THE MANUFACTURE AND UTILISATION OF ARCHITECTURAL TERRACOTTA AND FAIENCE

2 Volumes (Volume 1)

BY

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S U M M A R Y

The revival of terracotta and faience in British architecture was widespread, dramatic in its results and, for two decades, the subject of intense debate. However the materials have been frequently denigrated and more generally disregarded by both architects and historians. This study sets out to record and explain the rise and fall of interest in terracotta and faience, the extent and nature of the industry and the range of architectural usage in the Victorian, Edwardian and inter-war periods. The first two chapters record the faltering use of terracotta as an 'artificial stone', until the material gained its own identity, largely through the appreciation of Italian architecture. In the mid-Victorian period, terracotta will be seen to have become symbolic of the philosophy of the Victoria and Albert Museum and its Art School in attempting to reform both architecture and the decorative arts. The adoption of terracotta was furthered as much by industrial as aesthetic factors; three chapters examine how the exploitation of coal-measure clays, developments in the processes of manufacture, the changing motivation of industrialists and differing economics of production served to promote and then to hinder expansion and adaptation.

The practical values of economy, durability and fire-resistance and the aesthetic potential, seen in terms of colour and decorative and sculptural modelling, became inter-related in the work of the architects who made extensive use of architectural ceramics. A correlation emerges between the free Gothic style, exemplified by the designs of Alfred Waterhouse and the use of red terracotta supplied from Ruabon, and between the eclectic Renaissance style and a buff material produced by different manufacturers.

These patterns were modified as a result of the adoption of faience for facing external walls as well as interiors, and because of the new architectural requirements and tastes of the twentieth century. The general timidity in exploiting the scope for polychromatic decoration and the increasing opposition to architectural ceramics is contrasted with the most successful schemes produced for cinemas, chain-stores and factories. In the last chapter, those undertaken by the Hathern Station Brick and Terracotta Company between 1896 and 1939 are used as a case study; they confirm that manufacturers, architects and clients were all committed to creating a modern and yet decorative architecture, appropriate for new building types and that would appeal to and be comprehensible to the public.

TERRACOTTA, FAIENCE, GEOLOGY, MANUFACTURE, ARCHITECTURE.

(Michael John Stratton, Ph.D. University of Aston, 1983).

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C O N T E N T S

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INTRODUCTION

The revival of architectural terracotta dates back to the establishment of Coade's Manufactory in 1769. The initial purpose, and one which continued into the twentieth century, was to provide an economical and intricately worked alternative to carved stone, for both garden ornaments and architectural details. However, from the middle of the nineteenth century, terracotta gained its own identity, largely derived from the way in which the material had been used in late Gothic and early Renaissance architecture in Germany and Italy. Following these precedents it became used as a constructional material, large blocks being arranged to form complete facings or dressings to brickwork.

Terracotta became appreciated more for its decorative qualities than for being simply a durable and supposedly cheaper alternative to stone. Due to the ease with which plastic clay could be directly modelled or pressed into moulds, the material offered new scope for sculptural and repetitive decoration. While different clay bodies and firing conditions resulted in a variety of red and buff colours, the use of glazes permitted fully polychromatic effects. The glazed counterpart of terracotta, termed faience, was used first for interiors and then on building facades, where it came to accord closely with the bright, modernistic image sought in much of the architecture of the inter-war period.

These qualities only present a partial explanation of the importance of terracotta and faience. The extent of interest and debate aroused by the materials and their prime historical significance follow from the way in which they were used and judged within the context of the leading contemporary issues concerning architecture and its relation to sculpture. Given their decorative potential, it is not surprising that terracotta and faience became identified with attempts to use architectural ornament to express the form and purpose of modern buildings. An underlying development in architecture during the second half of the nineteenth century and for much of the twentieth has been a move away from archaeologically derived styles, that were increasingly regarded as irrelevant to an industrial age, towards the development of forms that would present signs if not symbols of the aspirations and tastes of contemporary society. As patronage and the appreciation of architecture came increasingly to involve the middle classes, so the artistry with which a period style was worked became less important than the associations which could be drawn from the nature and detailing of the design.

Most of the period styles carried particular associations in themselves, for example the Gothic with religion and the Renaissance of the Low Countries with commercial prosperity. If combined and adapted the styles could be made not only original but more relevant to particular values or to the purpose of a building. This approach of stylistic eclecticism was also used to interpret the composition of a building by grouping the forms and details within a functional heirarchy. Emphasis was given to the focal elements of the design such as the main entrance or the gables, while the general richness of a design was related to the status of the building.

This approach to architectural composition, frequently described by the Victorians in terms of the Picturesque, became closely allied to the architectural use of terracotta. In the late nineteenth century, stylistic eclecticism and the use of terracotta were combined in an attempt to create a decorative but truly contemporary architecture. How this movement evolved, how far it succeeded and under what pressures it disintegrated are issues worthy of study, as the movement marks, perhaps, the most coherent effort towards a widely applicable and comprehensible architecture in the industrial age. In contrast, although modernism has been promoted as a universal style, it has rarely attempted to appeal directly to the public and has consequently gained little popular appreciation.

Terracotta was also given an almost symbolic significance in promoting links between architecture and the associated arts, and between art and industry. As a decorative and yet constructional material, made in a factory and only needing to be fixed on site, terracotta had a unique position linking the art of architecture and the economics of industry. The historic examples of ancient Greece and Roman and Renaissance Italy, when terracotta had been used as both an architectural and sculptural material, were closely emulated by the Victorians. Especially since plastic clay was the ideal medium for teaching sculptural modelling it was logical that the material gained a central place in the philosophy, teaching and architecture of the Victoria and Albert Museum.

More than any craft product or art manufacture, terracotta encouraged the collaboration of architects, decorative artists and industrialists. The way in which these figures worked together forms the key to understanding how the ideas for the use of terracotta, expounded in innumerable lectures and articles, were applied in practice. It must be considered whether it was architects or industrialists who primarily dictated the course of the revival of terracotta, and hence whether it was changes in taste or in the technology of manufacture that led to the widespread architectural use of the material in the late nineteenth century.

The employment of skilled draughtsmen and modellers in the terracotta industry begs the question of whether they were given an element of the responsibility for the detailed design of the material. The main historical evidence for the major companies are their lavish catalogues, illustrating building components apparently to be ordered from stock. It is important to establish who designed these forms and how widely they were used in preference to specially commissioned designs.

Given the wide variation in the colour and texture of terracotta and faience, both over time and between different firms, it is worthwhile examining the various stages of design and manufacture in detail. The major manufacturers, such as Gibbs and Canning, J. C. Edwards, Burmantofts and Doulton and in the twentieth century, Hathern and Shaw achieved a distinctiveness in their products; this will be seen to reflect the geology of the clays that they were using and the expertise of their management and workers probably more than the technology of their plant.

The attention given to terracotta by the owners and managers of clayworking firms would seem to imply that its production must have been highly profitable, yet the relevant manufacturers appear to have achieved, at best, only limited profits. It is the method of pricing, the place of the terracotta section in the output of these firms, and the role of the Terra Cotta Association that serves to explain the apparent incongruity as to how a complex and labour intensive manufacture was still being offered in a wide variety of forms in the 1930s.

The industrial production of a decorative material for architectural use was seen by some critics as the ideal fulfilment of the concept of an art-manufacture; to others it was the very negation of the arts and crafts ideal, since it took the responsibility for design and execution away from the control of the architect and into the insensitive hands of a labour force who were criticised for producing repetitive and brash forms of design. The revival of terracotta and faience emerges as a valuable case-study of the changing conditions and taste that promoted and subsequently rejected the manufacture of a decorative and labour intensive product and that simultaneously saw first an increasing and then a diminishing interest in the role of ornament in architecture. As such the materials can be examined to throw light on a fundamental aspect of the economic and artistic response to industrialisation and rapid urban growth.

Definitions

The extent to which terracotta and faience became appreciated in terms of art, and of architectural usage, as much as for their physical properties and their methods of manufacture is apparent in the way that the working definitions applied to the materials altered during the course of the revival. Most of the definitions also refer to the concept of a hierarchy of materials and to the status of decorative forms in architectural design.

In its derivation from the Italian, terracotta means baked earth or clay. It was first applied, in the eighteenth century, to contemporary sculptural figures and ornaments, and to antiquities dating to the classical period. Josiah Wedgwood used the word to refer to his unglazed ornamental pieces, while a catalogue entitled a 'Description of ancient terracottas in the British Museum', was published in 1810. During this period, Coade were moulding plastic clay into sculptural groups and architectural details; usually fired to a pale grey colour, they were referred to as 'artificial stone'.

The term terracotta had become applied to architectural wares by the time of the Great Exhibition of 1851. It was used to imply that the products were not directly imitative of stone and were decorative in form. Most were in a buff colour. The revival of terracotta as an architectural material reached a climax in 1886, and in that year James Doulton provided a valuable definition of the material:

> While, in its literal meaning, terracotta, as I have already remarked, embraces every kind of pottery, it has now come to be applied exclusively to that class of ware used in the construction of buildings which is more or less ornamental and of a higher class than ordinary bricks, demanding more care in the choice and

> manipulation of the clay and much harder firing, and being, consequently, more durable and better fitted for moulded and modelled work.(1)

The all important distinction between terracotta and bricks was presented in more precise terms by Hasluck:

> Moulded bricks are closely allied to terracotta. Bricks having a moulding with a flat top are generally made by steam - or hand-power.(2)

By the late nineteenth century, most brickmaking was at least partly mechanised but terracotta was still hand pressed in moulds. While Hasluck was vague as to the matter of colour, A. B. Searle, one of the most prolific writers on clayworking, explained the element of confusion that existed and the importance of clay geology:

> The term 'teracotta' usually applies to objects of a certain shade of red, but originally it was used for all kinds of baked earth. At the present day any vases and similar objects made of unglazed clay are classed as 'terracotta' by dealers, quite irrespective of their colour. The precise shade of colour produced by red-burning clay cannot be foretold, as it depends so much on the state of iron oxide in the clay, the nature of the firing, and other conditions of manufacturing. Where terracotta is required to be of a buff or cream colour most fire-clays may be used in its production.(3)

Faience also gained a working meaning that differed somewhat from its more specific ceramic definition. Most precisely, faience was taken to mean a glazed earthenware,

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(1) Builder, 50, 1886, pp. 537-40 (p. 537).

(2) P. N. Hasluck, Terracotta work (Cassell, London 1905) p.14.

(3) A. B. Searle, Modern brickmaking (Scott, Greenwood and Son, London 1911), pp. 11-12.

as opposed to maiolica, which consisted of a white tin glaze and further coloured glazes over a stoneware body. Maiolica became more frequently spelt and pronounced as majolica. But the definition used for architectural faience was broader; in the 1930s G. N. Hodson, of the Hathern Station Brick and Terracotta Company, presented the almost ubiquitous distinction:

> Terracotta is generally taken to mean unglazed ware, moulded in block form; faience covers the same form when glazed.(1)

The management at Hathern and Shaw currently involved in making material for conservation work tend to reserve the term 'faience' for glazed slabwork which is no more than two inches thick, describing glazed blocks as 'glazed terracotta'. However the main area of historical confusion was where a clear glaze was applied to terracotta; this was referred to as both vitreous terracotta and vitreous faience. Most of the companies invented trade names such as 'Marmo', 'Hathernware', and 'Pentelica' with which to advertise their colour glazed faiences. Doulton introduced a series of names such as 'Parian' and 'Carraraware' to distinguish more specialist types of body and glaze.

For the purpose of this study, the term 'architectural ceramics' will be used to embrace all these variations of terracotta and faience. The modern spelling of 'terracotta' will be used, except in the case of the Terra Cotta Association which was frequently referred to by its initials.

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(1) G.N. Hodson, 'Architectural terracotta and faience', Transactions of the Ceramic Society, 35, 1935-6, pp. 43-51 (p. 43).

Archives and Other Source Material

The study of terracotta and faience is dependent upon the availability of information on both the industry and the relevant architects and their buildings. The most valuable records are those that indicate the way in which industrialists, architects and artists collaborated in the organisation of contracts and determination of designs.(1)

The ceramic industry suffers from a paucity of archives, many records being lost as a result of fires, take-overs or simply being regarded as superfluous. Of the long established firms, only Minton and Wedgwood have extensive collections, but their manufacture of terracotta and faience respectively was never very extensive. However the volumes of correspondence for Coade, running from 1813 to 1821, were extremely valuable in illuminating how the prices and designs for neo-classical ornaments were defined. The general lack of archives is most serious in the case of the firms that inherited much of the expertise and many of the models and moulds accumulated by Coade, in particular Blanchard and Blashfield. There are no archival sources with which to examine their fundamental role in promoting the constructional use of terracotta.

Similarly, for most of the major manufacturers of the late Victorian period, such as Doulton, J. C. Edwards and Burmantofts, the archives are meagre and those that survive relate almost entirely to the twentieth century. The Victorian catalogues and record photographs give little

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(1) The archives consulted are listed in the bibliography.

explanation of the commercial factors influencing the development of these firms and their products.

The two significant archives which were studied for the first time in the course of this study also only provide information in any depth for the twentieth century. Those for Gibbs and Canning of Tamworth show the most important manufacturer of the 1870s and early eighties suffering relative and then absolute decline. The minute books that run from 1893 to 1952 present the manufacture of terracotta within the context of a diversified clayworking firm, and cast particular light on investment decisions, the pattern of labour management, and the response to fluctuating trade. Stock books, investment records, work plans and photographs of modelled details provided supplementary information.

The records of the Hathern Station Brick and Terracotta Company were discovered at the works and, after being donated to the Ironbridge Gorge Museum, were catalogued and studied. The Company only started making terracotta on a large scale from the 1890s. Lacking minute books or extensive correspondence, the main value of the archive lies in a run of order books that provide a virtually complete list of the schemes supplied between 1896 and 1939, with details as to the type of material, the quantity and price, the architect and client. When related to the record photographs of the finished facades, it becomes possible to consider the complete output of one of the major firms for the first half of the twentieth century.

Hathern's production could be placed in the context of the rest of British terracotta industry, through the files of correspondence of the managing director with the Terra Cotta Association and the other member companies. A record of the major schemes supplied by three more of the member firms was obtained from record photographs for Carter, Doulton and Shaw, augmented in the last instance by an order book covering the period from 1914 to 1931. The annual reports that survive for Leeds Fireclay refer to the most important contracts at Burmantofts, as well as presenting the fluctuating fortunes of the company.

Both detailed information and a broader understanding of the character of the industry, its relation with architects and the pervading enthusiasm for architectural ceramics came from conversations with managers and draughtsmen who worked at Hathern, Shaw, Carter and Gibbs and Canning during the inter-war period. Unfortunately none of the senior management from the times of large-scale production are still alive.

The most important secondary source, like the archives, only reaches back as far as the nineties. From 1892 the British Clayworker included in its coverage all the major manufacturers of terracotta and examples of the schemes that they supplied. Reports of visits to these works, and biographies and obituaries of their owners and managers, represents information unavailable from any other source. Frequently the articles refer back to the foundation and development of the firms, enabling an appendix of basic industrial histories to be compiled. Further comparisons between the firms were made possible by references to technical developments, annual reports and the stands at the Building Trades Exhibitions.

Other journals of the ceramic industry such as the Brick and Pottery Trades Journal augmented this coverage. The files at Companies House and the entries under 'terracotta' in Kelly's Directory of the Building Trades helped to date the introduction and cessation of terracotta manufacture at the firms together with changes in their titles and locations.

The British Clayworker produced a supplement, entitled the Brickbuilder, which regularly contained a section on 'Recent brick and terracotta buildings'. Not surprisingly, it always credited the manufacturer who supplied the materials. This coverage conveniently takes over chronologically from when the architectural journals cease to list subcontractors in their reviews of contemporary architecture. The earlier references to the use of Doulton's, J. C. Edwards' or Gibbs and Canning's terracotta were typically in small entries in columns such as 'Miscellaneous' and 'Church Building News'. To gain a representative view of the market and the firms involved, it was necessary to survey a journal page by page. The Builder was covered from its foundation in 1842 to 1896. This end date was the year when Hathern's run of order books was commenced and one year after the Brickbuilder supplement had been introduced in the British Clayworker. Since no one journal gives absolute coverage of even the most important terracotta buildings and there is a differing regional bias in their reporting, it would be worth examining the British Architect or the Building News in comparable detail, whereas only a superficial search was in fact practicable. Technical articles, correspondence and reports of lectures in those journals provide some direct information on the industry.

However this coverage does tend to concentrate on the firms that were the most publicity conscious, such as Blashfield and Doulton.

The only book written specifically on terracotta is by P. N. Hasluck, a compiler of technical manuals.(1) It is valuable in explaining the techniques used in modelling and moulding. Furnival provides good coverage of faience,(2) and Searle's rather similar books are helpful on the geology of terracotta clays.(3) The other contemporary books covering architectural ceramics are by French or Americans, and so provide comparative rather than directly relevant information.(4)

The most comprehensive modern studies have approached the subject more through the industry than architectural use. Only Margaret Floyd's thesis and article on the introduction of terracotta into America for the construction of the Boston Museum has achieved a synthesis of these two strands.(5) A series of books on tiles, pioneered by Julian Barnard's work have promoted architectural ceramics as a valid sphere for study, particularly for design historians.(6)

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(1) P. N. Hasluck (1905), op.cit.

(2) W. J. Furnival, Leadless, decorative tiles and mosaic (W. J. Furnival, Stone 1904), pp. 749-779.

(3) A. B. Searle (1911), op.cit., and A. B. Searle, An introduction to British clays, shales and sands (C. Griffin, London 1912).

(4) For example, L. Lefevre, Architectural pottery (Scott, Greenwood and Son, London 1900), and C.T. Davis, A practical treatise on the manufacture of bricks, tiles terracotta, etc. (Sampson Low, Philadelphia 1884).

(5) M.H. Floyd, 'A terracotta cornerstone for Copley Square Museum of Fine Arts, Boston 1870-76, by Sturgis and Brigham' Journal of the Society of Architectural Historians, 32, 1975, pp. 83-103.

(6) J. Barnard, Victorian ceramic tiles (Studio Vista, London 1979).

With regard to the firms making terracotta and faience, the catalogue of the Doulton Story Exhibition provides concise notes on the schemes undertaken by this major manufacturer,[1] while Jennifer Hawkins' book on Carter , places their output of faience in the context of the structure of the firm and the manufacture of other products.[2]

There is an obvious need for company histories of the other major manufacturers and for studies of the architects most committed to the use of terracotta and faience. Nevertheless architectural ceramics were not promoted, except in advertising, in terms of one firm but as a cause for raising the status of the heavy clayworking industry and to improve the standard of public architecture. It is therefore important to define the extent and nature of the industry and the pattern of collaboration with architects and artists.

Terracotta and Faience in Architectural History

The level of attention that terracotta and faience received in contemporary lectures and journals shows that they were considered as being a considerable significance by architects, industrialists and the public. In contrast, their appreciation by architectural historians has been superficial and frequently misinformed. It is important to consider whether this is due to a pre-occupation with architects and their stylistic development, to a subjective distaste for the materials, or to a general attitude that most of the uses of architectural ceramics were mediocre, insensitive and retrogressive.

The materials of vernacular building have been the

(1) P. Atterbury and L. Irvine, The Doulton story (Royal Doulton, Stoke-on-Trent 1979).

(2) J. Hawkins, The Poole potteries (Barrie & Jenkins, London 1980).

subject of intensive study and precise differentiation, with the result that traditional construction has been lauded for its sensitivity to regional character and to the location of the building. Historians, as yet, have failed to achieve a corresponding appreciation of the variety of materials used in Victorian and twentieth century architecture. Consequently, while contemporary architects and critics were most meticulous in discerning between terracotta and artificial stone and appreciating the wide variety of colours and unglazed and glazed finishes, modern writers have tended to spread both confusion and accusations as to the insensitive monotony with which architectural ceramics were applied. Alec Clifton-Taylor failed to distinguish between terracotta and faience or to appreciate the problems of the decay of stone that were faced by the Victorians. He gave Accrington 'the dubious distinction of having made some of the most durable and visually disagreeable bricks in the country'.(1) Clifton-Taylor is one of the few architectural historians to have written on building materials. Since the majority of studies have been in the form of architectural biographies and studies of specific styles, attention has been concentrated on the artist-architects working largely for upper-class patrons and on the leading figures in introducing new styles, and in particular in pioneering a modern, 'functional' expression.

In the historical path identified by Pevsner, from the arts and crafts traditions and from engineering structures towards modern design, no consideration is given to architectural ceramics. They would have been disregarded largely

(1) A. Clifton-Taylor, A pattern of English building (Faber & Faber, London 1953), p. 128.

because of their indulgence in surface decoration and the pursuit of individuality. In the 'Buildings of England' volumes, the epithets most frequently used to describe terracotta buildings refer to the undisciplined use of period styles. The red brick and terracotta facade of the Shire Hall in Durham was described as showing 'such crushing proof of technical proficiency and aesthetic dumbness'.(1)

Pevsner states that 'the true pioneers of the Modern Movement are those who from the outset stood for machine art'.(2) He saw the new architecture essentially as a synthesis of Morris' handicrafts and of the theories propounding an abstract machine art. It may be that the honest acceptance of commercialised production by the clayworkers and architects making and using architectural ceramics, and their efforts to reconcile the need for economy and durability in construction with the prevailing public taste for intricacy and identifiable meaning in design, constituted the more honest and worthy path for architectural development in an industrial and urbanised age.

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(1) N. Pevsner, County Durham (Penguin, London 1953), P. 128.

(2) N. Pevsner, Pioneers of the modern movement (Faber & Faber and Faber, London 1936), p. 28.

C H A P T E R   O N E

THE EARLY REVIVAL, 1722 TO 1850

The revival of terracotta did not occur through a direct progression from innovation to large-scale production and widespread architectural use. Until the late nineteenth century output often faltered, with most manufacturers producing a range of statues, vases and some classical building details. The outstanding firm of this early period was Coade's Manufactory which, by the 1770s, was supplying a material of very high quality to a market that covered most of England and extended to Scotland and the continent.

It was not the intention of Coade or their rivals to present terracotta as a novel and distinctive material; the wares were described as 'artificial stone' and imitated Portland stone in their colour and texture. The success of the firm depended on the qualities of the clay body, the design and price of the wares and the methods by which they were sold. It is worthwhile studying this combination of factors in detail, as the contrast between Coade's success and the mediocrity and instability of most of the competition offers an insight into the purpose and path of the revival of terracotta. The failure of experiments in introducing terracotta at several potteries, illustrates, as much as the seventy years of continual production at Lambeth, the role of such factors as the techniques and economics of production and the advantages of aristocratic patronage.

It is possible to discern the main motivations influencing the manufacturers, and the architects and their clients. These, coupled with the industrial status of the potteries involved, demonstrate the practical role and artistic prestige which became associated with terracotta. Many of these preoccupations remained well into the twentieth century and ultimately were to contribute to the decline in the manufacture and use of architectural terracotta. Largely due to the exemplary quality of Coade stone, the manufacturing techniques and commercial approach that the Manufactory established formed the model for most of the firms working in the late nineteenth century.

Neo-classicism and Architectural Decoration

Most Coade stone was produced in the form of garden ornaments and decorative building details. An increased interest in such forms followed from the study of Greek and Roman art and the resulting taste for neo-classical design. Not only did the form of capitals and columns, and of statues and vases become far more finely considered but their use in architecture and gardens was governed not only by visual effect buy by a series of attitudes which worked through contemporary culture.

Summerson concisely outlined how the new attitudes to art and history that emerged with neo-classicism were governed by three concepts, which were to be fundamental in directing the use of architectural decoration through the various stylistic revivals of the nineteenth and early twentieth centuries. The most fundamental was the acceptance of the essentially Renaissance idea of contemporary art gaining inspiration from older cultures. This approach largely supplanted the prejudice that antiquity was necessarily inferior, simply because of its earlier place in the chronology of civilization. The second of Summerson's concepts, eclecticism, permitted an artist to chose between historic styles and to combine elements of different styles. Eclecticism permitted greater variety and originality; it led to the third concept, a modern style uniquely of the present, which became something of an obsession to the Victorians and which came to form a justification for the use of essentially new materials such as terracotta.[1]

The travels of artists and dilettanti to Italy and the Levant came to promote neo-classical design in England by several means: through the practice of architects such as William Chambers and Robert Adam, by a series of publications that began with Robert Wood's 'Ruins of Palmyra' in 1753, and with the example of the cases of antique vases and statues that were brought to England. The first major English collection of antiquities was created by Sir William Hamilton and sold to the British Museum in 1772. However most of the vases collected by Hamilton in 1789-90, out of tombs near Naples, came into the possession of Thomas Hope. Many of Hope's 1500 vases were displayed in three rooms of his London mansion; the resemblance between his collection and his furniture designs epitomised the neo-classical aim of inspiring modern art through a knowledge of the antique.[2] Meanwhile one room of

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(1) J. Summerson, Architecture in Britain 1530 to 1830 (Penguin, Harmondsworth, Middlesex 6th ed. 1977), p. 407.

(2) D. Watkin, Thomas Hope and the neo-classical idea (J. Murray, London 1968), p. 35. Hope emulated the spirit of his classical collection in the furniture and decoration which he designed in an Egyptian style.

Montagu house was reserved for housing the British Museum's collection of terracotta for which the first catalogue was published in 1810.(1)

As the British Museum gained new acquisitions, particularly in the 1850s, and provincial museums opened their own galleries, so classical art became more widely appreciated. Greek art remained in high esteem, even at the height of the Gothic Revival. The younger Charles Barry praised Greek vases for their elegance of form and beauty of workmanship,(2) while Ruskin repeatedly used his own drawings of terracotta statues to demonstrate the soft and flowing form of Greek sculpture.(3) The figures that were being excavated at Tanagra and Myrina from the 1870s had an immediate appeal to the Victorians due to their almost sentimental naturalistic charm.(4)

However both Hope and Ruskin would have protested against the way in which classical pieces became copied and adapted by potters. Over a period of eighty years Wedgwood, Fowke and Dillwyn were among those who made red and black Etruscan vases, but ceramic firms also reproduced Greek and Roman statues and ornamental details originally made in stone

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(1) G. & W. Nicol, Description of ancient terracotta in the British Museum (London 1810).

(2) C. Barry (Junior), "Some descriptive memoranda on the works executed in terracotta at New Alleyn's College, Dulwich", Trans.RIBA, 18, 1867-8, pp.259-79 (p.259)

(3) J. Ruskin (ed. E. T. Cook), The complete works of John Ruskin (G. Allen, London 1905), 20, p. 50, Lectures on landscape, 1871.

(4) R. Higgins, Greek terracottas (Methuen, London 1967), p. 97.

and marble. The clientele were more interested in the outline forms and sculptural relief of classical art than the colour and texture of particular materials. Contemporary taste seemed to favour the appearance of bright Portland stone and it was only from the late 1860s that the earthenware red associated with terracotta became used for building and garden ornaments.

Because of the emphasis on outline, published engravings constituted valuable sources of classical designs. Hamilton's collection was reproduced by D'Hancarville in 1766-7 but Wedgwood was using the proof sheets before even the first volume had been published. In the introduction to his trade catalogue, Wedgwood credited the source of his designs as being the:

> 'most choice and comprehensive collection of Sir William Hamilton'. (1)

Similarly the folios of antiquities discovered at Herculaneum provided the design for at least one of Wedgwood's jasper ware plaques. Such copyism was considered quite acceptable. Coade's catalogue of 1799 announced on the title page that their designs came from the antique,(2) while Blashfield

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(1) D. Irwin, "Neo-classical design", Apollo, 96, 1972, pp. 288-97 (p. 289). This article shows how neo-classicism brought a close association between art and industry.

(2) E. Coade, Coade's gallery or exhibition in artificial stone (S. Tibson, Lambeth 1799), p. 1.

took a camera to the British Museum to gain his designs for vases and urns.[1]

The demands for an accurate classicism in the design of ornaments encouraged their production in industry rather than by craftsmen. Stonemasons and wood carvers had been using architectural pattern books from the beginning of the eighteenth century[2], but only the most skilled could be relied upon to achieve the absolute correctness and perfect repetition required for neo-classical detailing. The standards were best achieved by the mass-production of ornaments from models, which were designed by an educated artist or copied from the antique.

The materials most widely used for Jacobean and early Georgian architectural decoration became discredited. Carved wood was not only out of date aesthetically but had become regarded as a fire risk. The Building Act of 1774 virtually banished wood from architectural facades in London.[3] The soft red bricks that could be carved or moulded were equally unfashionable. Grey brick was more acceptable but the material was thought to be too mean and unworkable for classical decoration.

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(1) J. M. Blashfield, A selection of vases, statues, busts, &c. from terracottas (J. Weale, London 1857). Blashfield claimed that he accumulated a larger collection of classical models than the Coade works had ever owned.

(2) G. Beard, Decorative plasterwork in Great Britain (Phaidon, London 1975), p. 21.

(3) D. Cruickshank & P. Wyld, London: the art of Georgian building (Architectural Press, London 1975), p. 202.

Stone was admired as the material of the ancient empires and hence as the correct material for the neo-classical style. In much of the provinces, particularly the south-west and the north, suitable stones were available locally and, therefore, cheaply. However in London stone tended to be either expensive or of poor quality, and it was the capital that was growing most rapidly and leading Georgian taste. There was an obvious market for a substitute material, one that was cheaper and more durable and that could readily be worked into capitals, keystones or running mouldings.

The main reason for neo-classical ornaments being produced as 'artificial stone' was that there was a general ignorance as to the use of terracotta in classical architecture. Even if the eighteeth century dilettanti had been aware of the brightly coloured antefixes and grotesques on temples such as Selinus, they would have been unlikely to have considered them worth recording or sending to England.(1) It was in the nineteenth century that architectural terracotta began to be added to the British collections. A series of Roman reliefs were acquired by the British Museum in 1805, more reliefs arrived in 1841 and Greek material followed in the 1860s.(2) It was the Etruscan civilization that became appreciated as making the most expressive use of terracotta. Thomas Hope's collection contained Etruscan vases but the large sarcophagi, the mural slabs and the antefixes were discovered and brought to England by the

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(1) A. W. Lawrence, Greek architecture (Penguin, Harmondsworth, Middlesex 1973), p. 124.

(2) H. B. Walters, Catalogue of the terracottas in the Department of Greek and Roman antiquities (British Museum, London 1903).

Victorians.[1] In his preoccupation with the classical remains of southern Italy, the eighteenth century traveller appears not to have appreciated the Gothic and Renaissance terracotta that he could have passed on his way through Lombardy.

Furthermore, both antiquarians and architects were oblivious to the use of terracotta in the south-east of England during the first forty years of the sixteenth century. The roundels on Hampton Court Palace were to be recognised later as being of Italian workmanship while Blashfield became aware of:

> Brick structures erected in England... decorated with terracotta devices in the form of crests, coats of arms, capitals, cornices, chimney-shafts, &c. (2)

A series of Renaissance tombs and screens had been erected in a group of churches in East Anglia including Oxburgh and Wymondham Abbey (Fig. 1.1). The natural red colour of the terracotta had been obscured by lime-washing and the free Renaissance designs incorporating dolphins and scrollwork only became appreciated in the 1880s, with drawings being published in the architectural journals.[3]

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(1) S. Haynes, Etruscan sculpture (British Museum, London 1971), p. 11. The most impressive Etruscan find was the eight foot long sarcophagus of Seointi Thanurnia Tiesnosa, discovered in 1886.

(2) J. M. Blashfield, An account of the history and manufacture of ancient and modern terracotta (J. Weale, London 1855), p. 15.

(3) Builder, 50, 1886, pp. 498-9. The terracotta on Layer Marney Towers, Essex is described and illustrated in detail.

Fig. 1.1. Tomb, Oxburgh Church, Norfolk, early 16th Century.

This Tudor use of terracotta had been dependent on Italian inspiration and probably French workmanship and did not continue after the Reformation. Legislation forbade or levied fines on the employment of foreign craftsmen and the intense religious and political nationalism of the period would have been intolerant of a material so obviously derived from Italy.(1)

The Eighteenth Century Revival and Coade's Manufactory

Except for a possible but unauthenticated use by Sir Christopher Wren about 1680,(2) there is no record of interest in architectural terracotta until Richard Holt's two patents of 1722 and his 'Treatise of Artificial Stone' which was printed eight years later.(3) Holt had apparently visited the Near East, including Egypt, to study building materials. This tour brought him inspiration rather than enlightenment: his consideration of how the ancients had bound clay with cement culminated with the claim that Stonehenge and the Pyramids were made of artificial stone.(4)

Holt's two patents started the confusion between terracotta and artificial stone. The first, jointly with

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(1) J. A. Wight, Brick building in England (J. Baker, London 1972), p. 181.

(2) N. Davey, A history of building materials. (Pheonix House, London 1961), p. 90. No reference or further details is given.

(3) R. Holt, A short treatise of artificial stone (S. Austen, London 1730).

(4) R. Holt, (1730), op.cit., p. 13.

Thomas Ripley, was for:

> A certain compound liquid metal... by which artificial stone and marble is made by casting or running the metal into moulds of any form or figure... and which being petrified or vitrified and finished by strong fire becomes more durable than stone and marble.

The second, this time with Samuel London, was even less informative, covering:

> A certain new composition or mixture (without any sort of clay) for making of white ware.
>
> (1)

The term metal was being used to refer to any hard mineral substance while stone meant any hard inorganic material. At this time there was no differentiation according to whether the substance had been quarried, prepared from clay by burning, or fixed from loose material by a cold process of aggregation.[2]

Aggregated stone and fired clay bodies could only be differentiated from each other by the terms 'artificial stone' and 'terracotta' from the middle of the nineteenth century. Until then manufactured bodies were usually referred to as artificial stone whether or not they contained clay and had been fired, as long as their finish was grey or white. The word terracotta mentioned by Holt in 1722, was linked to classical ornaments of a red earth -enware body. Only in the 1840s and 50s did it come to

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(1) K. A. Eskdaile, 'Coade stone', Architect and Building News, 161, 1940, pp. 94-6, 112-4 (p. 94).

(2) S. B. Hamilton, 'Coade stone', Architectural Review, 116, 1954, pp. 295-301 (p. 295).

refer to a specific type of ware, namely large scale ornaments and architectural decoration.(1) However, the material of Holt's first patent and more certainly Coade's Artificial Stone had a clay compositional base so may be regarded, within the Victorian and modern use of the term, as terracotta.

Although Holt had a factory, possibly a showroom and piblished a catalogue, one suspects that there was little demand for his glazed and crudely painted wares.(2) Independently, Daniel Pincot experimented in the production of a satisfactory clay body; he admitted that he benefitted from the knowledge of potters seeking suitable clays for porcelain. It may be as a result of using ball and china clays that he succeeded in firing clay slabs four feet long without warpage.(3)

Such technical achievements, fundamental to the manufacture of architectural ceramics, may have been the factor behind the immediate success of the Coade works. George Coade and his wife, Eleanor, came to Lambeth from Lyme Regis in 1769 and established their Manufactory at King's Arms Stairs.(4) This was the same address as Pincot was using in

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(1) Oxford English Dictionary (1722). From F. Coloria, Terracotta terminology, unpublished paper 1979, p. 1.

(2) D. Pincot, An essay on the origin, nature, uses and properties of artificial stone (R. Hott, London, 1770), p. 47.

(3) D. Pincot (1770), op.cit., p. 71.

(4) R. Gunnis, Dictionary of British sculptors 1660-1851 (Abbey Library, London, revised edition 1964), p. 105 Gunnis provides biographical details and a list of works for most of the early workers of terracotta.

the following year,[1] and he was definitely working for Coade in 1772[2]. The sale of stock of an 'Artificial Stone Manufactory' in Goldstone Square, Whitechapel[3] may in fact refer to Pincot's works in Goulston Square, Whitechapel[4] and mark his transfer to Lambeth.

Whether Pincot was bought out by Coade in Lambeth or whether he came simply to be employed by the firm, the works would have inherited his ceramic expertise, demonstrated in the fine copy of the Borghese vase that he exhibited at the Society of Artists in 1771.[5] The mixture of china clay with grog, and the firing of the goods in small muffle kilns were the two main factors contributing to the quality of Coade stone. Its remarkable durability over the past two centuries had led to suggestions of a composition or an additional ingredient that was a closely guarded secret, and lost with the closure of the works. It is conceivable, that Mrs. Coade, in her astuteness, encouraged the trade and the public to believe in the use of such a recipe, simply to dissuade competitors.

However for the visitors to the showroom, it would have been the smooth, stone coloured surface and the fine detailing that would have been the immediate attraction. Mrs. Coade and her cousin, John Sealy succeeded in engaging the best

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(1) D. Pincot (1770),op.cit., frontispiece.

(2) W. Chambers, Letter to M. H. Walpole, 8 June 1772, BM. Ad. MS. 41133.Pincot was paid £23 6s for his part in making gates for Strawberry Hill.

(3) R. Gunnis (1964), op.cit., p. 105 quoting a catalogue of an auction at Christies.

(4) R. Gunnis (1964), op.cit., p. 304.

(5) K. A. Eskaile (1940), op.cit., p.95. The vase is illustrated showing both free modelling and intricate detail.

designers and modellers available, with the result that their productions were accurate in their neo-classical design and detailing. In the eighteenth century there would have been nothing incongruous about having sculptors of Bacon's and Flaxman's status designing models for mass production. There was, as yet, no gulf between art and industry and sculptors had few scruples about repeating designs if so requested or if they lacked new inspiration.

John Bacon always worked in close accordance to public demand. Having been apprenticed to a china manufacturer he would have been well aware of both the potential and limitations of ceramic bodies. He joined Coade almost as soon as the works was established.(1) Bacon probably conceived and modelled most of the designs which went into production over a period of thirty years; a note in a folio volume of Coade's works states that the 36 plates were produced:

> No doubt under the superintendence of John Bacon the sculptor, who was for many years the real proprietor of this artificial stone manufacture. (2)

It is unlikely that Bacon had a managerial role but he does appear to have been working for Coade on a virtually full-time basis. He was very shrewd in his choice of designs. The lions, coats of arms, boys and girls in Charity School costume

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(1) R. Gunnis (1964), op.cit., p. 24.

(2) E. Coade, Etchings of Coade's artificial stone manufacture (1777). The designs are shown by outline drawings giving little indication as to relief or texture, a technique characteristic of John Flaxman.

and a range of classical statues, monuments and vases all found a ready market. (Fig. 1.2). Furthermore, the designs did not have to be changed continually, as neo-classical forms remained in demand well into the nineteenth century. According to a visitor to the works in 1824, some of Bacon's moulds, dating to the previous century, were still in use.[(1)]

When Bacon died in 1799, John De Vaere took over as the chief designer; like Bacon he also did some work for Wedgwood.[(2)] He had already been producing designs for Coade being responsible for the impressive group illustrated in the frontispiece of the 1799 catalogue and now to be found in the Geffrye Museum in London. The only other designer to be a regular employee was Joseph Panzetta, who worked for Coade over a period of twenty-six years.[(3)] Like Bacon he gained the reputation of being an imitator and a jobbing carver; the Coade day books show him as being involved in modelling the most mundane detail as well as major figures, such as the statue of Lord Hill at Shrewsbury, and of Britannia at Great Yarmouth.[(4)]

The designs were created by the most expedient means, with little concern for artistic originality. For Lord Hill's statue, Croggon asked to be lent a bust of the subject so that

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(1) S. B. Hamilton (1954), op.cit., p. 300.

(2) R. Gunnis (1964), op.cit., p. 128.

(3) R. Gunnis (1964), op.cit., p. 289.

(4) J. E. Ruch, 'Regency Coade: a study of the Coade record books, 1813-21', Architectural History, 11, 1968, pp. 34-56 (p.37).

Fig. 1.2. Monument to Sir William Hillman, 1800 (Coade stone)
A catalogued design placed in St. James', Hampstead
Road, now in the Victoria and Albert Museum, London.

Panzetta could achieve a proper likeness.(1) On another occasion, having received an order for a statue of Socrates, Croggon planned to send an artist down to Stowe to copy an example from the Marquis of Buckingham's collection.(2) Stowe provided designs for several catalogue items but probably the most frequently used source were the major collections in Rome.(3)

Three architects, James Paine, James Johnson and S. Robinson were engaged as free-lance designers,(4) and architectural details were also copied from pattern books.(5) When the major London architects such as Charles Cockerell, John Nash and Samuel Wyatt used Coade stone they normally provided their own designs.(6) (Fig. 1.3) William Wilkins, one of theleaders of the early nineteenth century Greek Revival was probably the firm's most valuable client. He worked closely with Croggon and Panzetta in the execution of

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(1) Letter from W. Croggon to E. Haycock, Shrewsbury, 9 March 1816, Coade letter book p. 179, PRO C.111/106. There are three record books covering the period 1813-21: an indexed letter book, an accounts book and an orders and memorandum book. The last records the amount of work involved in a particular commission. It is not possible to be certain as to which artists were employed full-time at Coade and which supplied designs on a free-lance basis as the accounts always shows payments being made for work on specific pieces not on a daily or weekly basis.

(2) Letter from W. Croggon to Sir G. Osborn, 13 September 1864, Coade letter book, op.cit., p. 59.

(3) D. Irwin (1972), op.cit., p. 293.

(4) R. Gunnis (1964), op.cit., p. 105.

(5) Letter from Croggon to J. Trevethan, 3 July 1820, Coade letter book, op.cit., p. 469. Croggon suggested that the entablature design be taken from Nicholson's book.

(6) J. E. Ruch (1968), op.cit., p. 38.

Fig. 1.3. Capital on the portico of Shugborough, Staffordshire, by S. Wyatt, 1794 (Coade Stone).

his designs, particularly on the £14,000 worth of decorations and chimneys made for Lord Rosebery's Dalmeny House, over a period of three years.(1)

The orders and the memorandum book show that drawing and modelling were the most expensive stages in the production of an item. Almost a third of the total cost of the Lord Hill statue consisted of Panzetta's wages for the modelling.(2) Where possible the client could save himself great expense by choosing from the catalogue, which, in 1784, ran to 778 different articles. The prices reflected the complexity of the design and its potential market, more than just the relative size. Architectural mouldings could be as little as 6d. per foot and a large ionic capital was only £3 10s. Vases became more expensive according to their size and the richness of detailing, the Villa Borghese vase costing £31 10s. Statues could be even more expensive, culminating in nine foot River God at £105 of which only two examples are known to have been executed.(3)

At such prices, the architectural details would have undercut the cost of carved stone while the difference was more marginal for special sculptures. One cannot accuse Coade,

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(1) J. E. Ruch (1968), op.cit., p. 40. The progress of the work can be followed through the orders and memorandum book dating to 1815-17.

(2) Cost of Lord Hill statue, January-September 1816, Coade orders and memorandum book, op.cit., unpaged.

(3) E. Coade, A descriptive catalogue of Coade's artificial stone manufactory (1784).

Sealy or Croggon of trying to make excess profits out of prestige orders. In fact an investigation arising out of a dispute over the price of some gate piers made for Horace Walpole showed that Eleanor Coade made a slight loss on the work.(1) Croggon also occasionally accepted uneconomically low prices. He reduced the price of Lord Hill statue from 380 to 300 guineas to counter a committee's decision to use natural stone saying:

> Such public works are desirable from the publicity and respectability they give to my manufactory that I will rather make a large sacrifice than lose their execution.
> (2)

It was vital to have the patronage of the major architects and the nobility, who were jointly directing architectural taste. Prestigious works also gained the firm publicity through the medium of monthly magazines such as the Illustrated London News or Gentleman's Magazine.

A further means of publicity was the exhibition gallery opened in 1799. For a shilling the public could inspect both the catalogue items and the latest special commission to be drawn from the kiln. The showroom was particularly valuable

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(1) W. Chambers (1772), ibid.

(2) Letter from Croggon to E. Haycock, Shrewsbury, 6 December, Coade letter book, op.cit., p. 154.

because the market was so concentrated in London. Architects and patrons in the provinces were sold catalogues or sent small plaster sketch models of special designs, for approval.[1] Trade not only extended to Scotland and Ireland but to Europe and North America; there were isolated orders from Russia and the West Indies.[2]

Wedgwood and Other Manufacturers in the Georgian and Regency Periods.

The gallery, the catalogues and the salesmanship that were used for selling Coade stone are closely comparable to the marketing techniques developed by Josiah Wedgwood. But Wedgwood, regarded as among the most successful of Georgian entrepreneurs, failed significantly with his attempts at introducing architectural ornaments. Having appreciated the market for neo-classical wares,[3] he had a series of bas-relief designs modelled to be made in basalt, common biscuit and terracotta bodies. They were intended for both interior and exterior decoration. Where plaques or medallions, as advertised in the 1773 catalogue, were in a light coloured terracotta, it was assumed that they would be painted or gilded.[4] The Adam brothers used some of these plaques on their Adelphi scheme (1767-72) and Sir John Wrottesley bought

(1) W. Croggon to E. Haycock, Shrewsbury, 16 October 1815, Coade letter book, op.cit., p. 143.

(2) R. Gunnis (1964), op.cit., p. 106.

(3) E. Meteyard, Life of Josiah Wedgwood (Hurst and Blackett, London 1866), Vol. 2, pp. 70-1.

(4) E. Meteyard (1866) op.cit., Vol.2, p.355. This was their first catalogue and, in contrast to Coade's, poorly produced.

several to decorate a room that he added to his home in 1772, but they were not widely adopted. Neither the Greeks or Romans had applied isolated pieces of scroll or festoon decoration onto their buildings and the idea of painted architectural ornament does not appear to have appealed to the Georgians.

Wedgwood and Bentley still hoped that their jasper plaques might be widely used for chimney pieces, if the aristocracy and leading architects could be persuaded to adopt them. To this end Wedgwood gave one to Sir William Hamilton[1] and visited country houses with samples. But again support was lacking, Sir William Chambers actually dissuading Queen Charlotte from making a purchase.[2] In 1779 Wedgwood admitted defeat:

> We really were unfortunate in the introduction of our jasper into public notice, that we could not prevail upon the architects to be god father to our child.
> (3)

Wedgwood and Bentley discovered that demand for architectural and interior decorations was limited and, where it existed, they would not command prices comparable to tableware and purely

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(1) J. Wedgwood to J. Bentley, 16 October, 1778. Wedgwood Archives No. 18855-26.

(2) J. Wedgwood to J. Bentley, 19 June 1779. Quoted in E. Meteyard (1866), op.cit., Vol.2, p. 378.

(3) J. Wedgwood to J. Bentley, 19 June 1779. Wedgwood Archives No. 18898-26.

ornamental pieces. Although Wedgwood was right in assuming that it was architects who had to be convinced of the value of terracotta, he did not appreciate that the material lacked the artistic or historic associations in relation to building that would justify the expense involved. Architects and builders would have seen such details as essentially wasteful and threatening to cut into their own profits. Wedgwood's jasper plaques cost from eight to twelve guineas(1) while Coade had thirty designs for chimney peice decoration running down to £1 5s. in price.(2) Wedgwood's biographer stated that, with regard to terracotta decorations, the potter was 'far greater than his age'.(3) Although his visions could only be realised a century later, after dramatic changes both in demand and in the scale of manufacture, Wedgwood can justly be regarded as the pioneer, albeit as an essentially unsuccessful one, of the expressive use of terracotta in architecture.

The much publicised success of Coade inevitably resulted in the establishment of other competitors. Of the few documented firms, several were initiated by Coade

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(1) E. Meteyard (1866), op.cit., Vol. 2, p. 375.

(2) A. Kelly, Decorative Wedgwood in architecture and furniture (Country Life, London 1965), p. 68.

(3) E. Meteyard (1866), op.cit., Vol. 2, p. 289.

employees. Their limited success may reflect the unique quality of Coade stone, poor management or that the market was both limited, and preoccupied by the artistic reputation developed by Eleanor Coade and John Bacon.

Two manufacturers can be seen to have avoided direct competition by working in their own provincial market. William John Coffee moved to Derby from being a fireman for Coade. After a period spent modelling at Derby China Works, he set up as a sculptor and manufacturer in terracotta, most of his output being the form of busts portraying famous local and national figures.(1)

To Jonathan Harmer of Heathfield, Sussex, manufacturing terracotta was one strand of a local business which encompassed bricklaying, plastering, land surveying and later iron-casting. He produced only seven types of terracotta ware: rosettes and a variety of bas-reliefs which cost between 8s and 10s. The designs were either loosely classical or composed of traditional subjects such as baskets of flowers. Most were used for decorating headstones and funeral tablets; the 58 bas-reliefs that have been recorded probably represent the bulk of those produced.(2)

The first two manufacturers known to have established themselves in London as rivals to Coade had very restricted

(1) R. Gunnis (1964), op.cit., p. 408.

(2) G. L. Remnant, 'Jonathan Harmer's terracottas', Transactions of the Sussex Archaeological Society, 100, 1962, pp. 142-8. There is a representative collection of Harmer's wares in the Sussex Archaeological Museum, Lewes.

success. Van Spangen gained the order for the Freemason's Charity School in 1801, probably in direct competition with Coade and Sealy, and subsequently manufactured various architectural details.[1] Charles Carter was a stonemason also involved in the Roman cement trade; he produced some terracotta ornaments at his works near Oxford Street in about 1815.[2]

It was two modellers who had left Coade by 1814 that were to present the strongest challenge to their former employer. James Bubb and John Rossi's venture had a dramatic start in 1818, when they received a contract for reliefs to the value of £5,000 for the facade of the London Custom House. However the groups were criticised for being warped, unartistic and in an unfashionable red colour.[3] After this failure the partnership probably split up, with Bubb being declared bankrupt.

Neither Bubb or Rossi proved to be particularly competent sculptors. Nevertheless, through his specialisation in architectural decoration, Rossi gained the contract for modelling the details for St. Pancras Church, London, built 1818-22. It forms the most completely architectural use of terracotta

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(1) R. Gunnis (1964), op.cit., p. 408.

(2) C. Barry, 'Terracotta', Builder, 26, 1868, pp. 546-7 (p. 546).

(3) R. Gunnis (1964), op.cit., p. 67.

within neo-classicism, with the running mouldings and sculptural figures being integrated rather than just applied to the Greek Revival building.

The architects, H. W. & W. Inwood copied the design of the steeple from the Temple of the Winds on the Acropolis and the portico was given fluted columns on the model of the Erechteum.(1) Britton and Pugin described how the brothers took complete casts of the caryatids which were then copied by Rossi in terracotta, and made to wrap round the cast iron cores which supported the roof.(2) Although each caryatid was made in four pieces, the blocks were so large that they warped in being fired. (Fig. 1.4). But the friezes and antefixes were accurately executed and are almost indistinguishable from the walls of Portland stone. At the west doorway, the decorated cyma and bead mouldings are let into grooves in the stone, in one foot lengths. Although widely appreciated at the time of its completion, the church was not to be admired by the Victorians for its use of terracotta. Rossi's and the Inwood's work was criticised in 1848 for the overall plan and style of the church, for using terracotta to imitate stone, and for applying a superficial slip to some of the material to give it the desired finish.(3)

The quality of design and technical proficiency shown in St. Pancras Church was not developed. Bubb and Rossi

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(1) N. Pevsner, London 2 (Penguin, Harmondsworth, Middlesex 1952), p. 204.

(2) J. Britton & A. Pugin, Illustrations of the public buildings of London (J. Weale, London 2nd ed. 1848) 1, p. 147.

(3) British Clayworker, 13, 1904, pp. xii-v (p. xiv). This is one section of a useful eight part article on the history of English terracotta, printed through 1904 and of unknown authorship.

Fig. 1.4. Caryatids, St. Pancras Church, London, by H. W. & W. Inwood, 1818-22 (Rossi).

continued to work separately through the 1820s. Employed by a sculptor and marble contractor called Joseph Browne,[1] Bubb had the most prestigious output. He modelled the figures of British Worthies for Nash's Chester Terrace in 1826 and forty figures for Cumberland Terrace in the following year.[2] Both Bubb and Rossi fell into poverty in the following decade. In part this was due to family liabilities, which in Rossi's case ran to sixteen children.[3] But terracotta was then in reduced demand, evinced by the younger Croggon closing the Coade works in either 1836 or the following year.[4]

The whole architectural climate was changing. The Greek Revival style had become more massive and austere with the juxtaposition of large Doric and Ionic porticos against smooth stuccoed facades being appreciated more than fine decorative detailing. Above all, antiquarianism became more wide ranging and emotive than being confined to the study of Greek and Roman classicism. A range of styles was being revived, including the Tudor, Norman and Gothic, but in the 1830s and forties there was less concern for the correctness of detailing than there had been with late eighteenth century

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(1) R. Gunnis (1964), op.cit., pp. 65-6.

(2) R. Gunnis (1964), op.cit., p. 67.

(3) R. Gunnis (1964), op.cit., p. 327.

(4) Sir H. Roberts & W. H. Godfrey, Survey of London (London County Council, London 1951), London, Vol. 23. part 1, p. 61.

neo-classicism.

Non-Ceramic Artificial Stones

There was still a demand for vases, fountains, and mundane building details. Through the 1840s this demand was supplied largely by the new, non-ceramic, artificial stones. Artificial stones had progressed from the vague claims of Holt's second patent in 1722 to a technical standard rivalling that of terracotta, largely as a result of the experiments with cements during the intervening century.

The demands for stucco, to transform brickwork into stone-like facades, and for a durable hydraulic cement for engineering projects, promoted the search for better mixtures than traditional mortar. It was discovered that nodules of London clay, found around the south-east coast, could be burnt to form a quick-setting and water resistant cement. Known as Roman cement, it was used for bonding and stucco work by architects such as C. R. Cockerell and John Nash, the main supplier being Messrs. Parker and Wyatt.(1)

A disadvantage of Roman cement was its dependence on the restricted resources of clay nodules and its strong brown colour. Manufacturers responded by mixing the basic raw materials of limestone or chalk and of clay or shale, to match the

(1) A. J. Francis, The cement industry 1796-1914 (David & Charles, Newton Abbot 1977), p. 38.

colour and texture of stone.[1] As a result architectural ornament could be moulded in cement, in the same way that plaster was worked in milder southern climates. The second James Pulham used an artificial cement that had been developed by his father, for making mouldings, garden ornaments and for the restoration of stone.[2]

Such cement mouldings proved to lack the durability necessary for external use. Cement was also condemned as an architectural material by Donaldson for its drab uniformity, and by Gilbert Scott because it encouraged the indiscriminate use of decoration.[3] Further criticism became unnecessary, since the Portland cements that largely superseded artificial cements during the 1850s were totally unsuitable as a facing or decorative material.

Most of the artificial stones were simply derivatives from artificial cements, the cement being used to bind a ground mixture of materials. Austin's artificial stone, introduced in 1828, was a mixture of broken stone, pounded marble and coarse sand, set by cement.[4] Bucknell's composition consisted of large fragments of stone bound together with Roman cement which formed the smooth surface.[5] In contrast, Ransome

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(1) K. Hudson, Building materials (Longman, London 1973), pp. 48-9.

(2) A. J. Francis (1977), op.cit., p. 103-6.

(3) J. T. Knowles, 'The use of cements on exteriors', Builder, 8, 1850, pp. 253-4 (p. 253). Discussion.

(4) C. Barry,(1868), op.cit., p. 546.

(5) R. Hunt, 'Artificial stone', Art Journal, 11, 1849, pp. 128-9. This is the conclusion to a three part article. Artificial stone received far more press than terracotta during these years.

created an essentially siliceous body; sand and ground stone were united by a strong acid acting on the silica in ground flint and the hardened mass was fired to a glassy texture in a kiln.(1)

The commercial predominance of artificial stone over terracotta during the second quarter of the nineteenth century is explained more by economic than artistic factors. The raw materials for artificial stone were available nearer to London than the Devon and Dorset china and ball clays used for terracotta. It is also likely that as a result of changes in management at Coade and the instability of the competition, that the standards and expertise amongst the clayworking firms had become dissipated.

However the effect of the brick tax on prices may have been the most important factor. It is not entirely clear how the tax, which was first introduced in 1784, was applied to terracotta, but it was stated in 1834 that the higher tax imposed on all but ordinary bricks had made ornamental chimney shafts prohibitively expensive and had led to the invention of artificial stones.(2) It was in 1803 that large bricks and, even more, those with smooth or polished surfaces were taxed at heavier rates: 10s per 1000 as opposed to 5s per 1000 for those with dimensions less than ten by three by five inches. Restrictions on the shapes of bricks, that had affected the

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(1) Art Journal, 4, 1852, pp. 382-3 and Building News, 8, 1862, p. 17.

(2) Architectural Magazine, 1, 1834, pp. 159-163.

viability of making decoratively moulded forms, were removed in 1839. The penalty against large sizes remained until the tax was finally repealed in 1850, a date which coincided closely with the renewal of interest in terracotta.(1)

Decorative Terracotta in the Early Victorian Period.

As might be expected, there was some continuity between the manufacture of terracotta and artificial stone. When Van Spangen's terracotta works was sold in 1828, the moulds were purchased by Felix Austin, an early maker of artificial stone. Austin followed Coade's example in employing leading architects and designers, such as Sidney Smirke and John Papworth, to produce designs.(2) However the majority of Austin's wares were loosely inspired by what were described as the Gothic, Old English and Elizabethan styles,(3) and they showed little artistic quality.

Similarly Ransome produced copies of any objects for which he could obtain moulds, many of the designs consisted of a jumble of Renaissance motifs.(4) The Art Journal suggest-

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(1) The history of the brick taxes is covered by E. Dobson (ed. F. Celoria), A rudimentary treatise on the manufacture ofbricks and tiles, 1850 (George Street Press, Stafford 1971), Vol. 1, pp. 6-8,and Vol. 2, pp. 79-85.

(2) R. Gunnis (1964), op.cit., p. 22.

(3) Architectural Magazine, 1, 1834, p. 163.

(4) Art Journal, 4, 1852, p. 337.

ed that, given the high quality of the body, the firm should turn towards making more artistic products. It was intimated that Ransome was more interested in supplying builders than connoisseurs.(1)

Another manufacturer, James Pulham, produced richly ornamental designs by repeatedly combining different forms.(2) Once established at Broxbourne in Hertfordshire, in 1846, he came to make terracotta as well as artificial stone and artificial cement. Little importance was laid on the differentiation of these materials; the trade name 'Pulhamite' was applied firstly to his artificial stone and then to a stone-coloured terracotta used mainly for garden ornamentation.(3)

The different use of the artificial stone and terracotta made by Pulham suggests that the former was essentially made for builders while ceramics were reserved for those with stronger artistic aspirations. All of his classical vases were made in terracotta while many of the fountains were in artificial stone; however the 'Hebe' fountain shown at the 1862 Exhibition was in terracotta.(4)

The number of firms that started making vases and figures from the middle of the nineteenth century reflects

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(1) Art Journal, 6, 1867, p. 192. The Art Journal repeatedly started new series, so the volume numbers do not ascend chronologically. For over twenty years they criticised the quality of design of British art manufactures while praising the most over-ornate pieces for the technical ingenuity that they demonstrated.

(2) L. Jewitt, The ceramic art of Great Britain, 1883 (P.P.B. Minet, Chicheley, revised new edition 1971), p. 247.

(3) A. J. Francis (1977), op.cit., p. 108.

(4) Art Journal, 2, 1863, supplement, p. 303.

an increase in demand beyond that caused simply by the repeal of the brick tax. Patronage was widening across the middle classes and there was a revival of interest in the antique, both factors being promoted by the Great Exhibition of 1851.

The types and quality of the wares shown at the major exhibitions over the next two decades varied more between the different manufacturers than over time. Just as in the eighteenth century, the employment of proper artists was the key to achieving quality in design, but the standards seem to have become looser and often lower. The Garnside Terracotta Works had a stock of classical models that could be arranged together to make up a variety of designs.(1) At the Irish Exhibition, Ferguson, Miller and Company exhibited a range of decorated flower pots, and a fountain with a twenty four foot diameter bowl forming a centre piece. It was reported as being designed by an architect but consisted simply of three different designs of tazzas arranged one above another and supported by men, dolphins and birds.(2)

The superior design shown by the French manufacturers was emphasised by a government committee report on art manufactures, published in 1836.(3) The vases made by two Paris

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(1) Art Journal, 5, 1853, supplement, p. 63.

(2) Art Journal, 5, 1853, supplement, p. 55.

(3) Report from the select committee on arts and their connection with manufactures (London 1836).

firms, Gossin and Follet, were particularly finely modelled and those of the latter were mostly to original designs. The terracotta made by the German firm Marsh of Charlottensburg, was also usually contemporary in design, its high price being considered justifiable because of the quality of the rich pink body.

Only two English firms, Blashfield and Blanchard matched the quality attained by the French and the Germans. John Marriott Blashfield was neither an artist nor a potter by background; however he fully appreciated the need for good design in art-manufactures if fashionable patronage was to be sustained. His involvement in cements and ceramics not only forms the most direct connection between the age of Coade stone through to the major architectural use of terracotta from the late 1860s, but the nature of his products and dealings exemplifies the commercial and artistic transitions that occurred around the middle of the nineteenth century.

Blashfield appears to have been primarily an entrepreneur; he probably became interested in exploiting the commercial potential of terracotta whilst importing marble and manufacturing cements and scagliola. In 1839, three years after buying some moulds from Coade he engaged James Bubb on experimental works with terracotta at Canford in Dorset.[3]

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(1) Art Journal, 11, 1849, p. 246.

(2) Art Journal, 5, 1853, supplement, p. 11.

(3) R. Gunnis (1964), op.cit., p. 68.

Although no works was established on the estate, Canford may have an important place in the revival of terracotta, at about the middle of the century. At least two decades after Blashfield's first experiments and after the manor house had been bought by Sir John Guest, a remarkable range of terracotta detailing was introduced, onto the house itself, for massive vases and statues, for garden walling and for most of the dressings on the estate cottages. Blashfield, now based at Stamford, Pulham of Broxbourne and the more local firm, Jennings of Parkstone all contributed to this remarkable display of decorative ceramics.

Of more immediate consequence was Blashfield's involvement in the development of terracotta from Richard Prosser's 1841 patent for the production of china buttons. The experimental work of Prosser and Blashfield succeeded in producing tesserae of uniform shape and size. Minton was to buy Prosser's patent and to use it to develop his encaustic tiles in 1845.

As well as being the London representative of Minton, Blashfield was a partner in the cement firm, Wyatt, Parker and Company. When this ceased trading in about 1846, he took over their Millwall works and continued to make cement.(2)

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(1) M. H. Floyd, 'A terracotta cornerstone for Copley Square. Museum of Fine Arts, Boston 1870-76, by Sturgis and Brigham', Journal of the Society of Architectural Historians, 32, 1975, pp. 83-103 (p. 96). This article and her thesis of the same title for Boston University gave a valuable account of the Victorian revival of terracotta and of Blashfield's contribution in particular.

(2) A. J. Francis (1977), op.cit., p. 40.

It is likely that his cement would have been used on the mansions lining Kensington Palace Gardens, built from 1844 onwards, a scheme in which he was involved as the developer.

This financial speculation in property development led to bankruptcy. The set-back could only have been slight for within a couple of years he had embarked on the manufacture of terracotta. By his own account, he gained inspiration from the Great Exhibition(1) and was able to use the Millwall factory and its stock of models and moulds.

Blashfield's earlier career had given him a grounding in ceramics and the building trade, and provided contracts with leading architects and designers. It is not surprising therefore that he was able to engage some of the major contemporary sculptors, such as Henry Weignall, Samuel Nixon and William Woodington, the last having previously worked for Coade. (2) However Blashfield's most prestigious association was with John Bell. Together they created sculptural groups that demonstrated the capabilities of Blashfield's clayworking and the imagination though slight sentimentality of Bell's modelling. (Fig. 1.5). Some of the compositions were massive in scale; an 8ft 6in high statue of Austrialia(3) was followed

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(1) J. M. Blashfield (1855), op.cit., p. 20.

(2) R. Gunnis (1964), op.cit., p. 56.

(3) J. M. Blashfield (1857), op.cit., unpaged.

Fig. 1.5. Figure modelled by John Bell, c.1854 (Blashfield), Source: Art Journal, 6, 1854, p. 13.

by a 9ft group supporting a massive tazza.[1] Such ceramic gargantuanism culminated in a 10ft 6in statue of Diana resting on a 5ft pedestal.[2]

The cultivation of publicity was taken to new and typically Victorian extremes. The new works at Stamford had a flamboyant opening in 1859. The local aristocracy attended the drawing of the first kiln; one of the busts of the Queen that had been fired was presented to Her Majesty on the following day.[3] The attention of East Midlands Society and of the readership of the Building News was maintained through that year with special displays being arranged in the showrooms and at various exhibitions. Clearly, there was still a market for neo-classical ornaments even though their design had to be more naturalistic or ostentatious to gain appreciable attention. (Fig. 1.6). Nevertheless Blashfield revived directly the designs of the Medici, Borghese, and Albani vases. Given the purchases from Coade in 1836, it is conceivable that the same models and moulds were being used a century after being originally made.

The other British manufactuer producing wares of real artistic quality during the 1850s and 1860s was Mark Blanchard. Also having bought some of Coade moulds before setting up his factory, Blanchard was still reproducing antique vase and statue designs in the early 1870s.[4] Edward Baily

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(1) Building News, 5, 1859, p. 1032.

(2) Builder, 18, 1860, p. 783.

(3) Building News, 5, 1859, p. 260.

(4) Art Journal, 2, 1863, supplement, p. 260.

Fig. 1.6. Flower pot showing 'much taste in its foliated decoration', c.1854 (Blashfield). Source: Art Journal, 6, 1854, p. 13.

and the younger Richard Westmacott supplied many of the contemporary designs.

By 1863 Blanchard was being described as the leading manufacturer of terracotta in England.(1) His success corresponded with the increasing architectural use of the material. The transition from the manufacture of mostly vases and statues to a concentration on building components can be seen in the wares shown at the major exhibitions, initiated by the Great Exhibition in the Crystal Palace. In 1851 most of the terracotta was purely decorative but at the Dublin Exhibition of 1853 three of the four stands displaying terracotta contained architectural items. In the Palace of Art and Industry of 1862 there were twenty exhibitors of terracotta, showing a much more comprehensive range of capitals, trusses and cornices.(2)

The middle of the nineteenth century was a period of great experimentation and corresponding confusion with regard to building materials. Terracotta was the subject of several patented inventions such as that for smokeless chimney terminals,(3) and for ribbed construction blocks. As early as 1848 a patented type of terracotta, made by Grimsley , was used for the roof

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(1) Art Journal, 2, 1863, supplement, p. 260.

(2) S. A. Smith, Alfred Waterhouse (Ph.D thesis, Courtauld Institute of Art, 1970). Smith briefly considers the application of terracotta to secular Gothic architecture.

(3) Building News, 12, 1865, p. viii.

supports as well as all the external details of St. Paul's School in Oxford.[1]

Terracotta Churches by Penson and Sharpe

By the middle of the century terracotta was re-asserting its worth in technical and economic terms, but it was still strongly associated with classical design and the imitation of stone. However, as the Gothic Revival emerged as a major architectural movement in the 1840s some of its adherents starting looking at new architectural materials,in order to introduce an element of contemporary originality and to produce decoration more cheaply than with carved stone.

A group of churches built on the Welsh Border during the forties, incorporated blocks of terracotta for decorative detailing. The material was too yellow in colour and too strongly moulded to be mistaken for stone. The larger churches were designed by Thomas Penson, one of the family of architects from Chester. His first use of terracotta which was termed 'firebrick' was in Christ Church, Welshpool, built 1839-44. The blunt Norman style of the stone exterior was contrasted with a more decorative Romanesque inside; the arches and apsidal rib-vaulting were made of yellow moulded bricks and terracotta. This detailing was curiously proportioned; the dogtooth mouldings on the arches were grossly overscaled while the heads above the capitals were made almost too small to be noticed. The heads all differed in design, being individually

(1) Builder, 6, 1848, pp. 223-4.

modelled as opposed to pressed from moulds. (Fig. 1.7).

In St. Agatha's, Llanymynech in Shropshire, completed a year later, Penson can be seen to be more confident about the use of terracotta. It was now used on the exterior as well as inside, with a Norman zig-zag pattern being applied to pointed arches and accompanied by a proliferation of modelled heads. Such a loose, almost eccentric use of an historic style, and of materials was still acceptable, at least in the eyes of the Illustrated London News, who described the church as being: 'Pure Norman... preserving strict architectural character'.(1) For his next church, St. David's, Newtown, finished in 1847, a combination of brick and terracotta completely replaced the use of stone. The style was looely derived from thirteenth century Gothic.

Similar combinations of buff brick and terracotta were used on Holy Trinity, Penrhos (1845) and St. Paul's, Dolfor (1851), both in Powys and attributed to Sidney Smirke and T. G. Newenham respectively.(2) The repetition of similar decorative motifs in churches by different architects but close to each other in location suggests that the material came from a common manufacturer. It has been suggested that the terracotta was produced by the emergent clayworking industry in Ruabon, about thirty miles to the north.(3)

While Penson would have adopted terracotta mainly for reasons of economy and possibly to assert a degree of origin-

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(1) Illustrated London News, 5, 1844, p. 188.

(2) R. Haslam, Buildings of Wales: Powys (Penguin, Harmondsworth, Middlsex 1979), pp. 183, 100.

(3) P. Howell, Victorian churches, RIBA drawings series, 1968.

Fig. 1.7. Arches to the nave, Christ Church, Welshpool, by T. Penson, 1839-44.

ality, Edmund Sharpe's churches in Lancashire became a widely publicised test for the architectural use of the material. The response was negative in that they failed conspicuously to gain the approval of the most important critics.

The initial inspiration for St. Stephen's at Lever Bridge, built 1842-5, came from John Fletcher who discovered a fireclay seam at his colliery near Bolton. Edmund Sharpe was commissioned to produce designs for a church built of terracotta, including even the pulpit, the organ and the pew ends. Sharpe, one of the leading authorities on mediaeval Gothic architecture, chose an early fourteenth century style, presumably for its curving detail that would best utilise the potential of plastic clay.(1) The material was worked into flowing tracery for the windows, the parapet, and inside, the chancel arcades and the pew ends. (Fig. 1.8) The use of terracotta extended to panels of flowers and leaves, and even to the individual letters for the texts on the west doorway and the chancel walls. (Fig. 1.9) The final tour de force was the openwork spire where the blocks were fitted together with ceramic dowels.

Despite the demolition of the spire and most of the tower, the comprehensiveness and intricacy of the decoration still

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(1) R. Jolley, Edmund Sharpe 1809-1877 (Monograph for an exhibition at the University of Lancaster, 1977). His other churches use Romanesque and 13-15th century Gothic details.

Fig. 1.8 St. Stephen's, Lever Bridge, Bolton, Lancashire, by E. Sharpe, 1842-5 (J. Fletcher).

Fig. 1.9 Reveal to west doorway with individually moulded letters and ball flowers, St. Stephen's, Lever Bridge, by E. Sharpe, 1842-5 (J. Fletcher).

conveys the sense of enthusiasm with which Sharpe and Fletcher must have worked so much detail into a small church located in a modest mining settlement. To keep the total cost of the building down to £3,000 most of the architectural forms as well as the individual details had to be repeated wherever practicable. The Ecclesiologist commented sarcastically on:

> The ingenuity that has made an ambitious church out of so few moulds. One large window, one small window, one large pinnacle, one yard of parapet, one sexfoil-light: behold nearly all that is necessary for the exterior at least of an elaborately cast-clay church. (1)

Their condemnation was written without having visited the church but it was justified in also questioning the durability of the material. The large solid blocks were not completely burnt and have suffered from severe water-absorption. Sharpe himself was dissatisfied with the body produced by Fletcher's workmen and in 1845 he disclaimed responsibility for the preparation and manufacture of the material.[2]

Nevertheless Sharpe did modify the use of terracotta for Holy Trinity Church at Platt near Manchester, built in only eighteen months, for consecration in June 1846. The decoration was designed to be worked in smaller pieces partly to ensure that the wall blocks were adequately fired. Although the detailing was made rather more correct archaeologically, the

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(1) Ecclesiologist, 3, 1844, p. 87.

(2) Builder, 3, 1845, p. 248.

tracery was again deeply moulded and the design dominated by a small spire.

While St. Stephen's has an appeal comparable to that of eighteenth century 'Gothick' architecture, at Holy Trinity, Platt, the repetition of details and even of complete doorways became far more dulling. The Ecclesiologist reiterated its opposition to the use of terracotta for churches, and the Builder criticised the church for its superficiality of effect.(1)

Sharpe bowed to the strength of this opposition. Even with his large number of church commissions and obvious enthusiasm for terracotta, he did not use the material again until 1874, when he produced the design for St. Paul's, Scotforth. For St. Paul's, the use of terracotta was restricted to the upper part of the tower and to the decorative detailing.(2)

There were two connecting strands to the Ecclesiologist's opposition to terracotta. It was not regarded as a worthy material, lacking the sanctification given to stone by use on mediaeval churches and cathedrals. Worse, Sharpe had used terracotta in imitation of stone. The blocks at Lever Bridge had been given a tooled surface and Sharpe took a pride in the fact that most of the visitors had not appreciated that the building material was in fact burnt clay.(3)

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(1) Builder, 3, 1845, pp. 571-2.

(2) R. Jolley, 'Edmund Sharpe and the "pot" churches', Architectural Review, 146, 1969, pp. 427-431, (p. 431).

(3) E. Sharpe, 'On the adaptability of terracotta to modern church work', Builder, 34, 1876, pp. 553-4.

But such delight in deception was incompatable with Victorian demands for honesty in building structure and in the use of materials. George Gilbert Scott commented in a discussion at the RIBA that:

> It was their duty, as architects, to make use of every material which nature had placed at their disposal... terracotta is a perfectly legitimate substance, and only becomes objectionable when it is turned into an artificial stone.
> (1)

These resounding condemnations and strictions meant that terracotta was given only a modest use in church building during the high Victorian period. William Butterfield, for instance, used smooth brown pipes made by Minton as wall arcade shafts in two churches,(2) while William White's St. Saviour's Church, in Islington incorporated oversize moulded bricks that were termed terracotta, as part of its polychromatic lining for the interior.(3)

Only one church dating to the third quarter of the century made an extensive use of terracotta and it can have served only to alienate more architects from adopting the material. The Roman Catholic Church of the Holy Name of Jesus, in Oxford Road, Manchester was built 1869-71. The exterior was of stone but the interior was largely lined with a lemony cream terracotta, probably made in Lancashire but possibly by Gibbs and Canning of Tamworth. The architect, Joseph Aloysius Hansom, might have been attracted to the use of terracotta through the example of Sharpe's churches at

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(1) Builder, 8, 1850, pp. 304-5 (p. 305).

(2) P.Thompson, William Butterfield, (Routledge and Kegan Paul, London 1971), p. 149. Butterfield, the leading exponent of Gothic structural polychromy only made minimal use of terracotta.

(3) Builder, 25, 1867, pp. 549-51.

Platt and Lever Bridge; however, through his career, Hansom frequently adopted an experimental approach to building materials.

The vaults to the nave, chancel and transepts were lined with hollow hexagonal blocks, some being decorated with a simple flower pattern. The traceried screens to the side chapels and confessionals were made up by repeating small moulded sections. The results were widely criticised largely because 'twisted surfaces and bad joints predominate to a melancholy extent'.(1) Even small blocks were badly warped and some of the joints were so wide that they had to be filled with fragments of terracotta. Vaulting was revered by the Victorians as the culmination of Mediaeval architecture and such irregularities and bad workmanship would have been regarded as virtually sacrilegious.

Not accepted for ecclesiastical use the driving morality of the Gothic Revival reduced terracotta to the status of a second-rate material, only one better than the widely condemned stucco. At the middle of the nineteenth century, terracotta was trapped in the straightjacket imposed by archaeologically inspired revivalism; it could only be used acceptably, without having to imitate other materials, if it was worked in a style with which it was historically associated. A more tolerant eclecticism, encouraging the use of materials in an unhistoric way to achieve an element of originality, did not develop for almost a generation. It emerged through the appreciation of

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(1) C. Stewart, The stones of Manchester. (E. Arnold, London 1956), p. 98.

of the art and architecture of the age when terracotta had been most widely used, that of Mediaeval and early Renaissance Italy.

Although there was little stylistic continuity from Coade stone to the design of late Victorian terracotta, the practical achievements of the Manufactory at Lambeth were not wasted. The models and moulds, and the expertise of those employed at the works formed the basis for the re-establishment of the industry, at new locations and working increasingly for different types of client. Mark Blanchard and John Blashfield, who both bought tools and materials from Coade's works and set up in production in the 1850s, appear to have followed the manufacturing techniques and commercial principles established by Coade in the last quarter of the eighteenth century.

The procedure of carefully preparing clays, pressing them in plaster moulds and firing them to high temperatures in small muffle kilns had been largely derived from contemporary developments in the china and pottery industries. What is remarkable is the extent to which the same types of processes and plants were being used well into the twentieth century, despite a rapid escalation in labour and fuel costs.

Similarly many of the methods by which Coade sold their products, such as the opening of an exhibition gallery, the publishing of catalogues and the cultivation of aristocratic patronage appear to have been accepted, almost without question, and applied to the marketing of a building material from works sited in the provinces. In these circumstances it seems hardly surprising that the manufacture of terracotta at both Blanchard and Blashfield collapsed in the 1870s. Moreover it is possible that the principles developed and proven by Coade turned from being the invaluable foundation of a terracotta industry in Britain to a major cause of inertia, in the face of fundamentally different raw materials and markets, in the second half of the nineteenth century.

CHAPTER TWO

THE VICTORIAN ACCEPTANCE OF TERRACOTTA: 1850 TO 1880.

The fundamental difference between Georgian and Victorian attitudes towards terracotta followed from the appreciation around the middle of the nineteenth century, that the material should not be moulded in forms imitative of stonework but should be given its own character of architectural expression. It was the way in which terracotta was promoted as an element of a far broader movement within architecture and the decorative arts that made the revival of the material both highly significant and contentious to the Victorians. The movement concerned was the development of museums and art schools in most of the provincial manufacturing towns, but which, after the late 1850s, centred on the cultural complex at South Kensington. From the study of Italian Renaissance examples terracotta gained a central and almost symbolic status in the teaching curricula of the art schools and in the collections and architecture of the Victoria and Albert Museum; two closely associated buildings in terms of both their foundation and location, the Albert Hall and Natural History Museum, also served to advance the revival of terracotta. Through the widespread appreciation of these buildings and the positions taken by the art students in the ceramic industry, the South Kensington movement established the basis for the use of architectural ceramics in the late Victorian period and into the twentieth century.

However the use of terracotta remained restricted in its extent for most of the third quarter of the nineteenth century. The work of the South Kensington team only reached architectural fruition in the 1860s. The fifties, when Henry Cole was first establishing the Museum and Art School at South Kensington, were lean years for terracotta. At both the 1851 and 1862 Exhibitions the two major manufacturers, Blanchard and Blashfield, could only present a few obscure buildings as having used the material, with the sole exception in 1862 of Blanchard's work on the Royal Horticultural Society's Arcades.(1) During the 1850s terracotta was used on a small scale in the outlying provinces, by architects and builders probably unaware of the Ecclesiologists' condemnation of the material.(2) It will be seen that in the following decade commercial architects typically accepted a restrained use of terracotta, on a small scale, in conjunction with brick, tile and stone and to create polychromatic effects. Other members of the profession remained opposed to the use of the material and expressed particular objection to the designs and building process by which it was incorporated into the fabric of the Victoria and Albert Museum.

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(1) At the 1851 Exhibition Blanchard showed an ionic capital for Clifden House and a gothic pinnacle for a chapel in Tottenham. Official descriptive and illustrated catalogue of the Great Exhibition (Royal Commission, London 1851) Vol. 2, p. 771. In 1862 Blanchard displayed a column made for the Royal Horticultural Society, another for Victoria Park and his range of vases. Blashfield displayed church crosses designed by Hine and Evans and details of an oriel window for his highness the Nizan Moorsheadabad, of Bengal. Illustrated Catalogue, the International Exhibition of 1862. British division (Her Majesty's Commissioners, London 1862), Vol. 2, pp. 60, 94.

(2) In Shropshire John Griffiths used solid blocks of fireclay for the dressings of several national schools, that at Broseley and dating to 1854 having moulded tracery and simple sculpture.

Demand until about 1880 remained modest, with three firms supplying the bulk of the material, so that this period of the revival did not produce the transformation of the industry to the scale of supplying the mass of terracotta buildings erected in the last two decades of the century. What was of paramount importance for this later period was the way in which the challenges involved in supplying these few pioneering schemes in the 1860s and seventies defined the problems of undertaking large architectural contracts, in terms of achieving a reliability in the supply and quality of the material and of the responsibility and liability of architect and manufacturer. These practical factors and the dogmatism that pervaded much of the work at South Kensington meant that many of the prejudices both for and against the material were already well established amongst the architectural profession before terracotta even achieved a widespread acceptance.

Terracotta and the South Kensington Philosophy of Art and Design.

The parent body of both the Victoria and Albert Museum and the national system of science and art schools was the Department of Science and Art. Established in 1856, it became a strong proponent and initiator of the architectural use of terracotta, largely through determining the design of the Museum through the various phases of its complex building history in the nineteenth century. After criticism of the appearance of the first parts of the Museum, dating from 1856, the blocks completed during the rest of the Victorian period were given rich terracotta decorations to their main facades while some of the interior spaces were lined with faience. The Department was also closely involved with several other major building projects at South Kensington including the Gardens of the Royal Horticultural Society laid out from 1859, the Royal Albert Hall built from 1867 and the Natural History Museum for which designs were first submitted in 1864 but construction only commenced in 1873; all three were important in furthering the use and acceptance of terracotta.

The dominant figures in these developments and their incorporation of terracotta were Sir Henry Cole and Captain Francis Fowke. Cole was a civil servant who, having established the Public Record Office and the Penny Post, became involved in promoting exhibitions of industrial art in the 1840s. He was on the Executive Committee of the 1851 Exhibition and was appointed Secretary of the Department of Science and Art in 1853.[1] Above all an effective executor of other people's ideas he gained a valuable ally in Captain Francis Fowke. An officer in the Royal Engineers, Fowke had the ability to design and organise large building projects for rapid and economical construction. He was closely involved in the

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(1) F. H. W. Sheppard (ed.), Survey of London, Vol. 38 (Athlone Press, London 1975). The museums area of South Kensington and Westminster, p. 78. This volume covers the building history of all the major public buildings in South Kensington and provides many valuable references to the supply and use of architectural ceramics.

British contribution to the Paris Exhibition of 1855 and joined the staff of Cole's Department of Science and Art in 1856, first as an inspector but soon becoming its architect and engineer.(1) He produced the completion plan for the Museum, and designs for the other major schemes with which the Department was associated. After his death in 1866 the designs for the Museum and the Royal Albert Hall were taken over by another Royal Engineer Officer, Henry Scott and those for the Natural History Museum by Alfred Waterhouse.

The work of Cole, Fowke and their team of draughtsmen, builders and decorative artists was an outcome of the broad movement for reform and education in the decorative arts and the sciences. A group that had been formed under the figure-head of the Prince Consort saw the need to advance the level and unity of culture in Britain; their views were crystallised into the establishment of a museum and a school of art at South Kensington by the profits and aesthetic lessons resulting from the Great Exhibition of 1851. A concern over the standard of British design, already expressed by a report in 1836,(2) was reinforced by observations of the excessive ornamentation and bad proportions of many of the items shown inside the Crystal Palace. William Morris and John Ruskin

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(1) J. Physick, The Victoria and Albert Museum: the history of its building (Phaidon, Christies, Oxford 1982), pp. 26-7. An invaluable work for unravelling the complexities of the building and decorating of the Museum.

(2) Report from the Select Committee on Arts and their connection with Manufactures (1836).

were appalled at the displays while Owen Jones made the worthwhile observation that many manufacturers were chasing ostentatious novelty rather than working to the principles of ornamental art.[1] Cole, in a lecture to the Royal Society, described the Exhibition as giving 'a living picture of point of development and a starting point for nature to direct his further exertions'.[2] There was a general consensus that no improvement in design could take place until the artists, manufacturers and the public had become better educated in art and until the underlying principles were more widely recognised.[3]

None of the critics disputed that the application of art to design implied ornamentation; this was universally accepted as a hallmark of advanced civilisation. Standards of design were regarded as being indicative of the state of national culture. Therefore it was a matter of shame that foreign design, particularly by the French and Germans,was so obviously superior. The Prince Consort, himself an immigrant from Germany, expressed, in a lecture to the Royal Society of Arts, the fundamental position of

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(1) N. Pevsner, Studies in art and design (Thames & Hudson, London 1968), Vol. 2, p. 47.

(2) Henry Cole, in Lectures on the results of the Great Exhibition of 1851. Delivered before the Society of Arts (D. Bogue, London 1852), Vol. 2, p. 450. The lecturers included Matthew Digby Wyatt, Owen Jones and L. Arnoux.

(3) Owen Jones in Lectures (1852), Vol. 2, op.cit., p. 287.

industrial art within the moral philosophy of the Victorians:

> Science discovers these laws of power, motion and transformation; industry applies them to the raw matter, which the earth yields use in abundance, but which becomes valuable only by his (sic) knowledge: art teaches us the immutable laws of beauty and symmetry, and gives our productions form in accordance with them.
>
> (1)

It was from the example of Germany that the ideals of unifying architecture, painting and sculpture and promoting art in industry became applied by the group involved in developments at South Kensington. Through the interest shown in the Italian Renaissance by artists such as the group called the Nazarenes and architects such as Gottfried Semper and H. von Schinkel it will be seen that the Germans also pioneered the association of terracotta with this movement for reform in the arts.(2)

However the first and most fundamental lesson drawn from Germany was in terms of art education. The main failure of the British system, in the eighteenth century art schools and the Normal School of Design established after the 1836 committee report, was that they did not combine teaching in applied and fine art and had gained little support from manufacturing industry. The necessary reforms were initiated by Gottfried Semper who had been responsible for defining the theoretical basis for art education in Germany.

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(1) Prince Consort at the Mansion House in 1850. Quoted by Henry Cole In Lecturers (1852), op.cit., Vol. 2, p. 450.

(2) N. Pevsner, Academies of art (University Press, Cambridge 1940), p. 253.

During his two years spent in Britain he established and led a class in 'Practical Construction, Architecture and Plastic Decoration' and advised on the general curricula at the School of Art.(1) The School was run at Marlborough House from 1853 until the move to South Kensington in 1857. Subsequently a course covering architectural drawing, modelling and casting was introduced. Under the administration of the Department of Science and Art, and renamed the National Art Training School in 1863, the teaching structure was maintained with remarkable consistency virtually until the end of the century. Cole, assisted by Richard Redgrave who was the Inspector General for Art from 1857-74, expanded the provision of art education so that there were 151 art schools in 1882. Just over a quarter of a million pupils were studying drawing according to the South Kensington curricula, with the best pupils progressing to more advanced studies and possibly a period of training at South Kensington.(2)

The art school became a major source of qualified designers and the firms producing architectural ceramics benefitted as much as any type of manufacturing industry. Henry Doulton supported and gained his artists from the Lambeth School of Art whose headmaster, John Sparkes, became the Superintendent at the South London School of Art and the Principal of the National Art Training School at South Kensington.(3) J. C. Edwards gave a Mr. Bryan, who had

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(1) L. D. Ettlinger, "On Science, Industry and Art; some theories of Gottfried Semper", Architectural Review, 136, 1964, pp. 57-60.

(2) F.H.W. Sheppard (1975), op.cit., p. 79.

(3) The role of John Sparkes and his teachers and students in initiating new standards of terracotta sculpture is considered in Chapter 8.

been trained at South Kensington, the responsibility for developing the terracotta section at the Pen-y-bont works during the 1880s.(1) Early in the twentieth century Gibbs and Canning were employing modellers who had been trained at the Royal College of Art, the successor to the National Art Training School.(2)

Several of the most successful artists or managers in the terracotta industry were trained at a local art school while serving an apprenticeship, sent to South Kensington to study under Sparkes, Frank Moody, Hugh Stannus or other of the teachers specialising in architecture and the decorative arts, and then rejoined their firm to work their way up to the position of chief decorative artist or head of the terracotta department. The head of the faience department at Maw, the largest decorative tile works in Britain and located at Jackfield in Shropshire, was John W. Bradburn.(3) Before attending the National Art Training School at South Kensington between 1882-5 he had studied at the Coalbrookdale Institute during the previous three years. The Coalbrookdale Company, ironfounders, had paid for the construction of the Institute building in 1859 which housed the art school but it was probably the local ceramic firms who provided the majority of both the teachers and students.(4)

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(1) Builder, 43, 1882, p. 188.

(2) At least one of Gibbs and Canning's inter-war designers trained at the Royal College of Art in South Kensington between 1910-13. Record photographs.

(3) Wellington Journal, 11 April 1908, p. 11.

(4) One of the part-time teachers was a designer at Craven Dunnill tile works.

The collection of Bradburn's lecture notes, reference books and award winning designs demonstrate how the principles that motivated the reconstitution of the art schools and the development of the Victoria and Albert Museum were taught to the students and were applied in the architectural ceramics industry. They also illustrate the pre-occupation at South Kensington with Renaissance art and the extent of attention given to terracotta both in a historical and modern context.(1)

A creed for decorative design had been established in the principles presented by Owen Jones. His 'Principles of Ornament' formed the basis of a placard that hung in the School of Art in South Kensington.(2) Meanwhile his book 'The Grammar of Ornament' was bought by Maw and in instalments by Bradburn. Jones strongly emphasised the primacy of architecture, stating that it was the prime material expression of an age and that it presented the importance of fitness, proportion and harmony in all design.(3) He saw historic architectural styles as essentially a series of decorative details and this was precisely the approach presented by the teaching given in the National Art Training School. Although Bradburn attended lectures by a Mr. Haygreen on the proportions of classical architecture, most of his notes were from Moody's and Stannus' lectures on decorative detailing.

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(1) The Bradburn collection has been loaned to the Ironbridge Gorge Museum by a descendant.

(2) M. D. Conway, Travels in South Kensington (Trubner & Co., London 1882), p. 107. A placard of art principles that hung in the school were closely derived from Owen Jones' Principles of Ornament.

(3) Owen Jones, Grammar of ornament (1856), pp. 3-5.

The course on decorative detailing centred on the thorough study of Renaissance forms. Stannus gave extensive consideration as to how such forms as diapers, festoons and tables should be arranged according to their architectural context and to the material in which they were being worked. There were three lectures solely on the range of possible dispositions of ribbons.(1) Given that all the forms and objects that Bradburn had to copy were Renaissance or classical in character it is not surprising that most of his own designs and the faience produced at Maw around the turn of the century accorded with this style.

It was considered that a precise knowledge of period decoration should form the basis from which students could develop more contemporary and imaginative designs. An important example was available in the work and teaching of Alfred Stevens. While a master at the Sheffield School of Art in the early 1850s Stevens initiated an approach to decorative design that, through his student assistants, came to dominate both the teaching work and the schemes of architectural decoration at South Kensington. As a result of nine years spent studying in Italy, Stevens developed an approach to modelling which combined the robustness of Michaeolangelo's sculpture with a typically Victorian mixture of naturalistic detail and abstract patterning.(2) Stannus studied under Stevens at Sheffield and propounded his master's approach in his own lectures.

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(1) J. Bradburn, Notebook of lectures at South Kensington, 1882-4.

(2) M. Diamond, Art and industry in Sheffield (Sheffield City Art Galleries 1975), p. 11.

He emphasised the value of vigorous modelling of varying relief, and juxtaposing symmetry and asymmetry, and straight and curved lines. While never doubting the value of Renaissance forms Stannus considered that 'the work should have some meaning or interestingness'.(1) Themes illustrative of man's handicraft were felt to be particularly appropriate while it was recommended that religious imagery should be avoided. All these characteristics are apparent in Stevens' sculpture and decorative designs. It was probably Stannus who urged Bradburn to make accurate copies of some of Stevens' designs for stoves and for ceiling panels.(2)

Terracotta and the Appreciation of Italian Renaissance Architecture.

The interest of the South Kensington team in the Renaissance ran far more strongly than amongst most of the architects of the mid-Victorian period; it also precursed the highly eclectic use of Renaissance motifs that became fashionable in the last two decades of the century. Many Victorian architects devoted extensive study to Italian buildings. The Gothic Revivalists found a precedent for the use of the style in secular buildings while Charles Barry initiated a fashion for adapting the Florentine palazzo style as an appropriate architectural expression for clubs

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(1) Lecture by H. Stannus on 21 October 1884, in J. Bradburn, Notebook, 1882-4, op.cit.

(2) J. Bradburn, Sketchbook, 1882-3.

and commercial buildings.[1] Cole, Fowke and Scott were more absolute than Barry in their commitment to the Italian Renaissance. To them, it both symbolised a revitalised order where the arts and sciences were reunited and allowed the practical exploitation of modern building technology and materials.

Just as the South Kensington team did not so much re-discover the Italian Renaissance as lead its use in contemporary art and architecture, they were not the first to appreciate the terracotta of the Italian quattrocento and cinquecento but did study and revive its use in a uniquely coherent manner. George Gilbert Scott recorded terracotta merely as a type of decoratively moulded brick that could contribute to polychromatic decoration, (Fig. 2.1) but Cole and his designers grasped fully the practical and decorative potential of the material.[2]

The German, K. F. von Schinkel, may have been the first of the nineteenth century architects to have appreciated Italian terracotta on a visit in 1803.[3] However, four decades later, when Gally Knight and Webb were studying Italian Gothic architecture they failed to differentiate terracotta from brickwork. Webb recorded the Della Robbia

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(1) H. R. Hitchcock, Early Victorian architecture in Britain (Yale University Press 1954), Vol. 1, p. 34.

(2) G. G. Scott, Remarks on secular and domestic architecture (J. Murray, London 1858), pp. 103-4.

(3) Surveyor, Engineer and Architect, 2, 1841, pp. 250-1.

Fig. 2.1 Brick and terracotta facade, Palazzetto, Ravenna, Italy, 15th Century.

reliefs before entering the Certosa di Pavia, but passed by the rich terracotta of the windows and arcades.[1] (Fig. 2.2). The earliest known article on Italian terracotta was published in 1849. After describing and illustrating several Italian churches it observed that such ornament could be cheaply and easily reproduced.[2] (Fig. 2.3).

The first extensive study, Gruner's 'Terracotta architecture of northern Italy' was not published until 1867.[3] This large folio volume and the several long articles on terracotta written around this date were more of a reflection than leading factors of the contemporary interest in the material. In their published lectures the younger Charles Barry and Richard Redgrave shared the same arguments and referred to virtually the same buildings. They both placed terracotta in a historical context from Greek figurines through to the productions of Blanchard and Blashfield.[4] Redgrave's enthusiasm for the revival of the material is of particular interest because he was not only responsible for the artistic curricula introduced at the South Kensington Art School in 1859 but also provided strong support to Cole in the development of the collections and the accommodation of the Museum.

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(1) H. Gally Knight, The ecclesiological architecture of Italy (Henry Bohn, London 1943). B. Webb, Sketches of continental ecclesiology (J. Masters, London 1848). Terracotta is grouped with brickwork in his description of north Italian churches.

(2) Builder, 7, 1849, p. 415.

(3) L. Gruner (ed)., The Terracotta architecture of northern Italy (J. Murray, London 1867). The text also covers Greek, Roman, French and German terracotta.

(4) C. Barry (Junior), 'Some descriptive memoranda on the works executed in terracotta at New Alleyn's College, Dulwich', Trans. RIBA, 18, 1867-8, pp. 259-279.

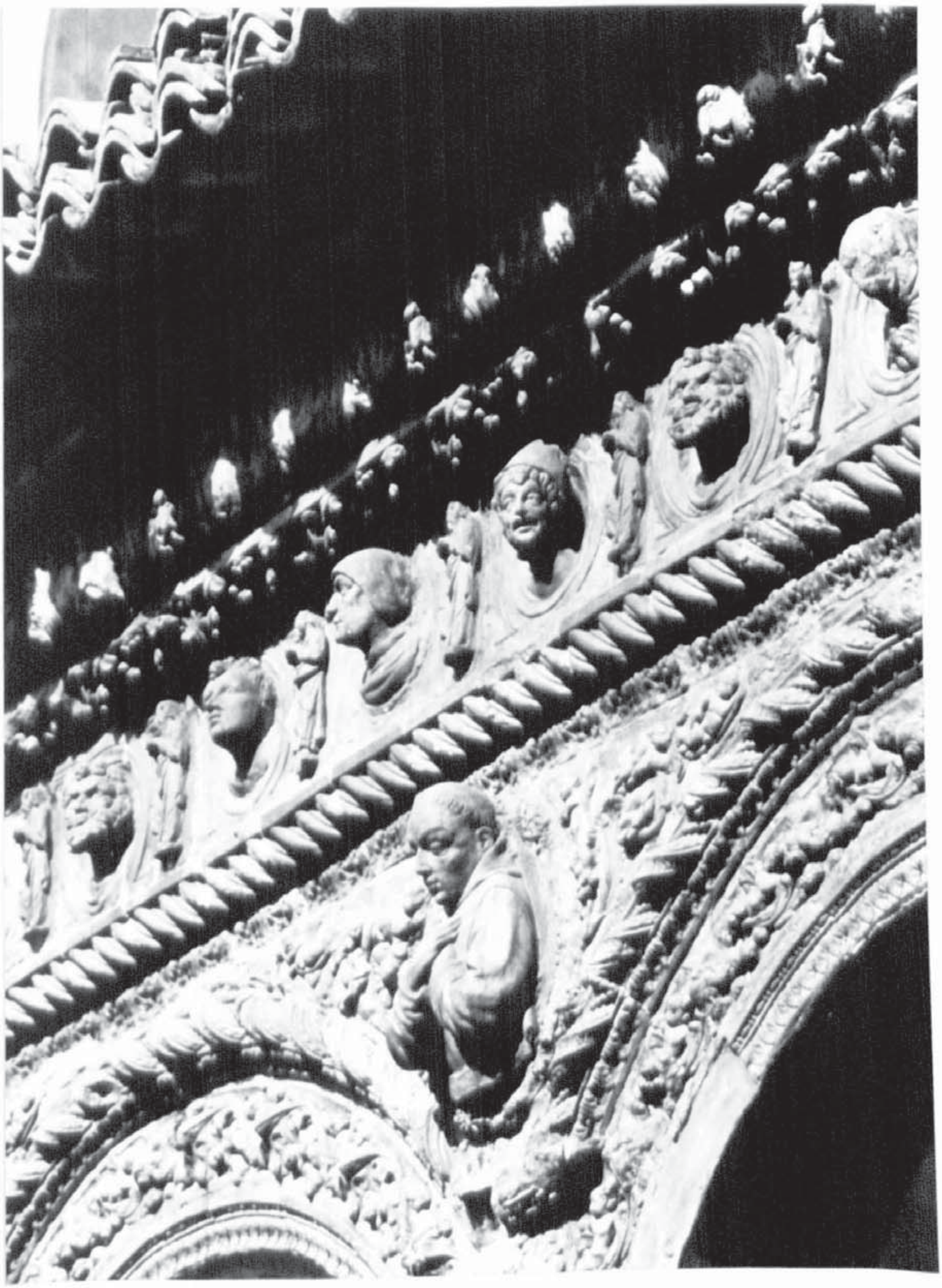

Fig. 2.2. Detail of arcaded cloisters, Certosa di Pavia, Italy, 15th Century.

Fig. 2.3. Brick and terracotta details from Bologna and Ferrara, Italy, 15th Century. Source: Builder, 7, 1849, p. 415.

Cole's interest in terracotta can be dated back to at least as early as the 1840s. As a young man on holiday he made special note of Torregiano's enamelled busts at Hampton Court.[1] Soon afterwards he designed a box of terracotta bricks for children which were made by Minton.[2] The historical appreciation shown by Redgrave and Cole developed virtually in tandem with their policy of acquiring historic and modern examples of the material for display, using it as a medium for teaching sculptural modelling and employing it as a building material for the main facades of the Museum.

The collection inherited by the Victoria and Albert Museum had been built up from an initial purchase of contemporary art in 1838 for the Normal School of Design. The Museum of Manufactures was established by Cole in 1852 and became renamed the Museum of Ornamental Art. Once it was transferred to South Kensington it became incorporated with the expanding historical collections. Terracotta and various types of faience became increasingly prominent in both the historic and modern displays. In 1860 and the following year there were large acquisitions of Italian Renaissance figures and sculptural groups. In 1862 samples of modern terracotta were purchased from the Austrian, Swedish and Danish displays at the International Exhibition.[3] Four large Della Robbias

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(1) This Tudor use of terracotta is described in J. A. Wight, Brick building in England. (J. Baker, London 1972). The sources of the craftsmen and their designs are unknown. The Victorians assumed that the work was by French or Italian craftsmen brought to Hampton Court.

(2) H. Cole, Fifty years of public work (G. Bell, London 1884), Vol. 1, pp. 98-9.

(3) Science and Art Department, Tenth report (HMSO, London 1863), Appendix Q, p. 177.

were added to the collection in 1864.(1) In 1871 terracotta and Della Robbia ware took up more space than the textiles displayed in the Museum and just over half the area allotted to either sculpture or pottery.(2)

While historic pieces were presented for their general educational value, modern terracotta was displayed to more didactive purpose. Signor Boni's architectural details were arranged in the central court of the Museum, giving:

> Valuable information to manufacturers of what may be done in this useful and durable material for the purpose of external decoration of buildings.(3)

The most blatantly commercial exhibit was in the Department of Construction. A panel of terracotta made by Blanchard for the Museum was placed alongside a copy carved in Portland stone. They were labelled with their respective prices: £2.3s and £5.8s.(4)

Ceramics in general were considered worthy of considerable attention by the South Kensington team; they exemplified the values of combining science and artistry which were held in such

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(1) The collection started to duplicate the British Museum's. They were lent Etruscan fragments from Canosa. Builder, 27, 1869, p. 679.

(2) Statement sent by Henry cole on 7 January 1871 to the First Commissioner of Works on the Museum's space requirements. Reproduced in J. Physick (1982), op.cit., pp. 282-3.

(3) Science and Art Department, Twelfth Report (HMSO, London, 1865), p. 233.

(4) Science and Art Department, (1865), op.cit., p. 223.

high esteem. As Arnoux stated:

> The ceramic is one of these choice manufacturers which requires a great amount of knowledge: one must be acquainted with geology, chemistry and natural philosophy.
> (1)

Admist the variety of pottery and sculpture, terracotta was afforded such extensive exhibition space largely for the lessons that it gave in art education. The material was regarded as presenting more directly than possible with carved wood or stone the ideas of the artist. According to Cole:

> The precise mould of terracotta protected the original conception in that you could have the exact work of the artist upon it.
> (2)

The relationship was even more direct in the case of sculpture where working with clay enabled artists to build up their ideas unconstrained by having to work with difficult materials.[3] Where models needed to be kept they could simply be lightly fired so avoiding the inconvenience of having to take a plaster cast.

Terracotta and Faience and the Department of Science and Art.

It was the appreciation of Renaissance art and terracotta, and a commitment to the value of the material for teaching,

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(1) L. Arnoux in Lectures on the results of the Great Exhibition (1852), op.cit., Vol. 2, p. 377.

(2) Parliamentary Papers, 1868-9, x, First report from Select Committee on Hungerford Bridge, 10 May 1869, qu. 2255. Quoted in F. H. W. Sheppard (1975), op.cit., p. 90.

(3) R. Wittkower, Sculpture (Peregrine, Harmondsworth, Middlesex 1979), pp. 189-203.

and sculpture and architectural decoration that became combined and applied at South Kensington.[1] However the role given to terracotta and faience in decorating extensive portions of Victoria and Albert Museum was dependent on an example offered from Germany and the recruitment of artists skilled in working the materials from Sheffield.

The influence from the Germans in terms of art education was accompanied by the acceptance of a particular architectural style that they had established, the Rundbogenstil. It was an eclectic style and drew on Byzantine, Romanesque and Italian architecture. Characterised by the use of brick facades pierced by round-arched window openings it offered a valuable approach to the development of a practical and yet decorative secular architecture. One of Bradburn's books, 'The schools of modern art in Germany', recounted how the use of the Rundbogenstil in Germany had become allied to the construction of museums and art schools and associated with the architectural use of terracotta.[2]

It was Schinkel who pioneered the development of the Rundbogenstil in a church in Berlin dating to 1828 and a series of other designs including the Architectural Insitute, all of

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(1) Certain designs for cast-iron were first modelled at foundries in clay. Coalbrookdale Company, Catalogue of ornamental ironwork (c. 1860s). During the construction of the Law Courts in London the architect would visit the sculptors' workshop and personally work the clay models that were to be copied in stone. A.E. Street, Memoir of George Edmund Street, 1888 (Reissued B. Blom, New York 1972), p. 136.

(2) J. Beavington Atkinson, The schools of modern art in Germany (Seeley, Jackson & Holliday, London 1880), p. 105.

which had terracotta dressings. F. von Gartner also used a combination of the Rundbogenstil and terracotta in Munich and Baden-Baden during the 1830s and forties. Semper was also a devotee of the style. It may have formed the basis of plans and the model that he produced for a Museum at South Kensington in 1854-5 and it was possibly on his suggestion that the work of von Gartner, von Schinkel and Hubsch was studied by Cole and Matthew Digby Wyatt on their visits to Berlin and Bavaria.(1)

Once Cole had become committed to the use of the Rundbogenstil and terracotta he drew on the designs and modelling skills of Alfred Stevens, as passed on to his student-assistants. Among those who were taught by Stevens at Sheffield School of Art and who had worked with him at the nearby Hoole stove works, were Godfrey Sykes, James Gamble and Reuben Townroe.

Cole succeeded in bringing these three artists to South Kensington where they designed and modelled the terracotta and faience decorations for the main facades and interiors of the Museum. Stevens must be largely credited with the sculptural and architectural quality of the Renaissance forms that they produced. The putti and swags in the quadrangle of the Museum relate closely to the forms on the stoves that Stevens had designed in Sheffield though the style was made rather more animated and less serious.(2)

Although it was clearly appropriate that architectural ceramics should be incorporated into the design of the Museum,

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(1) H. R. Hitchcock, Architecture, nineteenth and twentieth centuries (Pelican, Harmondsworth, Middlesex 1977),pp. 63, 57).

(2) M. Diamond, (1975), op.cit., p. 28.

it is important to appreciate that the lavishness with which they were used was by no means an inevitable outcome of the movement for design reform headed by the Prince Consort. Renaissance derived decorations in terracotta and faience were adopted so extensively not only for the artistic and educational reasons already stated. Through being modelled by students at the Art School they were economical to produce; by being to a large degree non-structural they could be installed after the building has been erected; furthermore they succeeded in providing a type of decorative expression that proved acceptable to the most hawkish of the contemporary critics.

None of the dignatories, architects or artists who established the movement for design reform after the Great Exhibition of 1851 took a major role in the design of the Museum. Semper returned to Germany, Owen Jones only designed the interior of one court, while Matthew Digby Wyatt's main contribution was to advise Cole as to possible sources of inspiration for designs.(1) Cole had little direct contact with the introverted Alfred Stevens, who became pre-occupied with completing the Wellington Monument for St. Paul's Cathedral.

Cole was left with considerable independence in the development of Museum's accommodation. The first building to be erected was the iron-framed Museum, commenced early in 1856. It was nicknamed the Brompton Boilers by the Builder, the journal being derisory about the use of corrugated iron for a museum building.(2) For the first permanent building to

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(1) F. H. W. Sheppard, (1975), op.cit., p. 77.

(2) J. Physick, (1982), op.cit., p. 25.

be erected on the site, the Sheepshanks Gallery which was started in November 1856, Cole and his designer Captain Fowke employed the Rundbogenstil, brick construction and tile and terracotta detailing.

Fowke, under Cole's direction, produced designs for most of the buildings of the Victoria and Albert Museum and associated projects in South Kensington which used terracotta, including the west and north sides of the Museum quadrangle, the Royal Albert Hall and unexecuted designs for the Cromwell Road front of the Victoria and Albert Museum and the Natural History Museum. In the Sheepshanks Gallery and those subsequent projects Fowke concentrated his efforts on achieving efficient construction and on introducing innovations to fulfil practical requirements of top-lighting or fire-proofing. He was willing to take a detached attitude towards decoration, never expecting to design every ornamental detail himself. This distinction between construction and decoration, apparent in the teaching of the Art School, became the defined approach for the Department's building projects. A report dating to 1860 stated: 'Our policy is to fit (a building) for use, and then to decorate it afterwards'.(1) In part this policy was necessitated by the pressing need for exhibition space and the sporadic way in which the Treasury provided the necessary funds. It also had important consequences for the appearance of the Museum and in particular the materials and methods used for decoration.

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(1) Parliamentary Papers, Report from Select Committee on South Kensington Museum (1860), xvi, qu. 1557.

The main facades of the Sheepshanks Gallery presented the architectural arrangement that was developed in most of Fowke's subsequent designs for the Department. A straight wall surface was divided by projecting pilasters into window bays with the upper floor having round arched openings. A projecting cornice separated the walls from a shallow pitched roof. The design, itself an adaptation of the German Rundbogenstil, was simply developed in other parts of the Museum according to whatever number of floors, size of windows or type of decoration was required. For the Sheepshanks Gallery, a frieze of tiles ran just below the cornice in a zig-zig pattern and the blind arches on the west elevation were filled with portraits of architects and artists, in sgraffito.[1] Inside, a perforated ornamental frieze of terracotta ran round the rooms, forming ducts for ventilation. Terracotta was also used for casing some of the iron girders in the buildings, presumably as a measure of fire-protection.

The use of tile, sgraffito and terracotta marked the adoption of historic and essentially Renaissance materials and styles for architectural decoration. The appearance of the Sheepshanks Gallery was judged more favourably than the 'Iron Museum' and Cole's initial indifference to the external appearance of the Museum became replaced by an increasing concern with architecture and types of decoration. The known elements of the chronology whereby the Department became committed to the extensive use of terracotta illustrates how

(1) The tile curtois was made by J. M. Blashfield.

the appreciation of Italian Renaissance architecture became intertwined with the artistry of Stevens and his pupils at Sheffield.

In January 1857 Cole had attended the opening of the Sheffield School of Art.(1) The most capable of Steven's pupils, Godfrey Sykes, had become the assistant master and he probably designed the terracotta medallions set in the facade of the school's new building, designed by Messrs. Manning and Mew. (2)

In 1858 there were prospects of the Government financing extensive construction on the Museum; In August Cole left for Italy with Richard and Samuel Redgrave, with the intention of searching out suitable precedents for architectural decoration.(3) They were advised on where to visit by Matthew Digby Wyatt. He suggested Rome, Venice, Ferrara, Bologna, Pisa and Sienna as the most useful places for studying brickwork.(4) Visiting several of these towns Cole could hardly fail to appreciate the architectural potential of terracotta. He wrote of a building in Rome:

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(1) Cole diary, 23 January 1857. Mrs. John Bonython made her type script of Cole's diary available.

(2) John Kirkby, 'Sheffield School of Art', South Yorkshire Group, Victorian Society Newsletter, 5, 1980, p. 7.

(3) H. Cole (1884), op.cit., Vol. 1, p. 337.

(4) Letter from M. D. Wyatt to H. Cole, 5 September 1871, V & A Museum Library.

> The pilasters were of red brick but the Corinthian capitals of yellow - not cut, but moulded before they were baked. I hope I shall adopt this system in Kensington, rather eschewing the use of stone, except where stone would be decidedly best. (1)

Cole returned to London in March 1859. Within a month he was preparing the ground plan for the extension of the musuem round a quadrangle and discussing the style with Fowke, who wanted to adopt the Venetian or Romanesque.(2) On 28 July 1859 recorded in his diary:

> Godfrey Sykes was to be engaged at 5s a week for one year to make designs, to be executed sgraffiatura, terracotta &c. (3)

In fact Sykes was to stay and design architectural decoration for the Department until his death in 1866.

The wide variety of Renaissance derived designs used in the Museum depended upon the accumulation of a large collection of drawings covering both Renaissance detail and modern design, which could then be used for developing decorative schemes for a specific facade or interior.

Cole, Fowke and the decorative artists at South Kensington all made repeated visits to Europe. These travels were not in the dilettanti manner of the grand tour but closely orientated towards the development of the Museum and its collections. In 1871 Wyatt was recommending the best places for Cole to visit

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(1) H. Cole (1884), op.cit., Vol. 1, p. 332.

(2) Cole diary, 4 April 1859.

(3) Cole diary, 28 July 1859.

in Germany, commenting on the excellence of the terracotta in general, and especially on Hubsch's Trinkhalle in Baden-Baden.[1] Whilst abroad, architectural study was combined with visiting art galleries, art manufactories and dealers to gain additions for the collections.

However, Fowke had to establish his architectural style before having the opportunity of studying Renaissance buildings and terracotta at first hand. These circumstances may explain why his designs were broadly emulative rather than imitative of historical examples. Fowke had already laid out a series of courts and the Official Residences when he went to Italy in 1863. He then showed himself to be primarily concerned with the constructional detail of buildings, his main record of terracotta being of a visit to Messrs. Boni's works in Milan.[2]

Sykes was sent to Italy over the winter of 1861, presumably to gain inspiration for the Official Residences, which had been planned in the autumn and were to be commenced in the following March. His water colours are freely executed but accurately convey the form and colour effects of the architectural details. His subjects range from the mediaeval to railway stations, but centre on cinquecento architecture and church monuments, with their lively cartouches, swags and putti.[3] (Fig. 2.4). Some of his drawings and sketch designs were posted back to Cole.[4]

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(1) Letter from M. D. Wyatt to H. Cole, 5 September 1871.

(2) F.H.W. Sheppard (1975), op.cit., p. 90.

(3) G. Sykes, Drawings, c.1860-66, Prints and drawings department, Victoria and Albert Museum.

(4) 'The sketch I sent forthe upper cap is rather a crib from a semi-classical one here at Pisa'. Letter from G. Sykes to H. Cole, 21 December 1861.

Aston University

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Fig. 2.4. Shield and cherubs on a tomb in Verona Cathedral, drawn by G. Sykes, early 1860s. Source: G. Sykes, Drawings, c. 1860-66.

Sykes produced many of his later designs away from South Kensington. Suffering from a kidney disease he spent several winters in one of the south coast resorts. Some of the details for the theatre front of the quadrangle were designed in Weymouth. He instructed his assistants before leaving and then sent them drawings and sketches. The inevitable problems of relating the decorative designs to Fowke's structure were resolved by letter or by a visit from one of the assistants.[1] Fortunately Fowke and Sykes seem to have respected each other's role in executing Cole's schemes and co-operated in relating the decoration of the buildings to their construction.

The two assistant designers, James Gamble and Reuben Townroe, drew up Sykes' designs ready for use by the modellers. When Sykes died in February 1866 they turned to using the accumulation of his drawings. Three years later, Fowke's successor, Colonel Henry Scott sought new designs and he recommended that Townroe and Gamble should be sent to Italy to visit the best examples of terracotta and record those not already drawn or photographed.[2] Sykes, Townroe and Gamble were the main, but not the only, designers to work on the terracotta decorations. F. W. Moody was yet another artist, influenced by Stevens, who came to work for the Department.

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(1) Letter from G. Sykes to H. Cole, 5 January 1865.

(2) Science and Art Department, Minutes, 27 June 1866. They were to be paid £52.10s each for sketches in Milan and Pavia.

The division between construction and decoration, whereby plans and sections were made by the engineer and passed on to the decorative artists, made it practicable for the decoration to be executed by students in the adjacent Art School. For the west and north ranges round the quadrangle, the terracotta decorations were designed by Sykes and modelled under his supervision, by the art school pupils.(1)

Several of the mediums employed in decorating the Museum, such as sgraffito, fresco and mosaic could be entirely executed by the pupils. In contrast terracotta and faience had to be pressed and fired at a factory.(2) However with the decorative artists controlling the working of the models and possibly the taking of moulds, any number of manufacturers could be involved. Blanchard, Doulton, Pulham and Wilson all supplied some portion of the terracotta; four other firms, Minton Colin Campbell, Minton Hollins, Gibbs and Canning and Maw were involved in manufacturing the faience.(3)

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(1) J. Physick (1982), op.cit., p. 119.

(2) PRO Works 17 22/4 Copy of specification for terracotta for chimneys of Science Schools, 18th contract, November 1870. The contract period commenced once the models were ready. The piece moulds were made by the contractor, it being specified that the models should not be damaged, so that they could be re-used.

(3) A complete list of the manufacturers and artists involved in all the decorative schemes in the museum is provided in 'Decorations of the South Kensington Museum, 1862 to 74'. The volume was never published. John Physick kindly made a copy available.

Cole stated 'The Department wishes to give any encouragement in its power to all terracotta manufacturers'. He took a strong interest in the major firms, visiting Pulham in 1858, Blashfield in 1865, Blanchard in 1866, and again in 1869, when he also visited Gibbs and Canning.(1) Since he is known to have shown a particular preference for the faience made by Minton Hollins, it may be that Blanchard was given comparable favour for the terracotta. This firm certainly gained more than lion's share of the contracts. They may have supplied over 95% of the terracotta.(2) They bid lowest and were certainly producing the finest material.

The Department maintained flexibility in its expenditure by having the terracotta supplied by series of small contracts. At least eighteen were used for the Huxley Building alone.(3) Since much of the terracotta and faience was not constructional but could be applied to a completed brick structure, long delivery periods could be given to the manufacturers.(4) Blanchard was generally allowed twenty to thirty weeks in which to supply contracts of up to a £1000, although one for £393 was to be supplied within ten weeks. Almost a year and a half was to be

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(1) Cole diary, 18 May 1858, 29 August 1865, 3 September 1866, 6 May 1869 and 21 June 1869.

(2) The incomplete list of approved tenders given in the precis of minutes show that between 8 July 1863 and 23 December 1869 Blanchard gained contracts of £12,998, and Wilson & Sons £301. Ball received £250 for the 'instruction' group for the lecture front, executed by Doulton.

(3) PRO, Works 17 22/4, Science Schools, 1870.

(4) Board Minute, 23 June 1871. The arrangement for accepting Messrs. Minton's estimate for panelling the staircase in 'Fictile Vitrified Patent Process' for £1,400 was that the work would be carried out gradually as 'Mr. Moody completed the designs and as it may be possible to obtain competent students to do the work'.

taken in the terms of Pulham's tender for part of the Huxley Building.(1) Small contracts and long delivery periods appear to have benefitted both the manufacturers and the Department. Small potteries such as Blanchard or Pulham were not put under severe financial or organisational strain by having suddenly to expand production and the building worksat the Museum were less likely to be thrown into chaos by firms failing to supply on schedule. There is no evidence of the contruction of any stage of the Museum being delayed through the late delivery of terracotta of faience.(2)

Fowke and Sykes' characteristic combination of brick and terracotta first emerged in a project near to but not actually part of the Museum, and one that had been planned out before Sykes was appointed by Cole in the summer of 1859. The Gardens of the Royal Horticultural Society were laid out on the west side of Exhibition Road between 1859-61. With the Prince Consort being the President of the Society it was not surprising that Cole, Richard Redgrave and Fowke were involved in designing the Gardens. Whilst in Italy in the winter of 1858 Cole had obtained photographs of Italian arcaded architecture; they were shown to the Society and the architect, Sydney Smirke was commissioned to design a series of arcades to surround the gardens.(3) On the northern and central arcades executed to his designs, the arches themselves were of brick, the piers and bases of stone and the cornice, niches and capitals of terracotta.(4) The stone

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(1) Board Minute, 18 December 1867.

(2) The terracotta contracts for the Huxley Building had a penalty of 2½% reduction in payment for every week that delivery was overdue.

(3) F.H.W. Sheppard (1975), op.cit., pp. 125-6.

(4) W. Ames, Prince Albert and Victorian taste (Chapman & Hall, London 1967), p. 81.

carving was criticised as being artistically worthless. As for the terracotta, the frieze of masks and wreaths, the spandrels and the niches failed to relate to the overall form of the round arched arcade.

Fowke undertook the southern arcades and the conservatory, with greater success. The arcades of moulded brickwork were supported by tall terracotta columns, designed by Sykes. The columns consisted of two spirally moulded sections divided by a ring and topped with a variety of capitals, of Ionic, Corinthian and even stiff-leaf design. Acclaimed for their form and detail modelling and proved to have considerable strength, the design of the columns became a hallmark of Sykes' subsequent work on the Museum.(1)

<u>The Use of Terracotta and Faience in the Victoria and Albert Museum.</u>

Fowke submitted a proposal for the completion of the Museum in 1860 which would have presented a symmetrical south frontage to Cromwell Road. It was non-committal as regards materials but Fowke is supposed to have been influenced by Sykes in deciding to use terracotta rather than Portland stone. This 1860 plan was to be subsequently altered and rejected when less than half complete. However in March 1862 construction started on the first stage of a range which faced

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(1) Science and Art Department, Ninth Report (HMSO, London 1862). App. Q p. 125. The columns were tested in 1861 for crushing strength in a specially constructed press; the results were pronounced most successful.

the Sheepshanks Gallery and provided residences for the Museum officials. It was the first part of the Museum to use Fowke and Sykes' combination of red brick and grey terracotta and defined an architectural style that was maintained when Fowke's plan was rearranged so that this block formed the west side of a quadrangle.(1)

The frontage to what became the quadrangle demonstrated what a lively and stylish facade could be created out of mixing brick and terracotta within a Rundbogenstil interpretation of Renaissance motifs. The combination of the two ceramic materials was highly flexible, evinced by the fact that the design was essentially a re-ordering of components used in the Horticultural Society Garden; the pilasters and running friezes were derived from Smirke's arcades while the balustrades, spiral columns and first floor arches related to Fowke's work. (Fig. 2.5).

The second floor moulded window surrounds and the cornice were new designs, as were the square columns to the ground floor windows. These show Sykes' terracotta modelling at its most expressive. Each surface was divided into framed panels, which were filled with a cherub, animal or plant form. The putti were highly animated without being over-sentimental; standing tightly in each recess, they appear collectively to be supporting the lintels. Sykes

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(1) The north side of the quadrangle was completed in 1866, the south, library range in 1884 and the east side in 1901. The south and east ranges differ mainly in using a more orange colour of terracotta, supplied by Doulton.

Fig. 2.5. Ground and first floor windows, Residences, Victoria and Albert Museum, London, by F. Fowke and G. Sykes, 1862-3 (Blanchard).

modelled his putti in four different poses, which, when mixed with a range of animals and plants, provided sufficient variety to disguise the repetition of individual designs. (Fig. 2.6)

The 'Terracotta building' was greatly admired so it is not surprising that the formula was developed on the north side of the quadrangle, begun in May 1864.(1) Intended to be the centre piece of Fowke's design for the completed museum and housing the lecture theatre, the central portion was given an additional storey and the decoration made more impressive in its scale and richness. The use of stone was completely avoided, and the terracotta was juxtaposed with patterned brickwork, panels of majolica and mosaic, and runs or ironwork cresting.(2)

The design set intricate detail against an overall grandeur. The massive doors were recessed in a terracotta surround incorporating two majolica panels. The balcony above was supported by consoles, three feet in depth. The six columns supporting the arches above the balcony were originally to have been made of red granite. After the stone had been delivered, Fowke decided to substitute terracotta.(3) The resulting 'Ages of Man' columns were each formed of six drums, three fluted with a bough winding over the surface, and three modelled with figures portraying the divisions of

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(1) Cole diary, 29 September 1863.

(2) Stone was used on the Official Residences for the plinth, window sills and projecting portion of the cornice.

(3) J. Physick (1982), op.cit., p. 114.

Fig. 2.6 Cherub in decorations of ground floor windows, Residences, Victoria and Albert Museum, designed by G. Sykes, 1862-3 (Blanchard).

man's life; childhood, manhood and old age. But even here the designs were repeated, ten designs providing for eighteen drums. These groups, especially those representing old age, with stooping figures clustered together, presented a vivid and purely sculptural quality.[1] (Fig. 2.7).

Sykes died before all the decorations for the lecture front had been designed let alone modelled and made. Gamble and Townroe were left to work from a series of slight sketches for most of the terracotta and faience other than the columns; however their work remains remarkably true to the style and quality of Sykes' work. The three arches supported by the 'Ages of Man' columns were lined with majolica tiles and mosaic roundels were set in majolica spandrels within the blind arches. Above, the second floor fenestration was made up of squat columns and arches. The cornice frieze alternated shells and horns with putti crouching at the top of the projecting brick pilasters. Gamble's modelling created deep and vigorous forms that could easily be appreciated three floors down at ground level. The tympanum was decorated with mosaic made by the Museum's mosaic class. The theme was the Great Exhibition's role in uniting the arts and sciences.

The provision of sculpture for the skyline of the lecture theatre block was first considered in 1863 but it was not until five years later that the arrangement was finalised. Gamble

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(1) The columns were made by Blanchard in a relatively short period, eight weeks and at a cost of £228. J. Physick (1982), op.cit., p. 116.

Fig. 2.7. Decorations on south facade of the Lecture Theatre building, Victoria and Albert Museum, by F. Fowke and decorative artists, 1864-6. 'Ages of Man', columns designed by G. Sykes (Blanchard), 'Science and Art' panels above doorway designed by J. Gamble and R. Townroe (Minton Hollins).

modelled the base of the central flagstaff but the two groups flanking the pediment were designed by Doulton's artist, Percival Ball and executed at their works. The comparison is instructive. The rounded lifeless figures and yellowness of Doulton's terracotta is unattractively discordant against the leaner modelling by the South Kensington artists and the sandy-grey tone of Blanchard's material. (Fig. 2.8).

Sykes died before the decorations had been made and fixed to the lecture front. In November 1865, just a month before his own death, Fowke made a sketch elevation for the Huxley Building. This block, sited on the western edge of the Museum site facing Exhibition Road, was planned to house a School of Naval Architecture and Marine Engineering. Cole, Scott and Richard Redgrave developed the design and construction commenced in 1867. Six 'Ages of Man' drum columns were arranged into a ground floor arcade and panels of putti formed the mullions for the first and second floor windows.[1] The top floor was given a new arcade design by Gamble; it is most notable for being entirely clad with terracotta blocks, with the effect that the colour contrast of brick and terracotta was replaced by a uniformity that projected the decorative detailing into stronger relief. The third floor of the Huxley building was the first example of a complete facing in terracotta being used within the framework of the Rundbogenstil. Within a year of completion in 1872 its example was being taken up by

(1) J. Physick (1982), op.cit., pp. 148-9

Fig. 2.8 Cornice of south facade of Lecture Theatre building, Victoria and Albert Museum, 1864-70. Cornice designed by G. Sykes (Blanchard), 'Instruction' sculptural group designed by P. Ball (Doulton).

Fig. 2.9. Figures and 'Science and Art' monogram in dado of the Ceramic Staircase, Victoria and Albert Museum, designed by F. W. Moody, 1865-71 (Minton Hollins).

the Natural History Museum on the other side of Exhibition Road.

The only interior use of terracotta in the Victoria and Albert Museum was for the balconies high up the walls of the cast courts, modelled by the students under Moody's supervision.(1) But faience was used for several rooms with a flamboyance that outshone any of the exterior decorations. In the faience installed in the Centre Refreshment Room, the Ceramic Gallery and the Ceramic Staircase it is possible to observe how the South Kensington style reached a high point of flamboyance but with the effect of provoking a degree of criticism that can only have furthered the reaction against such decorative richness.

The Centre Refreshment Room and the Ceramic Gallery were virtually contemporary, being constructed in 1867-8. The ceramics for both depended in their design on drawings produced by Sykes which were developed and augmented by Gamble and Townroe. Minton Hollins, Maw, and Gibbs and Canning were responsible for their execution. Faience was an appropriate material to use for decorating the Ceramics Gallery and was chosen for the Refreshment Room partly because it had been specified that washable materials should be employed. Sykes had suggested the use of majolica columns and Gamble designed and modelled those installed in both the Gallery and the Refreshment Room. Each column comprised a

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(1) F. H. W. Sheppard (1975) op.cit., p. 114.

drum bearing the name of an important ceramicist, with the section above being clad in a diamond pattern and surmounted by a composite capital. The Refreshment Room was also given majolica friezes, mirror surrounds and panels, and a rich variety of decorative tiling. The critics were concerned at the highly florid effect. The Building News considered that the Refreshment lacked 'harmony and repose' and referred to 'sham columns in a casing of crockery built up round a brick core'.(1) The columns in the Ceramic Gallery were removed in the Edwardian period.

The decoration of the Ceramic Staircase roused even stronger criticism. Although the carcass had been completed in 1865 Sykes had not drawn any designs for the staircase. They were prepared by Frank Moody who also supervised the modelling. Panels of 'vitrified ceramic painting' in the form of hexagonal tesserae provided yet more illustrations of science and art. Below the dado a form of faience termed Della Robbia ware was modelled into figures and Renaissance forms. The figures had to be grossly distorted in posture to fit the sloping panels while the modelling was heavier than in any of Sykes' work. (Fig. 2.9). The decorationswere only completed in 1871 and were poorly received by most of the critics.(2)

The Royal Albert Hall

It was also in 1871 that the Royal Albert Hall was completed and opened. Like the adjacent Gardens of the Royal Horticultural Society, the Hall was not initiated by the

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(1) Building News, 19, 1870, p. 55.

(2) J. Physick (1982), op. cit., p. 127.

Department of Science and Art but did largely owe its design to Cole, his engineer-designer and the decorative artists.(1) The design and construction of the Hall marks the contemporary transition that was occurring in the use of terracotta. In contrast to the Museum, the terracotta dressings were simply modelled but brightly coloured, they were made by one manufacturer and were supplied to be installed within the main building programme, between 1867-71.

Cole was responsible for the initial plans for a large music hall at South Kensington and designs were submitted by architects in late 1862. It was Fowke who came to gain control over the design; during the spring of 1865 he and Cole were wavering between using a Venetian style or 'two new systems for outside the hall - a Coliseum treatment and Bramante'.(2)

When Fowke died in December 1865 Cole did not appoint a successor, since he considered the design sufficiently developed for a draughtsman to execute it. Scott was in charge of the Departmental drawing office from January 1866 so effectively directed the design work on the Hall. He kept the elliptical plan but reworked much of the exterior. An undated drawing, probably made by John Liddell in 1866, shows the proposed elevation as being comparable to the facades of the Museum quadrangle; behind a balustrade the first floor windows were set in round arches divided by a slender columns.

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(1) 14 November 1871, Maw and Gibbs and Canning were sent models of white glazed soffits that were required for the Huxley Building. Maw quoted £1.10s.6d each and Gibbs and Canning 6s.6d.

(2) F. H. W. Sheppard (1975), op.cit., p. 182.

Fowke's Rundbogenstil had been reworked into a more classical form in Scott's final design, presented in June 1866. In April, Cole and Scott had agreed on using more Roman forms, based on the Pula Amphitheatre at Istria.(1) Cole then travelled to France, Switzerland and northern Italy, revisiting the Hospital in Milan and the Certosa di Pavia, but also considering the Amphitheatre at Nimes.(2) Cole was accompanied for part of this tour by the decorative artist who was to design and model most of the terracotta, Reuben Townroe. The artist and his wife remained at Pavia to make various drawings.

Scott's design incorporated the new ideas inspired by this tour. Within the form of an amphitheatre the wall surface was banded into storeys by massive projecting cornices. These cornices, the window surrounds, the pilasters and the entrance arches were made more French than Italian in their form and detailing. (Fig. 2.10).

All these dressings were executed in sand coloured terracotta, while the pink brickwork was kept absolutely plain. The South Kensington team obviously were seeking to extend the architectural use of terracotta in the hall. Cole

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(1) 'Designs for hall settled with Scott to take the Pola (sic) and to ornament it'. Cole diary, 2 April 1866.

(2) Cole diary, 21, 24 and 25 May 1866.

Fig. 2.10. Royal Albert Hall, London, by H. Scott and R. Townroe, 1867-71 (Terracotta by Gibbs and Canning and mosaic frieze by Minton Hollins).

spent considerable time, in 1865 and 1866, discussing the material and visiting various manufacturers.[1]

As with the Museum, the Department of Science and Art undertook all the detail design and modelling. Gilbert Redgrave and Thomas Verity worked under Scott's supervision in executing the drawings. Townroe designed and modelled, or supervised the modelling, of the terracotta. Gamble, fully occupied with the Huxley Building, appears to have primarily contributed advice.[2]

With Blanchard having financial problems and now producing poorer quality terracotta, this large contract, or group of contracts, became open to the other manufacturers. It is not known how Gibbs and Canning, who had only supplied a small amount of majolica for the Museum, and had never supplied any large contracts for terracotta came to exclude all the other firms. Scott employed the extra labour force required at Tamworth to make the 80,000 blocks for the Hall.[3] The Department may have been anxious to extend its control to the moulding and firing and wished one firm to supply all the terracotta so that the distinctive colour should be maintained right round the building. The moulders were instructed to leave any roughness on the blocks rather than to smooth them to an even finish.[4]

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(1) Cole diary, 20, 23 and 26 June 1866. Within one week Cole had to show and discuss the South Kensington terracotta with three visitors.

(2) F. H. W. Sheppard, (1975), op.cit., p. 193.

(3) Wheeler, Choice (1871), op.cit., p. 193.

(4) F. H. W. Sheppard, (1975), op.cit., p. 189.

The work was reviewed as 'one mass of enrichment, the general effect of which is rich and pleasing'.(1) With dentilled cornices and balustrades running round the building and all the round arched windows being divided by pilasters of the same design, the value of the terracotta dressings became far more architectural than sculptural.

From a distance the terracotta served to articulate the bulk of the smooth brickwork. Close to, the boisterousness of Sykes' design had been largely replaced by traditional classical detailing; only a greater naturalism in the vegetation set the pressings apart from competent stonework.(2) The repetition of architectural components was ruthlessly efficient. The same square headed window surround was repeated no less than 63 times and the round arched window a floor above, 58 times. The only figurative detailing was the range of animals and birds, which along with objects such as a harp and a hour glass, made up twenty different designs to fill small heraldic plaques. The effect would have been stultifying were it not for the curve created by the elliptical plan. This curve also disguised the considerable warpage of many of the blocks.

It was originally intended that the frieze running round the building should be modelled in relief. Instead it followed the example of the panel on the lecture front of the Museum,

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(1) Building News, 16, 1869, p. 475.

(2) The sharpness of the modelling has been impaired recently by a disastrous abrasive cleaning of the Hall.

being executed in the same material, terracotta tesserae, and adopting the same theme, that of the 1851 Exhibition. The design consisted of buff figures, outlined in black on a brown background. Ladies of the Museum's mosaic class were employed by Minton Hollins to make the 800 individual slabs.

The seven artists who contributed to the design of the frieze were paid a total of only £782. The use of students for making the tesserae meant that the total cost of the frieze was only £4,426. The hall was opened in March 1871 and the total cost only slightly exceeded the estimate of £200,000.(1)

It was a source of considerable pride to Cole and some chagrin to his critics that the Hall and the Museum were built at such low cost. Up to 1870, work on the Museum, excluding the large courts and galleries, had cost between 6d and 1s. per cubic foot. This was a third cheaper than George Gilbert Scotts' Foreign Office and almost three times cheaper than Pugin and Barry's House of Parliament.(2)

The repetitive use of terracotta and the involvement of the art school students were recognised as helping to reduce the level of expediture. The terracotta figures and the mosaics on the lecture theatre front of the Museum had cost only £1,286. However the decorative artists on the one hand and the Treasury on the other became increasingly dissat-

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(1) F. H. W. Sheppard (1975), op.cit., p.190.

(2) Memorandum on the proposed plan for completing the new buildings for the South Kensington Museum, 26 January 1870.

isfied with the way that the building programmes at South Kensington were organised. It had been originally intended that executing decorative work over an extended period would enable a more efficient use to be made of funds; however the length of time that projects came to require by the late 1860s and the failure to estimate costs accurately made budgetting almost impossible. Artists such as Stannus and Moody became embittered against the Department when they had to work for several years without payment.

Around 1870 the Office of Works gained control of the Department of Science and Art. The Office forced Henry Scott to disband most of the permanent labour force that had been responsible for the building work, and cut off the funding for the expansion for the Museum's accommodation. During the decade from Cole's retirement until Scott's death in 1883 the plans for the development of the Museum collapsed. The only use of terracotta on the Museum during this period was on the facade of the art library range which formed the south side of the quadrangle. Built between 1878-81 the terracotta dressings copied the designs of Fowke and Sykes for the west and north sides of the quadrangle. Even Cole was forced to comment that the material supplied by Doulton was of poor quality.(1) Doulton supplied more terracotta to the same designs for the eastern side of the quandrangle which was erected in 1901.

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(1) Cole diary, 8 September 1881.

At the end of the nineteenth century the Museum consciously turned away from using terracotta for the long planned main front to Cromwell Road. The architectural competition of 1891 for a south range in front of the quadrangle did not specify what material should be employed. Four of the eight entries, including the winning design by Aston Webb, incorporated terracotta. However stone had been substituted by the time that construction commenced in 1899.

The building programme at South Kensington achieved a distinctive though controversial approach to the use of architectural ceramics. The materials had been presented as being progressive, artistic and economical. On the other hand,by being essentially Renaissance in style and sculptural in effect,the Museum buildings were not universally appreciated. The loose Rundbogenstil architecture, with much of the decoration obviously applied rather than being part of the building structure, ran counter to the aestetic morals of the Gothic Revival. George Street, one of the leading Goths, equated Cole's Department with 'manufactories of architectural drawings'. Street emphasised to Cole that a designer should be consistent in his choice of style and then be responsible for the whole of the building to the last detail.(1)

Cole's belligerent condemnation of architects for their wastefulness and inability to produce building accomm-

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(1) Letter from G. E. Street to H. Cole, 19 December 1865.

odation to a specified cost, can only have alienated the profession further. Contemporary attitudes towards terracotta and faience became bound up in the prejudices expressed for and against the work of Cole and the Department of Science and Art. Furthermore many architects and critics must have been aware that the artistry of the decorations largely followed from the unique circumstances prevailing at South Kensington and in particular the presence of the decorative artists from Sheffield and the availability of the free labour of the Art School pupils.

The Wedgwood Institute, Burslem.

The values and controversy bound up in the use of architectural ceramics on the Victoria and Albert Museum and the Albert Hall were highlighted in one provincial building, the Wedgwood Institute in Burslem, Staffordshire. Housing a museum, two libraries and a classroom, it was intended to be a centre for 'Art and Science', on the historical inspiration of Josiah Wedgwood. The realisation of this comparitively small project took fourteen years between 1859-73, spanning the main period of the use of architectural ceramics at South Kensington. During this time it became thoroughly imbued with the South Kensington philosophy of art education. It also brought into debate the same issues of the relation between architecture and the associated arts, of the autonomy of the architect in terms of responsibility for a design, and of the value of ceramics in architectural decoration. The architecture of the finished building was a magnificent swansong to the revival of the Italian Renaissance style and the ideals that it represented.

The scheme was administered and, in practice, mismanaged by the Wedgwood Memorial Committee. They abandoned the designs shortlisted from a competition in 1860 as not suiting their instructions. The winner of the second competition, G. B. Nichols, saw his design mercilessly altered in the cause of ceramic decoration.(1)

The main advocate of architectural ceramics for the Institute was Alexander Beresford Hope. The grandson of Thomas Hope, the neo-classical designer and collector, he was a leading figure in the Gothic Revival and in efforts to revive the architectural crafts.(2) In March 1863 he offered a prize of £25 for a design for introducing ceramics into the facade of the Wedgwood Institute. The justification that he presented, at a meeting in Burslem, conveyed the mixture of historicism, nationalism and the will to unite artistic and technical skill, which typically motivated the application of ceramics to architectural decoration:

> He should like that monument not merely to be a record of Wedgwood but a fructifying germ which would develop to an extent beyond what Wedgwood ever dreamed. Their manufacturers had developed art to a very useful extent. Vases, statuettes, and the like, were produced in the Potteries with a perfection which made Europe aghast and envious. But there was another more solid and more eternal sort of pottery he should like to see taken up in this district, and that was architectural pottery. He was not propounding any vague dream of his own. If they travelled in Italy they would see pottery architecture there, of which they had no idea in these northern climes, but which they ought to have, in as much as the potters' ware was more fit to stand the atmosphere of manufacturing districts than any kind of stone.(3)

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(1) The Potteries School of Art built at Stoke (James Murray 1858-60) had already made a minor use of terracotta in its Italianate design.

(2) Art Journal, 3 new series, 1864, p. 249. He had developed the Architectural Museum jointly with Gilbert Scott.

(3) Builder, 21, 1863, p. 185.

Hope complimented Nichols on his plan and endeavoured to explain how giving the building 'a decorative coating' was not disparaging the architect's role. Rightly the Builder recognised the implied insult to Nichols and to the profession, and expressed the fear that Beresford Hope's proposal would set an unwelcome precedent.

The Department of Science and Art lent its full support to the scheme. J. C. Robinson, the Victoria and Albert Museum's art referee, joined Beresford Hope and Matthew Digby Wyatt in judging the competition for designing the facade. The scheme chosen was by Robert Edgar and John Lockwood Kipling. Kipling had been a student at Stoke Art School and had gained a scholarship to study at South Kensington.(1) Edgar and Kipling proposed a polychromatic materpiece of decorated brickwork, tiles, terracotta mouldings and panels, mosaic and Della Robbia ware in a necessarily loose quattrocento style. (Fig. 2.11).

Two national scholars from the Potteries School of Art, Rowland James Morris and William Wright, were sent to South

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(1) E. Rowley, The origins of the Wedgwood Memorial Institute, Burslem. (B. A. dissertation, Open University 1978). This study draws on both the committee minute book and contemporary reports on the building. Burslem Minute Book (1861-73), op.cit., 5 April 1864 Edgar and Kipling's payment was determined: 'Mr. Edgar's renumeration to be confined to the percentage upon the ceramic features which was to be limited to £1,000 in excess of the plain building. He / or rather Edgar and Kipling to receive 5% for designing and superintending the execution of this department; and to be paid trade prices either by the committee or the manufacturers for any modelling they might be required to execute'.

Aston University

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Fig. 2.11. Wedgwood Memorial Institute, Burslem, Staffordshire, by R. Edgar, and R.J. Morris and W. Wright, 1863-73 (Blanchard and Blashfield) Source: Architect, 6, 1869, p. 204.

Kensington to undertake the modelling work, supported by a grant of £500 from the Council of Education.[1] They were joined by J. F. Marsh, a modeller with Messrs. W. Davenport of Burslem. While Morris designed and modelled the terracotta panels portraying the months of the year, yet another student, Matthew Elden, from Stoke Art School, designed those illustrating the industrial processes of the pottery industry.

The main architect, Nichols, did not keep his position long enough to have to co-ordinate this complex programme of decoration. Before contruction commenced, he fell into a dispute concerning the foundations with the Building Committee. He was dismissed and in March 1866 Robert Edgar took over control.[2] Further problems arose as a consequence of Beresford Hope's proposal for a decorative ceramic facade, the additional costs almost leading to the abandoning of the whole project. An extra penny rate and an art exhibition helped to raise the necessary funds and a concert given in the town hall paid for one of the 'months' panels.[3]

Blanchard executed the terracotta mouldings and the 'months' panels, designed by Rowland Morris. Although in financial difficulties during this period, Blanchard was obviously still able to undertake small contracts to a high standard. Blashfield supplied the 'process' panels, at £6 each. The low price of £6 was a consequence of the Stamford

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(1) Burslem Minute Book (1861-73), op.cit., 10 January 1865.

(2) Burslem Minute Book (1861-73), op.cit., 16 March 1866.

(3) Burslem Minute Book (1861-73), op.cit., 4 January 1869.

firm not having to undertake the modelling. It was the Committee who incurred the additional expense of the panels being sent across the country in various states of manufacture. The clay was set in a wooden frame with a cover, transported from Stamford to South Kensington, modelled, returned to Stamford for firing and then sent across to Burslem.(1)

While the sculptural groups of modellers and pressers designed by Elden are rather conventional and static, Morris' crouched figures overflow their frames with the same animation as Sykes' panels in South Kensington. The light-hearted tone of the Museum putti was replaced by a more earnest Renaissance style. The designs were taken from 'The triumph of Julius Caesar' by Andrea Mantegna. The breadth of their composition was credited to the influence of the Headmaster of the Potteries Art School, J. Buchett and the Director of the ceramic section, Felix Miller.(2) These panels confirm that Steven's interpretation of Renaissance sculpture had an influence beyond Sykes and his Sheffield contemporaries, and extended through South Kensington, to the pupils of other art schools.

The Use of Terracotta in mid-Victorian Commercial and Public Architecture.

Away from the ideology and free labour force of the Museums and Art Schools there was no pressing case, on either economic or artistic grounds, for the architectural

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(1) C. Barry (1867-8), op.cit., p. 264.

(2) Art Journal, 10, 1871, pp. 91-2.

employment of terracotta. During the 1850s, sixties and most of the seventies its use was both restricted and restrained in effect. Apart from the Victoria and Albert Museum the only exterior use of faience was for small plaques and roundels and for ornamental memorials and fountains.

The interest of the aristocracy in employing terracotta ornaments in their gardens and on their houses began to wane in the 1860s though not without the execution of a few particularly grandiose schemes. In 1867 Lord Northampton commissioned Matthew Digby Wyatt to design an extensive series of fountains, pedestals and balustrades and a set of ornamental gate-piers for the grounds of Castle Ashby. They were made by Blashfield.(1) Three years earlier the Stamford firm had supplied a thirteen foot high terracotta portico for the London house of Viscount Strongford.(2)

The range of Blashfield and Digby Wyatt's interests in ceramics pioneered the way in which terracotta typically became used in the 1860s. They had a mutual involvement in tiles as much as terracotta during the middle years of the nineteenth century.(3) Blashfield had worked at Minton until

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(1) Builder, 26, 1868, pp. 44-5.

(2) Building News, 11, 1864, p. 240.

(3) M. H. Floyd, 'A terracotta cornerstone for Copley Square. Museum of Fine Arts, Boston 1870-76, by Sturgis and Brigham', Journal of the Society of Architectural Historians, 32, 1975, pp. 83-103. Margaret Floyd emphasises the importance of the fifties tile revival in the subsequent acceptance of terracotta. She discerns a three stage technological development from the manufacture of tesserae for mosaic, the creation of encaustic tile flooring by Minton in 1845 and manufacture and use of three dimensional terracotta in the 1860s.

1845 and commissioned Digby Wyatt to draw Italian tile pavements. Wyatt, in turn, came to design in the sixties, both terracotta decorations for Blashfield and decorative tiling and majolica for Maw.(1)

Architects and builders generally adopted terracotta to achieve polychromatic effects in conjunction with decorative tiles, mosaics, stone and brick. Hitchcock referred to terracotta as being 'the small change of polychromy' to the high Victorian architect.(2) The decorative potential of all the other materials had been accepted in the 1840s or early fifties, both for secular and ecclesiastical use, and were widely used in Italianate architecture during the subsequent two decades. Typically red brickwork was patterned with white and black bricks, with several colours of stone being used for dressings. Tiles and mosaic were set in tympana, spandrels or in the cornice.

Terracotta became used in polychromatic designs in conjunction with these materials. An early commercial example was a warehouse and offices built in the city in 1864. Messrs Hunt and Crombie's premises still stand in Eastcheap. It was built largely of three colours of brick and Bath stone, in an Italianate style. (Fig. 2.12). The window columns, the cornice and a series of medallions were moulded in bright red terracotta, supplied by Blanchard.(3)

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(1) A magnificent tiled fireplace of his design and made by Maw was shown at the 1862 Exhibition.

(2) H. R. Hitchcock (1954), op.cit., p. 607.

(3) Builder, 22, 1864, pp. 62-3.

Fig. 2.12. Messrs. Hunt and Crombie's premises, Eastcheap, London, by Nettle and Sansom, 1864 (Blanchard)
Source: *Builder*, 26, 1868, pp. 44.

However the animals' heads and crests achieved none of the quality of Sykes' panels which were being pressed at the same works during the same period. (Fig. 2.13). Also in 1864, stone dressings were combined with a terracotta cornice, in the facade of 66 Bishopsgate Street, designed by Chatfield Clarke.(1)

The combination of brick, stone and terracotta was worked on a far larger scale in several examples of new building type, the station hotel. The Great Western Hotel at Paddington (P. C. Hardwick 1851-3) had set a stylistic example with its eclectic but Renaissance based design. With the incorporation of round arched windows, more balconies and even small domes and spires, this formula was to be adopted for most of the London terminii built over the next twenty years. The four station hotels dating to between 1864 and 1866, Charing Cross, Broad Street, Cannon Street and Blackfriars, all made use of terracotta.

E. M. Barry, the most successful of the hotel architects, designed the Charing Cross and Cannon Street Hotels (1864 and 1866). In both, Blanchard's terracotta was used for the more superficial details, such as the capitals, detached columns, bulustrades and finials. Barry had obviously seen the potential for some original and economical detailing. The forms on Charing Cross were criticised as being uncouth and having been introduced for the sake of novelty.(2) The terracotta

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(1) Builder, 22, 1864, pp. 62-3.

(2) Builder, 22, 1864, pp. 930-2. For example the Corinthian capitals were of a design that incorporated both a letter 'C' and a cross.

Aston University

Illustration removed for copyright restrictions

Fig. 2.13. Animals' heads in the cornice, Messrs. Hunt and Crombie's premises, by Nettle and Sansom, 1864 (Blanchard) Source: Builder, 26, 1868, pp. 45.

had not been intended to be recognised as such; all the materials including the Portland cement used for the running mouldings were a monotonous grey in colour, a reflection of the French rather than Italian derivation of the design.(1)

At Cannon Street the style became even more French, with transom and mullion windows rather than round arches in all but the top floor. More of the mouldings were made in artificial cement. Perhaps the most interesting features were Billing's patent terracotta chimney terminals with their ingenious side vents, located above the mansard roof.(2)

Charing Cross and Cannon Street were the 'West End' and 'City' terminii of the South-Eastern Railway. Blackfriars Station (1863-4) was the terminus of the London, Chatham and Dover; this and several other stations along the line were designed by Joseph Taylor Junior. He chose an Italianate style in red brick with bands of detailing in red and white terracotta. One week after the Builder had condemned the use of terracotta on Charing Cross, the Building News was equally critical of Blackfriars Station. The keystones and springers had simple abstract and flower patterns:

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(1) The facade has now been coated in cream and grey paint.

(2) Builder, 24, 1866, p. 763.

> These two designs, one sight of which would surely be sufficient are actually being used over again in the new station at Ludgate Hill. If this be the necessary result of employing terracotta in architecture; the sooner that material is given up the better. Stereotyped ornament may spare architects the trouble of thinking, but it destroys all the interest of their work.
> (1)

It was observed that the blocks were badly jointed and most of the red bands of terracotta were discoloured by green and yellow stains.

Such criticisms do not appear to have deterred other station designers.(2) The engineer for the North London Railway, W. Baker, used some of Cubitt's terracotta for decorative panels and other minor details in Broad Street Station (1865-6).(3)

Hotels served to extend the large scale use of terracotta outside London. At Scarborough the material was

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(1) Building News, 11, 1864, p. 955.

(2) In about 1880 window dressings of white terracotta were used in the rebuilding of Crewe Station. The use of architectural ceramics in railway stations dating to the 1890s is considered in Chapter 10.

(3) C. Barry (1867-8), op.cit., p. 272. There is a convenient list of manufacturers' major contracts. Cubitt: cornices and strings at Darleston Hall and some work on Darbyshire's Columbia Market. Blanchard: apart from the station hotels and the Victoria and Albert Museum there is the Star and Garter Hotel and the capitals for Chiefden House near Maidenhead. Blashfield: works in India and New Zealand, the Sun Fire Office at Charing Cross, Hall and Allen's new warehouse by St. Paul's, the Town Hall in Farnham, the New India Office for Digby Wyatt, and for Barry himself Holy Trinity Church in Barking and parapets for a railway viaduct in Dulwich. (This list excludes those considered in the main text).

combined with red brick and Yorkshire stone in the Grand Hotel (Cuthbert Brodrick 1863-7).[1] More exotically in Cairo, the Oriental Hotel Company shipped in arches, cornices and balustrades made by Blanchard to provide the Renaissance details for their new hotel. The walls were built primarily of local stone.[2]

In Egypt, terracotta was probably used because there were no local masons able to carve pilasters and scrollwork friezes. In the West Country it was more likely to have been the hardness of the building stones that led to the adoption of terracotta. For the Duke of Cornwall Hotel, built opposite the London and South Western Railway Station in Plymouth between 1865 and 1867 , a cream coloured material was used in an original and highly flamboyant style. Charles Foster Hayward specified limestone for the plinth and some of the dressings but the main visual contrast was created between the dark irregular granite and the incised and applied decoration on Blashfield's terracotta. Massive blocks were formed into projecting cornices and window arches of faintly Moorish outline. The chimney-stacks were a weighty combination of red brick and terracotta. Heavy cast-ironwork lined the roof line and the balconies.

The point had been reached where the wilful mixing and developing of motifs, in the search for originality and a

(1) This use of terracotta in Yorkshire may mark the emergence of the terracotta industry in Leeds.

(2) Builder, 27, 1869, pp. 925, 7.

distinctive use of terracotta, had carried eclecticism beyond the repertoire of established styles. It was commented of the Duke of Cornwall Hotel:

> The variety of material is nothing to the variety of design. Mr. Hayward, whatever he may be, is certainly not a man of one idea. Other men may be great in particular specialities - Mr. Hayward combines all Mr. Seddon's columnar Gothic, Mr. Jones' plaster ceilings and Captain Fowke's terracotta. (1)

In this design, the size, the applied rather than moulded form of the decoration, and the heavy styling of the individual blocks were a reflection of the taste of the manufacturer as much as that of the architect. The same traits appear in the largest contract that Blashfield supplied, for Dulwich College (1866-70). New Alleyn's College, as it was originally named, was the most publicised use of terracotta in the sixties, outside the buildings related to the art school movement. It was the first case of an architect proclaiming that he had designed a building round the use of terracotta, since Sharpe and his 'pot churches'.(2)

Charles Barry Junior sought, from the outset, to give a relevant architectural expression to the material. Having

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(1) Building News, 12, 1865, p. 575. There is a further description of the hotel in Building News, 14, 1867, p. 64.

(2) C. Barry (1867-8), op.cit., p. 263.

visited Verona, Vicenza, Pavia and Sienna in the 1840s he applied the historical example of the Italian Renaissance rather more directly than with the broadly emulative approach take by Cole, Fowke and Sykes.(1) The school was given round arched windows, arcades and cornices set in rusticated and decorative brickwork, within a completely symmetrical plan. The clock tower which appears to be derived from the tower of the Carmine di Pavia,(2) was originally intended to have been one of a pair rising above the schoolroom blocks. (Fig. 2.14).

The symmetry of the plan formed the basis of a heirarchical ordering of the architectural components. Three designs of surrounds for round arched and four for stilted windows made up the bulk of the facade with two enormous traceried windows lighting the central great hall. With only a restricted range of forms, the richness of decoration was precisely related to the status of each wing, of each floor and of even the different entrances to the College. (Fig. 2.15).

Barry went to great efforts to ensure that the efficiency of his design was maintained in its execution. The surviving drawings presented clearly the use of the different types of window, doorway or cornice. (Fig. 2.16). He stated where moulds could be adapted rather than new ones made for particular

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(1) His interest in terracotta and the Italian Renaissance may stem from his friendship with Digby Wyatt. This link might also explain his consistent use of Blashfield's material.

(2) Illustrated by Lewis Gruner in: The terracotta architecture of northern Italy (J. Murray, London 1867).

Fig. 2.14 Entrance and tower, Dulwich College, London, by C. Barry (Junior), 1866-70 (Blashfield).

Fig. 2.15. Round arched first-floor windows, Dulwich College, by C. Barry (Junior), 1866-70 (Blashfield).

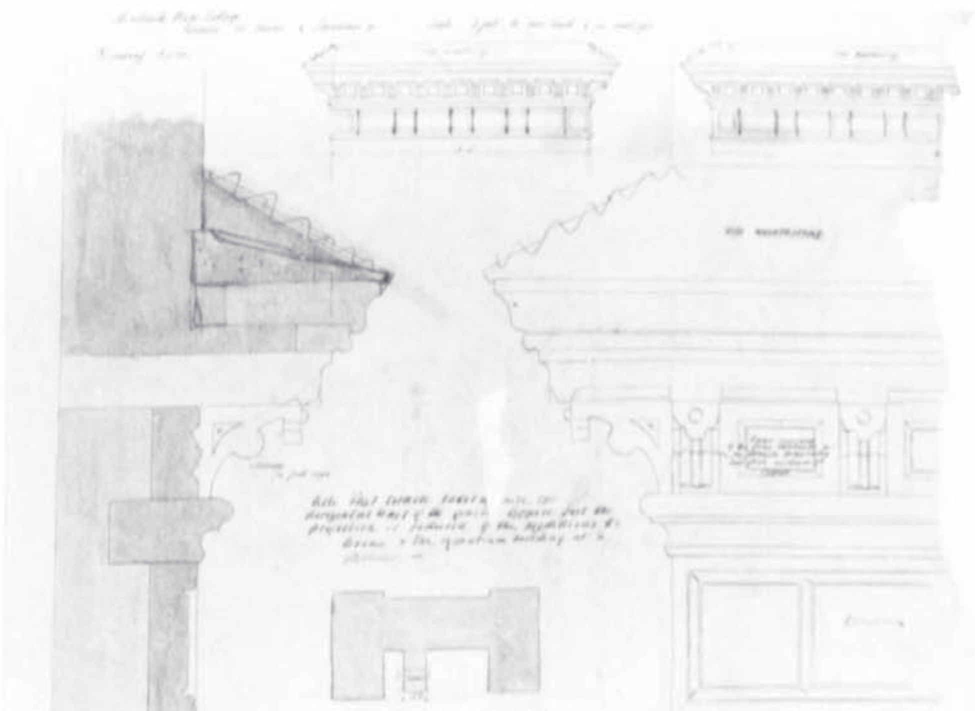

Fig. 2.16. Drawing for cornice of tower and staircase, Dulwich College, by C. Barry (Junior), 1866-70 (Blashfield).

blocks. Detail problems were resolved on visits to Blashfield's works at Stamford.[1]

This absolute control did not extend to the sculptural medallions and figures, or the surfaces covered in natural ornament. The architect only supplied sketches of the Renaissance heads to be set in the window tympana, or of the bearded men for the cornice. (Fig. 2.17). It seems as though Barry, like Street on the Law Courts, was a frequent visitor to the modellers' shop. He advised and possibly altered the models, but was not primarily responsible for their creation.[2] Unfortunately his sketch designs suggest little understanding of sculptural art and Blashfield's modelling is competent but hardly inspired.

How the modelling impresses is in the sheer intricacy of some of the detailing. In the hood to the main doorway, there are birds nestling in leaves and twigs which are surrounded by flowers and shells, all modelled in full, naturalistic relief. None of this was achieved by modelling in the sculptural tradition of either building up or cutting away the clay. Undercut detail was achieved by the application of separately modelled pieces to the block while in its plastic state.[3]

Henry Cole recorded on visiting Dulwich: 'Interesting but far less stylish than our own brick and terracotta'.[4]

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(1) Dulwich College retain the highly informative set of working drawings that Barry produced.

(2) C. Barry (1867-8), op.cit., p. 265.

(3) C. Barry (1867-8), ibid. He considered that this undercutting would create brilliant effects of light and shade.

(4) Cole diary, 20 March 1870.

Fig. 2.17. *Sketch drawing for head in upper cornice of tower, Dulwich College, by C. Barry (Junior), 1866-70 (Blashfield).*

His conceited comment truthfully reflects that, in one sense, Barry had failed in his architectural experiment. By controlling the design and execution of the building, from the plan to the form of each detail, he had produced a totally coherent architectural composition, and one that fully exploited the decorative potential of terracotta. However, while bridging the gulf between construction and decoration, neither the architect or Blashfield's modellers seem to have been capable of realising the sculptural artistry of which the material was capable.

By the end of the sixties most of the ethical and practical problems of using terracotta in architecture had been resolved within the context of the broad stylistic range from the Rundbogenstil through to the Franco-Italian Renaissance. Even if interpretations were very loose, the justification for using terracotta still partly depended on the association between historic usage and revived styles, and largely drew on the Italian quattrocento. The new interest in the Renaissance of the Low Countries and the English 'Queen Anne' did not extend the historical precedent; because the material had been so little used in these periods and countries, for several years, they served only to confuse further the progress of terracotta architecture. The majority of the new buildings reported in the journals as using terracotta were still commercial premises in London, combining different materials within a loosely Italianate style. Some of the terracotta details are sufficiently mundane to have possibly been chosen from a catalogue rather than designed by the architect.(1)

Henry King's premises in Cornwall (Edward l'Anson 1871) had four storeys of Venetian windows above the ground floor. They were entirely made o Cubitt's terracotta.(2) Messrs Hayter and Hayter's premises in Victoria Street (E. Ellis 1874) was comparable in style but was given an arcaded ground floor and an incongruous pediment above the cornice. The clutter created by the combination of still-leaf capitals, spiral balusters, scrollwork and diamond-pattern surfaces could only have been exacerbated by being executed in a mixture of brick, Portland stone, Ransome's patent stone and terracotta.(3) Such a mongrel combination of materials and styles was to appear in the West End in 1874,(4) and the provinces two years later.(5)

Only the building for Civil Service Supply Association, on the corner of Bedford Street and the Strand, showed real control in its composition and use of materials. The Bradford architects, Lockwood and Mawson adopted the curious combination of brick, terracotta and Mansfield stone of a matching red colour, in an ornate Italian Renaissance design. The stone was used for the main structural members while the terracotta carried the festoons in fruit and flowers and candelabra decorations.

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(1) The number of firms offering architectural details from stock increased during the 1860s.

(2) Builder, 29, 1871, pp. 187-9.

(3) Builder, 32, 1874, pp. 417-9.

(4) Messrs. Cadby's Manufactory, Hammersmith Road, West Kensington (Lewis Isaacs, 1874), has panels of terracotta over the first floor windows. Builder, 32, 1874, pp. 1073-5.

(4) Masonic Hall, Northampton (E.F. Law, 1876), Builder, 34, 1876, p. 900.

These designs, by combining terracotta with stone but without any polychromatic contrasts, prevented any expression of the colour and texture of the architecural ceramics. This approach of only using terracotta for non-structural decoration turned out to be an architectural dead end, for the strength of the material had already been proven in tests carried out by the South Kensington team.

The Natural History Museum.

This one building brought to a climax the advances that had been made in the manufacture and use of terracotta by the 1870s. It also demonstrated the means of expression, if not the precise styles, that were to dominate its architectural use for the rest of the century.(1) The architect of the Natural History Museum, Alfred Waterhouse, was of a younger generation than those who had been using terracotta in the sixties. On his travels he had been more impressed by north German than Italian Gothic; similarly in his designs he never used a complex structural polychromy, preferring a simple combination of materials.(2)

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(1) The history and architecture of the Museum is lucidly covered in M. Girouard, Alfred Waterhouse and the Natural History Museum (British Museum, Natural History, London 1981).

(2) S. A. Smith, Alfred Waterhouse (Ph.D., thesis, Courtauld Institute of Art 1970), p. 79.

Waterhouse had used red brick for a school in Reading commenced in 1865. For the town's Municipal Buildings, dating to 1874, red and blue bricks were combined in a north German Gothic design.(1) Although a complete facing of stone had been used for the Manchester Town Hall, commenced in 1868, part of the interior was lined with terracotta, in the same buff and blue-grey colours that were chosen for the Natural History Museum.

It was in 1868 that Waterhouse submitted his first drawings for the Natural History Museum. He had been appointed in February 1866 to execute Fowke's designs,(2) but a change both in government and in the accommodation requirements gave him the freedom to develop his own proposals. The competition won by Fowke for designing the Natural History Museum had called for a general description of the materials to be used. Fowke gave two alternatives: stone embellished by polished granite and white terracotta, or the already well-tried combination of red brick and white and red terracotta, into which polished granite or marble could be introduced.(3)

Fowke had been intending to re-work his completion plan for the Victoria and Albert Museum. Pairs of round arched windows would have been divided by friezes and balustrades in the manner of the quadrangle. Small towers, cupolas and

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(1) Builder, 32, 1874, p. 864. The extension to the town hall by Thomas Lainson has terracotta decorations made by Gunton of Costessey. Builder, 36, 1878, p. 437.

(2) F.H.W. Sheppard (1975), op.cit., p. 203, Fowke had won an open competition announced in January 1864.

(3) Works 17-16/1 Documents on the various competition entries.

a central dome would have created a later Renaissance, more Michaelangelesque effect.(1) Being called upon to execute Fowke's design, Waterhouse was faced with employing a material that he had not used before on such a significant scale. His decision to concentrate on, rather than abandon, terracotta reflected both its logicality for a new museum in South Kensington and a personal interest in architectural ceramics.

In submitting his design to the First Commissioner, Waterhouse said that terracotta would be harder, more durable and less expensive than stone, and better for colour.(2) He decided on a more Romanesque than Renaissance variation of the Rundbogenstil, with the round arched windows deeply recessed behind lines of columns and mouldings. (Fig. 2.18). The Romanesque was also better suited to Professor Owen's suggestion that the facade should be decorated with zoological figures.(3) (Fig. 2.19). Although the style had no historical association with terracotta, Waterhouse considered that its spiral and other surface patterning would help to obscure the warpage that usually distorted large ceramic blocks.

The decision to face the main front completely with terracotta, rather than to use it as a dressing to brickwork, probably followed from Waterhouse's appreciation of the value of washable surfaces. It also accorded with the approach being more cautiously adopted by Cole's engineers and

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(1) His design was worked out with the aid of the architectural office in the Science and Art Department.

(2) Works 17-17/2 Notes from H. A. Hunt to the Secretary, 22 October 1881.

(3) Works 17-17/2 ibid.

Fig. 2.18. Entrance archway, Natural History Museum, London, by A. Waterhouse, 1873-81 (Gibbs and Canning).

Fig. 2.19. Animal figures on the cornice of the west wing, Natural History Museum, by A. Waterhouse, 1873-81 (Gibbs and Canning).

decorative artists. They had used terracotta successfully as a complete ashlar facing on the ground floor of the Albert Hall and for the top floor of the Huxley Building. Large pieces were now made in the form of chambered blocks, open at the back, that could be fired to a structural strength and to resist the weather. This development had overcome the problem of blocks not being completely burnt, as experienced by Sharpe with his churches at Lever Bridge and Platt. The argument used by the Ecclesiologists in the 1840s, that terracotta should not rival the form and status of stone would have been held in little regard by Waterhouse. He was never to be hidebound by such historicist restrictions, and had the artistic ability to ensure that this use of architectural ceramics had its own rather than an imitative character.[1]

A major public building with a facade 680 feet long and containing eleven large galleries, built in one programme, and with both the main exterior and interior surfaces completely faced with terracotta, inevitably introduced a new range of issues, and as it transpired, problems into the process of manufacture and construction. In contrast to the Victoria and Albert Museum, terracotta now accounted for a significant proportion of the total cost of the building. Furthermore, since it had become an integral part of the structure, its rate of delivery would have to accord with the pace of construction.

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(1) Apart from the introduction of blue banding, the buff terracotta is comparable to the broad surfaces of Darley Dale stone on the Manchester Town Hall. The patterning of the jointing is also very similar, but the use of decorative and sculptural detail is fundamentally different.

Waterhouse and the Office of Works were not oblivious to the potential problems. In 1871 they started discussing various types of contract procedure. Waterhouse suggested that the quantities be divided into five or six sections, that estimates be taken from several manufacturers and that the contracts should be shared among the two or three firms who gave the lowest tenders. By having various manufacturers contributing, he hoped to avoid one gaining the complete contract at an inflated price.(1) He also wanted the Office of Works to deal directly with the manufacturers, this part being left out of the building contract.(2) This was the system that had been adopted by the Department of Science and Art for the Victoria and Albert Museum.

The First Commissioner feared that this would divide the responsibility for completing to time, the building contractor being able to blame the terracotta manufacturer for whom he was not responsible, and vice versa.(3) It was decided that there should be only one tender for the erection of the entire building, the builder choosing the terracotta supplier.

Models and moulds were made, the moulds being supplied to the competing firms. They would produce and submit samples, to assist the choice of a supplier and then to act as a

(1) Maybe Waterhouse felt that Gibbs and Canning had been paid too well for their work on the Royal Albert Hall.

(2) Works 17-16/3 A. Waterhouse to the First Commissioner, 19 December 1871.

(3) Works 17-17/2 ibid.

standard for examining their subsequent production.(1)

In 1868 Waterhouse had been instructed to reduce the cost of his design from £500,000 to £300,000, and he re-designed the building to be built in two stages. In July 1872 he announced that the tenders might be between 10% and 20% above the estimate £330,000 for the first stage, which had been received in 1870.(2) He was asked to simplify the decoration to the north elevations and to the interior, and various alterations were made without affecting the terracotta. But two years later when the tenders were opened the cheapest was £395,000, from Baker and Son.(3) This time Waterhouse was forced to reduce the scale of the building, the towers being lowered in height. In December 1872 Baker & Son's revised tender for £352,000 was accepted.(4)

The high level of the £395,000 tender was blamed by Waterhouse on the combination of the terracotta manufacturers.(5) Gibbs and Canning had suggested a price of £57,000 to Waterhouse and then given Baker & Son a tender of £88,000. Waterhouse was

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(1) Works 17-16/3 A. Waterhouse to the First Commissioner, 27 November 1871.

(2) Works 17-16/3 Office of Works to A. Waterhouse, 4 July 1872.

(3) Works 16-16/3 List of tenders, September 1872.

(4) Works 17-16/3 Report by Office of Works to Treasury, 6 December 1872.

(5) Works 17-16/3 Comments by D. Galton on list of tenders. Such combinations were to become a characteristic of the industry.

later accused of forcing the contractors into employing Gibbs and Canning. In fact there was little possibility of truly competitive tendering, as Waterhouse recognised; only four or five firms were making terracotta on a sufficiently large scale and of these the Tamworth firm were proving to be the cheapest and most reliable.(1)

The way in which Waterhouse influenced the contracts only emerged five years later, through the accusations that followed the bankruptcy of the contractors. In the system whereby the terracotta manufacturers were approached for tenders by the competing building contractors, Gibbs and Canning gave tenders to most of them, but not Baker & Son. It is not known on which manufacturer's quotation Baker & Son submitted their winning tender of £395,000. After the submission of these high tenders, Waterhouse realised that the cheapest combination of contractor and terracotta manufacturer had not been achieved. He contacted Charles Canning who then agreed terms with George Baker. They only entered into a formal agreement in July 1873.(2)

With these complications apparently resolved, confidence returned. A complete set of working drawings was lithographed, putting a mark of finality on the designs. It turned out to be ill-fated attempt to ensure the trouble free construction of the building.

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(1) Works 17-16/3 A. Waterhouse to First Commissioner, 27 December 1871. Waterhouse suggested that Gibbs and Canning, Blanchard, Doulton, Pulham , and from abroad, Marsh of Charlottensburg and Villeroy and Bosch of Mettlach auf Saar should be invited to tender.

(2) Works 17-17/1 A. Waterhouse to A. B. Mitford for Geo. Baker & Son, 9 January 1877.

Farmer and Brindley started making the first models to be required. However most of the decorative details, from the animal figures to the interior columns and corbels, were only designed once construction had started. Waterhouse's pencil drawings were sent to M. du Jardin of Farmer and Brindley, who produced the models. These were then used by the manufacturers for taking the moulds required for manufacture.(1)

The foundations were laid in the summer of 1873. Building progressed smoothly until the ground floor level was reached.(2) At this stage a course of terracotta extending the frontage of the building had to be rejected when drawn from the kiln at Tamworth.(3) Works were held up for two months until the blocks were made satisfactorily, but most seriously the organisation of Gibbs and Canning's supply rapidly degenerated into chaos. Messrs. Baker & Sons sent a representative to Tamworth to try and ensure that the blocks were made in the order in which they were required on site.

By January 1876 the delays had accumulated into a crisis. With only a few weeks of the contract period left, little more than half the building had been completed. Waterhouse admitted that the terracotta supply was to blame. As many as a third of the blocks in a firing were having to be rejected due to defects in burning. A consistent colour could not be achieved

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(1) Natural History Museum, A. Waterhouse, Sketches of terracotta decorations, 1874-8. The drawings are dated between November 1874 and October 1878.

(2) Works 17-16/3 A. Waterhouse to First Commissioner, 21 November 1873.

(3) This is probably the first batch of blue terracotta.

for the blue blocks which were to be arranged in bands across the frontage.(1)

Inevitably the question of responsibility and compensation arose. A condition in Baker & Son's contract provided for a fine of £500 for each week's delay after the completion date. There was to be a proportionate fine for the failure to complete any portion by the named time. The Office of Works had realised too late, that the contractors could not be fined for delays that resulted from Gibbs and Canning's inability to supply the terracotta at a consistent rate.

Gibbs and Canning appear to have gained their contract without having to accept a penalty clause for failing to supply within the specified time. Baker & Son's revised tender had contained the completion date of 1 November 1877, which was largely determined by the expected rate of terracotta supply. Under pressure from the First Commissioner, the contractors gained an undertaking from Gibbs and Canning for more rapid delivery which in turn enabled them to accept a shorter period for completion. Not only did Gibbs and Canning avoid any financial liability but they were assured of being paid in full value of the material supplied at the end of each month, upon a certificate from the Office of Works.(2)

Construction came to a halt in the summer of 1879 when the contractors failed. The trustees appointed for Baker & Son blamed their collapse on the slow supply of terracotta

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(1) Works 17-17/1 A. Waterhouse to Office of Works, 14 January 1876. The clerk of Works reported after a visit to Tamworth that the quality of the terracotta had recently improved and there was a large stock ready for firing.

(2) Works 17-17/1 A. B. Mitford for Geo. Baker & Son to Office of Works, 27 March 1876.

and claimed that this was the result of Waterhouse's successive alterations to the design. In a report to the trustees, it was claimed that virtually none of the lithographed drawings had been adhered to, and that a total re-measurement was necessary to determine the extent of the alterations.[1] Amongst the claims submitted by the trustees was one for sorting the animal figures into their correct categories. Two groups had been designed by Waterhouse, the fronts of the east and west wings being decorated with extinct and living species respectively, to correspond with the internal arrangement of the Museum. Somewhere in the process of modelling, manufacture or delivery, they had become mixed together.[2]

Waterhouse admitted revising the design during construction. He had altered the foundations just as construction commenced; he then changed the form of the terracotta as problems arose. The proportion of blue blocks was reduced and, to compensate, the amount of modelling was increased. The blocks were made smaller for easier fixing.[3] It was claimed by Waterhouse that all his alterations had been made within the terms of the contract, since he had supplied drawings and models to the contractor at least eight weeks before the terracotta was required.[4] He considered that the overall effect of alterations had been to reduce the

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(1) Works 17-17/1 Charles Trollope to trustees of Geo. Baker & Son, 20 December 1880.

(2) F. H. W. Sheppard (1975), op.cit., p. 212.

(3) Works 17-17/1 A. Waterhouse's notes on the builder's accounts.

(4) Works 17-17/1 A. Waterhouse to Geo. Baker & Son, 22 January, 1877.

building costs.

It was the extent of the lateness of the alterations that must have disrupted Baker & Son's works and Gibbs and Canning's organisation so severely. The central towers for example were reduced in height for a second time, the length of the window was altered, a double light window was introduced on each side of the main gable and a new dormer introduced. Baker & Son's trustees claimed £75,775 beyond the agreed price for the expenses caused by the alterations to the design. Much of this claim was accounted for by the increased number of blocks, the greater difficulty of setting them, and the other alterations to the terracotta.(1) After Waterhouse had examined the claim, reducing the figures rather than totally refuting them, the Office of Works increased their compensatory offer to the trustees from £10,000 to £25,000. It was accepted in July 1882.(2) In the following month Gibbs and Canning were given their final payment. Apart from a period in April 1876 when they were owed £5,000 they passed through all the delays and legal battles totally unpenalised.

The Museum opened in April 1881, over five years after the contractors should have completed their work. The final cost was £412,000.(3) The difficulties that beset the construction of the Natural History Museum were largely forgotten as the design gained widespread admiration from critics and from the

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(1) Works 17-17/1 Trustees to Geo. Baker & Son to A. Waterhouse, 6 July 1882.

(2) F. H. W. Sheppard (1975), ibid.

(3) F. H. W. Sheppard (1975), op.cit., p. 213.

public. The building was praised as being 'forward looking' in its originality of form and materials.[1] This was particularly remarkable considering the extent to which the Romanesque design was a compromise between the Italian Renaissance composition that was inherited from Captain Fowke and Waterhouse's personal type of Gothic, exemplified in the Manchester Town Hall. The use of any of these styles for public buildings was passing out of fashion by the late 1870s.

The Museum was undeniably impressive with its long elevation and the vaste space of the central hall, with its dramatic staircase in the form of a bridge. Beyond this, it was the combination of modernity and ornamental picturesqueness achieved in the use of materials that was the subject of the most favourable comments. Terracotta had gained a comparable status to stone without running the risk of being mistaken for another material. The smooth, pale-buff and blue-grey surfaces presented terracotta in its own, if not completely typical colours.

It was the Natural History Museum, far more than Dulwich College or the work of the Department of Science and Art, that ended over a century of imitation and confused usage, initiated by the introduction of Coade stone. E. M. Barry and Charles Foster Hayward had seen in terracotta the means and justification for novelty and a freer eclecticism in design.

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(1) Magazine of Art, 4, 1881, pp. 358-62, 463-5.

Illustrative decoration such as the 'Great Exhibition' friezes on the lecture front of the Victoria and Albert Museum and on the Albert Hall were indicative of a move towards a less historically dependent architectural decoration. Waterhouse went further in breaking free from historicism, by creating animal, botanical and abstract forms entirely Victorian in their feeling. The decorative details were superbly designed and disposed in the Natural History Museum. It is only by calculation that the repetition becomes apparent, with only eight species of beasts sitting on the cornice line, five patterns of columns used on the hall balustrades, and monkeys perched on the main columns in only four different poses.(1)

M. du Jardin worked precisely to Waterhouse's finely detailed pencil drawings. His shadings were transformed into three dimensions with angled surfaces, giving the beasts a lean aggressiveness. (Fig. 2.19). They are as alive as Sykes' putti and more contemporary in their image.

The sculptural richness encouraged by the art school movement and the vigour of mid-Victorian polychromy had been combined in what was a culmination of the acceptance of terracotta. Architectural ceramics had gained a strong place in architectural theory and practice and now offered real potential for original design.

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(1) Many of these details were redrawn by M. B. Adams and published over several months in Building News, 34, 1878.

What is particularly remarkable is that this potential constituted almost an architectural carte blanche, since Cole's team and then Waterhouse had released the material from the restriction of having to be designed in a form with which it was historically associated. Rather than re-creating Italian arcades or north German tracery in terracotta, they had demonstrated an approach based on the natural properties of burnt clay, exploiting its plasticity and sculptural potential, its scope for polychromatic effects and its propensity for low relief and repetitive decoration.

However these buildings of the 1860s and 1870s could not offer a direct lead for the wider and more commercial use of terracotta that was to follow in the last two decades of the century. Italian styles and their Rundbogenstil derivative rapidly passed out of fashion, being supplanted by a range of free Gothic and free Renaissance styles; these were highly eclectic in their combining of motifs but owed a considerable debt to the Gothic Revival and the 'Queen Anne' respectively. In this broad but highly confused climate of architectural taste, terracotta had a wide potential for innovative architecture but also threatened to promote imitative or purely eccentric design.

It was a largely unappreciated setback that most of the finest artist-architects of the late Victorian period had already been alienated from using the material, through its association with the character of Henry Cole and his policy of employing engineers and decorative artists rather than architects, and through its banal use by the majority of commercial architects, notably for office premises and railway stations in London. In part this prejudice was the inevitable result of terracotta becoming associated with public and commercial rather than domestic and ecclesiastical architecture. It meant that there were to be no examples of a light and restrained expression of terracotta by Nesfield, Bodley or Philip Webb to restrain the attention-seeking efforts of second-rate practitioners.

Most of the leading figures in the architectural profession would not have accepted the delegation of responsibility that typically resulted from the use of terracotta, and would have mistrusted passing on their detailed designs to the staff of some distant pottery or brickworks. They would also have been aware of the difficulties that accompanied the execution of these early schemes. In particular the drawn-out construction of the National History Museum highlighted rather than resolved the most serious problems, of inaccurate costing, badly managed contracts, delays in delivery and above all a lack of understanding between architects, builders and manufacturers.

Some of the difficulties with the Natural History Museum resulted from the fact that the sole supplier of what was the largest contract for terracotta to date, Gibbs and Canning, proved lacking in terms of both plant and expertise. They were the first of the major producers to be located on the coalfield and to be manufacturing terracotta essentially as a prestigious sideline to bricks and pipes. The failure of Blashfield and Blanchard demonstrates the financial strains of undertaking architectural work.[1] It was only with the sudden growth in demand for terracotta which coincided with the completion of the Natural History Museum that other firms became significantly involved in supplying architectural terracotta. This in turn promoted more extensive usage, both in the provinces as well as London, and greater efficiency in both the quality and organisation of manufacture.

(1) The demise of the terracotta production at Blashfield and Blanchard is considered in Chapter 5.

CHAPTER THREE

THE TERRACOTTA INDUSTRY: GEOLOGY AS A LOCATIONAL FACTOR

At almost every stage of the revival, the manufacture of terracotta was associated with a different geographical distribution, in the location both of the most significant firms and the clays on which they were dependent. Coade shipped china- and ball-clays from the south-west of England to be able to make architectural ornaments close to the centre of their market, in London. As the demand for architectural dressings developed around the middle of the nineteenth century, three of the most important London firms, Pulham, Blanchard and Blashfield moved out to the Home Counties and beyond to establish works near to suitable Eocene and Jurassic clays. (Fig. 3.1). By the time that the revival was at its height in the last two decades of the century, most of the terracotta was being made in works located on the coal-measures. The variety of shales, marls and fireclays found in the different coalfields resulted in a changing pattern of production that came to concentrate on Lancashire, Yorkshire and the Midlands in the inter-war period. (Fig. 3.2)

The progression, which in most general terms, ran from newer to older clays and from the south to the north of England, is worth examining in detail because it helps to explain why different groups of manufacturers dominated the market at successive periods. At any one time fewer than half-a-dozen firms were supplying the majority of contracts even though in the 1880s some 125 firms were advertising themselves as making

Fig.3.1. Map of Major Manufacturers of Terracotta c 1870

Fig.3.2. Map of Members of Terra Cotta Association c 1929

terracotta. The majority were brick, tile and pipeworks who offered to undertake architectural contracts but failed to develop beyond supplying simple terracotta details such as pier-caps and finials. It is possible to appreciate some of the factors that influenced the establishment and success of terracotta departments within heavy clayworking firms by examining the sequence that ideally ran from the discovery and analysis of suitable clays to their extraction and preparation into a clay composition with the appropriate qualities for production of architectural ceramics. According to the circumstances of discovery, these stages could be completed within almost a year or be drawn out over several decades.

The clay bodies used for making terracotta needed to have very specific properties. They had to be of a sufficiently fine texture to produce a smooth surface and to carry fine detail. They also had to be plastic enough to hold detailed modelling before drying and burning. However, too much moisture in the clay caused heavy shrinkage in the kiln and distortion of the modelled form. To enable large pieces to be made the body needed to be slightly porous, allowing water to escape during the early stages of burning. But open, soft, bodies were liable to damage by rainwater and atmospheric pollution; with the best clays, the surface was expected to vitrify slightly at full firing, creating a hard impervious surface.

There was no perfect terracotta body, only a variety of satisfactory compromises; these were largely dictated by the need to control shrinkage and achieve an even colour. The shrinkage in burning clays is generally between 12% and 38%, reaching 50% in some finely ground ball clays. It increases according to the fineness of the body and the water content; therefore clays had to be chosen and prepared carefully to ensure a precisely sized and well detailed product. The addition of grog (finely ground pottery) and a preparation of pounded feldspar and kaolin was found to help balance this equation.(1)

As a decorative but unglazed material the final colour was of critical importance. Whether the aim was to imitate stone or to produce a distinctive red or buff, the colour had to be bright and consistent. Heavy burning might create an impervious surface but it would always impair the colour; a clay with the correct proportions of iron oxides and fluxes such as soda, potash and lime would produce slight vitrification and a good colour at a temperature of around 900-1,000°C.

These factors had important practical implications for the industry. Common bricks and roofing tiles could be made of most clays which contained some sand or chalk and up to approximately 10% of iron compounds and other minerals, but for terracotta the proportions of silica, alumina, and iron oxide and a purity from organic matter were of critical importance. The quality of Coade stone resulted from the use of china clays

(1) A.B. Searle, An introduction to British clays, shales and sands (C. Griffin, London 1912) p.245.

consisting almost entirely of silica and alumina; similarly the Welsh fireclays used for terracotta were characterised by a high silica content.[1]

Various ideal compositions for terracotta were proposed, a typical example being 70% silica, 20% alumina, 7% water and 3% iron. Meanwhile, many clay deposits were analysed during the late nineteenth century to discover the products for which they were best suited.[2] The limitations of these tests were soon realised. Chemical analysis failed to reveal the all-important physical properties, which could be significantly altered at each stage of the manufacturing process. Clay preparation was just as important as the proportion of silica in determining plasticity; adding flint had different effects on fineness according to how it was ground, and firing conditions contributed to the production of a buff or red colour as much as the properties of iron oxide.(Fig. 3.3).

It was the accumulation of knowledge of Britain's geology and of experience in working different types of clay that created a structured clay industry. The properties of clays began to be properly appreciated from the late seventeenth century, by which time a coastal trade had developed from Dorset to London and the Potteries.[3] But little effort was

(1) British Clayworker, 4, 1896, pp.293-6,.

(2) British Clayworker, 7, 1898, pp.6-7. Several firms, of which the most widely used was Messrs Kircaldy and Sons in London, conducted tests on clays and ceramic products for composition, water absorption and strength.

(3) R.B. Pugh (ed.), Victoria History of the Counties of England: County of Stafford, Vol 2 (University of London 1967) pp.5,7.

Fig.3.3. Stages in the Production of Terracotta and Faience

Source: Transactions of the Ceramic Society, 35, 1935-6, p45 being made to discover the value of the other clays in the country's sedimentary formations. While china-and-ball clays were near the surface and needed little preparation for manufacture, older clays were usually found at depth and needed to be weathered and ground to become workable.

The early geological surveys helped to produce a wider understanding of the variety of Britain's clay reserves. Much of the early mapping by the Ordnance Geological Survey, from the 1820s, was in the form of economic studies of coalfields. This reflected the aims of the first director, Sir Henry Thomas de la Beche. It was work undertaken by the Survey in South Wales, from 1828, that first revealed the value of the underclays that lie beneath coal seams. Through the 1860s and 70s most of the coalfields were surveyed in detail and maps and cross-sections printed.(1)

Publication of a survey report frequently closely preceded or followed the establishment of a terracotta works in a particular area. Somerset and Devon were being surveyed when a fine red clay was discovered at Watcombe. Soon afterwards the Watcombe Terracotta Company was founded, and the officer of the Geological Survey subsequently produced a

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(1) Sir J. Smith Flett, The first hundred years of the geological survey of Great Britain (HMSO, London 1937) pp. 38-9. The volumes of the Memoirs of the Geological Survey and the special reports provide most valuable information on the clay reserves worked by the terracotta manufacturers. Martyn Owen provided an introduction to the collection in the Geological Museum Library.

report on specifically these clays.[1] The Watcombe clay had been analysed by the laboratory attached to the Museum of Practical Geology, prior to the founding of the works. From 1835 the Museum had been acquiring and testing both clay samples and products. Their collection of manufactured pieces included terracotta from Minton and the Lowesby Pottery, and majolica from Maw.

George Maw also donated to the museum a collection of clay samples and burnt trials for 120 different types of clay. His collection was arranged in geological sequence, in accordance with the theory that the plastic clays suitable for manufacture became scarcer with increasing geological age. It was soon realised that the problem was not scarcity but economics; it was more likely that clays from older formations needed to be mined. They also required greater care in selection, cleaning and weathering, besides precise control over their moisture content and firing conditions.

Apart from china-clays which are the products of the kaolinisation of granite feldspars, the clays most worked for architectural and domestic ceramics up to the late nineteenth century were from young sedimentary formations such as the Reading and Thanet beds, dating to the Eocene period. From the middle of the century, the Keuper marls and the Triassic clays at Stamford began to be exploited. Coal-measure marls

(1) W.A.E. Ussher, 'On the age and origin of the Watcombe clay', Transactions of the Devon Association, 9, 1887, pp. 296-300.

and fireclays were only used on a small scale for architectural products until the last quarter of the century when they were worked for most of the terracotta and faience made until the middle of the twentieth century.[(1)] There are some notable exceptions to the shift in terracotta manufacture onto the coalfields, such as in the case of Carter who were still prospering on the Dorset coast in the inter-war period. However the significant increase in the use of older clays should be examined as a contributory factor to the rise and eventual decline of the major firms, during the nineteenth and the first half of the twentieth centuries.

The entries in the building trades directories record the emergence and demise of terracotta manufacture, but give no indication of the level of production.[(2)] The regional pattern is all the more significant when considering only the few dominant companies. Most of them had been working on a small scale for several years before expanding to undertake large architectural contracts throughout the country.

For the works sited on the coal-measures there was a typical pattern of development. Possibly coinciding with

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(1) W.J. Furnival, Leadless decorative tiles, faience and mosaic (W.J. Furnival, Stone 1904) p.239. The majority of the samples are from Shropshire or the Staffordshire coalfields.

(2) Kelly's directory of the building trades (Kelly and Company, London 1883 to 1939) Terracotta and, from 1906, faience manufacturers are listed under 'London and suburbs' and the rest of 'England, Scotland and Wales'. Many of the firms listed could only have had a minimal output of terracotta, but were obviously willing to accept enquiries.

railway construction, a brick or pipe works would be established to use clays outcropping near the shafts or brought up from a coalmine. If the owner or manager found that the clay could be worked into terracotta he might decide to embark on this more prestigious and complex branch of clay-working. Starting with vases, statues and architectural embellishments, the breakthrough into supplying large contracts for constructional terracotta and faience would depend on a whole range of factors, from the quality of the body, investment in plant and the establishment of a draughting and modelling office to the growth of contracts from architects and clients.

Quaternary and Tertiary Clays: The South Coast and the London Basin

London was the centre of the terracotta industry until at least 1840. Since the recent clay deposits around the capital could not be made into a quality facing brick, let along anything decorative, the firms located along the banks of the Thames were dependent on raw materials shipped round from the south coast. A change in the source and preparation of these clays was started by the break between production at Coade's Manufactory and the development of Blanchard, Blashfield and Doulton as the major firms of the 1850s and 60s. The china-clay used for Coade stone produced a very fine terra cotta but costing between £32-£38 per ton was probably too expensive for large scale manufacture.[1] Furthermore, for Doulton and an increasing number of firms, terracotta was a relatively minor part of the business, clays being bought to make into a wide range of ceramic products.

The ball-clays of Dorset and Devon became the most used clay for terracotta making in London. Of Tertiary age, they share some of the properties of china-clays, being highly plastic and burning to a whitish colour. They became used widely for the manufacture of pottery, and sanitary and refractory ware as well as architectural ceramics.[2] The best ball-clays were very pure and required little preparation for manufacture. Dorset clays were used by Blashfield for his early experiments in making terracotta, Doulton had their own clay pits near Poole, and Messrs Stiff and Sons, one of the largest potteries in London, used clays from both Poole and Teignmouth in Devon.[3]

John Doulton had made some chimney pots and garden urns out of terracotta in the 1820s. But it was his son Henry who, apparently inspired by Blashfield's work and anxious to revive the earthenware trade, built a special kiln behind his pottery

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(1) J.E. Ruch, 'Regency Coade: a study of the Coade record books, 1813-21', Architectural History, 11, 1968, pp. 34-56 (p 56)

(2) H.P. Lewis, 'The geological distribution of clays of industrial importance'. Claycraft, 3, 1930, pp. 667-674 (p.669)

(3) Builder, 36, 1878, p. 732 At this date Stiff were importing some 15,000 tons of clay and coal up the Thames each year. The majority of references to the history of individual firms are provided in the relevant appendix.

and started making statues and architectural details.(1) Once a larger kiln had been constructed and the link established with the Lambeth school of Art, the architectural department at Doulton achieved a high quality of production and design. However, it was not until the eighties that they emerged as major producers.

Not surprisingly, it was being anticipated during the 1840s that, as well as sending clays to London, the clay workers in Dorset would soon develop potteries around Poole. Six were established by 1856. The Kinson Clay Works was built on land containing a forty foot depth of workable clay. The best clays were divided between being made into terracotta wares and being shipped to Staffordshire to be used as a constituent of porcelain. The poorer surface strata were used for sanitary pipes and firebricks.(2)

The Kinson, Branksea and Bourne Valley Potteries all made decorative terracotta until the 1880s.(3) A decade earlier, George Jennings had built a separate terracotta works his South Western Pottery in Parkstone to supply doorways, window surrounds and cornices for suburban villas.(4) The terracotta department closed in 1909 when the reserves of

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(1) E. Gosse (ed. D. Eyles), Sir Henry Doulton (Hutchinson, London 1970) p.42

(2) Builder, 14, 1856, p. 237

(3) L. Jewitt, The ceramic art of Great Britain, 1883 (P.P.B. Minet, Chicheley, revised new edition 1971) pp. 236-9

(4) George Jennings and Company, South Western Pottery, Catalogue (1874). This is possibly the earliest terracotta catalogue illustrating completed buildings. A copy was kindly supplied by Leslie Hayward of Poole Potteries.

suitable clay were exhausted, but the sanitary ware and stoneware were made until 1967.

The most important of the Poole firms had its origins in the Architectural Pottery Company, founded in 1854 by a group of people including John Ridgway, the china manufacturer from Hanley. Starting with pavement tiles and glazed bricks, they came to make wall tiles, mosaic and then terracotta, using various combinations of Purbeck and Fareham clays, and china-clay. The Architectural Pottery was purchased in 1895 by Messrs Carter who were already working a pottery along the East Quay. The two works were organised so that terracotta and faience were made at the East Quay Works and plain tiles at the Architectural Pottery. Carter thrived on a long succession of family management, benefitting greatly in the inter-war period from working closely with leading artists and designers.(1)

Clays from the border of Dorset and Hampshire were used to achieve coloured effects without glazes in Lady Baker's small workshop in Burley. It was entitled the County Industry for Dorset and Hampshire, and the production included vases, fireplaces and architectural columns.

In Devon, the areas of ball clays around Newton Abbot, especially those in the valley of the River Bovey, presented

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(1) J. Hawkins, The Poole potteries (Barrie and Jenkins, London 1980) p 2-6

some of the youngest valuable clay deposits in the country. Surveys undertaken from the 1860s disclosed a white pipe clay and black 'potters' clay. Pure and highly plastic in quality, it was to be expected that these reserves would be worked to support a local terracotta industry.

The Watcombe Terracotta Company was established just outside Torquay through the iniative of G.P. Allen, an amateur scientist, who experimented with the clay on his estate and sent samples to the Museum of Practical Geology for analysis. This small company gained considerable publicity, through its purpose of making art objects from a pure homogeneous clay, as opposed to the mixture of clays being used in London.(1)

In contrast to this and other small potteries working round Torquay, Candy and Company, just to the north of Newton Abbot, worked twenty-two distinct layers of clay from their pit, enabling them to produce a wide range of products in addition to terracotta.(2) The top layers of sand and fireclay became used for firebricks, a blueish white clay for pipes and glazed bricks, yellow and variegated clays for wire-cut bricks, a whitish clay for salt-glazed ware, a brown clay for firebricks when mixed with upper clays, and a sandy clay from 57 feet below ground level was used for paving blocks.(3) Working such a

(1) Art Journal 11, 1872, p.200.

(2) Geological Survey and Museum, Special reports on the mineral resources of Great Britain: Vol.31: Ball clays (HMSO, London 1929)p.10. The report contains a detailed section of a trial boring made at Heathfield.

(3) Claycraft, 11, 1938, p.433.

range of clays and products gave a flexibility which enabled the firm to respond to the changing demands of the building trades, while the claypit at Heathfield produced an independent income through sales to other manufacturers.[1]

The narrow outcrops of Eocene clay that form the Oldhaven, Blackheath, Woolwich and Reading, and Thanet beds attracted two early manufacturers, Pulham and Blanchard to leave London. The clay forms a line of exposure rarely more than two miles wide that runs along the sides of the Thames valley, dividing the chalk from the London clay. On the north side it extends from Ipswich to Newbury and on the south runs back across to Canterbury. The clay re-emerges round the Hampsire basin, from Poole to Worthing, reaching as far inland as Salisbury.[2]

Pulham moved from north London to Hoddesdon and then to Broxbourne in Hertfordshire during the 1840s. Two decades later, Blanchard decided to work the Eocene beds at Bishops Waltham, Hampshire.[3] Both firms were using the

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(1) Claycraft, 7, 1933, p.13-16 (p.16). The Devon and Courtenay Clay Company was set up to handle sales of raw material. H. Lloyd Fox, the retired managing director of Candy, loaned a company catalogue.

(2) The Geological Map of Great Britain, 'Ten Mile Map' (Ordnance Survey, Shessington 1957) Sheet 2 shows these geological divisions most clearly.

(3) H.J. Osborne White, The geology of the country near Fareham and Havant (Museum of Geological Science, London, 1913) p.42. Blanchard's fortunes revived after turning to concentrate on bricks and tiles.

composition perfected by Coade of mixing in large proportions of flint, glass and grog. Neither was very successful at making terracotta after the 1870s. Just inland from Portsmouth and using the same clays as Blanchard, E.P. Bastin made facing bricks and terracotta at Rowlands Castle. This was a firm which gained a good reputation through the nineteenth century but which was wound up in 1908.

At Reading, the outcrop exposes some fine red burning clays, which were first appreciated in 1814. S. and E. Collier was founded in 1848 and worked five pits around the town in succession, making bricks, tiles and terracotta.(1) An inferior variety of these clays runs across the south side of London. The only terracotta works in the London suburbs was Perrett Bros of South Cheam, Surrey who produced the pier caps, chimneys and finials used in house building.

There are small exposures of a comparable Eocene clay around Norwich, and these were probably used in Gunton's Works on the edge of the city. From 1815, an estate brickworks supplied the materials for Costessey Hall. It was taken over by George Gunton who started making Tudor-style chimney pots and windows. The clays required considerable washing to remove stones and coarse grit, and could not be made into large blocks. Neverthless, Gunton made bricks and terracotta for a century at Costessey, the yard closing in 1916.(2)

Of the other manufacturers in the south-east, most were

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(1) British Clayworker, 9, 1901, pp. 467-9 (p.468)

(2) British Clayworker, 49, 1940, pp. 100-1.

located on or near this band of clay. Henley, Reading and Guildford each supported several smaller firms. The main brickmaker on the Isle of Wight, Pritchett and Company, had a works on the very narrow Eocene outcrop which runs across the island, enabling him to make terracotta arches.

Such small brickyards did not have suitable clay reserves or capital to undertake the manufacturer of faience in the twentieth century, and this was a period when the demand for terracotta dropped rapidly. In 1906 there were fifteen works in the south-east outside London, advertising themselves as making terracotta; by 1939 there were only two.(1)

Mesozoic Clays

The geology of the Mesozoic Age is one of chalk and limestone. Ordinary bricks could be made where the clays were sufficiently clean and plastic. The Gault and Wealden beds in the south-east tended to produce soft mottled bricks, often containing limestone nodules. The terracotta works located on the chalk, such as W.T. Chapman at Cleethorpes, almost certainly had to buy in clays to make ornamental dressings as the Kimmeridge and Oxford clays running across the Humber from Hull to Weymouth were too shaley and bituminous.(2)

However, two firms, over a hundered miles apart, made

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(1) Kelly's Directory of the building trades (Kelly and Company, London 1906), pp. 2492-4, (1939) pp. 2272

(2) Claycraft, 3, 1930, pp. 667-674 (pp. 670-1).

use of the clays occurring at the base of the oolitic limestones. John Blashfield took his works from Millwall to Stamford to use the Jurassic clays on the Wakerley estate, a short distance away in Northamptonshire. As these clays contained large quantities of organic matter they were only fit for producing coarse structural terracotta on their own. Blashfield mixed in clays from Dorset and Cornwall, ground glass, china stone, feldspar and flint and grog to produce a finer body. Other local clays were added to obtain a red colour.(1)

Near Stroud, on the edge of the Cotswold escarpment, the Stonehouse Brick and Tile Company had an ideal location, between good clay reserves and a main railway line. A 120 foot deep bed of grey clay could produce red terracotta and pottery, but the bulk of the firm's output was of bricks and tiles.(2)

Between the Jurassic limestones and lias, and the Triassic sandstones, are the Keuper marls. They extend over

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(1) C. Barry (Junior), 'Some descriptive memoranda on the works executed in terracotta at New Alleyn's College, Dulwich', Trans. RIBA, 1867-8, pp 259-79(p 263). Barry contrasts Blashfield's mixing of different clay with the ideal of finding a pure terracotta clay pursued by Blanchard. A detailed description of the clays used by Blashfield is provided in J.W. Judd, The geology of Rutland (Museum of Geological Sciences, London 1875), pp. 188-201.

(2) British Clayworker, 56, 1947-8, p. 78.

a wide area from the Lancashire coast to the Bristol Channel and cover most of the Midlands. Salt, gypsum and thin beds of sandstone produce impurities that made many formations awkward to work; in consequence the use of these clays for terracotta was restricted to a few locations and to the making of small products. One firm to suffer from the poor quality of the Keuper marls was the Della Robbia Pottery, established in 1894 at Birkenhead to make vases and architectural decorations. The intention was to use clays from nearby Moreton, but they failed to burn reliably. Supplies of better clays were subsequently brought in from Etruria and probably Devon and Ruabon.(1)

At Bridgwater in Somerset, several of the brick and roofing tile firms made finials and other moulded decorations, and in Nottingham the brick industry in the eastern suburbs produced decorative panels and keystones. The red clay used by Sankey at Bulwell, on the edge of Nottingham, for making flower pots and terracotta garden ornaments was from the Permian marl. Because of its heavy shrinkage this clay was unsuitable for constructional work.(2) The other firms in the Midlands, away from the coalfields, mined or quarried their materials from the Keuper series. With the exception of

(1) Della Robbia Pottery, Birkenhead 1894-1906 (Williamson Art Gallery and Museum, Birkenhead, undated).

(2) The Admiral Blake Museum in Bridgwater and Gedling House Museum just outside Nottingham have good collections covering the local brick, tile and terracotta industries.

Jabez Thompson at Northwich they were only working on a small scale, and most were out of business by the end of the First World War.(1)

Palaeozoic: Carboniferous Clays of the Coalfields

The scale of the Victorian revival of terracotta and faience depended entirely on the exploitation of coal-measure clays. From being virtually unused at the beginning of the century they came to dominate in the making of architectural ceramics,until the 'Fletton' bricks made from Jurassic clays became mass produced and decorative terracotta went out of fashion, and as the large-scale production of faience ceased with the outbreak ofthe Second World War.(2)

The carboniferous rocks can be divided into four well defined groups: the sequence, in increasing age, is upper coal-measures, lower coal-measures, millstone grit and mountain limestone. The last is almost devoid of any clays. The sequence of layers running through the upper and lower coal-measures would have been of bewildering complexity to the Victorian clayworker even with the aid of the geological surveys and mining maps. Tilting and faulting can reverse the sequence of outcropping,and erosion results in some beds being

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(1) The marked fluctuations in the number of east Midlands works making terracotta around 1900 represents these small firms moving in and out of the market.

(2) In 1930, counties in which the carboniferous rocks are the chief source of clay supplied nearly two-thirds of the total output of England and Wales. Claycraft, 1930, op. cit., p. 667.

missing altogether.

However, laminated shales normally occur above the seams while fireclays are found underneath. Shales are essentially siliceous clays that readily split along the planes of deposition. They range from smooth clays to hard sandstones and were widely used for the manufacture of bricks, tiles, coarse pottery, refractory goods and sanitary ware. Normally grey in colour, they could be burnt to buffs and reds as well as greys with careful selection and firing. For terracotta they needed to be sufficiently free of impurities, and broken down by a long period of weathering or heavy grinding.(1)

Fireclays can simply be defined as lean clays so free from impurities that they can withstand strong heat. Not all the clays underlying the coal seams have this refractory quality but fireclays do occur in most of the major coalfields. The demand for firebricks, retorts, crucibles, glazed bricks and sanitary appliances which was created through industrial and urban growth resulted in a waste material from coalmining being turned into a valuable raw material. Areas such as Stourbridge, Leeds and Glenboig gained a strong reputation for their firebricks. For terracotta the fireclays would be chosen and frequently mixed to produce a smooth and more attractively coloured body; in many cases the proportion of silica would still render them insufficiently plastic for detailed moulding.(2)

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(1) A.B. Searle (1912) op.cit., p. 52.

(2) A.B. Searle (1912) op.cit., pp170-3.

The clays of the upper coal-measures were the first to be appreciated as being of value and used for terracotta, and it was in the Potteries that the link between the ceramic industry and the coalfields was first fully established. The Etruria marls and the Blackband series of the upper measures outcrop down the eastern side of the triangular area of the North Staffordshire coalfield, and works developed in an almost continuous line from Etruria down to Longport. Accordingly terracotta was made in Etruria, Hanley and Longton. Although there were as many as nine firms advertising the material, production never reached a large scale, as the clays were generally not sufficiently plastic or even in colour.(1) Several Staffordshire potters were making terracotta table and ornamental wares in the early nineteenth century, both Davenport, Beck and Company and William Baddeley having their works in Hanley.(2)

Thomas and Herbert Minton were leading figures in the revival of decorative tiles. But through all its various ownerships, the firm concentrated on glazed ware, making faience panels, columns and fountains rather than terracotta. Even with faience, the potential shown in the interiors of the Victoria and Albert Museum or the central pieces of Exhibition stands was never matched by extensive commercial production.

The only firm in the Potteries to manufacture terracotta over a long period was George Woolliscroft and Son. The

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(1) Kelly's (1906) op. cit., pp. 2492-4.

(2) L. Jewitt (1883) op. cit., p.507.

material that they were using for making cornices, balustrades and brackets in 1852, was described as 'a very plastic clay of pure argillaceous nature burning to a cream colour'.(1) It probably incorporated ball-clays from Dorset and Devon. While red and blue bricks, and floor and wall tiles dominated production, an interest in decorative materials led them into supplying faience, mosaic, stained glass and fresco paintings. Several other brick and tile makers advertised moulded goods, described as terracotta, to complete their catalogues. John Caddick kept finials and simple cornices in stock but decorative string courses and tile murals were only made to order.(2)

The Staffordshire coal-measure sequence, with the Keele series overlaying the Etruria marls and ironstones, and coals and fireclays bedded underneath, re-emerges thirty miles to the west just over the Welsh Border. Here some of the upper series of clays have the ideal properties for making terracotta. During the last quarter of the nineteenth century the small town of Ruabon became the main centre of the industry, and throughout Britain the name became identified with the indestructable, deep red blocks used on public buildings and suburban houses.

The strata around Ruabon dip from west to east with Permian marls overlying the fireclays of the middle coal-measures. The best marls were in the upper layers, and were purple and mottled in colour. The original workings were

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(1) Art Journal, 4, 1852, p. 254

(2) John Caddick, Catalogue (c. 1890).

sited where the clays outcropped above the drift deposits.[1] Even more than in the Potteries, the composition of the beds varied between localities. As the industry developed from the middle of the century, works came to specialise in the products best suited to the qualities of their clay reserves.

Because of the local abundance of good building stone, bricks and tiles were first made only as by-products to coal mining. John Coster Edwards worked in coal and iron before starting to make bricks in about 1850 at his father's mine.[2] His first works was established at Trefynant on the western side of the coalfield. The manufacture of common bricks, firebricks and sanitary pipes was soon supplemented with encaustic tiles and buff terracotta, the clay being mined from a seam lying beneath Trefynant and the westerly part of Acrefair.

While Trefynant was located on the fireclays of the middle coal-measures, one of the finest clay exposures of upper coal-measure marls was at Pen-y-bont, a mile to the east. Here J.C. Edwards established, and rapidly developed through the sixties, the manufacture of red facing bricks, roofing tiles and terracotta.

The pit at Pen-y-bont was described as a 'clayworkers'

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(1) J. Edwards, 'Permian marls of the Wrexham and Ruabon District', Trans. of Denbighshire Historical Society, 22, 1973, pp. 238-50 (pp. 240-43).

(2) G.G. Lerry, 'The industries of Denbighshire', Trans. of Denbighshire Historical Society, 8, 1959, pp. 105-111 (p.106).

Eldorado', containing almost twenty distinct grades of marl.[1] The success of Messrs. J.C. Edwards largely resulted from being able to distinguish and blend these clays to produce architectural ceramics of a consistently high quality. The bulk of the marls were dark red and slightly mottled; some were harder, some more mottled and others rather sandy. Grey and purple marls were only found in certain parts of the pit. Common bricks were made from a hard grey rock termed 'bastard clay'. The best marls were described as being used 'as stock in the manufacture of the well-known Ruabon terracotta', suggesting that other clays or fluxes were mixed into the body. They possibly came from one of J.C. Edwards' three other works in the district.[2]

The other leading figure in the Ruabon terracotta industry was Henry Dennis. His brickworks at Hafod and Pant were established in conjunction with the five collieries of which he was managing director. The Hafod Works used the red marls to make terracotta and ornamental tiles while the Pant Works concentrated on glazed bricks and plain tiles.[3] The last firm to enter the market was the Ruabon Brick and Terracotta Company. John Haigh, a member of a family of local industrialists, established the works just to the north of Ruabon in 1883. These large firms all survived into the

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(1) Claycraft, 2, 1929, pp. 340-42.

(2) Geological Survey and Museum, Special reports on the mineral resources of Great Britain; Vol. 14, Refractory materials, fireclays (HMSO, London 1920) pp. 184-5.

(3) G.G. Lerry, 'Henry Dennis', Trans. of Denbighshire Historical Society, 1, 1952, pp. 33-45.

1960s. However, their marls proved ill-suited to carrying glazes for faience work and after the First World War production was mostly of bricks and of quarry, wall and roofing tiles.

Just to the north of Wrexham, the same sequence of coal-measures runs under Buckley and Hawarden. Marls comparable to those at Ruabon, though possibly slightly older, were used for making terracotta at about the turn of the century. The most important firm was the Buckley Brick and Tile Company Limited, but its level of production never approached that of the Ruabon firms.

In marked contrast to the similarity between the carboniferous strata of Buckley, Ruabon and the Potteries, the other Midlands coalfields present a far more diverse geology. From Shropshire, through Stourbridge, Tamworth and Nuneaton to Coalville and Loughborough the quality of the marls and fireclays is very variable. As a result many firms were involved to some degree in making terracotta or faience but only a few could claim either as a major speciality.

In the Shropshire coalfield around Ironbridge and Broseley, the beds are disturbed by gentle folding and much faulting. The general pattern on the banks of the Severn Gorge is of a brick clay over a red tile clay with a highly refractory fireclay below the main coal seam. It was probably the fireclay that was burnt into a yellow terracotta by the Coalbrookdale Company. During the prosperity experienced by the local brick and tile industry at the turn of the century, the red clays were used for making terracotta panels, pier-caps and finials at several works. The two major tile manufacturers at Jackfield, Maw and Craven Dunnill, used a mixture of these clays. Shropshire clays had been shipped down to Worcester for the china trade in the eighteenth century and were used there by Maw until they decided in 1852 to move upstream from the city to Broseley where a variety of clays and coal could be obtained near the surface. The works were re-located adjacent to the Severn Valley Railway, near Craven Dunnill, and both firms developed enormous ranges of encaustic and glazed tiles. Their production of moulded faience enabled them to supply complete facing schemes for public buildings, including the exteriors of public houses. The only terracotta made was in the form of plant markers, designed and patented by George Maw.(1)

At the southern-most point of the Black Country coalfield, the Stourbridge fireclays gained a particular reputation for their refractoriness and low kiln shrinkage. In two locations, the upper clays, described as marls, were used for making terracotta. To supply the growing market in the Midlands, Doulton opened a works making terracotta, chimney-pots and blue bricks in 1889, which was adjacent to the Company's drain-pipe factory at Rowley Regis. Similarly, J. King and Company built a second works in Stourbridge to make bricks and terracotta. In the twentieth century two

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(1) Geological Survey and Museum (1920) op. cit., pp. 150-1. The report emphasised the value of the red clay used in tile manufacture.

firms; the Stourbridge Firebrick Company and the Stourbridge Glazed Brick Company were using the fireclays to produce slab faience on a limited scale.[1]

The narrow coalfield on the eastern boundary of Warwickshire, running from Tamworth down to Nuneaton attracted the first large terracotta works in the Midlands which was indeed, the first using any coal- measure clays. The basis of the industry was a fine white clay found immediately underneath the uppermost coal seam. Confusingly described as both a marl and as fireclay it is certainly older than the Keele series and the Etruria marls of the Potteries and Ruabon.

At Glascote, just outside Tamworth, Gibbs and Canning started producing drainage pipes in 1846. Clays were obtained both from the adjacent coalmine and from a pit 300 yards to the north of the works. Underneath three layers of black clay, seams of white and red clay were found to be ideal for terracotta.[2] When fired, these were usually a yellowy buff colour but could be made in a soft red colour. Having gained the largest contracts for architectural terracotta in South Kensington, Gibbs and Canning emphasised that they used only their naturally occurring clays, avoiding any artificial mixture of dissimilar materials.[3] They had the advantage of clay and coal reserves being immediately to hand and

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(1) The northern, Cannock end of the coalfield had no clays suitable for making terracotta.

(2) Geological Survey and Museum, Geology of the country around Lichfield (HMSO, London 1912) pp. 201-2.

(3) British Clayworker, 22, 1913, p. lxi.

access to two railway companies and the Coventry canal. However, by the inter-war period the best of the local clays were exhausted; and, unable to produce slab faience economically, the firm became increasingly uncompetitive.

Only two miles away at Wilnecote, George Skey bought a group of coal-mines and duly discovered the same beds of white clay. By combining these with the clays from higher and lower levels he was able to build up by 1862 a large pottery making architectural details, brown glazed domestic ware, sewage pipies and facing bricks.

Skey never developed the terracotta business to the same scale as Gibbs and Canning. The other firmson this coalfield, the Haunchwood Brick and Tile Company and Stanley Brothers in Nuneaton, also held back from undertaking architectural contracts and as a result saw their market collapse in the Edwardian period. After the boom period of the 1890s markets became more competitive and firms concentrated on the lines to which their clays and expertise were best suited; to Skey this was making sinks while Stanley became the leading firm in the manufacture of glazed bricks.

The East Midlands, through Leicestershire and southern Derbyshire, had sixteen firms advertising terracotta during the 1880s.[1] Almost half of these were away from the coalfields and were using the Keuper marls to make small panels and finials. The carboniferous clays around Coalville were first appreciated by George Smith, who in 1859 proceeded to

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(1) Kelly's Directory of the Building Trades (Kelly and Company 1883) pp. 986-8, (1890) pp. 1893-1894.

form the Midland Brick and Terracotta Company. They produced architectural details in three colours, but neither this firm nor those established slightly further west at Measham and Swadlincote made terracotta either in large quantites or long after the turn of the century.

Similarly, the large firm of G. Tucker and Son, who had been making engineering bricks in Loughborough since 1850, appears only to have produced terracotta for about six years between 1899 and 1906. The red was produced from a Permian marl but the buff colour was introduced once the shaft at a new works had been sunk to a depth of 900 feet, reaching the coal-measures.(1)

Four miles to the north of Loughborough and just off the coalfield, the Hathern Station Brick and Terracotta Company was established as late as 1874, but it became one of the country's largest producers of terracotta by the end of the century. The firm was located between a clay bank and the Midland Railway; a second Works at Cliff near Tamworth supplied the Hathern Works with fireclay. Part of the rapid growth of the terracotta department was due to the interest of G.A. Hodson who directed the firm from 1899. Growth was assisted by the use of a variety of outside clays which enabled specialisation in whatever type of architectural or other ceramic ware was most in demand.(2)

With the exceptions of Hathern and Gibbs and Canning, the

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(1) British Clayworker, 10, 1901 p. 105.

(2) The history of Gibbs and Canning and the Hathern Station Brick and Terracotta Company is considered in greater detail in Chapter 5.

production of architectural ceramics in the Midlands was declining for most of the twentieth century. Most of the firms had exhausted the best clays from their pits and lacked the capital to invest sufficiently to make the buying in of raw materials worthwhile.

In what became a more tightly competitive market, unable by the twenties to command economic prices, it was the manufacturers in Yorkshire and Lancashire who emerged as the probably most successful. From the middle of the century, there was a large number of small firms advertising themselves as producing terracotta, both in Yorkshire and the north-east. Those around Newcastle were never very significant and the Sheffield firms such as John Armitage failed to develop beyond making ornamental brickwork. By the 1880s, Leeds was established as the major centre of both firebrick and terracotta manufacture.(1)

The first use of the Yorkshire fireclays for building components was at Wakefield, where the Cliffe Terracotta Works was making chimney tops and ornaments in 1849. However, Leeds had the advantage of being underlaid by clays particularly free from organic matter and iron compounds. Not only did the firebricks made from this 'Leeds bed' have a high refractoriness but the clays could also be used for buff terracotta and faience of a reliable shape and colour.(2)

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(1) Yorkshire contained more terracotta works than any other part of Britain in 1883. Kelly's, (1883), op. cit., pp. 986-8.

(2) A.B. Searle (1912), op. cit., p. 175.

Following the discovery of a seam of the 'Leeds bed' fireclay in a coal mine, Wilcock and Company started making firebricks and drainpipes around 1858. A range of architectural details followed but it was only after 1880 that the firm started to undertake major contracts. While their pottery, and probably the terracotta, used some proportion of the upper shaley clays, the newly introduced faience was made from the purest fireclay so that it could withstand a high firing before being prepared for glazing. Leeds Fireclay took over the firm in 1889 and concentrated on the types of products most suited to the properties of the clay. The low shrinkage and pure composition allowed large blocks and slabs to be produced, both for architectural facings and sanitary use. By 1920 the group had nine quarries and mines at work, four of them using the 'Leeds' beds. By the inter-war period the mining of clay appears to have stopped at Burmantofts but faience was manufactured there until at least 1956.

Wilcock had only one local competitor in the architectural market. Messrs Joseph Cliff and Sons was one of the earliest firebrick firms and had been established in Wortley in 1795.

Terracotta began to be made in 1866, but by the nineties Cliff had been incorporated into the Leeds Fireclay Group. In 1900 W.D. Cliff, H.E. Cliff and the works manager from Burmantofts pits set up independently. The Leeds Art Pottery and Tile Company soon changed its title to the Leeds Pottery and Middleton Fireclay Works; it achieved considerable success in undercutting longer established manufacturers for glazed brick and faience work until the Second World War.(1)

The 'Halifax' beds of these fireclays extends underneath the Pennines to the Lancashire coalfield, which covers a triangular area bounded by Colne and Stockport to the east and Huyton in the west. The coal-measures are covered with a deep layer of boulder clay, so it was only with the sinking of deeper shafts from the 1890s that the fireclays of Accrington, Chorley and Darwen started to be exploited on a large scale.

The Ladyshore works belonging to Colonel Fletcher that produced the terracotta for Sharpe's churches at Lever Bridge and Platt, both dating to the 1840s, gained local competition in the form of no less than five other small potteries in Bolton, most associated with a coalmine.(2) The Ladyshore terracotta used at Lever Bridge was distorted in the kiln even though much of it was not fired to a high enough temperature to be impervious to water. Only with a better understanding of clay bodies and with powerful machinery could the hard shales and fireclays be worked satisfactorily.

The brick and pipe trade of Lancashire developed during the nineties, Darwen becoming a centre for the making of sanitary pipes. One of the Darwen firms was Shaw's Glazed

(1) Their success is recorded in the correspondence of the Terra-Cotta Association, held in the Hathern archives.

(2) Kelly's (1883), op. cit., pp. 986-8. These potteries provide the best example of firms keeping entries in the directories long after they had stopped producing the material. Most were still advertising in 1939.

Brick Company. Founded by Arthur Gerald Shaw, the works was located at Whitebirk, adjacent to his brother's coalmine. A new mine was subsequently established at Waterside and the works moved there in 1908. The fireclay seam from the drift-mine was used on its own for firebrick manufacture; for chemical ware, electrical fittings and architectural ceramics it was blended with several other clays, particularly ball-clays from Devon or Dorset.(1) Using gas-fired kilns, Shaw was able to produce faience both rapidly and economically. In the thirties they managed to out-compete Hathern, Doulton and Burmantofts in the supply of architectural slabwork.

The key to the rapid growth of the brick industry around Accrington in the 1890s was success in machine-pressing the hard shales. Frederick Stephenson proved the process and founded the Accrington Brick and Tile Company in 1887. The works had a shale bank 70 feet high, and a nearby shaft bringing up coal and fireclay for making firebricks and mixing with the shale. However the shale alone appears to have been used for the terracotta, once it had been weathered, ground and moistened into a plastic state.(2)

During the 'brick fever' that gripped Accrington, the number of firms in Lancashire producing terracotta doubled to reach twenty-four in 1906.(3) Stephenson moved on to set

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(1) Geological Survey and Museum (1920) op. cit., pp. 27-8.

(2) British Clayworker, 11, 1902, op. cit., pp. 305-7.

(3) British Clayworker, 3, 1894, p. 206. Kelly's Directory of the Building Trades (Kelly and Company, London 1906)

up the Whinney Hill Plastic Brick Company and Albert and Charles Foster established the Enfield Brick and Terracotta Company in 1893. One year later the Huncoat Plastic Brick and Terracotta Company was founded, and the Withnell Brick and Terracotta Company followed in 1897. The boom inevitably broke and the Huncoat and Withnell works had to be sold in 1917 and 1912 respectively, and produced little terracotta after the First World War.

The last establishment on the Lancashire coalfield in 1901, the Bispham Hall Brick, Tile and Terracotta Company, was the only Lancashire firm, apart from Shaw, to produce much faience in the twenties and thirties. Like Shaw they mixed their own clays with other materials, primarily clays from Ruabon, specially fired grog and some sand, and offered a wide range of glazed finishes.[1]

Of the other coalfields in England and Wales only two are of relevance. There were three small potteries listed in or near Bristol as making terracotta in the 1880s that may have been using Keuper marls or coal-measure clays. The only firm to exploit the seams of the Bristol coalfield on a large scale was the Cattybrook Brick Company. The clay at Almondsbury was first quarried and made into bricks to supply the Great Western Railway. By carefully selecting and mixing

(1) Geological Survey and Museum, 1920, op. cit., p. 43.

clays, from three different pits it proved possible to make, red and yellow pressed bricks and red and buff terracotta.

On the other side of the River Severn a band of Keuper marl lines the coast from Chepstow to Cardiff. At Newport it was used by the St Julian's Brick and Tile Company for making bricks and terracotta just before the First World War. The Welsh fireclays, worked throughout much of Glamorgan, were never used for making terracotta. The reason there was no significant terracotta industry in South Wales is probably because the fireclays were too siliceous. However there was also an attitude prevalent in Wales that fireclays were merely waste products of coal-mining rather than valuable raw materials.[1]

Fireclays were first used for making terracotta on the central Scotland coalfield. The Scottish fireclays are interbedded frequently with sandstone and coal. Their composition is closer to china-clay than most English fireclays and this probably explains why they were used for ornamental vases and statues, while south of the border only younger Tertiary and Mesozoic clays were used.[2]

The development of combined coalmines and fireclay works coincided with the construction of the Garnkirk Railway in the 1830s. The Garnkirk Coal Company had just been formed in 1828. Discovering beds of fireclay that would burn to a light colour resembling sandstone, they started making ornamental chimney pots and vases. They produced a large variety

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(1) A.B. Searle (1912), op. cit., p.174

(2) A.B. Searle (1912) op. cit., pp. 179-180.

architectural ornaments but by the sixties were concentrating on brick and tile production.

This sequence of events was closely paralleled by developments at nearby Heathfield. A brick and pottery works established by Peter Ferguson made terracotta ornaments during the 1850s, trading as Ferguson, Miller and Company. The clay that was used for both ornamental and fireclay products came from the 'Glenboig seam' found at a depth of 350 feet. The most successful of the works on this seam, the Glenboig Union Fireclay Company, which described itself as 'the largest fire clay works in the world' at the turn of the century, never made any terracotta.(1)

The only recorded location of terracotta manufacture outside the central lowlands is on the Dumfries coalfield. Copings, pier-caps and finials were made at the Buccleuch brickworks near Sanquhar.(2)

Similarly, in Northern Ireland the clay industry was concentrated in one area, the immediate vicinity of Belfast. Of the several brickworks clustered round the city the Lagan Vale Estate Brick and Terracotta Works was the only firm that produced a significant amount of terracotta from the marl beds. Developed from 1897 by H.R. Vaughan, in conjunction

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(1) Graeme Cruikshank of the Huntly House Museum provided much very useful information on these Scottish manufacturers.

(2) Only two manufacturers were ever listed for Eire, the Arklan Terracotta Brick and Tile Company and the Kingscourt Brick and Terracotta Works. Kelly's(1906), op. cit., p. 2661.

with one of the largest building contractors in Belfast, the products were mainly facing bricks and decorative details.

The clay strata of Britain and the history of their exploitation is clearly the underlying determinant of the distribution of the terracotta industry during the Industrial Revolution. Allowing for the variations resulting from Britain's complex geology, the development from using ball-clays and Eocene beds to the Keuper marls and the coal-measures provides the means for an interpretation of the changing distribution of manufacturers. Bearing in mind the regional nature of most manufacturers' markets a consideration of this historical development helps to explain the variations in ceramic architecture, where terracotta was used and in what architectural forms. The stone coloured window surrounds on Bournemouth's Victorian villas, the soft red decorations on Edwardian hotels at Cromer and the smooth cream cladding of inter-war stores along Blackpool promenade reflect Jenning's, Gunton's and Shaw's clay banks as much as any architect's or client's taste.

Some of the exceptions to this trend can be explained by the roles of the owners or works managers. Terracotta was rarely manufactured purely for the motive of profit; Henry Doulton had strong artistic aspirations, Jabez Thompson was an amateur artist and Walwyn Chapman a spare-time architect. In the last two cases these interests may explain why terracotta was produced despite the problems of salt-ridden Keuper marls in Northwich and the fact that there were no suitable clays at all in Cleethorpes.

What cannot be explained by examining geology and the initiatives ofindustrialists is how it became possible to work the deeper plastic clays and why neighbouring manufacturers so obviously had different levels of success with the same clay strata. That is large a reflection of the complexities of the manufacturing process and the skills and machinery that it came to demand for commercial success.

C H A P T E R   F O U R

THE TERRACOTTA INDUSTRY: MANUFACTURING PROCESSES

The making of terracotta had been organised as a compromise between mass-production and craftwork at Coade in the late eighteenth century. The need for such a balance was fully accepted by the late Victorian manufacturers, who generally regarded architectural ceramics as being the most challenging and labour intensive branch of heavy clayworking. Most of the basic techniques used in the manufacture of terracotta and faience will be seen to have been derived from earlier developments in potteries and china works.

In the late eighteenth century it was appreciated that the production of a good quality terracotta followed from the careful choice of clays and the incorporation of grog, the hand pressing of plastic clay into plaster moulds, and closely regulated drying and burning. These were to remain the most important conditions during the height of the revival in the late nineteenth century and for the making of blocks for restoration work in the present day. It is important to discern how far the particular techniques used in achieving these conditions remained unaltered or were adapted or replaced as production came to concentrate on architectural forms and to utilise coal-measure clays.

In examining the processes that transformed raw clays into a durable and decorative building material, it becomes apparent that the manufacturers were heavily constrained by having to balance out the various qualities required in their product; the addition of grog reduced the shrinkage suffered in drying and firing but impaired the colour of the body, small muffle kilns burnt terracotta most quickly and without discolouration but were the most expensive in terms of fuel, whilst the more opaque and durable glazes tended to obscure moulded detail. By examining the manufacture of terracotta in this context, it is possible to appreciate why inventions and new practices were taken up so cautiously. The management of most of the firms were preoccupied with producing a product of high technical and artistic quality for which a standard had been set in the late eighteenth century. The balancing of artistic ideals with industrial efficiency became increasingly tortuous and was rarely entirely satisfactory.(1)

Developments in the Clay Industry

Early Victorian terracotta manufacturers learnt little in terms of techniques from classical and Renaissance ceramics. Though inspired by Greek figurines and vases,(2) Della Robbia panels and Lomardic churches,(3) they did not consider closely

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(1) The problems were highlighted in a report by C. Carter 1920; quoted in J. Hawkins, The Poole potteries (Barrie & Jenkins, London 1980), p. 66.

(2) It is now known that the Greeks made their models in clay, wax or plaster and their moulds most typically in clay, which was fired before being used for pressing. R.A. Higgins Greek terracottas (Methuen, London 1967), pp. 1-5.

(3) Much of the late Gothic and early Renaissance terracotta in northern Italy was made from wooden moulds. C. Ricci, introduction to G. Ferrari, Terracotta and brick pavements in Italian art (Ulrico Hoepli, Milano (1928), p. 40.

the precise means by which they had been made. The main source of practical expertise was the accumulation of skills in decorative ceramics, many of which were brought in from France and Germany with the diffusion of the methods of porcelain manufacture.

Through the impetus given by the rediscovery of the formula for hardpaste porcelain and through the improvements made in earthenware and stoneware bodies, moulds became widely used for making dishes and other tableware, from the second decade of the eighteenth century.[1] The hand-pressing of pieces was supplemented by slip-casting from about 1731 and, within a decade, plaster of Paris moulds had become widely adopted. It was the use of models and moulds that encouraged manufacturers to introduce standardised products made in large numbers.[2]

While porcelain was soon being cast into finely detailed forms, the models and moulds used for earthenware and early terracotta pieces remained far coarser. Additional detail might be added by the finisher. A visitor to the Coade works at Lambeth recorded that the articles were first formed roughly in a mould and 'then polished by the chisel while in the soft state'. 'In some cases particular enrichments in matrices are added; and in others the whole is nearly the work of the hand'.[3]

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(1) G. B. Hughes, English and Scottish earthenware 1660-1860 (Lutterworth Press, London 1961), pp. 31, 183.

(2) R. B. Pugh (ed.), Victoria history of the counties of England: County of Stafford, Vol. 2 (University of London 1967), p. 9.

(3) Report by a journalist in the Somerset House Gazette, 1824. Quoted in D. Cruickshank and P. Wyld, London: the art of Georgian building (Architectural Press, London 1975), p. 199.

The quality of Coade stone resulted largely from the mixing of china-clay with finely ground grog. The widespread use of china-clays and ball-clays and the incorporation of grog, flint and other additives resulted in firms developing new ceramic bodies. The creamware and different types of porcelain perfected by Wedgwood were followed in the nineteenth century by stone china, ironstone china and granite ware. The search for bodies which were more decorative and durable, and preferably cheaper, continued into the Victorian period, aided by the chemical analysis of clays, and glazing and firing trials.

The technical expertise, precision and scale of organisation within Wedgwood, Worcester, Derby and other leading potteries was gradually taken up by the heavy clay industry. The shift of brick, tile and pipe making into large factories, which used coal-measure clays, was the prelude that enabled terracotta to become an almost mass produced building material.

Bricks hardly featured in the 1851 Exhibition. They were still being made in imprecise forms and colours at small brickyards. Finely-textured and even-coloured facing and cutting bricks represented either the best products drawn from each clamp or kiln, or the speciality of a few firms.

The irregularity of the heat in clamps resulted in bricks being burnt to a variety of colours and strengths, thirteen different grades being recognised in London.(1)

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(1) E. Dobson (ed. F. Celoria), A rudimentary treatise on the manufacture of bricks and tiles, 1850. (George Street Press, Stafford 1971). Vol. 2, p. 38. Dobson's work is the most authoritive account of brick and tile making in the early Victorian period, but he makes no mention of the revival of terracotta.

Malms, grey stocks and cutters were the most important for Georgian architecture. The hierarchy of brick types was overturned by the architects of the Gothic Revival who adopted brick as a cheap means of achieving polychromatic decoration. A wide variety of colours was produced by varying the strength of the firing and the supply of oxygen, in a clamp or Scotch kiln. Whites, creams, yellows, buffs, reds, browns, blacks, blues and greys could all be fired from a suitable London clay.

For less mottled and stronger colours, bricks were ordered from different parts of the country, areas gaining reputations in accordance with their clay deposits. Devon and Dorset ball-clays were renowned for producing white bricks, the Eocene beds of Leicestershire, Berkshire and Hampshire for reds and the Staffordshire coalfield for its 'blues'.(1)

The 'Queen Anne' Revival directed taste away from polychromy to the appreciation of red brickwork that could be carved, rubbed or moulded to produce the relevant classical details. Bricks for carving and rubbing had to be very fine and soft. To make 'rubbers' the clay was carefully chosen, run through a wash-mill to lie in evaporating pits, sand was added to reduce the effort needed in rubbing to shape, and the bricks were only gently fired.(2) Several brickworks in Nottinghamshire, Suffolk the London basin and above all Fareham in Hampshire gained a reputation for making rubbing bricks, which were most widely used in the suburbs of London

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(1) E. Dobson (1850), op.cit., Vol. 1, p. 20.

(2) Common rock sand was used, which also helped to create a bright red colour.

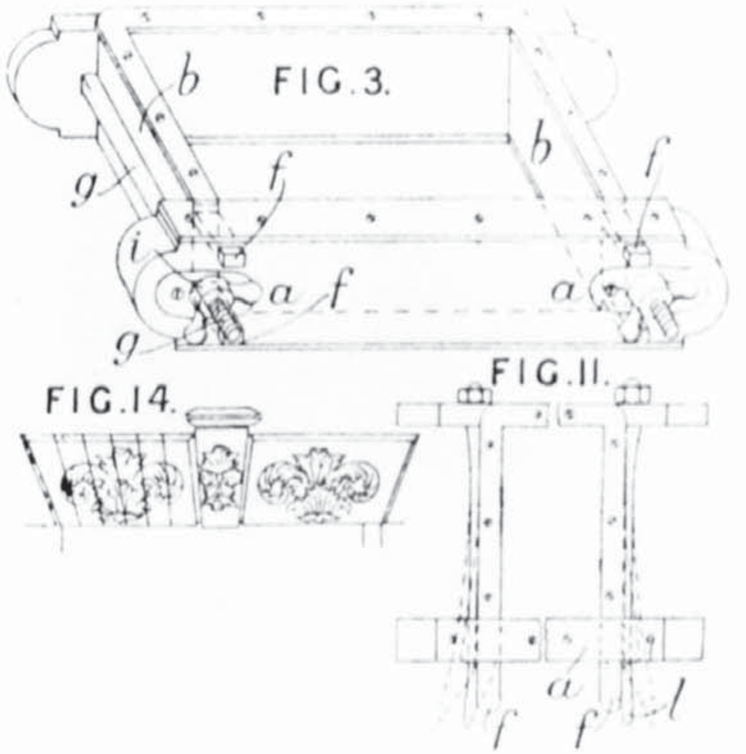

Fig. 4.1. J. Arnold's patent for moulding bricks and building blocks, No. 9, 2 January, 1855.

during the 1880s. Costing twice as much as facing bricks and requiring careful working on site, they also had the disadvantage of being liable to weather badly.[(1)]

By moulding the forms into the clay before firing, it was possible to create decorative work of greater durability at a far lower cost. Various types of wooden and metal moulds were developed, initially for filling by hand. The patent design of J. Arnold permitted more than one face to have an ornamental pattern.[(2)] (Fig. 4.1).

While light clays were necessary for hand pressing, a stiffer clay mix was preferred for machine pressing. The stiff plastic process, whereby a clot of clay was pushed by machine into moulds arranged in parallel, or round a rotating table, became widely used in the coalfields. It was adapted to produce moulded and perforated bricks in J. Cowley's machine, patented in 1863.[(3)] The majority of Victorian decoratively moulded bricks were pressed twice, once into the basic rectangular shape and again in the special mould. Hand operated re-presses were in use through the sixties and a power operated version was invented by Bennett and Sayer

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(1) Rivingtons, Notes on building construction (Rivingtons, London 1879), Vol. 3, pp. 104-5.

(2) J. Arnold, Patent no. 9, 2 January 1855. The patents relating to ceramics are brought together in Class 87 of the abridgement of specifications. Kilns are under Class 51.

(3) J. Cowley, Patent no. 647, 9 March 1863.

in 1877. The principal machinery manufacturers, such as Whittaker of Accrington and Johnson of Leeds, supplied metal moulds with their machines, which may explain why a limited range of motifs recurs so frequently both in catalogues and buildings. (Fig. 4.2).

The most economical means of producing special shapes of brick was by extruding the clay through dies of the required cross-section. In 1842 James Hunt patented a machine that extruded a column of clay in the shape of a plan-view of a brick, which was cut by wires to the depth required. Within twenty years two firms were making steam powered wire-cut machines, which proved the cheapest means for producing simple mouldings for plinths, cornices and wall-copings.(1)

The use of machinery, of stiffer clay bodies derived from coal-measure seams, and the acceptance of more standard -ised products, all served to focus investment into larger works. Rather than concentrate on the one or two lines which their raw materials and location might have suggested as most suitable these firms offered the widest range of clay products possible. The same machinery and plant, such as the clay-preparation machines, drying rooms and kilns, were used for as many types of clay and products as their design would allow. Brick and roofing tile works soon started making decorative bricks, finials, chimney pots, garden edging tiles and quarry tiles and then, more selectively, terracotta, decorative tiles

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(1) J. Woodforde, Bricks to build a house (Routledge and Kegan Paul, London 1976), pp. 116-7.

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Fig. 4.2. Pullan and Morris' power-driven screw press with sample products. Source : A.B. Searle, Modern brickmaking (Scott, Greenwood and Son, London 1911), p. 170.

and faience. At other works pipes, sanitary ware or fire-bricks were the major lines of manufacture.

Terracotta and faience were probably the most demanding of these offshoots of brick and tile production. With the exception of the modelling and moulding, the basic processes were similar to other branches of heavy clayworking. However, one finds that, at each stage, higher standards and more precise control were necessary to work up to five hundred weight of clay into blocks that were both durable and artistic in finish.

Clay Extraction and Preparation

Clay quarrying and mining became increasingly mechanised as steam excavators and compressed air drills were introduced both above and below ground. But such machinery was too indiscriminate to extract the best clays out of coal-measure seams. Terracotta clays had to be carefully selected and sorted; in the most valuable quarries such as at Pen-y-bont in Ruabon, the overburden was removed, faces blasted and the marls of fireclays carried away, all by hand. J. C. Edwards first considered using an excavator in only the 1920s.(1) Similarly, in most mines, several types of clay and coal had to be differentiated and the seams were too thin to justify the use of machinery. However, by the inter-war period, Shaw were using air drills and electric pumps, the latter to prevent

(1) Claycraft, 2, 1929, pp. 340-2 (p. 340).

flooding.[1] For most firms it became more economical to buy clay from specialist suppliers rather than to work partially exhausted exposures, which were increasingly unproductive and waterlogged.[2]

Light and overhead railways became more necessary as clayworkingshad to extend away from the works. The Cattybrook Brick Company had a typical system of transport; clay was removed by blasting and digging, and carried in wheelbarrows, to be tipped into trucks which were drawn from the working face to the foot of an incline, up which they were hauled to the grinding mill.[3]

Weathering was an old established custom in clayworking. It served to break down hard masses of clay into a state suitable for grinding, improved the purity and plasticity of the clays and enhanced the colour of the burnt goods. Consequently weathering was regarded as being of particular value for clays to be made into fine goods such as terracotta. The practice of leaving clays exposed to winter frosts was an important reason why brickmaking had been a seasonal industry. Hard shales and fireclays could require weathering for a longer period, the Coalbrookdale Company leaving its fireclays for up to three years before working.[4] Meanwhile

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(1) Geological Survey and Museum, Special reports on the mineral resources of Great Britain, Vol. 14: Refractory materials, fireclays (HMSO, London 1920), p. 27.

(2) A few firms with plentiful reserves, such as Candy of Newton Abbot, set up subsidiaries to market clay to other manufacturers.

(3) L. Richardson, 'Brick earths, pottery and brickmaking in Gloucestershire', Proceedings of the Cheltenham Natural Science Society, 1, 1910, pp. 222-287 (p. 281).

(4) Geological Survey and Museum (1920), op.cit., p. 149.

the establishment of large factories meant that production needed to be maintained throughout the year and the fluctuating nature of demand made it difficult to judge how much clay should be dug to supply production in subsequent years.

The restraints imposed by weathering were partly overcome by achieving comparable effects through mechanical processes. Grinding, screening, pugging and mixing were used to work clays into the required composition and consistency. Rather than searching for a pure 'terracotta' clay that required little preparation, manufacturers came to accept that fine grinding, followed by pugging, and a precisely controlled mixture of clays, could make good architectural terracotta. The machines and their setting had to be precisely suited to the types of clay and product; the clays could be ground too wet for effective pugging, they could be passed through too large a sieve or not soaked, mixed and pugged long enough. If the various clays were not perfectly mixed, unequal contraction in the kiln could cause the blocks to crack or even explode.(1)

The Coalbrookdale Company mixed their clays before grinding but it became more common for the clays and grog to be ground separately in mills with perforated pans, and the crushed material to be passed through a screen before any mixing took place. A jaw crusher and a set of rollers would be used for grinding the grog.(2)

The clay, having been dry-ground, screened and combined

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(1) A.B. Searle, The clayworker's handbook (C. Griffin, London 1929), pp. 47-8.

(2) British Clayworker, 9, 1900, pp. xlvi-xlvii.

with grog, was mixed with water in a wet pan mill to obtain the right degree of plasticity. This process was called tempering.

The tempered mixture was then passed through a pug-mill. In small brickyards pugging could have been the only preparation given to the clay; for terracotta it might have been repeated several times to allow the blades to thoroughly mix the materials into large plastic wads.(1) The working of horse-gins was supplanted by steam power from about the 1860s and Whitehead had brought a combined mill for crushing and pugging onto the market by the eighties.

Filter pressing, whereby a slip was pumped through a series of gauzes which trapped any over-sized particles, was normally only used when the clays were to be sieved into a dust for tile-making. However in some firms the clays for making terracotta or faience were also fed into the presses, to ensure an evenness of particle size. For finer ware such as statues and relief panels Blashfield accepted the additional expense of slip-washing the clays and evaporating the excess of the water in a slip-kiln. The contemporary Scottish manufacturer , Wilson used a 'slip plate' whereby fireclay soaked in water was boiled to the desired consistency.(2) Such washing and evaporating was sometimes used to enable impure clays to be made into architectural terracotta.

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(1) Pugging was repeated at least twice by Blashfield to mix the different clays. Builder, 26, 1868, pp. 546-7 (p. 547).

(2) Architect, 10, 1873, p. 202. By the 1890s the slip-kiln had largely been replaced by the evaporating tank in which the slip would be left for around a fortnight.

Blashfield stored both coarse and their finely prepared clays for a few days before using them; storing in a cold dark place increased plasticity and ensured a close blending of the clay and grog. Their clay was also beaten and wedged. Wedging consisted of cutting a large lump of clay many times with a wire, and throwing the lumps back together again, forcing out any air.(1)

While the processes used in clay preparation became increasingly standarised between different firms, the situation as regards the types of body used became more complex and confused. The management of Blanchard, Wilson, and Gibbs and Canning had all argued in favour of using one particular clay which had the desired properties. Ball-clays of Devon and Dorset, marls and fireclays could all be used on their own for making terracotta, as they often were for bricks and tiles, but few seams provided exactly the right combination of physical and chemical properties for large architectural blockwork or faience.(2)

Ball-clays, regarded as an impure kaolin, were sufficiently plastic for hand-moulding but a less desirable characteristic, associated with high plasticity, was that they shrank

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(1) Builder, 26, 1868, p. 547.

(2) The discussion on Charles Barry's paper on terracotta considers the merits and disadvantages of mixing clays. Builder, 26, 1868, pp. 856-7. The most authoritative American text on architectural ceramics considered that it was always worth the extra expense of mixing clays. C. T. Davis, A practical treatise on the manufacture of bricks, tiles, terracotta, etc., (Sampson Low, Philadelphia 1884), p. 307.

heavily and tended to warp in the kiln. Fireclays, in contrast, had a low plasticity and a low shrinkage so a combination of these two types could help to produce a workable compromise.

The alkalis contained in Dorset ball-clays were also of value in that they acted as a flux, making the body fuse to a harder consistency. Marls were the type most usually worked on their own. The high plasticity that they developed after weathering and pugging did lead to shrinkage in drying and burning, but not with the attendant problems of warping that beset ball-clays.(1)

Mixing was also a means of producing the desired colour in the burnt product, and changing tastes influenced the composition used. Buffs, reds and blues could be made from clays that burnt naturally to one of these colours. Clays with a high iron content would help to produce a bright red finish and the addition of ball clays might create a stone colour. Red and biscuit burning clays were combined to produce a tawny colour.(2) Grey terracotta was made either by blending black and white burning clays or by the addition of maganese dioxide.(3)

Many additives were recommended for various colours, but they were mostly applied as slips after the blocks had

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(1) W. A. McIntyre, Investigations into the durability of architectural terracotta and faience (HMSO, London 1929), p. 5.

(2) British Clayworker, 26, 1917, p. ii.

(3) British Clayworker, 21, 1913, p. 122. A whole series of additives were listed to make other colours.

been moulded. The most common, though least publicised, practice was redding, whereby iron oxides were fixed to the surface with glue powder.[(1)] These tricks of the trade came to be criticised both for their dishonesty in covering up the natural finish of the clay and because they tended to split away from the block, either in the kiln or after several years of exposure to the atmosphere.

Barytes was frequently mixed into the body, to control efflorescence that could appear on the surface of the terracotta and bricks. Such 'scum' became a particular problem to the manufacturers around Ruabon in the 1890s. This discolouration was thought to be caused by either vegetable matter in the clay or sulphurous gases in the kiln, and the blocks had to be scrubbed with sand and water, which damaged the surface.[(2)] A 'scum destroyer' of carbonate of barytes was sold which made the salts soluble in the waters that were driven off by drying and burning.[(3)]

While the incorporation of fireclays could help to reduce shrinkage, the main means of control was the addition of finely ground earthenware. 'Grog' had been used in pottery

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(1) British Clayworker, 3, 1894, p. 12. The report covered about fifty different compositions for redding terracotta, using fixatives such as fish glue and boiled starch.

(2) This journal carried a lengthy correspondence on the problem of scum, initiated by W. S. Edwards, British Clayworker, 1, 1892, p. 28.

(3) British Clayworker, 6, 1897, p. vii.

from the early eighteenth century. Coarser grains were selected to give stability to terracotta, the main constraint on the quantity that could be incorporated being its detrimental effect on the colour of the finished goods. J. C. Edwards stated that the addition of grog in significant quantities would ruin the bright red characteristics of Ruabon goods.(1) Sand was also used by some manufacturers to control shrinkage,(2) while in America experiments were made with using ground furnace slag as a grog.(3)

Blashfield were unique in their use of coprolites. Composed mainly of phosphate of lime, the mineral acted as a flux, helping to bind the moulded forms. It was regarded as an equivalent to the burnt bones used in china wares and thought also to increase plasticity without causing excessive shrinkage.(4)

Model and Mould Making

Except in the case of unique sculptural pieces, terracotta work required the making of moulds into which the clay could be pressed. These were built up round models which in turn required detailed drawings to an oversize scale, allowing for the clay to shrink in drying and burning. The skills involved were virtually unknown in the brick

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(1) Building News, 44, 1883, pp. 349-50.

(2) Blashfield incorporated sand in their complex terracotta body.

(3) British Clayworker, 27, 1919, pp. 199-200.

(4) British Clayworker, 13, 1904, pp. xxvii-iii (p. xxxviii).

industry and were more complex than in most of the modelling undertaken in pottery and china works. Designers of tableware never had to allow for pieces to shrink by several inches, for expansion joints or for coursing in with brickwork.

The first necessity was for the design to be developed into full-size working drawings, one for each model required. Whereas, previously decorative details had been some of the last elements of a building to be finalised, they now had to be among the first, since the terracotta manufacturer needed at least eight weeks before making his first deliveries.

The sequence and scale of drawings produced never appears to have been standardised. The earliest terracotta work for which a set of drawings survives, Dulwich College, built between 1866 and 1870, had elevations drawn up at scales of one inch to two or four feet, showing the arrangement of terracotta across the facades, more detailed elevations of cornices, windows and doorways at one and a half inches to the foot, and full-size and shrinkage scale drawings of many of the blocks.(1) (Figs. 2.16 and 17)

A fairly standard procedure was established by the turn of the century. The manufacturer quoted a price from small-scale drawings, at a scale of one inch to either four or eight feet, which were used to calculate the quantity terracotta required and the amount of ornamental work. Once

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(1) The drawings are in the care of the school.

the contract was agreed, the architect supplied drawings, usually at a half inch or one inch scale with full-size sections where necessary.(1) The draughtsman in the works would use these one inch scale drawings to work out how strings, cornices, sills and other components could be made in conveniently sized blocks, the jointing being indicated and the different forms identified by number or letter. (Figs. 8.16 and 9.11). Then, for each block full size details would be drawn from which the shrinkage scale could be calculated.

One aim in working out the design in such detail was to achieve as much repetition of block forms as possible, thereby minimising the number of moulds that would have to be made. As well as determining the number of moulds, the draughtsman would consider where models could be altered to produce a slightly different form, maybe one shorter or with different detail. Whereas such an alteration might take only one hour, a new model could involve eight or nine hours work and the use of more plaster.(2)

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(1) P. N. Hasluck, Terracotta work (Cassell, London 1905), p. 12. This is the only manual published in England on making terracotta. Its value is somewhat restricted since the author apparently draws his information from a brickworks with only a small output of terracotta; the Star Works, near Newport, Monmouthshire.

(2) Brick and Pottery Trades Journal, 7, 1903, pp. 1-2. The article illustrates how the cost of a traceried window could be halved by slightly reworking the design to reduce the number of moulds required.

The draughtsman also adapted the details of the architect's designs to ease the problems of manufacture. Undercutting would be avoided where possible as it either involved making extra loose moulds or cutting clay out of the blocks once they had been pressed. Drying and firing were less likely to warp the blocks if they were of a regular thickness; thin tapering details could bend and be easily damaged in transit or fitting.(1) The architects who made regular use of terracotta were well aware of these factors and worked out their designs in accordance with the practicalities of manufacture. Some had the most important ornamental features modelled under their personal supervision, the models then being supplied to the mould makers.

Whatever the number of draughtsmen employed at a works, normally only one person would be given responsibility for a specific building and would see the work through to the completion of delivery.(2) The set of working drawings would be his reference on the design and on the progress in executing the contract. A tracing of the scale drawing would be sent to the architect for his approval of the jointing and other minor alterations. Amendments would normally

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(1) Building News, 60, 1891, pp. 531-2. This article considers the role of the terracotta draughtsman in detail. It is one of a series of ten covering all the stages of manufacture and architectural use of terracotta.

(2) The draughtsmen's books at Shaw were all named on the spine, that person being responsible for the contracts recorded inside.

be marked in red ink and incorporated into a tracing supplied to the builders.

Once the design was finalised, drawings were made of each differing block. They were to 'shrinkage' scale, which was the size to which the clay would have to be moulded in order to contract in drying and firing to the required dimensions. Rulers were used for working out the scale; the 'ordinary' rule was divided into twenty-four inches and the 'clay' rule, totalling about twenty-six inches in length, was also divided into twenty-four divisions.

A proportion of one-twelfth or one-thirteenth was the typical measure allowed. The 'clay' drawings were used for making the necessary models.(1)

In the subsequent stages of manufacture the draughtsman was still the controlling figure. It was in his work-book that the numbers of each type of block were systematically recorded. A brief description of the blocks might have been given to assist reference. A typical form of recording was that each contract was allocated a letter of the alphabet and all relevant work stamped with the letter and possibly the initials of the name of the building.

Draughtsmen may have overseen production, but the workers at each stage retained an individual responsibility by virtue of the unique skills of their craft. The

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(1) Since various clays had different shrinkages, a variety of rulers was necessary. It was recommended as being more reliable to have two one-sided rulers rather than a single rule marked on both faces. Building News, 60, 1891, pp. 531-2.

plasterers' shop, using techniques developed in Britain from the early sixteenth century, was the most detached of all, virtually forming a distinct works in itself.

Though wood, clay and even stone were used, plaster became the most usual material for both models and moulds. Using guides or templates it could be worked quite rapidly to perfect trueness.(1) Apart from simple ashlar work for which the models were made out of plain plaster slabs, models were best built up on solid cores, being shaped by a template to the required outline. There were two basic methods: round forms were turned on a potters wheel or a lathe, while straight mouldings were run on a 'horse'.

The 'horse' consisted of a piece of sheet zinc, cut to the desired outline and nailed to a frame of wood. It was slid or 'run' along the edge of a slate bench as successive layers of plaster were built up, until the wet plaster was formed into an exact model of the cross-section. The plaster model was sawn off to length and used for making a mould.(2) (Fig. 4.3).

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(1) The techniques of modelling and moulding plaster had reached high standards in response to the demands of Georgian interior decoration. The means of mixing plaster to a suitable thickness was simple and apparently maintained by subsequent generations of modellers. Plaster of Paris would be added to a basinful of water by sprinkling in a handful at a time until as much plaster had been added as the water would cover. Then it could be assumed that the mixture was strong enough; once skimmed to remove any lumps it was ready for use. P. N. Hasluck (1905), op.cit., pp. 123-4.

(2) The faces of the model to be covered in plaster were well greased with soft soap boiled in oil to prevent the model and mould sticking together.

Fig. 4.3. Model, template, mounted template, and horse for running a moulding in plaster. Source: W.J. Furnival, Leadless decorative tiles, faience and mosaic (W. J. Furnival, Stone 1904), p. 766.

The simplest way to contain the plaster mould was to build around the model a wall of clay termed a 'cottle', leaving a space of about two inches. The plaster mixture was then simply poured into this gap to cover the top of the model, again to a depth of about two inches.[(1)] (Fig. 4.4).

Usually it was necessary to have slips of plaster forming the inside faces of the mould to enable it to be removed easily after pressing. For each face, strips of clay were built up on the sides of the model, located by further strips fixed at either end. Once they were removed, notches were cut in the edges of the plaster slips and the other faces built up. The four plaster slips were wider at the bottom than the top to aid their removal.[(2)]

A case was then made to mould the face of the model and to surround the slips, holding them in the correct position. Since this case only had to run to half the depth of the model, clay was built up round the base of the slips. Once the plaster was dry, this clay and the model were removed.[(3)] (Fig. 4.5)

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(1) The use of a cottle is described in W. Furnival, Leadless decorative tiles and mosaic (W. Furnival, Stone 1904), p. 266. Furnival and Hasluck provide the only comprehensive accounts of model and mould making for terracotta work.

(2) P. N. Hasluck (1905), op.cit., p. 79.

(3) Most terracotta blocks had recessed panels in their ends and were made with slightly tapering sides, narrowing away from the face. This enabled more mortar to fit between the pieces without having unsightly wide joints. By lightly trimming the front edge there was considerable scope for adjusting the fitting of the blocks.

Fig. 4.4. Cottle in section, and in plan when the mould is required to have open, and closed, ends. Source : W. J. Furnival (1904), op.cit., p. 767.

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Fig. 4.5. *Mould for a cornice in section. Source: W. J. Furnival (1904), op.cit., p. 767.*

A template of zinc was again used for modelling round pieces such as columns and finials. It was fixed on a large box to one side of a rotating spindle onto which layers of plaster were applied. When dry the model would be cut from the spindle. Because both sides needed accurate moulding a two-piece mould was necessary. They were termed 'top and bottom' or 'book' moulds. To mould the top part the model was laid flat and clay poured half way up its side. The exposed half was then covered in plaster. Once the mould was dry the model was turned over and plaster built up over the half formerly covered in clay.(1)

The majority of architectural forms could be modelled and moulded through appropriate variations in these methods. Square and octagonal chimney pots were made up of slabs of plaster run from templates. For round pots a lathe with a template was again used for turning the model. (Fig. 4.6). The mould was then built up in two parts round this model. The complex chimney pots introduced in the middle of the nineteenth century, with special outlets and side vents, were made with a set of moulds that fitted on top of each other, and by then tacking extra projections directly onto the clay pressing. Any lines that required cutting by the finisher, such as for making a scalloped top, could be scratched on the model and consequently marked out on the pressing.(2) (Fig. 4.7).

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(1) P. N. Hasluck (1905), op.cit., p. 74.

(2) P. N. Hasluck (1905), op.cit., p. 39.

Fig. 4.6. Lathe for turning a chimney pot. Source: P.N. Hasluck, Terracotta work (Cassell, London 1905), p. 38.

Fig. 4.7. Model and bottom mould for a chimney pot. Source: P. N. Hasluck (1905), op.cit., p. 39.

The fretwork, lozenge and spiral patterns of Tudor style chimney pots could be worked into the model. A fret pattern was traced and cut into a sheet of clay laid out flat on a board, the design then being transferred to the shaft to the pot. Spiral stripes involved a preliminary model and mould. A strip of plaster was run on a horse to the desired section and a mould made of the strip. Clay was then pressed into the mould and that pressing twisted onto the model of the shaft. By applying differing patterns, one basic form of shaft could be developed into a range of decorative designs. The ingenious use of models enabled manufacturers to advertise a bewildering array of architectural details in their catalogues, with groups of, for example, keystones sharing the same overall dimensions. The builder could choose a variety of designs to give interest to a building frontage, without incurring any extra difficulty or expense.

The classical vase and pedestal found in most catalogues involved fairly complex plasterwork. (Fig. 4.8). The vase and its neck were modelled separately, but in both cases by having a template run round a block of plaster. For the square pedestal the template was run along the bench making up the slabs to form the four sides.(1) (Fig. 4.9). Ornamentation was applied either in the form of strips of moulding, such as in an egg and dart pattern pressed out of a separate mould, or by applying hand modelled details.

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(1) P. N. Hasluck (1905), op.cit., pp. 60-2.

Fig. 4.8. *Example of a terracotta vase.* Source: P. N. Hasluck (1905), *op.cit.*, p. 61.

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Fig. 4.9. The method of running a pedestal for a garden vase.
Source: P. N. Hasluck (1905), op.cit., p. 63.

Making the mould of a vase involved a slightly different use of plaster slips and a case. Firstly the handles were cut off to be moulded separately. The first mould to be formed was for the rim, round which a ring of plaster was laid. Turning the vase upside down the sides were then moulded, in several parts. Strips of clay were used to mark the boundary inside which the plaster was applied. (Fig. 4.10). As each section was completed the clay strips were removed and a distinguishing mark put on each plaster slip. To keep all the slips together, a case or shell was built up round the bottom portion of the vase. The same technique was used for the neck of the vase and two half-moulds were used for the handles. (Fig. 4.11). The square pedestal mould comprised four slips held in place by a case.

The example of a diminishing moulding illustrates the ingenuity used in modelling complex forms. The section of the face of the keystone, because of its diminishing width, was formed by a template hinged in the middle. (Fig. 4.12). This narrowed as the guiding-pieces were run down the sides of the model. (Fig. 4.13). The acanthus leaves, straps and any other enrichment were modelled by hand. For the mould, four slips were built up round the sides. (Fig. 4.14). Before the case carrying the moulding for the face was built up, a 'loose piece' of plaster was inserted beneath the under-cut of the acanthus leaf, surrounded temporarily by a wall of clay. It was then taken out and trimmed to be easily removable with each pressing.[1] Fig.(4.15)

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(1) P. N. Hasluck (1905), op.cit., pp. 78-9.

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Fig. 4.10 Mould making for a vase: clay edging strips, and with the inside area filled with plaster. Source: P.N. Hasluck (1905), op.cit., p. 66.

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Fig. 4.11. Mould making for a vase: the finished mould and the half-mould for a handle. Source: P.N. Hasluck (1905), op.cit., p. 66.

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Fig. 4.12. A running mould used for a diminishing keystone. Source: P. N. Hasluck (1905), op.cit., p. 78.

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Illustration removed for copyright restrictions

Fig. 4.13. Handling a running mould. Source: P.N. Hasluck (1905), op.cit., p. 79.

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Illustration removed for copyright restrictions

Fig. 4.14. The four slips for a mould of a keystone. Source: P. N. Hasluck (1905), op.cit., p. 80.

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Illustration removed for copyright restrictions

Fig. 4.15. A loose-piece and the case forming the mould of a keystone. Source: P. N. Hasluck (1905), op.cit., p. 81.

Where the keystone was part of a semi-circular arch, a curving arch moulding was run by fixing the template to an arm of the desired radius pinned to the workbench. The moulding at the head of the key was run on a 'horse' and fixed on to the plaster block. (Fig. 4.16). In this example Hasluck recommended that the keystone be modelled entirely by hand.(1)

Building up architectural forms in clay required skills in both draughting and sculpturing. Once a centre line had been marked out clay was built up into a half round form running down the centre. Taking each side in turn the general shape of the spiral was built up, and a roll of clay was laid from head to foot, twisting it into the shape of the 'S' scroll. For clay modelling it was emphasised that the overall form of the piece should be roughed out before any fine finishing was attempted. The final stage would be to model the ribbons, festoons, and leaves.(2)

If the design of a component such as a keystone was too large to be pressed and fired in one piece,the model would be cut into conveniently sized pieces and moulds would be made for each.

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(1) P. N. Hasluck (1905), op.cit., pp. 83-5.

(2) Ordinary red clays and fireclays were not sufficiently fine or ductile for modelling; pipeclay could be used but proper modelling clay was recommended. P.N. Hasluck (1905), op.cit., p. 119.

Fig. 4.16. Radius mould for running a curved arch. Source: P. N. Hasluck (1905), op.cit., p. 86.

Aston University

Illustration removed for copyright restrictions

Fig. 4.17. Case and model in section for moulding with gelatine. Source: P. N. Hasluck (1905), op.cit., p. 155.

Hand-worked clay details were frequently applied to plaster models. For decorative and sculptural work, such as friezes, a bed of clay was preferred to plaster;(1) as well as leaving the applied clay moist and workable it had a yielding surface and so could be given some detailing. For free-standing groups, bricks, wood or hard plaster were used as a stable core and a wire framework bent into the shape of the limbs or stems. Where large models had to be cut up to be made in several blocks, the joints were hidden, where possible, by drapes or other folds in the surface. Fine leaves, stalks and other fragile forms might have to be modelled in copper.(2)

Such figure groups were not only very costly in terms of time but they were beyond the capabilities of the plaster shops in many smaller firms. Minor manufacturers would hire a modeller specifically to produce the models required for their catalogued range or else turn to an independent firm of model makers.(3)

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(1) The face of the plaster slab had to be varnished with shellac to close up the pores, otherwise the moisture of the clay would be absorbed too rapidly.

(2) Various suggestions to help an architectural modeller produce a creditable piece of sculpture were put forward, such as using geometry to reduce scale, looking at the model in a mirror to check for any imbalance and copying details from photographs. P. N. Hasluck (1905), op.cit., p. 131.

(3) M. du Jardin in London and H. Mabey in Leeds were two firms that appear to have specialised in model making for terracotta.

When very fine detail, but only a limited number of pressings, was required, such as for set-pieces in a major architectural contract, gelatine moulds were a valuable alternative. They were easy to make and could reproduce undercut detail; the disadvantages were that the limited number of pressings possible had to be taken within a couple of days of the mould being made, before the gelatine lost its elasticity and form.(1) A plaster case was made, leaving a space between it and the model. The gelatine was poured into this cavity, at the lowest level of the model, so expelling the air through holes in the suface of the case. After allowing the gelatine time to set, the case was removed and the jelly carefully peeled from the model. This jelly was sufficiently flexible to bend round any slight undercutting.(2) (Fig. 4.17).

As production expanded, plaster moulds became an increasing problem, because of the labour that they involved, the space that they required for storage and the speed of their deterioration. Firms tried to economise on the number of moulds required; often rather than making special moulds for corner or end pieces, pressed blocks would be cut and rejoined to form the required shape.(3) With the dominance

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(1) Gelatine is prepared by soaking in water until soft and then being dissolved. The inside of the case and surface of the model was coated in paraffin oil, in which some stearin or candle wax had been melted. If the jelly was too hot, it would stick to the plaster.

(2) P. N. Hasluck (1905), op.cit., p. 154.

(3) This practice was condemned as the two parts of the block could easily break apart in the kiln or during fitting.

of architectural contracts over stock sales vast numbers of moulds were accumulated, presumably in case of repeat orders by the same client or architect. However, most stores were insufficiently dry and too disorganised for the models and moulds to be easily re-used.[1]

Just before the First World War considerable attention was given to improving the quality of plaster moulds. They were best kept for several weeks after they had been made, before being used for pressing. This was quite feasible for stock products but increasingly impracticable for architectural commissions where pressing had to be commence as soon as possible. If not left to harden the surface was quickly worn down, with a loss of detail and exposure of air-bubbles. Damaged plaster moulds could not be restored. A partial alternative, suitable for the outer cases only, was fibrous black asphalt which could be melted down and re-used.[2]

The main effort to avoid the time and expense of plaster models and moulds was concentrated on the potential of clay extrusion. Having been used for moulded bricks, extruding machines produced some early 'ashlar' terracotta, consisting of simple facing blocks that were bonded into brickwork.[3] Various patents were taken out during the last

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(1) British Clayworker, 19, 1910, pp. 213-5.

(2) H. L. Doulton and J. M. Carr, Patent no. 19, 445, 16 October 1893. Doulton took out more patents relating to terracotta and faience than all the other major manufacturers put together.

(3) The dies for extrusion were generally made of beechwood lined with fine moleskin stretched across the inner faces. The corners would be slightly rounded to prevent dragging on the edge of the die.

three decades of the nineteenth century but few can have been widely applied. The most bizarre was W. P. Thompson's patent of 1897. Extruded blocks had their face ornamented by an embossed roller onto which a coloured slip was applied by a hopper. Separate punches at the side made holes to help with drying.(1)

Doulton was the only firm to make much use of extrusion, with their cellular terracotta introduced about 1890. Rectangular clay blocks were extruded and cut to the overall dimension required. The blocks were then worked back directly to a moulded section, possibly using a plasterer's 'horse' as a guide. For a long moulding, several blocks were laid together along the bench and worked at the same time. This method was first used on a large scale for the bank designed by Collcutt, on Ludgate Hill. There is no report of how the clay was actually cut away without the need for a completely disproportionate amount of hand-finishing.(2) A variation was patented in 1889 with an extruded stream of terracotta clay being inserted in a hollow mould and the clay being forced out to the required length.(3) In this case the gain was more in terms of constructional strength than in any economising in model or mould making. (Fig. 4.18).

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(1) W. P. Thompson, Patent no. 2767, 2 February, 1897.

(2) Building News, 61, 1892, pp. 268-9.

(3) H. L. Doulton and S. H. Leech, Patent no. 5205, 26 March 1889.

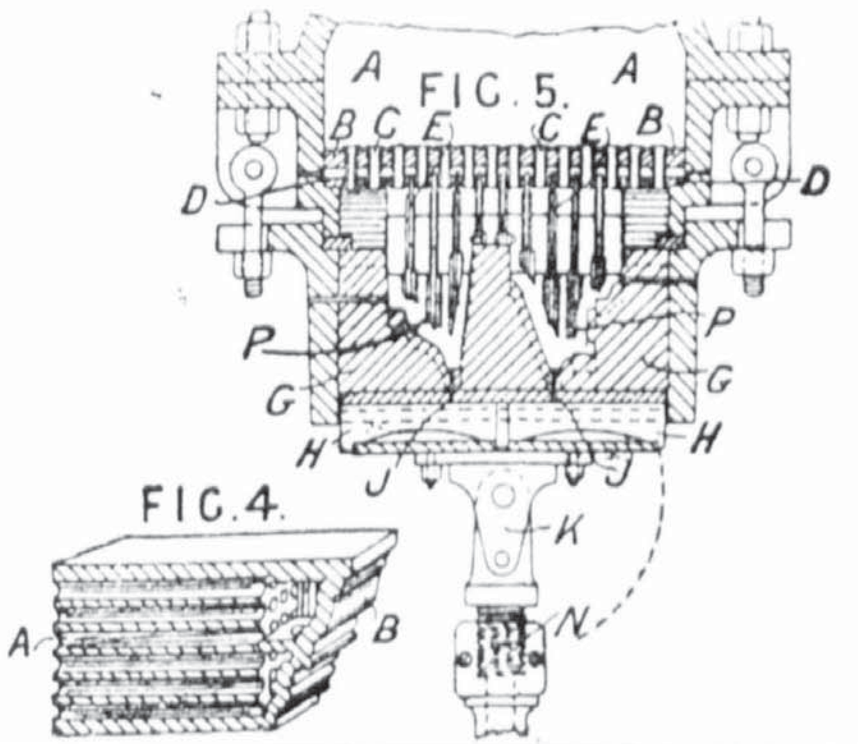

Fig. 4.18. H. L. Doulton's and S. H. Leech's patent for extruded and moulded terracotta, no. 5205, 26 March 1889.

The final solution to the expense of modelling and moulding ornamental terracotta came with the replacement of relief decoration and constructional blockwork by plain faience slabs. In form little more than very large tiles, it appears that the original intention had been to extrude the units through a narrow rectangular die. However serious problems were incurred with the twisting that occurred in drying, and in achieving a compatability with the corner, plinth and other special blocks that still had to be pressed in moulds. Some of the earliest slab faience was pressed and fired with a back webbing which was knocked out before the goods were dispatched. A more economical approach which was used for most of the slabwork produced in the late thirties was to cast these large tiles in banks of moulds produced from simple plaster models.[1]

Moulds for faience slabs were also made of plaster of Paris, usually in two pieces which separated along the back edge of the tile. The technique of mould-making was derived from that used for block work. The model was placed face uppermost on a glass surface and clay strips built up about three inches away from the edge of the model. A highly liquid plaster would be poured round and over the model, covering it to about the same depth of three inches.

When dry the model and the mould were turned over, the sides of the first mould were soaped and a plug was placed in the centre of the back of the tile. Plaster was

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(1) G. N. Hodson, 'Architectural terracotta and faience', Transactions of the Ceramic Society, 35, 1935-6, pp. 43-51 (p. 49).

poured onto the back of the model. Once set, the moulds were separated and the model removed. As with moulding for terracotta, the model had to be sized with soap or shellac to prevent the plaster from sticking. Notches were cut into the first mould to produce joggles that would locate the pieces correctly.[1]

Pressing and Finishing

In comparison with the precision of clay preparation and the combination of experience and artistry needed in model and mould making, the actual pressing of the terracotta blocks was relatively unskilled and repetitious.

Early illustrations show the pressing shop to be a confusion of piles of clay, empty and full moulds and drying blocks, but in the larger works it became organised more like a production line. The moulds to be used by the presser in a day's work were set in line between rails on which was run a pressing table.[2] A clot of clay was cut from a large heap and set on the side of the table. The mould was lifted up beside the clay, and strips about one and a quarter inches thick were laid in the mould, filling the bottom face first, then the sides, and being beaten into the detail of the mould by the first. Cross-pieces called straps, sometimes with holes cut in them, were placed in where necessary. (Fig. 4.19).

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(1) D. Hamilton, Architectural ceramics (Thames and Hudson, London 1978), pp. 104-5.

(2) The clay was 'knocked up' on a plaster topped table, to harden the outer skin slightly and to force the grog below the surface to the clay. D. Hamilton (1978), op.cit., p. 60.

Fig. 4.19. Blocks in and removed from plaster moulds, pressing shop, Hathernware Ceramics Ltd., 1982.

Where the moulded faces were uneven it was important to gouge out the inside surface of the clay, so that the clay body was of a constant thickness. Any roughness in the inside surface would be smoothed down by a wet sponge or by templates. If the blocks could not have an open back a top layer of clay was put on with a hole left to assist drying and prevent the piece exploding in the kiln.[1]

The backs of architectural blocks, exposed at the open top of the mould, were simply trimmed off with a metal bow. Where the piece had been moulded in two halves, as with chimneypots, the two halves, still in the moulds, were set up in a vertical position tightly held against each other and left for at least a day until the clay adhered.[2]

The natural advantage of using plaster for the moulds was that it absorbed the moisture from the surface of the clay, causing slight shrinkage. This enabled the piece to be removed from the mould after a few hours if it was a simple block, and within the working day if it was more complex.

The rate at which moulds could be refilled, was constrained by the fact that they retained moisture drawn from the clay. If a mould was damp when used for pressing clay tended to catch on the plaster, making removal difficult. Shaking fine clay dust inside the mould reduced the likelihood of sticking. However, to make large numbers of a particular

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(1) P. N. Hasluck (1905), op.cit., p. 13.

(2) P. N. Hasluck (1905), op.cit., p. 47.

block, duplicate moulds had to be used. The problem of damp may explain why pressing never became mechanised in Britain. In contrast, much of the ashlar used in inter-war buildings in America was pressed by powered rams and plungers.

Finishing the blocks, to the precise form and surface required, involved more skill and time than was normally appreciated outside the industry. Considerable work could be involved, in cutting holes, inserting struts, smoothing out the inside, scooping out undercuts and scoring the sides to assist the mortar in gripping the block. Pieces were sometimes cut and joined together, to make up blocks impossible to mould in one piece or where the use of a special mould could not be justified.(1)

But the most time-consuming aspect of finishing was the smoothing of the surface. Even the simplest blocks would have slight blemishes on being removed from the mould. Knives or boxwood tools were used for working flat surfaces, and small pieces of leather for enriched detail.(2) The smooth skin created was impervious to water but would also reduce evaporation in drying. Considerable concern was expressed as to the dangers of overfinishing, which would destroy the liveliness of a sculptural design as initially modelled. On some buildings no finishing was allowed at all, or the details might be touched up by the modeller himself. In the Edwardian

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(1) It is modern practice at Hathorn to leave most pieces needing to be cut away, until after firing. Perforations are made in the block to aid removal.

(2) P. N. Hasluck (1905), op.cit., p. 13.

period a variety of dragged surfaces came into favour, imitating the finishes of stone masonry.[1]

Drying

Steam-heated rooms were often used for the pressing of terracotta, to speed up the drying of the clay away from the moulds. Once removed and finished the piece would be placed on a rack for further drying. Control over the initial stages of drying had to be far more precise than for bricks or tiles, which were traditionally left in the sun and fresh air, or exposed to waste heat from the kiln.[2] Water had to be driven off carefully at first, for, if the surface dried much faster than the insides, warping and cracking would occur. Such hairline cracks would widen out in the kiln.[3]

Two systems of controlled drying were developed: rooms heated with pipes, and tunnel driers. Smaller wares were placed on racks in the drying rooms and they would be

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(1) Finishing to produce a polished surface was also technically undesirable. It restricted the loss of water in drying and firing and could result in the surface peeling away. British Clayworker, 9, 1901, pp. lxiii-lxiv (p. lix).

(2) The amount of drying required varied according to the type of clay. Low shrinkage fireclays needed less drying than fat ball-clays. A Gateshead fireclay shrank half an inch to the foot and took sixteen hours to dry while the clay from Stonehouse, Gloucestershire, shrank one and a half inches and took fifty-six hours. British Clayworker, 12, 1904, pp. 358-360.

(3) Building News, 61, 1892, pp. 268-9.

turned around periodically to ensure even drying. Two to three days was the shortest time quoted but more thorough drying enabled the heat to be built up more rapidly in the kiln.(1) Such steam-heated rooms made a significant demand on fuel. Those at Hathern are still warmed by a coke-fired boiler. An alternative was to direct the waste heat from the kilns through underfloor flues, the blocks then resting on quarry tiles sprinkled with sand. To be effective these drying rooms had to be well sealed from draughts, have low ceilings and as few doors as possible. In the older firms the drying rooms were rarely purpose-built, or in any way approached these standards.(2)

It was the tunnel dryer, using the same continuous principle as introduced with the Dressler tunnel kiln, that brought more exacting standards to drying terracotta. There was some prejudice that an enclosed tunnel was too inflexible to handle terracotta in all its various forms. However, the value of this type of kiln was proven in the more modern and innovative works such as the Bispham Hall Company. Here, in 1907, blocks containing five cublic feet of clay were being dried by the tunnel dryer in a third of the time taken on a shed floor.(3)

Since the blocks tended to accumulate dust while being dried they were rubbed over with water just before being set in the kiln.

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(1) W. A. McIntyre (1929), op.cit., p. 9.

(2) Building News, 61, 1892, p. 332.

(3) British Clayworker, 16, 1907, p. 132.

Firing

While special drying plant was a facility that most of the larger manufacturers came to install, suitable kilns were the essential prerequisite of terracotta production. Johathan Harmer was able to burn his tablets and urns in the bread oven in his home,(1) but architectural work required a kiln that could create a temperature of over 1000°c with plenty of oxygen, and that protected the goods from the flames and smoke. The cost of such kilns prevented at least one brickyard, belonging to Heacham and situated in north Norfolk, from branching out into terracotta.(2)

The technology of kiln design was well advanced by the late eighteenth century, promoted by the advent of coal firing in the previous century and rapid development in the china and pottery industry. Down-draught and muffle kilns enabled both the temperature and the oxygen to be precisely controlled.(3) An even temperature was ensured by directing the heat up behind walls and then down through the ware, or by radiating it through 'the muffle' which was a complete kiln lining. The muffle also protected the goods from being discoloured by the fire.

Success in firing early terracotta came from using small purpose-made kilns. Coade used muffle kilns, of which the largest was only nine feet in diameter and ten feet high inside.

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(1) P. Lucas, Heathfield memorials (A.L. Humphreys, London 1910), p.107.

(2) British Clayworker, 30, 1922, pp. 255-7.

(3) M. Hammond, Bricks and brickmaking (Shire publications, Princes Risborough 1981), pp. 22-3.

The down-draught kilns used in many potteries often could not burn terracotta hard enough. Around the middle of the nineteenth century several factories, such as the Ladyshore Works and Cubitt, were turning out underburnt work.(1)

Of the designs of down-draught kiln, the cupola, so named because of its circular plan and dome-shaped top, was the most widely used for terracotta. It was favoured by the works on the Midlands coalfields, and J. C. Edwards' works at Pen-y-bont appears to have had about twenty five of this design at the turn of the century.(2) A small down-draught kiln with a sixteen foot internal diameter was regarded as ideal by the ceramicists, though a slightly larger kiln could hold up to 16,000 blocks.

The terracotta kilns at Ruabon were built to a highly practical design. The nine furnaces in a circular down-draught type were made so that they were easy to remove from the brickwork of the kiln, when they burnt out. The furnaces were made of firebricks, the rest of the kiln of ordinary bricks, and the expansion occurring in firing was restrained by bands of disused straps that had hoisted the cages up local shafts.(3) The blocks were stacked in chambers formed by bricks, with the bottom of the kiln being lined with a further three foot layer of brick. The blocks were best stacked on their ends to prevent their faces from being marked and to

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(1) British Clayworker, 13, 1904, pp. lx-lxii, (p. lxi).

(2) Building News, 61, 1892, pp. 630-2. The unlined down-draught cupola kiln had the advantage of a wider floor area than the bottle oven used for pottery and china.

(3) Building News, 60, 1891, p. 275.

enable a thorough distribution of heat.[1] (Fig. 4.20).

It was recommended that wood should be used to burn buff terracotta, as coal frequently caused discolouration, even of red ware. Most of the early firms such as Coade and Blashfield used muffle kilns, enabling them to fire with coal without the worry of discolouration. A wide variety of designs for muffle kilns was patented, with the fireboxes and flues being placed in various positions round the chamber, and later being fired by gas as well as coal. Blashfield's design of 1860 left spaces not only between the kiln wall and the muffle but under the floor as well, with a central flue. This flue also served to support shelving on which to set the goods.[2] The kilns, used at his works in Stamford, were still small, having an internal diameter and height of about twenty-five feet. (Fig. 4.21). He burnt his terracotta at a very high temperature, having taken extreme care in drying.

This design was capable of burning twenty-five tons of terracotta in each firing, but only by the consumption of twenty tons of coal, in the case of hollow ware, and twenty-five tons for solid blocks.[3] Using coal almost weight for weight with terracotta, these kilns became totally uneconomic with rising fuel prices, when large quantities of architect-

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(1) British Clayworker, 24, 1915, pp. 20-1, (pp. 21).

(2) J. M. Blashfield, Patent no. 577, 1 March 1860.

(3) British Clayworker, 13, 1904, pp. xxxvii-viii (p. xxxviii).

Fig. 4.20. Cross section of a down-draught kiln used for burning terracotta in Ruabon. Source: Building News, 60, 1891, p. 275.

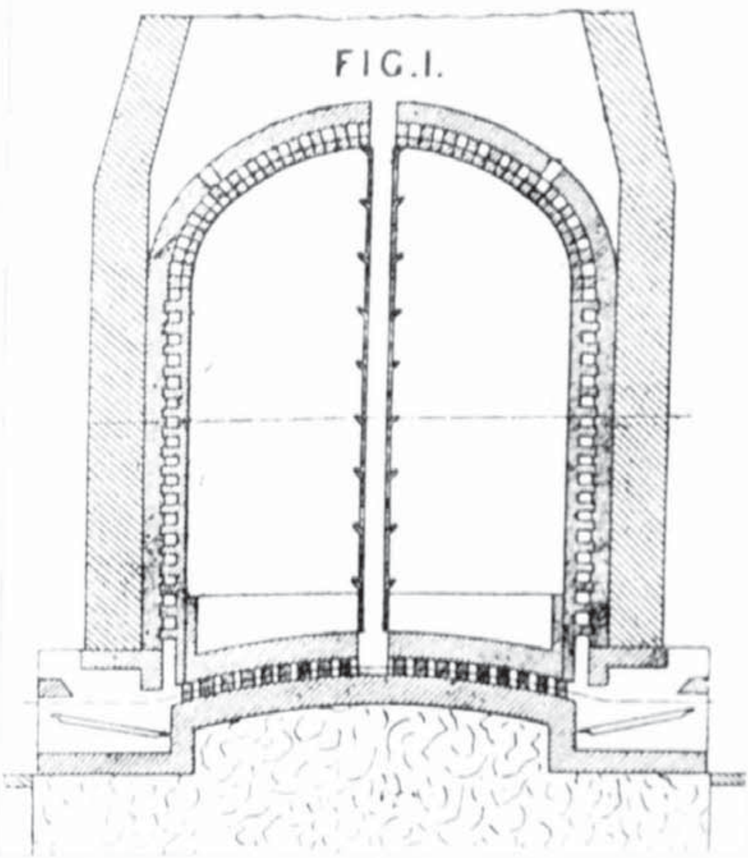

Fig. 4.21. J. M. Blashfield's patent design for a muffle kiln, no. 577, 1 March 1860.

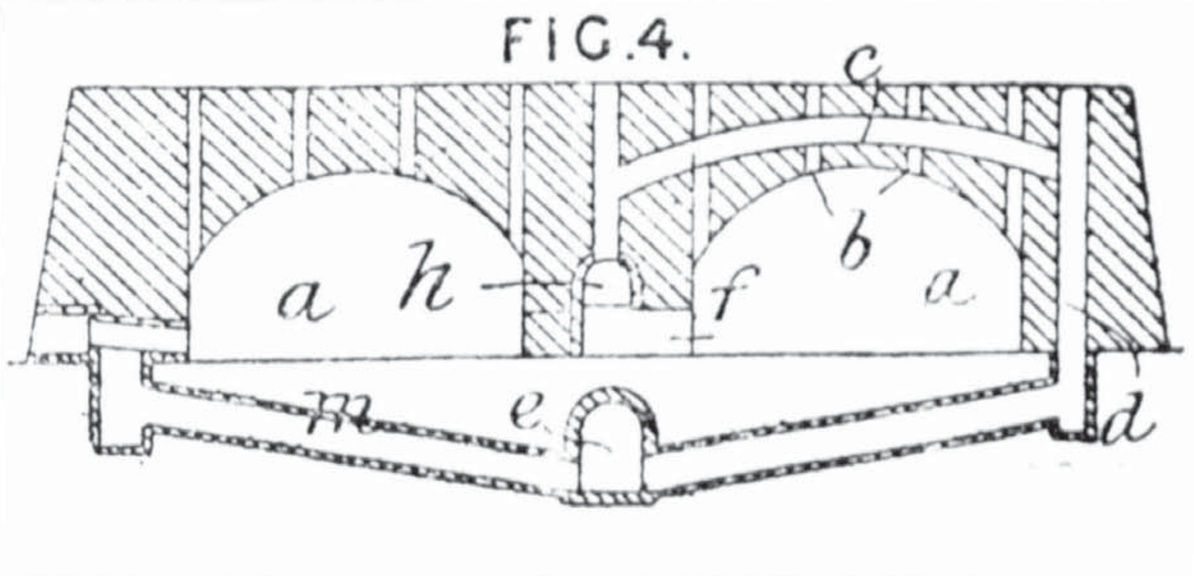

Fig. 4.22. C. Dean and J. Heatherington's patent design for a continuous kiln with flues 'f' connecting via a central duct 'h' to other chambers, no. 10713, 2 June 1894.

-ural facing were being fired. The Americans became more concerned with the heavy cost of muffle kiln maintenance rather than the cost of firing them. A sixteen foot kiln would last for about forty burns before needing partial relining, but minor repairs were needed after about twenty firings. The weakest points were the inner arch over the fire chamber and its side lining, and the support of the muffle in front of the fire chamber.(1)

Smaller kilns were more durable but they became impracticable for burning all but replacements and special pieces. Not only did they used proportionately more coal but they were too expensive to build. A twelve foot kiln cost more than half the price of a sixteen foot one although the latter had about three times the capacity.(2)

The need for greater economy and capacity in the heavy clay industry led to the development of continuous kilns. Multi-chamber kilns were patented in the 1840s but the first efficient continuous kiln was designed by Friedrich Hoffmann in 1856. With the fire working round the chambers, the use of heat was far more efficient. Each chamber was set, burnt, cooled and emptied in sequence, the waste heat being used to pre-heat the freshly set ware.

In the early designs of continuous kilns the goods were prone to discolouration by fire-gases and this precluded

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(1) The cost of kiln repairs was estimated at one dollar per ton burnt. I. L. Conkling 'Kilns for burning terracotta', reprint from Transactions of the America Society, in British Clayworker, 16, 1907, pp. 178-184 (p. 179).

(2) British Clayworker, 16, 1907, . op.cit., p. 180.

the use of such kilns for terracotta. In 1870 Hoffmann revised his design to incorporate hot-air flues to carry clean air direct from the cooling chambers to the pre-heating section, avoiding the firing zone. But problems with obtaining a good colour and preventing cracking and distortion continued. Attempts were made to protect the goods by building them in pockets, or by erecting temporary muffles, solutions that involved extra labour and the production of large numbers of low grade bricks.

Terracotta needed a design of continuous kiln in which the fuel would be burnt out of contact with the goods, the heat regulated precisely and air available at any temperature to ensure a good colour. Steam and other volatile matter had to be removed from all the chambers. Most importantly a higher firing temperature than normally possible with a Hoffmann was needed to achieve vitrification and a full colour. The 'Staffordshire' kiln patented by Dean, Heatherington and Company in 1894 marked a significant advance; it had flues and dampers that could control the fire sufficiently closely, as well as wide transverse arches that served to increase the capacity.(1) (Fig. 4.22). A Staffordshire design was used at the St. Julian's brickworks for firing facing bricks and terracotta goods in the same chamber. The firm claimed to be achieving a 60% saving in fuel costs and to be obtaining more even colours than with their intermittent down-draught kilns.(2)

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(1) C. Dean and J. Heatherington, patent no. 10,713, 2 June 1894.

(2) British Clayworker, 17, 1909, pp. 320-4. The Staffordshire formed the model for most designs of brick kiln built in the first half of this century.

But special flues were not sufficient to ensure the clean burning of buff terracotta and glazed ware. It was necessary to combine the principles of the down-draught and continuous kilns; one approach taken was to modify a continuous kiln design as far as necessary, the other was to connect down-draught kilns together, re-using the heat generated in successive chambers.

It was the builders of the widely used Belgian kiln, Messrs. William Jones of Buckley, Cheshire who produced one of the first, fully successful continuous down-draught kilns. Patented in 1910 the 'Ruabon' was really a series of rectangular down-draught kilns, built side-by-side and back-to-back with the chambers able to be worked independently or together. The gases could either be taken direct from the chambers to the chimney or, by a series of flues in each chamber wall, to the next chamber, the flow being controlled by dampers. The significant difference in the Ruabon from ordinary continuous kilns was that these flues discharged into 'bags' before passing to the next chamber so ensuring a complete down-draught action. The problem of the hot waste gases causing discolouration of the goods that they were warming was solved by passing the gases through only four chambers, instead of the customary six, before sending them out of the chimney. They were never allowed to become sufficiently cool to cause waste to be condensed onto the goods. The heat lost was thought to be insignificant in relation to the corresponding improvement in the finish of the goods.[1]

Other terracotta works came to use continuous kilns with some type of down-draught action. The Lagan Vale Estate Works used Vaughan's 'Patent Continuous Kiln'[2] and the Cattybrook Company a small design of twelve chambers called the 'Guthrie'.[3]

Muffle, down-draught and then continuous kilns burnt most of the architectural ceramics produced in Britain. However, from the late 1920s some faience was fired in tunnel kilns. The goods travelled on trolleys through tightly enclosed heating, firing, and cooling sections; hence the temperature was precisely controlled and there was little heat loss. But the capital cost was very high and they allowed little flexibility in production. Tunnel kilns were ideally suited for tiles or sanitary ware. The Dressler tunnel kiln that Carter installed at the White works was briefly used for faience but soon turned over to firing only tiles.[4] Hathern and Shaw , also installed tunnel kilns and ran smaller faience ware through them during the 1920s and 30s. At this period many of the American firms were using them for virtually all of their faience production.

Whatever the type of kiln, there was a range of essential conditions that had to be attained in the firing.

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(1) British Clayworker, 21, 1912, pp. 96-8. The kiln described was built for the Alyn Brick Company, near Mold.

(2) British Clayworker, 15, 1906, pp. 69, 77-8.

(3) Claycraft, 7, 1933, pp. 11-13.

(4) J. Hawkins (1980), op.cit., pp. 60-1.

Terracotta required a stronger and more regular heat than bricks; the heat had to be evenly distributed through the kiln, and had to be both built up and cooled evenly. Flashes of flame or dust would discolour the goods.[1]

Firing affected the terracotta in stages. The first, the 'water smoking' period, was possibly the most critical. The remaining water held in the pores of the clay had to be driven off. If the temperature was increased too rapidly warping and cracking would occur, and if the kiln was not well ventilated scum could be deposited on the surface of the blocks.[2]

Extra heating led to the oxidisation stage whereby the water, chemically combined in hydrated minerals was forced out, any carbonaceous matter being burnt and ferrous compounds being oxidised to ferric. The expulsion of these further gases again necessitated good ventilation.

The heat having been built up cautiously to about 700°c, it could then be increased more rapidly to a maximum of between 1000°c and 1250°c. The main period of shrinkage and greatest heat therefore rapidly led to vitrification, with the clay being tightly bonded by the 'sintering' of its constituents. Vitrification usually had to be avoided as the colour and form of the blocks would suffer. With clays that started to vitrify soon after sintering there was the danger that any

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(1) C. T. Davis (1884), op.cit., p. 294.

(2) W. A. McIntyre (1929), op.cit., p. 11. This stage was aptly described by the Americans as 'going through the sweat'.

inequality of temperature in the kiln would result in some of the goods being under-burnt and others being partially fused and destroyed.

The onset of cooling was critical for red terracotta. Overheating had to be avoided, and when the colour was calculated as being as its best the openings were closed, leaving the fires to reduce in intensity, so preventing cool air chilling the contents. However, sufficient air had to be present to avoid the surface being discoloured by reduction conditions in the kiln.(1)

Each firm had its own pattern of burning, but a typical time-scale, at the turn of the century, was for the goods to be in the kiln for between ten to fourteen days, the water-smoking and cooling periods each taking two days. Small muffle kilns burnt terracotta more quickly. Firing at Coade lasted only four days, though it is not clear what time was spent in the initial warming and cooling.(2)

The type of fuel was naturally critical in achieving a successful firing. Coal had been used successfully by Coade and fired most terracotta made during the nineteenth century.

Gas emerged as the major hope for economical and totally clear combustion but experiments just before the First

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(1) British Clayworker, 28, 1919, p. 4-5 (p.4). Measurement by pyrometers and thermoscopes contributed to greater accuracy in firing, but the experience of the firemen was the best judge as to when cooling should be commenced.

(2) Davis recommended the terracotta only needed between five or seven days in the kiln. C. T. Davis (1884), op.cit., pp. 324-5. King at Stourbridge, on contrast, kept their terracotta in the kiln for fourteen days. British Clayworker, 1, 1892, p. 189.

World War were hampered by an inability to control the fire. Arthur Shaw, founder of the Darwen firm, carried out tests for seven years to perfect his design for a chamber kiln worked from a gas producer. Intended for the production of terracotta and faience as well as glazed bricks and electrical porcelain, it was an adaption of the continuous chamber kiln. It was recorded as saving 66% of the fuel costs of coal-fired intermittent kilns.(1)

Shaw kilns were built at many works in the twenties, but gas-firing became most widely used in intermittent, Staffordshire or tunnel kilns that were either newly erected or adapted from older kilns. After the Second World War oil became a third alternative. Modern works alternate between gas and oil according to cost and convenience rather than to any influence on the finish of the goods.

Glazing

Firing conditions were even more critical in the case of faience. There were essentially two types of glazed architectural ceramics, defined by the number of times they were fired. The bulk of faience made in the nineteenth century was fired twice, once in biscuit form and again, at a lower temperature, after the glaze had been applied. A single-fired faience was introduced in 1888; glazing followed immediately after drying, the body being burnt and

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(1) British Clayworker, 30, 1922, pp. 255-7.

the glaze hardening in one firing.

The clay body used for making red terracotta could not carry glazes, but a white earthernware used for tiles, or a fireclay that produced a buff terracotta, were suitable. If the fireclay was too coarse and dark when fired, an engobe or surface slip could be applied to obtain a better surface. Only test firings would show whether a glaze would craze or split away from a particular body.(1)

Glazes consisted of a mixture of fluxes and colouring ingredients very finely ground and mixed to a cream with water. The desired colour was obtained by adding suitable metallic oxides. These colourings or even complete glazes were frequently supplied by specialist glazes chemists such as Wenger. (2) The compounding of glazes required considerable delicacy. As well as needing to have a comparable shrinkage to the clay body, the colours had to remain clean and consistent when in contact with kiln gases, and the glaze material had to fuse to a glass at a temperature closely approaching that at

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(1) W. J. Furnival (1904), op.cit., pp.758-763. This most useful account of faience manufacture lists recipes of suitable bodies in detail. They include combinations of ball-clays, china clay, slender fireclays and grog.

(2) The Gladstone Pottery Museum holds correspondence from Blashfield and the Watcombe Terracotta Clay Company, ordering colours from the firm of Messrs. J. Emery and Sons. A letter from Watcombe, 4 November 1873, includes uranium yellow in the order and refers to trade with Wenger.

which the body reached maximum strength in the kiln.

Fusibility was the factor that held back the development of architectural faience. If too difficult to fuse, the glaze would not become fluid enough to form a smooth, even surface; but if too easily fusible the glaze could be drawn into the body of the clay.(1) The problem was that neither soft fusible glazes nor fine earthenware bodies in large blocks were sufficiently durable for exterior architectural use.

The method used in making faience panels for interior use through the 1860s and seventies was to run highly fusible majolica glazes over a fine, lightly burnt body and then to fire at a slightly lower temperature. Made up of white tin coloured by pigments, majolica glazes were naturally translucent, providing an attractive variety of tones when covering low relief panels. However, they would not adhere sufficiently evenly to the different planes of moulded blocks, and any coarseness in the body would show through.(2)

Harder, opaque glazes were more durable but had the disadvantage of obscuring any fine surface detail, since

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(1) British Clayworker, 6, 1898, pp. 228-30, (p. 229).

(2) Furthermore the firing of majolica glazes had to build up rapidly and the cooling be equally sudden to control the high fluidity. This again meant that the blocks had to be relatively thin, otherwise cracking would occur. British Clayworker, 7, 1898, pp. 136-8, (p. 138).

they lay as a thick skin over the ware. As a result, faience mouldings were usually simpler than if they had been intended for terracotta. To try and achieve even but light applications of hard glazes, a variety of techniques was developed. The early glazes were often built up by successive layers of hand painting. For architectural work dipping was less time-consuming though great care was needed to avoid runs. Finally, spraying, which had been widely used in America, was adopted in Britain during the 1920s.

A succession of glazed bodies was introduced in attempts to produce colourful and yet sufficiently durable ware. J. C. Edwards added a special range of semi-opaque glazes to supplement their established majolica glazes and enamels.(1) It was Doulton who, from the 1870s produced the greatest variety of glazed architectural ceramics. Having been making a majolica glazed terracotta for interiors, they found that a salt-glazed stoneware used for art pottery was sufficiently durable for use on the outside of buildings.(2)

Doultonware as it was called, was subjected to a single firing at a high temperature. Its success led to the development of other associated materials, such as polychrome stoneware, whereby the body was covered with a white slip before the colours were applied, and a matt glazed stoneware called 'Carraraware'. Carrara faience had a dull glazed surface resembling Italian marble. Pressed blocks were dipped in the

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(1) W. Furnival (1904), op.cit., p. 755.

(2) W. Furnival (1904), op.cit., p. 749.

glaze and then burnt like ordinary biscuit ware.[1] While majolica faience had to be given its second firing in either a muffle kiln or in saggars, Carraraware and the similar faiences produced by competitors were burnt in continuous chambers.[2] An examination of early examples of Carraraware, such as on the Savoy Hotel, shows that the glazes had to be very thinly applied to permit their firing at the same time as the unburnt clay to which they were applied. Most of the manufacturers still making terracotta and faience after the First World War turned to such matt-glazed ware but, as drying and kiln technology improved, and in particular with gas-firing, it was possible to return to bright colours and reflective finishes. The use of spray guns permitted the application of a speckled coating of a second colour, which resulted in granite effects and other textured finishes.[3]

On being drawn from the kiln the blocks were checked, sorted and packed for despatch. Manufacturers were loath to incur the delay and additional cost of remaking damaged pieces. Obviously those that had shrunk undersize or 'blown' in the kiln, due to bad pressing or to not being thoroughly dried, had to be discarded. But for other faults there was

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(1) Polychrome stoneware was fired to a temperature of 1250°c with salt being lightly thrown over the goods in the kiln.

(2) Carrara type ware could be coloured the same shades as majolica by dipping in a white glaze and then spraying with a coloured glaze. Ball-clay with a ten per cent addition of fireclay made up the body for Doulton's Carraraware. British Clayworker, 13, 1904, pp. xx-xi (p. xx).

(3) Silver and bronze finishes became technically possible in the 1920s; lustre and rich colour were applied for interior decoration. W. Furnival (1904), op.cit., p. 779.

a variety of remedies, that were rarely publicised, let alone condoned. If the blocks were too large they could be cut to size by a mason, and, if chipped a stopping of plaster of Paris and yellow ochre applied. Faience could suffer from light patches where the glaze was too thin; in this case a slightly deeper glaze was painted on, the piece then being re-dipped and lightly re-fired.(1)

The only way to ensure that all the blocks in a contract had been made to dimension was to fabricate the facade at the works, a practice carried out for the Albert Hall at Tamworth, the Coliseum Theatre at Hathorn,(2) and probably for other major buildings. If not already labelled, a number sequence for fixing was scratched onto each block.

The delay and expense of remaking pieces that had to be discarded on being drawn from the kiln formed a considerable incentive for manufacturers to achieve consistently high standards. A firm's reputation was also at stake. Cyril Carter commented in relation to faience work:

> It is troublesome stuff to make, and needs the greatest care from the drawing office to the job - care in making, care in handling. If it is not well made, if mistakes are made in details or in making, causing delays to jobs, it will get a bad name and architects will cease to use it.(3)

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(1) British Clayworker, 10, 1901, p. 216.

(2) Daily Mail, 17 December 1904, Supplement: The Coliseum.

(3) Quoted in J. Hawkins (1980), op.cit., p. 66.

Terracotta and faience always had to compete, on their costs and their merits, against other materials. Coade, Blanchard and Blashfield had demonstrated that a simple works could produce a high quality product; it was the economies necessitated by large-scale production and higher costs that necessitated new investment and the introduction of new techniques.

However the specialised processes of manufacture, the making of plaster models and moulds and the pressing and finishing of the blocks, remained fundamentally unaltered and highly labour intensive. It was the ancillary stages of clay excavation and preparation, and of glazing and firing that were most affected by advances in technology and mechanisation. More powerful pug-mills and continuous kilns were installed at most works, primarily to improve the efficiency of brick, pipe and tile production, and the advantages accorded to the terracotta and faience department were usually a secondary consideration. Such plant often involved a loss of flexibility. This can be seen most clearly with regard to kilns, which represented the most expensive investments in any works. The long-proven intermittent kilns certainly wasted coal but they gave consistent results even with a fluctuating output. With continuous kilns a stock line of production needed to be available to fill gaps when architectural ceramics were in low demand, and the whole works had to be re-arranged around the kilns to utilise the waste heat, if a significant increase in efficiency was to be obtained. Tunnel kilns involved an even greater capital outlay and could not accommodate the largest sizes of blocks demanded for architectural use.[1]

The changing nature of demand for architecutral ceramics in the nineteenth and early twentieth centuries reduced the scope for mechanisation in several respects. The decline of the manufacture of catalogued stock items in favour of material for specific architectural contracts prevented any real progress towards mass-production or the attainment of a consistent level of output. While faience did permit a standardisation in the composition of the clay bodies, the formation of suitable glazes became an increasingly variable and critical factor.

Modern types of kiln and faience glazes necessitated a level of precision and measurement in the work that would have seemed alien to the craft of making a decorative architectural material to a high artistic standard. It was judgements validated by a commitment to the end product and by long apprenticeships, and the skilled use of simple tools such as hand-lathes, that brought the industry to its strongest commercial success. Mechanisation and advanced technology never appealed to the management and staff involved in making terracotta and faience; consequently they were never introd-uced on a scale sufficient to supersede the expertise of a skilled labour force. Hence it was primarily the inter-realtionship of modest investment, and management and marketing policies implemented by the manufacturers that

(1) G. N. Hodson, Transactions of the Ceramic Society, 35 (1935-6), op.cit., p. 48.

largely dictated how firms fared through two decades of heavy demand at the end of the Victorian period, and then half a century of wavering demand and increasingly unprofitable prices.

CHAPTER FIVE

THE TERRACOTTA INDUSTRY: MANAGEMENT AND MARKETING

Once the technology of making architectural terracotta and faience had been proven it was the way in which manufacture was organised that largely determined the supply and competitiveness of the materials. The demand for architectural ceramics was in part dictated by a series of external factors such as the building cycle, architectural fashion and competition from alternative materials. However within these constraints the relative success of each firm in winning profitable orders largely depended on factors within its control. The structure of the firm in terms of its range of manufactures will be seen to be of fundamental importance but the patterns of management of the work force, of supplies of fuel and raw materials, and decisions concerning investment and marketing directly affected the standard of competitiveness and viability.(1)

One of the characteristics of the ceramic industry through the last two centuries has been the far reaching division of labour according to the skills involved in each stage of manufacture, into model and mould makers, pressers

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(1) This examination of the business history of terracotta and faience concentrates on the archives of two firms, Gibbs and Canning of Tamworth and the Hathern Station Brick and Terracotta Company near Loughborough. They both contain imcomplete runs of annual returns and a range of financial, technical and legal documents. Gibb and Canning's have the great advantage of including the minute books of board meetings, Hathern's a valuable run of order books. Neither have extensive correspondence with architects or suppliers. Additional sources are the annual reports of Leeds Fireclay Company and the notices and articles contained in the British Clayworker.

and burners, amongst other tasks. The pattern of transformation to the labour process, from craft working to de-skilled mass-production, identified as occurring through industrialisation, hardly applies to any branch of clayworking.(1) It was the combination of labour intensiveness with a highly skilled workforce that characterised the manufacture of terracotta and faience and which became anomalous in the twentieth century. Making an unstandardised product in response to individual contracts was increasingly unviable with labour and fuel costs rising and the market becoming more severely competitive.

The longer established firms, characterised by Gibbs and Canning, responded by cutting wages, making investment decisions on a short term basis and looking to the trade association to ensure them an adequate market share and a profitable level of prices. Meanwhile the more successful firms, such as Hathern, ensured their markets by developing close ties with architects, so circumventing the competitive system of tendering.

In examining why some firms failed to compete successfully and most failed to re-invest for greater efficiency, the answers centre on why certain firms came to and continued to specialise in making architectural ceramics. Profit may have been more a matter of expectation than consistency while some

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(1) C. Littler, 'Deskilling and changing structures of control' in S. Wood (ed), The degradation of work? (Hutchinson, London 1982), pp. 122-145.

directors regarded terracotta and faience simply as loss leaders to attract large orders for bricks and tiles. Elsewhere owners and management appear to have been pre-occupied not with economics but with the prestige of producing artistic and technically challenging materials that appealed to their educated sensibilities.

Firms could afford to make essentially prestigious or artistic articles as a result of terracotta and faience being produced in conjunction with other heavy clay products. During periods of low demand and profits, the continuing costs of skilled labour and plant were carried by the more consistent returns from bricks, tiles and pipes. These more mundane lines were made on a far larger and more extensive scale. In 1912 the annual output of bricks in the United Kingdom was valued at £5,794,000, of roofing and paving tiles at £520,000 and of sanitary ware at £516,000. The output of terracotta and faience was worth £198,000. (Fig. 5.1).[1] A 1925 directory lists fifty firms as making terracotta and 1,247 brickworks being in production, and this latter figure does not include the smaller yards fround throughout most of the country.[2] According to the census return of 1891, 43,688 men were employed in brickmaking.[3] On the other hand

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(1) British Clayworker, 21, 1912, pp. 166-7.

(2) Kelly's Directory of Building Trades (Kelly and Company, London 1925).

(3) British Clayworker, 2, 1894, pp. 203-6 (p. 203).

Fig. 5.1. Breakdown of annual production of heavy clay products in the United Kingdom in 1912.

Source: Census of Production, reproduced in British Clayworker, 21, 1912, pp. 166-7.

	£
Bricks (of Brick-earth and Fireclay)	5,794,000
Retorts	57,000
Fireclay Goods (Unspecified)	195,000
Bricks and Fireclay Goods (made at China Works or Potteries)	64,000
Architectural Terracotta and Faience	120,000
Architectural Terracotta and Faience (made at China Works or Potteries)	78,000
Roofing and Paving Tiles	520,000
Red Pottery, Stoneware, Brown and Yellow Ware	220,000
Sanitary Ware	516,000
Other Clay Goods (Unspecified)	11,000
Quarry Products	35,000
Cement, Concrete etc.	18,000
Other Products.	29,000

the dozen factories that were supplying the bulk of architectural terracotta at this time would have employed a total of under two thousand men. Given that the same workforce was responsible for excavating and preparing the clays, whatever their type and use, probably only eight hundred of this number could have been directly involved in making terracotta or faience.

Having been adopted and developed by the brick and tile industry, where large factories had been established on the coalfields, the terracotta and faience section of the trade became increasingly anachronistic with its lack of mechanisation and standardisation. It also called for a more sophisticated level of management and marketing than required for making bricks, tiles and pipes. Demand for these basic materials was local and largely determined by the building cycle. The market for terracotta and faience was far wider and the effect of fluctuations in building was compounded by competition from manufacturers throughout the country, from other materials, and by the fickleness of taste amongst architects and clients. If competing on the other side of the country or abroad, a firm was dependent on a system of agencies or representatives to provide the close communication needed between the manufacturer and the buyer.

Management

Sophisticated standards of management had been introduced by a few firms in the china and pottery industry during the eighteenth century. While many smaller enterprises continued to be relatively primitively managed, the systems of accounting, research and the division of labour developed by Wedgwood were applied to the larger works in the Potteries, such as Enoch Wood which had a workforce of around a thousand by 1833.(1) These principles only became adopted in the brick and tile trade, and consequently to terracotta, late in the nineteenth century when improvements in organisation and accounting became essential as works became larger and more mechanised, and competition more severe.

Potteries had traditionally been financed and managed by one man and this was the way in which the main terracotta manufacturers, such as Blashfield, Blanchard and Pulham were operating at the middle of the nineteenth century. A quarter of a century later only a few of the potteries and brickworks recorded as making terracotta had formed themselves into limited liability companies.(2)

Of the range of factors that it has been suggested encouraged the incorporation of manufacturing businesses, it was the need for greater working capital to fund re-development

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(1) S. Pollard, The genesis of modern management (E. Arnold, London, 1965), p. 98. Pollard considered that it was organisational more than technical change that transformed the scale of the pottery industry.

(2) L. Jewitt, The Ceramic art of Great Britain, 1883 (P.P.B Minet, Chicheley, revised new edition 1971), p. 2. Individual potters would have resisted any loss of control through entrusting ownership to shareholders: R.L. Payne, 'The emergence of the large scale company in Great Britain 1870-1914', Economic History Review, 20, 1967, pp. 519-542 (p. 520).

or expansion, that was most important with terracotta firms. Undertaking major architectural contracts imposed a serious financial and organisational strain on potteries used only to supplying a small quantity of vases and decorative details in terracotta, as supplementary lines to the making of plain materials such bricks, tiles or pots. Most concerns no doubt lacked the necessary accommodation, machinery and above all an adequate number of kilns to have any marginal capacity in supplying the facing material for a public building within the specified date.

The two most successful manufacturers of the 1860s became confronted with this problem, especially when working in the free market rather than to the extended delivery periods granted by Henry Cole's department at South Kensington. Blanchard and Blashfield both formed themselves into companies as their difficulties became more acute. It proved to be no solution; Blashfield went bankrupt a year later, in 1875, while Blanchard simply reverted to making bricks and roofing tiles.

As might be expected incorporation was more successful if undertaken in the expectation of a strong demand rather than because of the desperate need for more plant and machinery. Henry Doulton and Company was formed in 1846, to fund continuing experiments in the manufacture of stoneware pipes. John Doulton advanced his som £400 and the third partner was Henry's younger brother, who invested £200. At the end of 1853 this Company was amalgamated with the original partnership of Doulton and Watts, to establish a new firm. Doulton and

Company with a capital of £51,682.(1)

Doulton was the first of the companies making terracotta to develop on a large scale, factories being opened at St. Helens and Rowley Regis by the 1840s, to supplement those at Lambeth. Their future competitors in supplying terracotta and faience, such as J.C. Edwards, Tucker and Hathern were yet to establish themselves even as small brickyards. The only other terracotta manufacturer to be established as a major business by the middle of the century was Gibbs and Canning. This firm was less fortunate in its pattern of growth, the problems encountered in supplying all the terracotta for the Natural History Museum contributing to them going into liquidation in 1881, the year that the Museum opened.(2)

Gibbs and Canning were re-formed as a Company in 1893. This was the period of the greatest number of company formations by the works that were making terracotta. Though the market for architectural ceramics was still buoyant after the rapid growth in demand during the previous decade and a boom in the building industry was experienced in many parts of the country, competition against stone and between the manufacturers was becoming more acute. While cutting machinery was making hard facing stones relatively cheaper, new terracotta manu-

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(1) E. Gosse (ed D. Eyles), Henry Doulton (Hutchinson, London 1970), p. 33.

(2) The problems which Gibbs and Canning incurred over the Natural History Museum are considered in Chapter 2.

facturers were becoming established, particularly in the north of England. Furthermore rising coal and labour costs were necessitating investment in machinery, though primarily for the savings possible in the manufacture of bricks rather than of terracotta.

Most of the subscribers to the new Company of Gibbs and Canning were directly involved in the business. The manager, the firm's solicitor and another brickmaker were among the six who took up the share issue.(1) George Woolliscroft and Son were an even more close-knit concern; the father and son, Ellen Woolliscroft who was the cashier, the foreman of the brick and tile works, the accountant and the commercial traveller, took all the shares and the directors' posts, with George Woolliscroft becoming the permanent managing director.(2) Similarly, up to 1888, Maw and Company was directed by George, Arthur, George Hornby and Arthur John Maw, all four of them describing themselves as tile manufacturers.(3)

However, by the 1920s only Arthur John was left and six unrelated local manufacturers of roofing tiles made up the board at Maw. These Broseley industrialists were renowned for their conservatism, which bordered on downright meanness. Since

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(1) Gibbs and Canning, Articles of association, 14 March 1893. The company returns for the major firms are held at Companies House, Cardiff.

(2) George Woolliscroft and Son, Articles of association, 24 December 1894.

(3) Maw and Company, Memorandum of association, 19 September 1888.

they did not have any personal experience of decorative tile-work, it is not surprising that they did little to arrest the decline of the production of picture panels, mosaic and faience at Maw. [1]

The ceramic firms that adapted to more modern forms of large scale industrial organisation by diversifying, buying out rivals and developing more complex organisational structures, were generally not those who were the most successful in supplying architectural ceramics after the turn of the century. [2] Terracotta and faience, being highly complex materials, demanded a level of enthusiasm and commitment that was instilled more through a direct professional involvement in their manufacture rather than by new management techniques.

The contrasting results of mergers implemented at two firms, Carter and Wilcock of Burmantofts at about the end of the nineteenth century, illustrate the most important factors in determining whether take-overs or mergers benefitted the terracotta sections. Jesse Carter, with his three sons as partners, bought out all the competing firms in Poole by 1901. The firm proved to be highly successful in the Edwardian period; it had not only achieved a local and regional

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(1) The other mid-Shropshire manufacturer of decorative tiles and faience, Craven Dunnill had been formed into a company in 1872, and declined even more rapidly in the inter-war period.

(2) The patterns of transition to modern forms of industrial organisation are considered in: L. Hannah, The rise of the corporate economy (Methuen, London 1976), pp. 1-8.

monopoly but had become able to supply the full range of tile faience and mosaic materials.

The purpose behind the merger of seven brick and fire-brick works, including Wilcock of Burmantofts, in 1889, to form Leeds Fireclay was to reduce local rivalry, rationalise production and co-ordinate efforts at marketing. Capital of £1 million was bought together but there is little evidence of a re-organisation of the firms or of extensive new investment. There was no strong initiative towards combined advertising possibly because the main products, firebricks, glazed bricks, sanitary ware and terracotta and faience did not interrelate very closely in terms of demand. The slumps in the Edwardian period hit Leeds Fireclay harder than most companies. The heated recriminations amongst the Board indicated that few of the members had much concern for status of the Company in terms of the ceramics trade let alone for its artistic productions at Burmantofts. There were fourteen changes on the board between January 1901 and August 1910, with seven taking place during the financial crisis of 1905 to 1906. This left a totally new management in control, of which only two of its members were involved in the ceramic industry.(1)

Whether or not the loss of family or traditional

(1) This long-running crisis was reported with avid interest by the British Clayworker. The changes in the board are listed in the copies of the register, deposited at Companies House.

claywoking industry ownership resulted in a deterioration in the standards of management, it certainly seemed to dilute the interest in making terracotta and faience. None of the major manufacturers saw architectural ceramics as the economic basis of their works or extolled its profit-making potential. They were motivated far more by the technical challenge and the artistry involved.

While chinamaking had gained a high status in the previous century, partly through the achievements of Josiah Wedgwood, brickmaking was regarded as one of the roughest and most mundane of all manufacturers.(1) It was aspiring and gentrified brickmakers who were, therefore, attracted to decorative architectural work, for the artistic associations and prestige that it carried. To the educated industrialist a knowledge of architecture and the arts made supplying terracotta, first to the aristocracy and then to architects, seem a prestigious and rewarding prospect rather than a daunting one. The only brickworks in Cheshire to make much terracotta was run by Jabez Thompson, a man of wide artistic interests who painted in his spare time. The only firm in the same county to produce faience, in the form of Della Robbia ware resulted from the partnership of a painter and designer, Basil Rathbone, and a sculptor, Conrad Dressler. For other

(1) The semi-rural and unskilled nature of most mid-century brickworks is presented in E. Dobson (ed F. Celoria), A rudimentary treatise on the manufacture of bricks and tiles,1850, (George Street Press, Stafford 1971).

clayworkers it was contacts with potters and artists through the art schools in South Kensington and the provinces that provided the inspiration and practical advice in supplementing utilitarian wares with art manufactures. Having mastered the technical problems of making stoneware, the Lambeth firm of Doulton became involved in terracotta work in the 1840s. Henry Doulton gained advice and some designs from the sculptor, Samuel Nixon. Two decades later it was the head of Lambeth School of Art, John Sparkes who encouraged him to produce architectural terracotta and stoneware and to employ the decorative artist George Tinworth.(1)

The geological and scientific knowledge needed for the precise working of clays presented the same appeal to Victorian industrialists as it had to the more progressive china manufacturers of the eighteenth century. H.R. Vaughan spent his career gaining experience of working different types of clay and making a wide variety of products, and turned to terracotta when he discovered a suitable seam, on arriving at Lagan Vale near Belfast.(2) Managers were offered advice as to how they could test clays themselves;(3) however most results gave little indication of the all-important physical properties apparent during pressing or firing.

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(1) E. Gosse (1970), op.cit., pp. 21,70

(2) British Clayworker, 15, 1906, p. 69.

(3) An American industrialist presented a highly sophisticated range of tests on both clays and burnt samples. British Clayworker, 29, 1920, pp. 189-194.

The sophisticated approach taken by the major terracotta manufacturers in the development of their industrial empires was complemented by their efforts to become established as figureheads in local politics, education and welfare and to adopt the life-styles of the landed gentry in the county. John Coster Edwards, the 'greatest manufacturer of terracotta in the world', started out as a brickmaker, employing a man and two boys. He came to own five works around Ruabon, employing nearly a thousand men. Having built a country house near Llangollen, he took up a string of public positions within the county: Magistrate, Deputy Lieutenant and finally High Sheriff. His obituary described him as having 'the grace and distinguished air of the typical country squire'.(1) Edwards' local rival lived in a mediaeval hall just outside Ruabon. Henry Dennis was a railway engineer who turned to estate development, coal mining and, when the Hafod pit brought out a quality red clay, terracotta and other decorative ceramics. A Justice of the Peace and an Alderman, he was a prominent figure in the Institution of Civil Engineers and the Mining Institute.(2)

The other figure whose career also covered coal mining and engineering was Reginald Stanley. After several years in north America, apparently panning for gold and fighting outlaws and the Sioux, he settled down to making bricks, tiles

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(1) British Clayworker, 43, 1935, p. 317.

(2) G.G. Lerry, 'The Industries of Denbighshire', Trans. of Denbighshire Historical Society, 8, 1959, pp. 105-11, (pp. 108-9).

and terracotta in Nuneaton, While developing the business he produced several designs for brickmaking and coalmining machines and played a prominent role in the development of the Clayworkers' Institute.(1)

Frequently it was the second generation to be involved in the business which oversaw the introduction of terracotta manufacture on a large scale. In part this reflected that the high demand for terracotta developed a generation later than the foundation of many clay works on the coalfields during the middle of the nineteenth century. But the son also had the better education and training, and the opportunity to specialise, while working for his father. Jabez Thompson, George Woolliscroft, Walwyn T. Chapman and Gilbert Tucker all introduced the production of terracotta, having inherited works from their fathers.

It was likely that the character of each business would change when the son gained control, as he would have been able to specialise during his early years with the family firm possibly to complement his father's preoccupations. G.A. Hodson was the son of the founder of the Hathern works and promoted the terracotta section until his death in 1938. His son, G.N. Hodson, concentrated on the making of chemical stoneware, after its introduction during the First World War. On succeeding to the chairmanship he does not appear to have fought strongly for the recovery of the architectural section.(2)

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(1) British Clayworker, 11, 1902, p. 10.

(2) P.L. Payne, British entrepreneurship in the nineteenth century (Macmillan, London 1974), p. 27.

While the more gentrified life-styles of the second and third generations of a family of industrialists undoubtedly gave them a strong interest in producing terracotta and faience, their aspirations could often stray away from manufacturing altogether. Charles Fitzroy Doll, an architect who made extensive use of the materials, became disenchanted with the way in which the British industry was managed in the Edwardian period:

> Unfortunately they rely on their reputations rather than on keeping pace with the times, and let their markets become less and less good. A father makes a business and tries to do the best he can for his sons by giving them a University education. What is the result? The young fellows devote themselves to sport, and prefer to let £20,000 become £15,000 a year, and so to the vanishing point, rather than find a lump sum that their manager, if an intelligent man, warns them is required for up-to-date plant. (1)

With the exception of the Hodsons and a few other families, the descendants came to leave the day-to-day running of the works increasingly in the hands of the works manager. For these men mobility and an accumulation of wide experience offered the best path to promotion. When Blashfield's works at Stamford finally closed, the Midland Brick and Terracotta Company recruited its manager, J. Joiner, for a new factory at Polesworth.[2] Similarly, when the new Bispham Hall works

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(1) British Clayworker, 15, 1906, p. ii-iii (p. ii).

(2) L. Jewitt (1971), op. cit., pp. 243-4.

were built in Lancashire around 1902, Frank Fidler, a manager who had worked at Leeds Fireclay and then in Coalville, was employed to advise on the layout and then to manage the terracotta section.(1) Some managers gained particular reputations: John Phillips turned from managing clay works in Cornwall to running the Tamar Terracotta and Brickworks during theperiod when it was gaining architectural contracts throughout southern England. He subsequently moved to Ruabon, then to Bracknell and finally to Nottingham, making bricks and terracotta in each case. He also spent a period of time at Bedford to lay out a plant working the Oxford clays.

Neither managers nor managing directors could rely simply on their technical expertise. The efficient management of the labour force and of other costs of production, and development of contacts with architects and clients became increasingly critical in the tightly competitive market of the twentieth century. The major firms accepted the restrictions and additional complexities of marketing through the Terra Cotta Association. C.B. Broad, who was on the board of Gibbs and Canning through the nineties, was instrumental in its foundation early in the Edwardian period,(2) and Alfred Barrett, the chairman and managing director of Leeds Fireclay from 1903 to 1913, was one of its first chairmen.(3)

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(1) British Clayworker, 11, 1902, pp. 11-14 (p. 13).
(2) British Clayworker, 16, 1908, p. 285.
(3) British Clayworker, 12, 1903, p. 343.

The leading figure in the inter-war terracotta industry was H.J.C. Johnson. He started at Leeds Fireclay around 1890 at the age of fourteen, and worked his way up through the posts of works manager, sales manager and general manager. Through the trade associations and industrial reconstruction committees, and numerous representations, lectures and papers, he became a forthright spokesman for terracotta production and the heavy clay industry.(1)

None of the other firms seemed to have been directed by figures of a comparable broad-mindedness. The Hodsons safely steered Hathern through decades of heavy fluctuations in demand and prices but the management at Gibbs and Canning appears to have become too fragmented, and then too aged, to retain any sense of commercial direction. When the manager and secretary of the works retired in 1897 due to ill health, it was a pin manufacturer, P.A. Warden, who became the secretary, with a newspaper proprietor from Evesham, William Smith, taking over the chairmanship. In 1906, the board member with the widest experience in the ceramic industry, C.B. Broad, had to resign as a result of accepting a directorship with a competing firm. H.J. Smith replaced him and two months later was given the responsibility of chairman. In 1916 he was in turn succeeded by N.H. Everitt, a resident of the Isle of Wight.(2)

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(1) British Clayworker, 59, 1950-1, p. 64.

(2) Gibbs and Canning, Directors' meetings, 9 February 1897, 12 October 1897, 8 August 1906, 17 October 1906 and 10 February 1916.

From 1918 a period of stability returned with A.E. Smith as the works manager and P.A. Warden and J. Carroll as managing directors. Warden was the first to leave, in 1941, though he continued to act as the secretary until a few weeks before his death in 1950. J. Carroll retired during the war and A.E. Smith became probably the last chairman of the company, in 1950.[1] These three doggedly kept the firm in operation but seem to have been preoccupied with the everyday problems of local landowners, failing machinery and unreliable sales representatives, rather than with re-directing business into more profitable spheres of activity.

The Terracotta Department within the Clayworking Companies

How far the production of terracotta influenced the organisation of the works where it was made depended on whether it was a sideline, relative to a large output of bricks or pottery, or whether it constituted almost a distinct works in itself, with its own drawing office and plaster shops. Accordingly, the firm would be either orientated towards the mass production of simple forms, or to the complexities of architectural contracts. Apart from the early specialists such as Blashfield and Blanchard, terracotta was just one of several lines, however its production was organised and whatever the size of the company. Leeds Fireclay, Stanley and Gunton all had several clayworks but each firm had only one works producing

(1) Gibbs and Canning, Register of directors, 24 July 1918, Directors' meetings, 27 August 1941 and 20 April 1950.

terracotta, and then usually in conjunction with facing bricks, Gibbs and Canning and Hathern were probably the two firms that became most dependent on terracotta and faience.

Gibbs and Canning had commenced trading in 1846, and sales, largely of socket pipes, trebled over the first four years. In 1881 the three main groups of manufacture were described as terracotta; glazed pipes and sanitary ware; and bluebricks, firebricks and tiles.(1) They had a virtual monopoly on the large architectural contracts for terracotta in the 1870s and early eighties. Even so, in 1893 terracotta formed only 14% of the sales while pipes comprised 57%.(2) Glazed bricks were about as important as terracotta and were more consistently in demand throughout thenineties. There was a rather vulnerable dependence on pipes and terracotta in the Edwardian period, and then at the outbreak of theFirst World War the trade in architectural ceramics collapsed. Utilitarian pottery took up some of the spare capacity.

With armistice, pre-war trade revived rapidly, sales of pipes running at £20,000 for both 1919-20 and 1920-21. During the twenties, terracotta and faience made up about a third of the sales, the precise level fluctuating against the more consistent demand for sinks, firebricks and pottery. The overall trading situation at Gibbs and Canning was deteriorating badly by the middle of the 1920s, sales of terracotta and faience dropping to £9,540 in 1927-8. From the tone of the directors' minutes, production was hardly viable and it

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(1) Gibbs and Canning, Particulars of sale of Glascote Works at Tamworth, 1811.

(2) Gibbs and Canning, Nominal Ledger, 1893-1902.

appears as though little improvement occurred in the 1930s.[1] (Fig. 5.2).

Hathern was a later establishment. In 1874 George and James Hobson started making bricks from a claypit adjacent to the Midland Railway. Having supplied small architectural details, the firm began the large scale manufacture of terracotta in 1897; within a year at £8,000, they had almost matched the output of terracotta from Gibbs and Canning. In 1903 they reached £14,635 while Gibbs and Canning's sales of terracotta remained virtually static. However during those six years the production of bricks at Hathern and at the subsidiary Cliff works declined markedly so that Gibbs and Canning's total sales ran at a slightly higher level, averaging about £25,000 a year.

Hatherns' sales of terracotta fluctuated heavily in the Edwardian period; in the 1920s they were completely unstable albeit at sufficiently high level to make them the largest manufacturer in the country. The sales of terracotta and faience rose from a minimum of £11,044 in 1915 to £51,120 in 1920 and a peak of £56,526 in 1924. The sales of bricks also rose but far more modestly, making the expanded company increasingly dependent on one type of product. This instability, with sales of terracotta and faience wavering by over a third between individual years, only settled during serious slump between 1932-7. From 1934 this was partly compensated by growth, first in the brick trade and then in the newly introduced manufacture of chemical stoneware, which had

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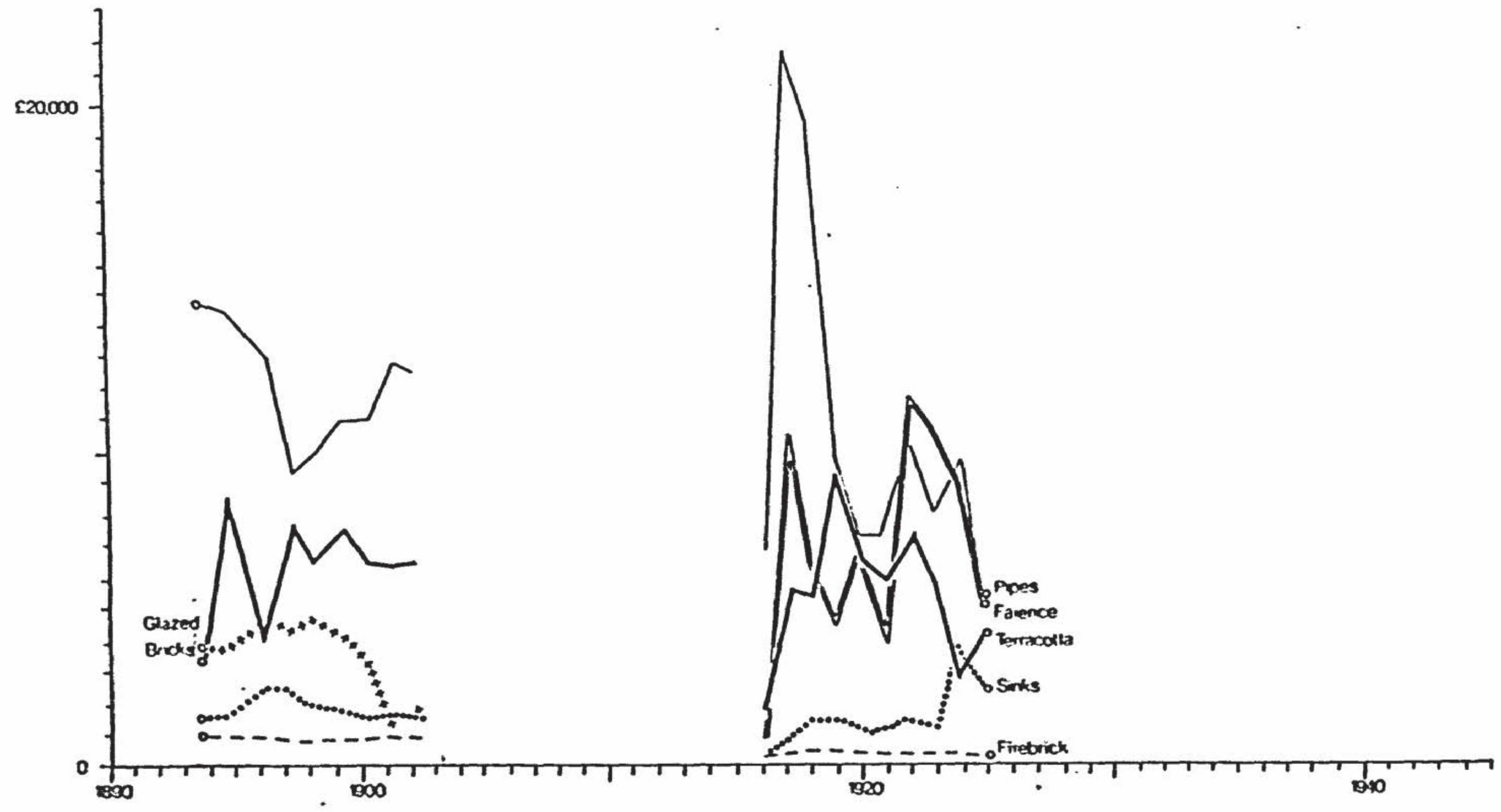
(1) Gibbs and Canning, Nominal Ledger, 1916-1927.

Fig.5.2. Gibbs & Canning: Sales of Terracotta, Faience and other Products 1893–1902, 1916-25

Source: Gibbs and Canning Nominal Ledgers



to maintain the Company after the collapse of terracotta and faience, and building brick sales in 1939. (Figs. 5, 3 and 4).

<u>Labour Costs</u>

These fluctuations in demand for a labour intensive product meant that the skilled workers were alternately over-stretched or under-utilised. Since the modellers, draughtsmen, moulders, and finishers constituted the major cost in production, the way in which they were managed had a major influence on a firm's profitability.

The patterns of labour management applied to terracotta manufacture in the Victorian, Edwardian and inter-war periods evolved from the methods by which the pottery and china, and the brick trade had become organised during the preceding century. From the onset of industrial production, the labour force in most branches of clayworking was grouped into sections corresponding to the main stages of manufacture. However while model and mould makers, pressers and kiln-men in a pottery or chinaworks were usually employed directly by the owner or manager,(2) the equivalent stages in brickmaking were normally organised through subcontracting arrangements. The owners of brickyards let subcontracts, often at a rate

(1) Hathern, Sales figures from annual returns, 1903-1941.

(2) Josiah Wedgwood pioneered the extreme division of labour in the ceramics industry; some of his earliest accounts, from 1747-60, show labour being hired on weekly rates with abut a quarter having specified tasks. Reprinted in H. Owen, The Staffordshire Potter, 1901 (Kingsmead, Bath 1970), p. 307-310.

Fig.5.3. Hathern: Sales of Terracotta and Faience and other Products 1904-42

Source: Hathern Ledgers

Fig.5.4..Hathern: Profit and Loss on Terracotta and Faience, and Bricks 1892 - 1942

Source: Hathern Ledgers

per 1000 bricks, to middle men or moulders who then contracted out each process of manufacture, also on piece rates.(1)

The main advantage of subcontracting was that the hiring of labour could be closely related to the level of production through the seasons of the year and through fluctuations in demand. A much less satisfactory consequence was that the quality of the bricks and related products could not be tightly controlled. Needing to maintain a high technical and artistic standard, Coade employed all its labour directly, the manager being given an annual salary and the foreman and the rest of the labour force paid on a daily rate. Between 1813-21 the labour force grew from fifteen to twenty-two men of whom eleven were in steady employment, the remainder being taken on as demand justified.(2)

In the large brick, tile and pipe factories that became established in the Victorian period it was also the norm for workers to be hired directly for wages. One of the earliest firms to be sited on a coalfield, Garnkirk Fireclay, in Scotland, were paying skilled workers up to 30s a week and unskilled labourers about 15s-17s a week in 1867.(3) The same system of employment appears to have been applied where terracotta was being trade in such works; the owners and

(1) R. Samuel (ed), Miners, quarrymen and saltworkers (Routledge and Kegan Paul, London 1972), p. 26.

(2) J.E. Ruch, 'Regency Coade: a study of the Coade record books, 1813-21', 11, 1968, pp. 34-56 (p.36).

(3) Notes on Garnkirk Fireclay Company, 1867. Supplied by Graeme Cruickshank.

managers were probably more mindful of the need for tight managerial control than of the unstable nature of demand for the material.

The distinctive conditions of terracotta manufacture resulted in the major firms organising a distinct section under a separate head. With the need for precise costings for architectural contracts, particularly after the formation of the Terra Cotta Association, the accounts were also compiled separately, and combined with those for the other main products to make up the annual return.(1)

At Coade, the sculptor and decorative artist, John Bacon Senior, was a full-time employee and carried most of the responsibility for managing the Manufactory during its first thirty years. Similarly for much of the Victorian period, when terracotta production was relatively small in scale and at many works largely of sculptural or ornamental pieces, it was a decorative artist who was often the head of the section. He would probably have been trained in the use of clay in one of the art schools. A Mr. Bryan who promoted the terracotta section at J.C. Edwards' Pen-y-bont works in the 1880s had studies at South Kensington. He in turn trained school leavers to undertake the modelling while Mr. Richardson, a pupil of the architect Frank Verity, supervised the drawing office. Apparently J.C. Edwards was responsible for some of the designs himself.(2)

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(1) The basic account books kept at Gibbs and Canning for the terracotta section were an order book, contract working book and a day book.

(2) Builder, 43, 1882, p. 188.

There was no standard pattern to the organisation of a section making terracotta and faience within a clayworks in the 1870s and eighties. At Burmantofts it appears that it was the manager of the works, Mr. Holroyd, who was in control, with English and French artists being employed on a variety of short and longer term arrangements.(1) Similarly Minton did not have a specific post to manage their modest output of architectural ceramics but employed artists, in particular Frenchmen such as Leon Arnoux, to work on their faience and other large decorative ware.(2)

Most firms responded to the rapid growth in demand for architectural ceramics from about 1880 by creating a heirarchy in the terracotta section, headed by a manager and several draughtsmen and modellers. In contrast Doulton maintained, until the last decade of the century, a looser arrangement whereby sculptors and decorative artists were the most important figures, and were grouped together into a studio. George Tinworth, who was employed from about 1867, John Broad who joined the studio in 1873 and other resident artists such as M.V. Ellis gained much of their work in terracotta through their personal rather than Doulton's reputation. Apart from modelling for the small amount of architectural work being undertaken in the 1870s and early eighties they were left to work with considerable freedom. In consequence a wide range of ceramics bodies was produced

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(1) S. Wilkin, 'Burmantofts faience', Leeds Art Calendar, 1979, pp. 15-20. Referring to an article in the Artist, 1881.

(2) J. Barnard, Victorian ceramic tiles (Studio Vista, London 1979), pp. 15-20.

and their Doultonware, terracotta, polychrome stoneware and Carraraware was far more likely to be worked into sculpture groups or friezes, while other firms increasingly only produced stylistic details, repetitive mouldings and name panels.

George Tinworth was the modeller who gave Doulton a strong reputation for statuary, fountains, and other sculptural work such as church reredoses. He epitomised the artistic rather than the commercial approach to terracotta. The son of a wheelwright and largely illiterate, he was taught in the evenings at the Lambeth School of Art. John Sparkes gained him a position at Doulton, initially touching up pottery moulds and modelling figures. He gained publicity when two medallions, a bust and several vases were shown at the 1867 Exhibition, and then became the central figure of the Lambeth studio through is inventiveness and remarkable output.(1) His wife's diary for 1888 refers to his work on thirty-three large panels, thirteen statues or large vases and twenty-five domestic pieces. He designed largely from personal commission or inspiration and was desperately disappointed when his productions would not sell or fire correctly in the kiln.(2)

Reflecting the changing market for architectural ceramics, it was a more practical man, W.J. Neatby, who had trained with an architect rather than had an art school education, who was put in charge of the architectural department

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(1) E. Gosse, (1970), op.cit., pp. 70-2.

(2) Mrs. Tinworth, Diary 1888. Held by Doulton and made available to me by Miss. F. Lovering.

in 1890. Neatby was also highly productive and developed his own distinctive style, but his most significant achievement was to apply a wide range of ceramic techniques in major architectural contracts.(1)

But as the materials became more standardised and decoration more polychromatic than sculptural, it was the draughtsman who became the central figure in most works. He supervised the taking out of quantities and making up of a tender and then, if the tender was successful, the drawing of shrinkage scale plans and the arrangement of the detailing. Once the draughtsman was given the responsibility of seeing each contract through all the stages of the works, not surprisingly he frequently emerged as the head of the terracotta section. Mr. Harrison, a draughtsman at Gibbs and Canning had gained control by 1908.(2) The manager of the Huncoat Terracotta Works had been the senior draughtsman at Pen-y-bont.(3)

There was no precursor for the combination of skills required by the head of a terracotta section and by the draughtsmen who had to develop architectural designs in a form suitable for production in ceramics. Many of the brickworks which attempted to gain from the growth in demand for

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(1) P. Atterbury and L. Irvine, The Doulton Story (Royal Doulton, Stoke-on Trent 1979), p. 73. One other firm which appointed a major head designer in about 1890 was Maw. The work of Temple and Neatby is considered in Chapter 9.

(2) Gibbs and Canning, Directors' meeting, 11 November 1908.

(3) British Clayworker, 13, 1904, p. 268.

the material failed to recruit sufficiently qualified staff or to provide an adequate training. It was considered, with hindsight, that one of the main reasons why there were so many problems with terracotta in the decades up to the turn of the century was that the draughtsmen, modellers, mould makers, pressers and finishers had been drawn from dissimilar trades and 'pitchforked' into the business without any training.(1)

The result was not just a combination of low standards and mistakes, but inconsistency even on a particular building contract. Due to the rate of demand and the pace at which orders had to be executed, several model and mould makers would be working from the set of templates or in hand-modelling. The difference in the way that individuals produced scroll curves or cartouches could be glaringly apparent across a completed frontage.(2)

The speed with which orders had to be undertaken also resulted in the inefficient use of labour. Architects were always impatient for the first deliveries of terracotta as, until they arrived, only the foundations of a building could be undertaken. Mr. Nicol, of Essex, Nicol and Goodman, wanted the first consignment for Messrs. Lunt's in Birmingham to be ready five weeks from the date the drawings were supplied, the whole quantity having to be delivered within six months.(3) In the twenties, pressing might commence in

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(1) British Clayworker, 9, 1900, pp. xlvi-xlvii (p. xlvi).

(2) British Clayworker, 9, 1901, pp. l-li (p. l).

(3) Gibbs and Canning, letter from E. Walker to W. Smith, 13 March 1894.

the same week that the modellers started work; by pushing each sub-contract through pressing, glazing and firing as soon as possible a small shop front could be made in five weeks. There was not quite the same urgency for a cladding material such as slab faience as it was applied once the brick structure was completed. However the rate of cinema construction in the thirties meant that schemes were being completed in as little as two months.

The manager of the terracotta section had to keep on sufficient staff during lean periods so that a start could be made on a large contract or several smaller ones just as soon as the tenders had proved acceptable. A result of this was that, in contrast to brickyards where workers were paid according to piece-rates and easily laid off, terracotta workers were usually given a modest wage but security of tenure. A pattern became established at both Gibbs and Canning and at Hathorn that apprentices were taken on from school, were bound for probably three years, and worked their way up within either the draughtsmen's office, the modellers' studio or one of the workshops. Frequently a apprentice would have the guidance of his father and be succeeded by his son.(1) Medals from the Clayworkers Institute were presented for fifty years' service in the firms. In the severe recession of 1932, G.A. Hodson wrote repeatedly to the Minister of Labour referring to an employee who had worked for Hathorn over thirty years,

(1) Their wages rose from a one-third to a two-third level of the relevant ordinary rate, over the period of the apprenticeship. Hathorn, Records of apprenticeship agreements, 1906-12.

except for a break of sixteen months when he had been dismissed for lack of work.(1) In the 1930s, Hathorn employed up to 210 hands in times of reasonably strong demand.(2)

There was a prevailing attitude at Hathorn that, rather than recruit young architects or artists, it was better to introduce the peculiarities of terracotta working to employees at the outset of their careers. Most of their draughtsmen came straight from school, starting as office boys. Understandably Hodson was loath to lose staff that they had invested in by training, and there is no evidence of draughtsmen being dismissed for lack of work. However, at Hathorn in 1932 some staff had to be dismissed and it must have been particularly galling that several were taken on by the Empire Stone Company and other artificial stone manufacturers.(3)

The usual response to a severe recession was to try and reduce the wages bill. In 1896 the management at Gibbs and Canning proposed that the number of hours worked per day be reduced. In response to objections it was arranged that production would be stopped on Saturday and Mondays.(4) A comparable cut-back took place in October 1906 and two years later some members of the drawing office were temporarily

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(1) Hathern, Letter from G.A. Hodson to Rt.Hon.Sir. H. Betterton, London, 14 February 1932.

(2) Hathern, Letter from G.N. Hodson to the Ministry of Supply, Leicester, 17 April 1944.

(3) Gibbs and Canning, Directors' meeting, 28 April 1932.

(4) Gibbs and Canning, Directors' meetings, 10 November 1896 and 15 December 1896.

suspended on half pay.[1]

The rates of pay appear to have become increasingly uncompetitive, in relation to the more highly mechanised elements of the clay industry, through a combination of lack of alternative employment, weak union pressure and a paternalistic relationship between the management and workers. Pressers and finishersat Gibbs and Canning were being paid between 6s and 10s a week in 1905, rising to £1 in 1912.[2] At the turn of the century the modellers and draughtsmen were earning over £2 and the head of the terracotta department, Mr. Harrison was receiving almost £4 a week. The rates for pressers and finishers differed little from those being paid for the equivalent processes in the brick and pipe sections even though the latter products involved far less skill. More significantly the wages offered by Gibbs and Canning were well below those being paid in the Staffordshire Potteries. In 1900 men making simple hollow-ware earned between £1 and £2 5s a week.[3]

At Hathern three national awards served to double many of the wages, but they slumped during the twenties. The rates went up from 10d an hour to 1s 10d, between January 1919 and October 1920, but in September 1923 Frederick Butler was engaged as a model maker at only 1s 3d an hour.[4]

Such reductions in pay were generally accepted without

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(1) Gibbs and Canning, Directors' meeting, 11 November 1908.
(2) Gibbs and Canning, Directors' meeting, 9 January 1900.
(3) H. Owen, (1970), op.cit., p. 333.
(4) Hathern, Notes by G.N. Hodson, undated.

recourse to industrial action. The only recorded strike at Gibbs and Canning was for a month in 1898, when a demand for a 15% pay increase was refused.(1) There was a three month lock-out at Hathern in 1917 over the dismissal of an employee.(2) This was no doubt prompted by the Hodsons' tendency to dismiss non-skilled workers for the most petty misdemeanours, those lised in a register including 'being cheeky', 'always grumbling', 'having long hair' and being convicted in a 'peeping Tom case'.(3)

In the case of modelling staff there was some flexibility to respond to severe fluctuations. At Gibbs and Canning, one of the modellers, John Evans undertook work for other clients if trade was slack, while in busy periods, outside modellers, such as B. Creswick, and draughtsmen such as A. Whitehead, were paid lump sums for their services.(4) However, the costs of modelling enriched details became a large element in the labour expense of contracts. For the Elite Picture House, Nottingham, made in 1920, the wages for making the models comprise £239.00 out of a total labour cost of £1,046. In the following decade finely modelled architectural ceramics became either unprofitable or prohibitively expensive.(5) Probably the most serious consequence of the labour intensity

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(1) Gibbs and Canning, Directors' meetings, 5 July 1898 and 9 August 1898.

(2) British Clayworker, 26, 1917, p. 94.

(3) Hathern, Register of employees, 1919-37.

(4) Gibbs and Canning, Directors' meeting, 18 August 1896. Whitehead was simultaneously running his own sanitary and firebrick works in Leeds.

(5) Hathern, Wages analysis book, May 1919 - June 1921.

of making terracotta, and the policy of retaining skilled staff and workers through recessions, was that labour costs became a heavy burden when the drawing office and the modelling studio were not working at near full capacity. This threatened the profitability of the whole section and at times that of the entire company.

Material and Fuel Costs

After labour, fuel was the largest cost in production. Whereas cheap and even free supplies of coal had been a major justification for large works developing near pitheads, after the First World War rising fuel costs became a major burden to the heavy clay industry.

At Hathern, coal increased as a proportion of costs from 10% in December 1901 to 18% in 1919. In 1926 Leeds Fireclay stated that coal costs rose four times through the settlement of the coal strike; (1) low retail prices meant that they were unable to make a profit for five months. The increase in costs was exacerbated by a deterioration in quality which increased the amount burnt in the kilns. The heavy consumption of muffle kilns made the coal costs far more expensive for terracotta than for bricks and other goods which were fired in continuous kilns.

(1) Hathern annual returns, 1901 and 1919. Leeds Fireclay Company, Annual report, 1926. Leeds Fireclay had complained about the effect of increased coal costs as early as 1907. British Clayworker, 16, 1907, pp. 185-6.

The extent to which coal supplies became a real problem depended on the relationship between the works and the coal-mine. Where they were adjacent and under the same ownership, as with Henry Dennis' Hafod Works, mining costs were probably not fully passed on to the clayworks. It was more usual for firms to arrange deals with nearby collieries, but the prices became increasingly less favourable as the colliery owners found themselves less able to be generous in return for supplies of bricks or other services. Gibbs and Canning made a series of complex agreements with the nearby Glascote Colliery, which included the leasing of land and the use of the colliery tramway. When heavy use was being made of the kilns, additional supplies were brought in from Skey's Colliery, about four miles away at Wilnecote. In 1927, about £1,000 a month was being paid to the Glascote Colliery for coal, constituting by far the heaviest outgoing expense.(1)

The management at Gibbs and Canning considered gas-firing, but does not appear ever to have installed a producer, or built new, or converted the existing, kilns. Shaw were among the pioneers of using gas, just after the First World War, but it was only in the thirties that Hathern began to think about any alternative to coal. Buying from various collieries on the East Midlands field, the coal cost per foot cube of terracotta averaged 7d in 1935. The small gas-fired tunnel kiln built in that year halved the cost to 3½d. Coke was used to feed a pair of gas producers. Hathern themselves estimated that they would save £1,500 a year by firing through the tunnel kiln.(2)

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(1) Gibbs and Canning, Directors' meeting, 29 June 1927.

(2) Such economies depended on the tunnel kiln working at near capacity, as the firings had to be maintained at full level, whatever the load.

Despite this and the fact that Shaw had successfully used gas for their faience over the previous twenty years, the initiative came solely from Gibbons Brothers, the kiln suppliers; their representative noticed the groups of old beehive and rectangular kilns from a passing train, and persevered with letters and unrequested visits until he eventually gained a sale.

Clay was initially a more minor expense. Where the firm owned the claybank or mine, only the cost of extraction and transporting had to be accounted for. It was a satisfactory arrangement which operated in many companies until the reserves of workable clay began to run out. When this started to occur a major asset turned into an increasing liability.

Gibbs and Canning's success in making terracotta and pipes had been attributed to deposits of white and black clay, and marl in their own mine that still totalled 77,000 tons in 1878, after thirty years of working. The white and black clays combined in equal proportion for terracotta while the red marl was used for pipes.(1) The underviewer was directed by the manager as to what proportions of these clays were required for the current range of production. He organised the mining and quarring, which by the turn of the century had extended into neighbouring fields. The policy seems to have been to take out a lease and work out the clay within that period, selling the surplus, or making it into bricks and retorts, rather than leaving any unexploited.

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(1) Gibbs and Canning, Reply by Charles Canning to Mr Hunt's report, 16 December 1878.

Their problems started in 1896 when the pit seems to have been becoming uneconomic. The management attempted to reduce the price given to the mines and, being rebuffed, looked to Skey for supplies. Four years later there were insufficient clays for terracotta. A new lease was taken and the working extended but the quality proved to be inadequate and new shafts had to be sunk. With the clayhole becoming waterlogged the management again considered purchasing clay, just before the First World War.[1] In 1927 clay began to be bought regularly from the Leicestershire Colliery and Pipe Company at a cost of 16s per ton, delivered. Following the drop in production caused by the Second World War it was decided to close down the clay-pit and the mine ceased working in 1950.[2]

At Hathern the proportion of clay bought in from outside sources increased dramatically between 1932 and 1939. The cost of the clay, barytes and grog used in the terracotta section doubled over the period; these raw materials came to constitute an expense almost as great as that of the coal used in the kilns.[3]

As the claybanks adjacent to a particular works were depleted, it became more economical if not essential to buy in raw materials from specialist suppliers; the most typical sources were Scotland for fireclays, Devon for ball clays and Staffordshire for marls. The greater expense of importing

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(1) Gibbs and Canning, Directors' meetings, 13 November 1900, 12 February 1906 and 12 November 1901.

(2) Gibbs and Canning, Directors' meeting, 29 April 1940.

(3) Hathern, Ledgers, 1932, 1934.

clays must have been a factor leading numerous firms first to give up making architectural ceramics which required high quality clays and then to close entirely as the more ordinary beds in a bank or pit became exhausted.

Delivery Costs

Delivery to the respective merchant or building site was a significant expense that became the responsibility of the manufacturer. It therefore served to influence the location of works, the siting of depots in the major cities, and reduced the level of motivation to compete for contracts far across the country.

Coade's prices had not included the cost of delivery from the London showroom. Packing and transport incurred extra charges, Coade refusing to carry any liability unless wooden cases were paid for.(1) Most of the Victorian terracotta catalogues quoted prices at the works, maybe with special prices at the London depot. The full range of options was to buy ex-kiln, loaded on board railway-waggons or delivered at a railway station or wharf. Local builders, contractors and merchants benefitted from being able to collect from the works, paying the ex-kiln price, possibly with a small extra charge to cover assistance in loading.(2)

As the supplying of catalogued goods gave way to

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(1) Letter from W. Croggon, Coade to E. Haycock, Shrewsbury, concerning the consignment of the statue of Lord Hill, 26 January 1816.

(2) All the firms would go to inordinate lengths to gain major local contracts.

architectural contracts, manufacturers found that they had to absorb the delivery costs, otherwise the purchaser would almost always choose the most local manufacturer. It became incorporated within the rules of the Terra Cotta Association that all prices had to include delivery to the site.(1)

Railways were fundamental in the development of the works based on the coalfieldsand needing to supply a wide market. Coade had used canals and rivers but they were too slow and geographically limited. As the Midlands and northern coalfields developed in the second quarter of the nineteenth century, the construction of a railway, and opening of coal-mines, and heavy clay works followed in close sequence. At Garnkirk, in mid-Lothian, the first colliery was opened in 1828, the railway in 1831 and the fireclay works, subsequently producing terracotta, two years later.(2)

With the railways probably buying engineering bricks at advantageous rates and some of their management being involved in the works, cheap rates tended to be accompanied by considerable goodwill, from at least the local companies. However, rather than simply having a loading platform and maybe a siding, the larger firms found it desirable to have private sidings and their own shunting locomotives, to reduce the dependency on the railway company when loading and unloading waggons.(3)

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(1) Terra Cotta Association, Rule book, 1937. One of a series of Association papers contained in the Hathorn archive.

(2) Notes on Garnkirk Fireclay Company supplied by Graeme Cruickshank.

(3) British Clayworker, 14, 1905, p. 211.

The only major works without immediate rail links was the Burmantofts factory, in a suburb of Leeds. By the inter-war period they were minimising the cost of transhipment by packing the products straight into railway waggon bodies which were collected and taken to the goods yard on horse-drawn drays.(1) As early as 1893 Leeds Fireclay were complaining at the disastrous effect on their wider markets of the railway rates being put by more than a third.(2) The costs, which were roughly proportional to distance, were still a source of objection in the twenties. Normally the railway company carried the risk of damage; but when a consignment of terracotta was ruined by fire whilst in transit, and Gibbs and Canning only recieved half the damanges claimed, they decided to negotiate lower rates, with no insurance against loss or damange.(3)

As more contracts came in for cinemas and stores, in suburbs away from railway depots, road transport should have become a worthwhile alternative. However, it was stated at Hathern that the severe fluctuations in trade made it uneconomic to maintain a fleet of lorries to transport such a bulky product across the country. Only after the Second World War, as the nationalised railway became disinterested in serving private sidings and working private-owner waggons, did delivery by road become the norm.

Transport costs were a major obstacle to the export

(1) Claycraft, 2, 1929, pp. 147-8 (p. 147).

(2) British Clayworker, 1, 1893, pp. 218-9.

(3) Gibbs and Canning, Directors' meetings, 14 September 1897 and 11 October 1905.

trade, especially once an industry had developed in North America. Two transhipments and possibly two hauls by railway, as well as the sea passage and the additional packing required, comprised a heavy expense in relation to the value of the material. In 1912 Gibbs and Canning supplied terracotta for the World Building in Vancouver, to the value of £2,727. Packing and delivery to Liverpool cost an additional £570 and shipping to Vancouver £883.(1) Just when Gibbs and Canning and Doulton were proving successful in the Canadian market, the rates of the Canadian railway companies were increased steeply. The two firms tried specifically to gain an alteration in the class rate for terracotta, apparently with no success.(2)

The higher transport costs, and more competitive tendering of the twentieth century, meant that companies could hardly afford to offer low prices for distant jobs. This is one explanation why the market for each manufacturer tended to become more regionally concentrated, after the initial growth years of the 1880s and 1890s.

The Layout, Plant and Machinery of Terracotta Works

A typical basis for the layout of brick, tile and terracotta works was that clay was usually accepted at one end of the factory and finished goods despatched from the other.

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(1) The breakages in the shipping of this terracotta led to a claim from the contractors, and some of the missing blocks being replaced with stone. Directors' meeting, 21 August 1912.

(2) Gibbs and Canning, Directors' meeting, 19 April 1912.

Nevertheless most appeared haphazard in layout and untidy in appearance. None of the firms, except for Doulton at Lambeth, put much emphasis on presenting a public face of order and cleanliness,as exemplified in the model works of Leverhulme or Cadbury. This could possibly be justified on the grounds that a loose collection of buildings could most easily be altered or extended, and that the public would often only see the works from a passing train. However it must have seemed incongruous for a architect wishing to inspect the process for making faience, which was, after all, advertised as being clean and colourful, to be confronted with a maze of sheds and kilns pouring out smoke and soot.

The most important factors concerning the layout and form of the major works producing terracotta were the relationship with the organisation and efficiency of production, and the question whether the lack of major re-investment resulted from the short-sightedness of management or the unreliability of both demand and profits. Generally the factories were started and developed along the lines of either a pottery, or brickyard, depending typically on whether the location was urban and the products primarily in the form or pots or ornamental ware, or rural and consisting largely of bricks. While the early manufacturers of 'artificial stone' were mostly located in potteries by the River Thames, after the middle of the nineteenth century the bulk of terracotta and faience was made on open sites offering greater space for buildings, storage and the working of claybanks or mines.

A site within a town or city was acceptable and possibly desirable until more space was needed to complete architectural contracts and the levels of pollution became intolerable. Works were usually established in the yard behind a town house; it was the fact that courtyard potteries usually rose through two or three stories that made them so unsuitable for the production of ashlared blocks, weighing over 50 lbs each. Coade's Manufactory was initially in one end of a Georgian house in Lambeth and Doulton and Watt's first building, nearby, was a stuccoed residence that soon became decorated with terracotta ornaments. (Fig. 5.5) Doulton were the only major firm to retain a city centre location; the works expanded rapidly, over the road and along the river frontage. In the 1870s Tarring Son and Wilkinson designed for them three Gothic-style blocks decorated with terracotta and Doultonware to house the showrooms, offices and studios.(1) However part of the site was kept as open ground, for the storage of waste moulds. (Fig. 5.6) A 233 foot chimney designed as a companile, formed a landmark for the works. In 1939 a new headquarters was built in a modernistic style faced with Carraraware and two stoneware relief panels. Difficulties with transport and clean air legislation led Doulton to close the Lambeth Pottery in 1956.(2)

Blanchard and Blashfield had moved out of London almost

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(1) The building accommodating the showroom and studios was illustrated with details in: Building News, 31 1876, p. 468.

(2) Doulton House, as it was termed, was illustrated in Pottery and Glass, 42, 1950, pp. 48-9.

Fig. 5.5. Doulton and Watts Pottery, Lambeth, from a letterhead, January 1847. Source: Royal Doulton Tableware Ltd.

Fig. 5.6. Lambeth Embankment, London showing the showroom and offices of Doulton, by Tarring Son and Wilkinson, 1876-8, and beyond, the office of J. Stiff and Sons.

a century earlier. Through an agreement with the Marquis of Exeter, Blashfield took over an old foundry in Stamford. A showroom faced Wharf Road while kilns were built beside the River Welland.(1)

One of the most tightly enclosed works was at East Quay, Poole, purchased by Jesse Carter in 1875. On a triangular site, fronting the harbour, it became clustered with small buildings. Clearly unsuitable for terracotta and faience, their production was transferred to the old Architectural Pottery Works at Hamworthy, a far more open site with both water and rail access.(2) Ornamental brickwork was used on the buildings in most prominent view and the kilns were decorated with spiral patterns.

In contrast to the manufacture of pottery, brickmaking occurred mostly on open ground and remained largely an outdoor occupation until mechanisation became widespread in the second half of the nineteenth century. Sheds would either be erected or existing outbuildings taken over for the modelling, pressing and drying of terracotta. Some works never developed beyond the form of a small estate yard. Gunton at Costessey, was, after eighty years, still housed in a collection of eighteen sheds scattered round a pond, and hidden from the nearby hall by a belt of trees. Only in the twentieth century

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(1) Information supplied by John Smith, Curator of Stamford Museum.

2) O S map 25 inch, Dorset sheet xciii. 16, 1902 and 1925 editions. The 6 inch and 25 inch maps held at the British Library provided a means of comparing the layouts and development of the major works.

did the claybank extend far enough to justify the laying of tramway.[1]

Works established in the coalfields used machinery from the outset. They followed the example of the frequently nearby pithead by having the buildings clustered round the boiler which provided steam both for the steam engine to drive the grinding pans and pug mills and for the pipes in the drying rooms. Kilns were built as closely as possible to the main group of buildings. (Fig. 5.7) Where the works were located between a claybank and a railway, it was most logical to arrange the clay preparation sheds, boiler house and engine house, pressing shops and kilns in a sequence towards the sidings. A hill-slope could provide the gravity to move materials through each process. This pattern was found in many works from Blanchard in Hampshire to the Buccleuch works in Dumfries. The Stonehouse Brick and Tile Company's works beside the Gloucester to Swindon railway was a particularly well laid out example. The kilns were sited beside the line and were topped with vases of plants, partly as a demonstration that all the combustion was carried away to the single chimney.[2]

The works making terracotta were rarely rebuilt or extended on a systematic basis. Developments occurred on a

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(1) O S map, 6 inch, Norfolk sheet lxii, NE, 1891 and 1938 editions.

(2) O S map, 25 inch, Gloucestershire sheet xlix.2., xli.4, 1923 edition. The only firm that in anyway laid out the surroundings of their works was Candy and Company who built some workers' housing in the Edwardian period. O S map, 25 inch, Devonshire sheet lix.2, 1905 and 1936 editions.

Fig. 5.7. Plan showing circular and rectangular kilns, and major buildings of the Pen-y-bont Works of J. C. Edwards, Ruabon, c.1900. Source: Clwyd Record Office, Hawarden.

Fig. 5.8. Plan showing terracotta section of the Glascote Works of Gibbs and Canning, Tamworth, 1884. Source: Tamworth Castle Museum.

more ad hoc basis, typically to expand capacity in response to an increase in orders rather than to achieve greater levels of efficiency in production. Investment decisions were most critical with regard to the kilns. Early in the twentieth century continuous and tunnel kilns had been proven to bring worthwhile economies but they cost at least £5,000 to build. In contrast, intermittent kilns had the advantage that they were relatively cheap and quick to construct. As soon as the contract was sealed for supplying the terracotta for the Birmingham Technical Schools, the directors of Gibbs and Canning authorised the construction of four new kilns to accommodate the extra work. Three months later an upturn in demand in the domestic section necessitated the construction of a new chimney-pot kiln.(1)

The management at Tamworth was well aware of the benefits to be gained from continuous and tunnel kilns, and gas firing, but they repeatedly postponed or abandoned any decisions involving large investments. Having inspected examples at other works and received details from the Hoffmann Construction Company, they gave up proposals to construct a continuous kiln in 1914. The war led to the large-scale production of jars and it was proposed to build a small Dressler tunnel kiln which would also be capable of burning terracotta. Nothing seems to have come of this scheme and a report produced in 1931 on the viability of spending £9,000 on a Dressler was not followed by a purchase. The calculations in the report assumed rather optimistically that the production

(1) Gibbs and Canning, Directors' meeting, 5 December 1893.

of terracotta would increase by a third. At this rate and projecting a comparable increase in the output of sinks, the saving in coal would have been £1,973 a year; and with less labour being required for setting, firing and drawing the goods the total saving was estimated at £2,173. Apart from the capital cost of the tunnel kiln, the fact that it would only achieve worthwhile economies if run continuously at full capacity, and the rapid decline in demand for terracotta and faience during the subsequent three years made its construction unjustifiable.(1)

Considering a more modest expenditure on new technology, the managing director, James Carroll, went up to Darwen to inspect Shaw's gas kilns, but he did not implement any conversions at Gibbs and Canning. The only kilns for terracotta recorded as being made in the twentieth century at Glascote were a pair of ordinary muffle kilns. Built to a design used at Stourbridge it was hoped that they would use half as much coal as the firm's other muffle kilns.(2)

If the expenditure on kilns was cautious, the board begrudged spending any money on the manufacturing shops. Sheds

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(1) The report did not consider how the necessary £9,000 was to be raised or take into account the interest payments on raising this amount of capital. Gibbs and Canning, Report on Dressler tunnel oven, 1931.

(2) Gibbs and Canning, Directors' meeting, 27 September 1912.

were taken over and extended, or relinquished, as demand justified. Waste building materials were used where possible. Two of the terracotta shops were called the 'Museum' and 'South Kensington' because blocks decorated with snakes, lizards and other animals left over from supplying the Natural History Museum were used as dressings.(1) Upturns in the terracotta trade resulted in the chimney-pot shop being taken over in January 1894, the terracotta fitting shop being extended in March 1893, and new buildings being erected in 1907 to accommodate the growing output of semi-glazed material.(2) Once, even Gibbs and Canning were caught out; the fitting shop was rebuilt in 1929 in anticipation of supply the Winter Gardens in Blackpool, a large job that was won by Shaw.(3)

Conversely, when demand slumped, accommodation was taken away from the terracotta section. In the First World War the mould shop was used by the pottery department; in the Second World War, most of the works was turned over to the fabricating munitions.(4)

The terracotta section at Gibbs and Canning was housed largely in separate sheds, surrounded by the kilns and on the other side of railway tracks from the main factory block. (Fig. 5. 8 and 9). At Hathern the section was, and is, grouped down one side of the main block of buildings,

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(1) Illustrated in photographs taken shortly before the demolition of the works.

(2) Gibbs and Canning, Directors' meeting, 9 January 1894, 22 March 1898 and 19 April 1907.

(3) Gibbs and Canning, Directors' meeting, 27 June 1929.

(4) Gibbs and Canning, Directors' meeting, 21 July 1915.

Aston University

Illustration removed for copyright restrictions

Fig. 5.9. Plan showing terracotta section (top left of plan) of the Glascote Works of Gibbs and Canning, Tamworth, 1928. Source: Tamworth Castle Museum.

Aston University

Illustration removed for copyright restrictions

Fig. 5.10. Part of the offices, showing terracotta details, and a decapitated lion originally made for the Natural History Museum at Glascote Works of Gibbs and Canning, c. 1955. Source: Tamworth Castle Museum.

conveniently adjacent to the main drying rooms. Both the drying and pressing rooms were steam-heated. The models were made in top-lit workshops nicknamed the 'Crystal Palace'. Rebuildings and extensions again usually consisted of piecemeal additions, some of the outbuildings consisting simply of old plaster moulds covered by a roof.(1)

Only the office blocks, necessitated by the increasing amount of administration and the need for draughting rooms, were built with any regard to architectural style. None matched the scale and flamboyance of Doulton's. Wilcock employed Maurice B. Adams, who designed some of the firm's products, to design a new office block at Burmantofts, with rich 'Queen Anne' decorations in terracotta.(2) Gibbs and Canning had a plain office building, but a pair of lions, intended for the Natural History Museum, flanked their entrance. (Fig. 5. 10) While Hathern used buff terracotta lettering on their new offices, Shaw completely fronted theirs in 1927 with white faience, which still startles the unknowing traveller on the edge of the Pennines.

Bispham also had a faience-fronted office. Being laid out as late as 1902, their works was the only one that could be described in any way as planned, with production arranged in an

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(1) Many of the outbuildings at Hathern were demolished in 1981. At the same time the area of undergrowth, littered with kiln failures and left-overs of chemical and architectural orders, was partly cleared.

(2) With the works at Burmantofts having been completely demolished it has not been possible to ascertain whether or not this design was actually constructed. Building News, 39, 1880, p. 303.

orderly path through the buildings.(1) It is unlikely that the relatively haphazard arrangement of the other firms incurred very great costs, because the processes themselves were so labour intensive. The time and manpower used in moving 20,000 cubic feet of blocks a year across railway tracks and up ramps to first floor drying rooms was never commented upon, let alone quantified by the management at Gibbs and Canning. Henry Doulton had introduced some mechanical handling as early as the 1840s but generally wheelbarrows and chain-hoists were the only aids used until the advent of the fork-lift truck.

Cautious and short-term decisions seem to have had the worst effects when applied to investments in machinery, and their maintenance. The attitudes of many owners and managers were rather ambivalent since an opposition to machine-made products continued right through the nineteenth century. It was not just with architectectural ceramics but also with firebricks that hand-made goods were often regarded as being technically superior. As regards design, there was even greater prejudice. Basil Rathbone condemned the use of any power as 'paralysing artistic development'.(2) Despite this, steam-powered grinders, pug-mills and blungers were adapted in all but the smallest works and were seen as vital for preparing clay bodies in the quantity and quality needed for terracotta and faience.

Firms tended to buy their machinery on a piecemeal

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(1) British Clayworker, 11, 1902, p. 11-14.

(2) British Clayworker, 2, 1894, p. 238.

basis, guided by reputations, stands at agricultural shows and the efforts of trade representatives. John Whitehead, Bradley and Craven, William Johnson and T.C Fawcett all provided a full range of machinery. While each became renowned for particular types: Bradley and Craven for 'stiff', and Hughes of Ruabon for 'plastic' brick machines, none approached a monopoly in the area of clay-preparation.(1) It might have been better if machinery had been supplied as a complete unit by one firm, with guaranteed results. As it was, the yields resulting from limited modernisation were frequently overestimated and it could take a year to achieve the specified output.

At Gibbs and Canning the final stages of preparing the clays for making terracotta were segregated from the other production. With separate blungers being required for different colours of terracotta, the use of machinery must have been very inflexible. Purchases were frequently deferred and second-hand replacements were used where possible. There is no evidence of any systematic maintenance or renewal. The low investment in machinery led to something of a crisis in July 1893 when the general manager reported that the large stationary engine and the brickmaking machinery were all unusable.(2) General repairs and revaluations of the ageing plant were one recurring cause for the terracotta section at Hathorn operating at a loss. The sum of £9,484 was incurred under this heading for the half

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(1) Bradley and Craven tested designs at their own brick-works, so they tended to be best suited to the local Yorkshire clays, Builder, 17, 1859 pp. 508-9.

(2) Gibbs and Canning, Directors' meeting, 11 July 1893.

year ending December 1936.[1]

Steam engines powered the machinery in most works until the inter-war period, and as late as 1902 a 200 horse power compound engine was installed at the newly planned Bispham Hall works even though other managers were already worried about the rising cost of steam coal.[2] Collier bought a gas-engine in the same year,[3] and electrical installations were widely adopted in the late twenties.[4]

With certain exceptions, the industry became increasingly timid in investing in better plant and machinery in the twentieth century. Being willing to expand capacity in response to increased orders for a particular type of product was probably necessary given the unstable nature of the building market; however it was a short-sighted and financially hazardous approach, in that the resulting increase in expenditure on capital and wages cut into the potential profits on the additional contracts and made the firm even less viable when demand subsequently fell. Meanwhile the potential gains from greater efficiency and improved standards were growing with advances in technology and higher labour and fuel costs. Though a lack of profits will be seen to be a fundamental problem,

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(1) Hathern, Ledger, 1936.

(2) British Clayworker, 11, 1902, p. 11-14.

(3) British Clayworker, 11, 1902, p. 45. The firm apologised for the fact that the gas engine was American, being made by Westinghouse.

(4) Electrical plant was installed at three large works in 1928 and 1929. British Clayworker, 37, 1928, pp. 12-13, 338-41 and 38, 1929, p. 125.

management was too ready to accept modes of working inherited from the nineteenth century. While the Fletton brick industry was being heavily rationalised, through mergers and mechanisation, to increase productivity to levels inconceivable to the Victorians, such equations were never considered in the traditional works for terracotta and faience. Heavy expenditure on clay preparation, model and mould making, finishing and on fuel for burning was apparently accepted as an inevitable part of producing the materials.

Marketing

If the nature of the products and the pattern of demand could be used as a justification for low levels of mechanisation and investment, architectural ceramics certainly required the greatest possible effort and expenditure for their promotion and selling. Terracotta and faience's attributes of economy, durability and a unique appearance should have been continually publicised as they were having to compete against longer established and essentially simpler materials. It was either the commercial client, the architect or possibly the builder who chose the material and its supplier for a building. Advertising and a sales network had to cover all three, and keep pace with changes in public taste, architectural style and the practicalities of building construction.

The early manufacturers of decorative components and garden ornaments had the advantage of a known clientele amongst the upper classes and the, then small, profession of architects. Showrooms and a restricted circulation of catalogues were used to present the availability and artistry of the products. By the middle of the nineteenth century, the quality of design had become of rather less importance than the ability to supply, from stock, a wide range of goods across the country. Almost any forms of classical or Tudor design would suffice, and standards of advertising were equally loose. In a Scottish directory, probably dating to the 1860s, the same engraving of vases, statues and architectural components was used to illustrate the wares of Ord Adams Coal, Fireclay and Terracotta Works as had been used by the Art Journal to portray the objects exhibited by Blashfield at the Dublin Exhibition of 1853.(1)

A measure of commercial status, in the view of manufacturers, clients and the public, was the range of products and the styles, sizes and colours offered in the company catalogues. Even small firms such as Gunton or Johnson and Company, of Ditchling in Sussex, paid for the publication of a large catalogue. The most lavish volumes came out in the 1880s and nineties, and they remained in use during the early decades of the new century, once decorative components had gone out of fashion and manufacturers were trying to clear stocks of pier caps and finials. In one case, the market appears to have collapsed virtually as the catalogue was being printed. Some of the details, and in particular the finials and water spouts, offered in the Ruabon Brick and Terracotta Company's

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(1) An undated advertisement sent by Graeme Cruickshank, and Art Journal, 5, 1853, supplement p. 56.

catalogue are of a quality and distinctiveness untraceable in any villas, or groups of shops and offices, in the Midlands or in the north-west of England.(1) The Lancashire firms established in the Edwardian period simply printed folded sheets to show their ranges of decorative bricks and terracotta panels.(2)

During the third quarter of the nineteenth century some terracotta manufacturers concentrated on catalogued lines while others primarily executed special designs in response to individual demands. Burmantofts produced one of the widest ranges of brick and terracotta forms, advertised in their catalogue 'de luxe' but management was not in favour of executing 'specials' for individual customers. It was regarded as being wasteful of the modellers' expertise and time. The advertisements by Doulton produced in the 1870s did not offer to execute architects' own designs, referring instead to the capabilities of Lambeth Art School(3)

In contrast, the Cliffe Terracotta Works, at Wakefield, would execute any of the designs shown in the publications of the Architectural Society, on receiving an order for at least twenty-five of a particular chimney-pot, piece of tracery, or other form.(4) The Garnkirk Company simply offered to make

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(1) Ruabon Brick and Terracotta Company, Catalogue (c.1890) The Volume cost five guineas.

(2) Manchester Public Library holds examples for the Accrington Brick and Tile Company and the Huncoat Plastic Brick and Terracotta Company.

(3) S. Wilkin (1979) op. cit., p. 20, Referring to an article in the Magazine of Art, 8, 1885.

(4) Builder, 28, 1870, p. 435.

every description of terracotta work, to any design. The policy of offering an enormous variety of stock products turned into one of making anything that the customer demanded. This willingness became Hathern's watchword and brought them a favourable reputation and no doubt additional orders; but it was hardly calculated to provide consistently high productivity and profits.

At about the turn of the century the catalogue became supplanted by the brochure, containing illustrations of the most grandiose ceramic frontages and interiors executed by a firm. It became assumed rather than stated that orders would be accepted in the form of special commissions.(1) Burmantofts and Craven Dunnill made up photographs of their schemes into leather bound volumes. Many of these brochures still recounted the historical precedents for the use of the materials, Hathern gaining assistance from the British Museum to publish a series of monographs on the architectural use of ceramics from the Egyptians to Renaissance England.(2)

But such literature was very expensive and architects became notorious for failing to read brochures. Advertising in the architectural magazines was thought to be more worthwhile, Doulton and Carter regularly taking columns or pages. In 1893 Gibbs and Canning were taking space in nine different journals, but largely to promote pipes rather than terracotta.(3)

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(1) The extent to which terracotta and faience were supplied in catalogued designs is considered in Chapter 8.

(2) Hathernware Limited, Monographs, numbers 1-11 (undated).

(3) Gibbs and Canning, Directors' meeting, 6 June 1893. This advertising would have been undertaken partly to publicise the recent incorporation.

The directors maintained the same level and designs of advertising over several years. The only specific initiatives that are recorded were the placing of four advertisements in Japanese journals in 1897 and expenditure at the end of the Second World War to try and revive the faience trade.[1]

During the inter-war period Hathern's expenditure on advertising dropped to below £1,000 a year.[2] The Company did not produce series of advertisements within a consistent style or erect striking stands at the Building Trades Exhibitions; they do not appear to have mailed architects directly with their brochures which were made up largely of record photographs or technical drawings.[3] While some of the Victorian and Edwardian advertisements, especially those produced by Carter consisted of rich designs in an Art Nouveau style, advertising in the 1920s and thirties was far more restrained and practical in its message.

The increasingly meagre efforts of the terracotta manufacturers may be contrasted with advertisements produced by the most successful tile companies. Even a relatively small and newly established firm such as Thynne of Hereford produced a range of catalogues and pamphlets that promoted their tiles and slabbed fireplaces with a strongly modern and slightly

(1) Gibbs and Canning, Directors' meeting, 25 May 1944.

(2) Hathern, Private ledger, 1938-9.

(3) Hathern Station Brick and Terracotta Co. Ltd, Terracotta buildings (undated, c. 1920).
Hathern Station Brick and Terracotta Co. Ltd, Modern practice in architectural terracotta (undated, c. 1930).

popular image. Meanwhile the attitude taken by the management of Gibbs and Canning and Hathorn appears to have been that the materials largely advertised themselves through their natural qualities and their historical associations, the name of the firm having only to be associated with that reputation and the allegance of architects maintained through good service.

While the Terra Cotta Society in America ran a united advertising campaign to challenge other materials, the Terra Cotta Association's efforts in Britain were ineffective and almost bizarre. The only promotional book that they published was on Italian Renaissance terracotta; the campaniles and arcades that were recommended as forms applicable to modern design must have seemed somewhat irrelevant to inter-war architects. For a modern study the Terra Cotta Association approached Christopher Hussey, the writer for 'Country Life' on English country houses, rather than a practising architect.(1)

Another valid criticism that was levelled against manufacturers by the main trade journal was that they made little attempt to approach the client himself, concentrating almost entirely on the architect and the builder.(2) The most direct contact the client could make with the profession and the trade was through exhibitions and the work of representatives.

The International Exhibitions, in London in 1851 and 1862, and in Dublin in 1853 had confirmed the status of

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(1) Terra Cotta Association, Terracotta of the Italian Renaissance (Terra Cotta Association, Derby 1928). Christopher Hussey's book never advanced beyond the outline stage.

(2) British Clayworker, 30, 1921, pp. 116-8.

terracotta as an industrial art. The potential of the national and international exhibitions was best appreciated by Henry Doulton. Art wares were first exhibited in 1867 in Paris. In 1888, at Glasgow, they were housed in an Indian-style pavilion built in glazed and enamelled terracotta with the Company also showing a forty-six feet high terracotta fountain.[1] The culmination of their stand design came five years later at Chicago. Several manufacturers were making special efforts to impress the American market and Maw sent over a massive, classical structure, with a sequence of tile-lined rooms, all designed by C.H. Temple.[2]

However, it was the rather more mundane agricultural shows, provincial art displays and trade exhibitions that provided a forum whereby products could be compared and contacts made. The Building Trades Exhibition was held in some form throughout the eighties, and from 1894, the year when H. Bannister Fletcher was the chairman of the organising committee, it was consistently successful, with all the major terracotta firms having displays.[3]

Exhibiting was relatively cheap and could provide wide publicity. For the 1899 exhibition it cost Gibbs and Canning only £30 to hire the space, and about £21 to pay Harrison Townsend for a unique design of stand.[4] It was

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(1) P. Atterbury and L. Irvine, (1979), op.cit., pp. 11-12.

(2) British Clayworker, 2, 1893, pp. 83-4.

(3) British Clayworker, 3, 1894, pp. i-ii.

(4) Gibbs and Canning, Directors' meeting, 18 October 1898.

virtually a miniature version of his design for the Bishopsgate Institute, with finely flowing decoration covering the surfaces. Each firm developed a particular architectural form for its stand and developed it over the years, as products were revised (Fig. 5.11) . Gunton built miniature Tudor Lodges with full-size chimneys, Jabez Thompson, Elizabethan doorways; while Stanley laid different colours of glazed bricks into a semi-pryamid which was topped with terracotta details.(1) In the inter-war period it seemed to be particularly important for stands to be designed by major architectural practices; Carter made a particular impact with their modernistic structures, that of 1932 being designed by Easton and Robertson.(2)

It was largely at the Building Trades Exhibitions that firms gained and sought to maintain their reputations. The red terracotta made by J.C. Edwards was always a brighter red than their competitors, Burmantofts' faience had the most attractive glazes, while Bispham set the standard for grey terracotta in the Edwardian period. Other firms gained acceptance for their terracotta and faience through their record for other wares; Stanley were synonymous with the finest glazed bricks, and Candy made the best firebricks in the south of England.

As the emphasis changed from selling stock products to winning orders for architectural contracts trade represent-atives became the key figures in the marketing system.

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(1) Every year the British Clayworker gave up almost half an issue to reviewing the Exhibition and illustrating the main stands.

(2) British Clayworker, 41, 1932, p. xxxii.

Fig. 5.11. Stand of Nostel Brick, Tile and Terracotta Works, at the Building Trades Exhibition, 1909. Source: British Clayworker, 17, 1909, p. 56.

Travellers had been employed by Wedgwood to tour the country houses owned by his best customers. In the nineteenth century the larger firms making terracotta found that they needed a permanent sales force, to be on the watch for new buildings that might use ceramic materials, to develop contacts with architects, and to work with them during the estimating and execution of a scheme.

Gibbs and Canning used a combination of representatives and commission agents, the latter covering the more distant markets. Representatives were paid reasonably well, about £3 a week at the turn of the century, but judging by the high turnover, frequently proved unsatisfactory.(1) Lacking any architectural training, many were unable to measure up plans or a building, and consequently, inaccurate information was relayed back to the draughtsmen who were normally tied to the office. However, at slack times draughtsmen would be sent out to try and attract additional business, being recalled as more orders came in.

There was little consistency in the number or quality of representatives at work. The most successful were well experienced in the terracotta trade; Gibbs and Canning's London agent for terracotta from 1897 was W. Aumonier Junior, the son of the modeller who worked the details on the Birmingham Assize Courts. In 1913, Messrs Broad and Company, the pipe and pottery manufacturers, were made representatives for the

(1) Eventually Gibbs and Canning would only take on representatives for a three month trial. Directors' meeting, 9 March 1897.

southern countries.(1) Alfred Whitehead, a manufacturer of sanitary ware in Leeds, who was a director at Gibbs and Canning, also acted as their representative in the north of England.

Whitehead was simply paid 5% commission on orders that he gained.(2) Gibbs and Canning increasingly relied on commission agents as they did not involve any continual expense. However, agents often proved inadequate to the task, working for more than one manufacturer and having insufficient knowledge of the architectural market.

Unfamiliarity with the firm's products was the main problem for agents overseas. One of the first stages in Gibbs and Canning's efforts to develop trade in Canada after 1912, was setting up agencies in all the major cities. A high commission of 7½% was offered as an incentive. Further plans evolved through discussions with a Mr. Laferme who came over to Tamworth from Montreal. An arrangement for the transfer of stock was agreed and the directors accepted the proposal of a factory being built in Canada, subject to supplies of a clay suitable for making architectural ceramics being assured. Plans for a new works were dropped at the outset of the First World War.(3)

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(1) Gibbs and Canning, Directors' meeting, 21 December 1897 and 18 June 1913.

(2) Gibbs and Canning, Directors' meeting, 10 February 1903.

(3) Gibbs and Canning, Directors' meetings, 3 July 1914 and 25 March 1915. Having worked consistently to develop a trade with Canada, there is no mention of the schemes at all after the Armistice of 1918.

The growth of a network of representatives and agents was, in part, to suit the way that terracotta and faience was sold. From sales being arranged with either the client, contractor or architect, the new standardisation of contracting procedure in the building industry resulted in a uniform approach to the supply of terracotta. The contractor who successfully tendered to erect the building would sub-contract out for the supply of terracotta as he would any other major material. Nearly all the contracts recorded by Hathern are with building contractors.

In this circumstance, what is remarkable is the extent to which architects influenced the decision of the contractor as to the supplier of terracotta and faience. Waterhouse had certainly used his influence over the contractors for the National History Museum, in favour of Gibbs and Canning. By the time of the growth in demand towards the end of the century such preferences had become formalised in the specifications for a building. A writer in 1906 simply stated that the architect specified certain designs to be made by a particular firm, and the contractor had to place his order accordingly.(1)

One practical explanation for the fact that the decision was often made by the architect was that some of the work might be put in progress before the overall building contract was let, to prevent any delaying of construction. More generally, with such a complex and decorative material,

(1) British Clayworker, 15, 1906, pp. 95-7. An almost unique and therefore valuable article on the marketing of terracotta.

the architect's concern over design and other qualities naturally dominated over the contractor's pre-occupation with price and prompt delivery. In practice there were only a few major firms to choose between and their prices were broadly comparable from the 1880s; the need to agree colours and details and the wish of many architects to delegate much of the decorative work to the modellers, encouraged the development of a close working relationship with one particular firm. In the frequent situation where architects were designing a series of offices, shops or cinemas for one client, some consistency of modelled detail could be achieved and, possibly, models and moulds re-used.

Links forged during the early stages of the terracotta revival resulted largely from the undeveloped state of the industry and only lasted through a few schemes. Captain Fowke chose to rely on Blanchard, Charles Barry on Blashfield, and Waterhouse on Gibbs and Canning, to be certain of the blocks being supplied in the required form and colour. The 1880s and 1890s were the only years when the market was truly competitive. However Waterhouse typically made his choice according to colour, a Ruabon firm for a red terracotta and Burmantofts for buff. Meanwhile Doulton gained the consistent patronage of Ernest George and Peto,and T.E. Collcutt.

As the concept of the chain store and of a circuit of cinemas became established in the twentieth century architects again worked closely with particular firms. The pub architects, James and Lister Lea, and George Coles, designer of many of the early Odeons, usually used Hathern's terracotta. For the later phase of Odeons, Harry Weedon turned to Shaw of Darwen.(1)

The Birmingham practice of Essex, Nicol and Goodman directed orders to Doulton and Hathern but also had a close link with Gibbs and Canning through the nineties. In March 1894, Mr Nicol made no attempt to disguise the fact that he wanted them to supply the terracotta for Messrs Lunt's premises in Birmingham.(2) Eight months later he met the firm's chairman who offered to put in a tender of £6,367 for supplying the new meat market. Nicol gave an immediate reply that it would probably be accepted.(3)

The tendering and pricing system at Gibbs and Canning was frequently over-ridden by the management to ensure that an important contract was won. Although estimating was done to a price per foot cube the general manager was normally allowed to use his descretion in reducing the rate. With a very large building such as the Technical School in Manchester, the head of the terracotta section was sent immediately to inspect the drawings and obtain further details. He and Edwin Walker, the manager, priced the scheme according to the quantities and the proportions of plain and enriched terracotta. The estimates were sent to William Smith giving him the option

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(1) The extent and methods by which architects dictated the choice of manufacturer are considered in more detail in Chapter 6 for the late nineteenth century and Chapter 10 for the period of 1896-1939.

(2) Letter from E. Walker to W. Smith, Evesham, 10 March 1894.

(3) Gibbs and Canning, Directors' meeting, 7 November 1894.

of putting on another 1d or so per foot cube to ensure a worthwhile profit. Three days later Edwin Walker reduced the price in an attempt to ensure that his firm supplied the building. Having submitted a tender of £18,007 he wrote on the following day to the building committee in Manchester, enclosing promotional photographs, in a final sales bid.[1] Despite all these efforts the contract was awarded to Burmantofts.

In a number of cases, Gibbs and Canning found themselves undercut by Burmantofts, Hathorn and other firms, so promptly reduced their prices. Most of the manufacturers seem to have been willing to forgo the possibility of a profit simply to gain the work.

At Hathorn such attempts at undercutting the competition were accepted as commonplace. Discounts appear to have been freely offered to regular clients, for local jobs, or with prompt payment. The final effort in producing a sufficiently low price could be to tear out a page of the list of quantities, simply to reduce the total cube being costed.[2]

The Role of the Terra Cotta Association in Regulating Competition and Pricing

It was intense competition resulting in severe price cutting and contracts being undertaken at a loss that led to

(1) Letter from E. Walker to W. Smith, Evesham, 1 August 1894 and Gibbs and Canning, Directors' meeting, 13 August 1895.

(2) Information supplied by Harry North of Hathornware Ceramics Ltd, 24 March 1981.

the formation of the Terra Cotta Association just after the turn of the century. Clement Broad, one of the directors at Gibbs and Canning, led in its initiation, possibly because his company was proving so unsuccessful in gaining commissions and so had the most to gain.[1] Reflecting the state of the market all the major manufacturers joined the Association; in 1922 the list of members comprised Bispham, Carter, Dennis, J.C. Edwards, Gibbs and Canning, Hathorn, King, Leeds Fireclay, Middleton and Shaw. Its proclaimed purpose was to regulate the prices, discounts and general terms of sales, largely by allocating quotas entitling members to a proportion of the market.

The circumstances leading up to the formation of the Terra Cotta Association were characteristic of those that stimulated comparable attempts in other industrial sectors to limit competition, both at the end of the Victorian period and in the recession in the early nineteenth century.[2] The essential problem was one of over capacity, largely precipitated by several new firms becoming large scale and efficient manufacturers of architectural ceramics. Gibbs and Canning and J.C. Edwards had been able virtually to share the growing demand of the early 1880s. However they soon had to face competition from other Ruabon firms, and from Doulton and

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(1) British Clayworker, 16, 1908, p. 285.

(2) A valuable case study of a trade association of the earlier period is S.R.H. Jones, 'Price associations and competition in the British pin industry 1814-40', Economic History Review, 26, 1973, pp. 237-253.

Burmantofts (Leeds Fireclay). In the nineties Hathorn made a rapid penetration into an already insecure market while Shaw Carter and Bispham entered into competition in the following decade.

Unlike most other associations including those attempting to control the brick, tile and sanitary ware trades, the Terra Cotta Association never directly fixed a minimum price. The main financial measure was the establishment of a common fund to permit the compensation of those firms that failed to achieve their quotas. This provision accorded with the aspects of the cartels that were formed in several traditional industries, such as cotton, in the 1890s.[1] It will be seen that the fund did nothing to control the aggressive competitiveness of the terracotta firms who resented making payments to the Association far more than quoting at unprofitable prices.

The proportion of the market that each member firm should take each year was devised as a percentage, and the system became one of averaging out the previous five years. It is a measure of their desperation, that the firms were willing to accept their market share being defined at a particular level. Then, any member delivering less than his proper proportion of the total deliveries, in each group and in each quarter of the year, was paid 1s per foot cube on short deliveries, and a member delivering more paid the equivalent

(1) A general consideration of trade associations and cartels in the context of the economy of the late Victorian recession is provided by P.Mathias, The first industrial nation (Methuen, London 1969), pp. 386-395.

on the excess into the General Fund. There were four groups of material: natural terracottas, vitreous semi-glazed faces, fully glazed greys, and all whites, ivory and cream and other fully glazed faiences.[1]

In addition to the system of compensation, the actual prices that each member could quote were regulated. At the end of a quarter, each firm was graded according to whether his orders were above or below his entitlement. If above, he then had to quote at a proportionally higher price according to a scale. Where his orders were 120% to 125% of the specified level, he had to then quote 1d more than the official minimum prices, where more than 150%, 2½d more. Conversely at between 75-80% they could be 1d less and, if under 50%, 2½d less than official minimum prices.[2]

The fixing of minimum prices was done through another complex arrangement, by the member 'first in' on any scheme. This was the manufacturer who first registered having received an enquiry for a particular job, with the Association. He could decide a rate per foot cube that his firm wished to tender. But the other members could not simply try to undercut that price; their minimum rate was determined by the Secretary of the Association who used the following formula; W.H. Facon calculated the difference between the price fixed by the member

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(1) Terra Cotta Association, Draft of revision of regulations, 1927. This circular briefly covers the past organisation of the Association.

(2) Terra Cotta Association, Rule book, 1937. This is the only rule book that survived at Hathern; the details of rates and procedures may well have differed during the previous 28 years.

'first in' for the job and the price that he was allowed to quote under the official scheme of grading. The difference between those two prices was added to every other member's minimum price, as defined by their own grading for that quarter.(1)

Being 'first in' gave the advantage of defining whether the prices quoted could be relatively low or high. If the firm was desperate for work, or had a particular advantage in relation to the job, such as being local or having some models and moulds that could be re-used, they would quote at a low rate. The other members could then also give prices below their defined minimum rate but probably did not have comparable advantages, so would find executing the contract at a cheap rate unprofitable. The advantage of being the first to register the enquiry was even greater if one was working to near capacity and additional labour was needed, or the job was particularly remote and complex. By presenting a high rate all the other manufacturers except those on a very low grading, also had to quote high, so that the firm was still well placed to win the order.

An additional but highly significant bonus given to the firm 'first in' was the responsibility for taking out the quantities for terracotta from the drawings supplied. Each aspect of working out the cube and cost of terracotta or faience required was defined in the rule book; 3s per foot super had to be added to the cost for enriched modelling and there were minimum costs for columns and tracery. Delivery

(1) Terra Cotta Association, Rule book, 1937, ibid.

and fixing cost 3s 6d for jobs over 1,000 cubic feet and 4s 6d per cubic foot for those under. A final incentive was that the firm was paid 2½% of the total cost of the terracotta, whether or not they finally got the contract.[(1)]

The only complete exemption to these procedures was that Lancashire, Cheshire and Wales were 'free', unregulated areas for red terracotta. Only the Ruabon firms were still advertising unglazed red material in the inter-war period, and their production was too small to affect the rest of the industry significantly.[(2)]

The exclusion of fully glazed faiences from part of the regulations proved far more contentious. They were only a minor aspect of production before the First World War, so were left out of the system of compensation to and from the Association's central funds. The price was still regulated by the grading of firms and the 'first in' rule.[(3)]

With clays and gas-fired kilns ideally suited for faience, Shaw, at Darwen, were able to dominate in making faience, and their entitlement progressively increased by the use of a five year average for grading. Usually working to near capacity, they made little effort to compete in classes 1 and 2, the terracotta and semi-glazed sections. As a result they

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(1) Terra Cotta Association, Summary of important resolutions, circulated 7 February 1927.

(2) Rule Book, Terra Cotta Association, 1937, op. cit. G.A. Hodson's interpretation of the origin of the Terra Cotta Association was that it was meant to maintain 4s 9d per foot cube with each firm receiving 100% of its agreed share. G.A. Hodson, Notes on A.G. Shaw's proposals of 10 August 1914.

(3) Terra Cotta Association, Draft of revision of regulations, 1927.

gained compensation from the general fund for being below their proportion, over several years. If demand was low for glazed work they could turn to terracotta, undercutting the other members because of their low grading.

From 1921 George Hodson complained repeatedly that Hathern were losing out through Shaw's unfair advantages; his firm was only gaining the small and complex jobs, for example a church in Blackpool with large areas of tracery which Shaw did not want anyway.(1) After five years he refused to up grade his own prices for terracotta as an attempt to stop Shaw undercutting them, and threatened to leave the Association.(2)

All types of terracotta and faience were included in compensation grading, by a revision to the rules in 1927.(3) Three years later Shaw were accused of having found an alternative way round the rules. They were concentrating on making faience in small sizes, so that it was classified as tiling and therefore beyond the control of the Association. Up to three-quarters of the ceramics used on some of their schemes was being exempted by this means.(4) At the November meeting of the Association in 1930, Doulton proposed that any structural tile work larger than 12 inches by 8 inches in dimension should

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(1) Letter from G.A. Hodson to E. Lloyd Edwards, J.C. Edwards and Son, 6 January 1925. Hodson grudgingly agreed that Shaw's terracotta might be the best in the market.

(2) Hathern, Letter from E. Lloyd Edwards to G.A. Hodson, 7 January 1925.

(3) Terra Cotta Association, Draft of revision of terracotta regulations, 1927.

(4) Hathern, Letter from G.N. Hodson to W. Facon, Derby 28 October 1930.

be regarded as faience. The rather over-zealous sales techniques of Shaw's representatives also came in for some criticism; one J.A. Todd frequently put in late tenders calculated just to undercut the competition.(1)

But looking at the inter-war period overall it was the firms outside the Association and the makers of artificial stone who presented the more serious and damaging competition. Before the First World War, the structure of the Association had been criticised by Arthur Shaw because it failed to deal with outside competition and actually invited it by maintaining higher prices.(2) Rainford Potteries and Middleton Fireclay were the two firms that started gaining small jobs but by 1930 were able to give low quotations on large contracts. By the rules of the Association, members could be given permission from the chairman to quote below their grading, in order to beat outsiders. Middleton specialised in executing shopfronts for Montague Burton, and the longer established firms had to reduce their prices by up to 2s per foot cube to counter such competition.(3)

Two months later Burton stores used artificial stone on their branch at Colwyn Bay.(4) The members had first really been

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(1) Terra Cotta Association, Agenda of meeting, London, 20 November 1930. Letter from G.N. Hodson to W. Facon, Derby, 30 November 1928.

(2) Terra Cotta Association, A.G. Shaw's proposals, 10 August 1914.

(3) Middleton's success in supplying facades for Burton is considered in greater detail in Chapter 10.

(4) List of orders lost to outside competition, Terra Cotta Association, 1928.

struck in 1914 by the challenge that artificial stone represented, when it was tendered at a price of only two-thirds that of the cheapest terracotta. Ten years later Hodson suggested that the way to force firms like the Empire Stone Company out of business was to make a brief concerted effort to undercut them.(1) However by this time, the stone finishes had improved considerably and most of the terracotta jobs, with a good degree of repetition, were being lost.

Despite the restrictiveness of the Terra Cotta Association and the inclusion of the largest manufacturers in its membership, it appears to have unwittingly re-inforced two of the most characteristic aspects of the Victorian industry; the preoccupation with maintaining a good level of production rather than tendering realistic prices and gaining profitable contracts, and an emphasis on personal ties with architects as a means of winning contracts. The advantage of being 'first in' dictated each day's working pattern at Hathern. All the post was addressed to the Hodsons' home at Loughborough where it was opened at seven o'clock in the morning, the Terra Cotta Association being notified by telegram of any enquiries.(2) Since architects sent out the drawings to the manufacturer there was every gain to be had from knowing when buildings were being planned and, most likely, being first in line for each mailing.

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(1) In 1914 the artificial stone manufacturers were offering prices of 3s 6d per foot cube including fixing. Letter from A. Marsden, Bispham Hall Colliery to J.J. Green of the Terra Cotta Association, Southport. Letter from G.A. Hodson to T.C.A., Southport, undated.

(2) Conversation with Harry North, 25 March 1981.

In part, the continual concern of manufacturers to offer competitive prices followed from the prime traditional justification for terracotta, that it was cheaper than other materials. John Pulham made a typical claim, in 1847, that terracotta was between a third and a half cheaper than stone.(1) Catalogues of garden ornaments show the prices of terracotta statues and vases under-cutting those of cast iron and stone ones, and Henry Cole's schemes in South Kensington achieved rich decoration at minimal expense.

But the advantage was by no means cut and dried. The terracotta decorations quadrangle in the Victoria and Albert Museum, and the Albert Hall were so cheap because the art students provided free labour for the modelling and moulding. Following a series of unprecedented rises in the cost of all building materials, around 1876, terracotta was described as being too expensive for ordinary domestic work and exceeding the cost of stone.(2) In the following decade it could be either cheaper or more expensive; to be an economical alternative, the design had to involve considerable repetition and be used sufficiently near to a works for transport costs not to be prohibitive. Alfred Waterhouse referred to a price of 4d 6d per foot cube for making and fixing the material and this may be taken as the lowest commercial rate for its use.(3) This was near the average level of quotations during

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(1) Builder, 5, 1847, p, 37,

(2) Builder, 34, 1876, pp. 516-8 (p. 517).

(3) Builder, 36, 1878, pp. 906-7 (p. 907).

the last two decades of the century, faience usually being offered at around 5s 6d to 6s 0d per foot cube.

While the prices rose by about 1s in the early years of the new century, those of stone dropped. Portland stone delivered in London, that had cost 2s 8d per foot cube in 1884, was only 2s 1d in 1910.(1) The cutting of thin facings made the use of Portland stone ashlar increasingly economical.

In the decade of 1912 to 1922, which spanned the First World War, the cost of terracotta more than doubled to 16s and enriched terracotta went up by 13s to reach 22s. The higher increase in the latter reflected the expense of skilled labour for modelling. Even more dramatically, the cost of wall linings or panelling in faience went up from between 3-5s per foot super to 13s 6d-40s.(2)

The price books apologised that it had become impracticable to present standard prices for terracotta and faience. The reality of prices quoted by the manufacturers showed lower rates that tended to drop further through the twenties. At 12s to 13s for terracotta and 13s to 15s for faience, these prices were still above those offered by the artificial stone makers; their lowest prices were 5s 6d per foot cube and 7s 6d if in moulded form.(3)

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(1) Laxton's, Builders' price book (Kelly and Company, London 1884, 1910).

(2) Laxton and Lockwood's, Builders' price book (Kelly's Directories, London 1912 and 1922).

(3) Laxton's, Builders' price book (Kelly's Directories, London 1932).

Though the operation of the Association complicated pricing, levels can be seen to have fallen again through the thirties. A comparison of the rates given in the price books in 1932 and 1939 shows the disparities that one might expect between the firms. The Middleton Fireclay Company, outside the Association, dropped its prices on fully glazed ware by 20% to 10s. Hathern quoted a range of prices, the cheapest being near to Middleton's and the most expensive on the same level as Leeds Fireclay's.(1) From the Hathern order books, terracotta dropped to a price of 10s in 1934 while faience blockwork fell more dramatically to between 7s and 10s 6d. Firms must have been conscious of the cheaper alternative of faience slabwork which had been introduced at a price averaging 2s 4d per square foot. It generally worked out as being about four times cheaper in facing a building than blockwork.

The way that prices held during the Edwardian period, at a time of rising costs, and fell through the inter-war period reflected an attitude expressed in two letters by G.A. Hodson, that his firm had to have several large jobs in hand to be able to cover the labour and other costs and to have any hope of returning a profit.

> I must keep my terracotta department up to a minimum level. Immediately below that level, the business loses money fast owing to the expensive staff. (2)

> I have had sufficient years experience of terracotta to know that it is impossible to live unless you can

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(1) Laxton's, Builders' Price book (Kelly's Directories, London, 1932, 1939).

(2) Hathern, Letter from G.A. Hodson to E. Lloyd Edwards, 9 January 1925.

occasionally secure among all the small jobs one large one that has repetition. (1)

The profit and loss figures for Hathern demonstrate that they had to maintain a fairly high output to break even. In the first decade of the twentieth century sales of £10,000 were needed and, by the twenties, the figure was £21,000. When sales dropped to this level in 1918, 1934 and 1939, profits turned into losses.(2)

In the most generalised terms, Hathern had to sell the equivalent of sufficient terracotta for eighteen pubs each year in the Edwardian period, twenty-six shopfronts in the twenties and in the mid thirties enough faience for fifteen cinemas. It was only when a large contract such as for a Frank Matcham theatre, at up to £3,600, or a big cinema like the Cinema House, Sheffield to the value of £2,460 that good profits could be assured for one or two years.(3)

Large orders and high levels of output were necessary because they led to a significant reduction in the cost of making the product. Taking three sample periods for Hathern: December 1906 - June 1908, June 1919 - December 1920 and December 1938 - June 1940, when production either rose or fell dramatically, it emerges that the overall costs of manufacture exceeded the income at the lowest levels. Profitability was

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(1) Hathern, Letter from G.A. Hodson to E.Lloyd Edwards, 6 January 1925.

(2) The losses of 1939 are possibly the most remarkable as wage costs were falling dramatically through recruitment to the forces.

(3) The Hathern order books give the total price for each contract and usually the rate per foot cube.

reached at a slightly higher level of production and increased through to a tripling of output. However there was a limit to these economies of scale, probably as the capacity of the plant and labour force became fully utilised. In December 1920 half-year sales of £27,652 brought a proportionately higher increase in costs.(1)

Bearing in mind the cost of the skilled labour force, which was kept on during times of low demand, and the fact that the kilns and machinery only operated efficiently at near full capacity, it was impossible for the firms to function effectively when the variable costs were not adjusted in relation to output. In June 1919 when sales were only £5,667, wages, the labour costs of fixing terracotta and the fuel costs comprised 65% of total costs; in December 1920 with sales increased to £27,652 the proportion of these variable costs had fallen to 57%.(2)

The inconsistency of the profit made by the terracotta section frequently imposed a severe strain on the finances of the companies. Gibbs and Canning never adjusted to the fluctuations of income and expenditure. Since payment was only received once the terracotta was being delivered, a recovery in trade at first led to heavy expenditure; in 1896 new orders necessitated an extension of the overdraft.(3)

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(1) Hathorn, Ledgers, 1906 - 8, 1919 - 20, 1938 - 40.

(2) Hathorn, Annual returns, 1919 and 1920.

(3) Several of the efforts at Gibbs and Canning to raise capital were necessitated by the existence of large bank overdrafts. Letter from P.A. Warden to W. Smith, Evesham, 15 May 1894.

In 1901 to 1902, the large quantities of stock waiting delivery instructions again produced a trading deficit. Deficits returned in 1908 and by 1911 they were in serious financial trouble, with an overdraft of £2,185. This reached £3,312 by the following spring. An upturn cleared the overdraft and lasted until the outbreak of the First World War.(1)

The collapse of demand in 1914 inevitably lead to deficits and large profits were only achieved again in 1924. The terracotta trade at Gibbs and Canning remained reasonably strong until 1932 when staff had to be laid off. The building boom of 1938 brought a profit of £9,278 but again was ended by a world war. By March 1940 it was planned to close the terracotta department. The overdraft increased, despite strong demand for sinks, reaching £13,800 by September 1952.(2)

For the years that sales figures are available for both Gibbs and Canning and Hathorn, they follow a virtually identical direction. Obviously at the mercy of the building cycle, it was what each firm made of a rising or falling demand that mattered. The most difficult years before the First World War were 1893 and 1911, as indeed they were for Leeds Fireclay. In 1920 and 1921, demand for Gibbs and Canning's products was just beginning to rise but Hathorns' sale of terracotta more than doubled. Hathorn and Gibbs and Canning

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(1) Gibbs and Canning, Director's meetings, 18 August 1896, 8 April 1902 and 19 February 1913. Generally the year 1905 was something of a turning point; there was no fall in demand but competition became much stiffer as the Lancashire firms expanded. British Clayworker, 8, 1905, p. 315.

(2) Gibbs and Canning, Director's meetings, 27 April 1917, 28 April 1932, 14 December 1938, 28 March 1940 and 26 September 1952.

both reached a low point in 1932 and a peak in 1938. Hathorns' financial position severely worsened from 1934 when the terracotta sections lost over £4,000, the first time a serious loss had been returned since 1894. From then on, the returns lurched wildly from profit to loss with each fluctuation in sales. (Fig. 5.2, 3 and 4).

The directors at Hathern paid a dividend averaging 3% up to the First World War and payments became higher in the inter-war period. When the company was proving particularly successful during the twenties, it was paying a dividend of 4% on preference shares and 10% on ordinary shares. However such a level of payments was maintained in the following decade even if it resulted in a loss being returned. In March 1938 £3,400 was paid out in dividends, a figure which was only slightly less than the loss reported by the terracotta section for the half-year.(1) It does appear as though the interests of the shareholders were being put before the needs of the company.(2)

In the inter-war period it was the consistent profits acheived through the stoneware and brickmaking sections that resulted in Hathern only returning a total loss in one half-year, for early 1932. (Fig. 5. 4) At the end of the decade the rapid increase in stoneware production compensated for the

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(1) Hathern, Annual returns 1894-1939.

(2) It was commented that, where demand was slackening but competition keen in the clay industry, profits went to the shareholders rather than for investment. British Clayworker, 38, 1929, pp. 9-10.

collapse in demand for terracotta. During the thirties a given level of sales from the brick section could produce double the profit that was achieved by making terracotta. It is fully understandable why directors and shareholders encouraged firms to concentrate on mass-producing mundane building materials rather than terracotta and faience.

Unlike Hathern, Gibbs and Canning did not succeed in its attempts to revive the production of faience after the Second World War; although the firm had ceased making the product on which they had most frequently returned a loss, the finances of the Company continued to deteriorate in the 1950s until complete closure took place in 1958.

There is no evidence that the unreliability or meagreness of the profits achieved by many terracotta and faience sections led directly to bankruptcies. Where such failures occurred, typically in the 1870s or around 1905, they were usually precipitated by severe competition or complications over a particular large contract, an example being Gibbs and Canning's collapse after the breakdown of their supply of material for the Natural History Museum. Of the 76 firms which certainly made architectural ceramics on a commercial scale (listed and briefly described in the appendix) the majority continued in business after they had ceased making the materials, typically concentrating on the more profitable bricks and tiles. Only eighteen appear to have ceased trading in a complete closure that included the terracotta and faience section.

However it was certainly the heavy clayworking firms which concentrated on making engineering, facing and glazed bricks and only made terracotta and faience as sidelines which were able to pay consistently high dividends, Stanley of Nuneaton paying an average of 8% over eight years up to the turn of the century.(1) In the inter-war period Shaw returned strong profits thrugh the mass production of plain tiles, faience being regarded, in part, as means of ensuring that they gained the largest architectural contracts which typically involved simple faience mouldings and large areas of tiling. Unfortunately for Gibbs and Canning and Hathern, terracotta and faience rarely worked as loss-leaders to bring in large sales of bricks. Except where red Ruabon bricks and terracotta were matched across a facade, an architect would normally specify locally made facing bricks or, in the inter-war period the ubiquitous Flettons.

The fundamental problem affecting the viability of the manufacture of terracotta and faience was the inconsistency of demand. With threefold variations in the level or orders occurring from one year to the next it is understandable that the management hesitated from undertaking large-scale investment. Their major failure appears to have been a tardiness in introducing a simpler material, and then, once slab faience was in production from the mid thirites, not to promote it as being available from stock. Supplying predominantly standardised forms would not have only enabled production to be

(1) British Clayworker, 11, 1902, p. 10. The annual returns of Stanley were reported in the British Clayworker for most years up to the First World War.

maintained at a more even level but would have removed the need for such a large and expensive staff of draughtsmen and modellers being kept on during slack periods,so that the next large order could be undertaken with the necessary speed.

The American industry achieved the breakthrough into mass-production in the inter-war period. It also recognised that the best profits came from large orders and promoted the material as being appropriate for major city centre buildings, such as banks, tower blocks and railway stations. In contrast, the efforts at advertising by the British firms, whether independently or through the Terra Cotta Association, were lamentable, and faience gained little acceptance amongst the higher echelons of the architectural profession in the twentieth century.

The management at Hathorn and Gibbs and Canning came to regard the Terra Cotta Association with animosity; they never allowed it to achieve a control over price cutting or excess capacity because they were more willing to undertake a contract at an unprofitable price than see the scheme supplied by Shaw or the Empire Stone Company. Such attitudes followed from a belligerent competitiveness against both the newly developed faience firms and the artificial stone manufacturers; they also represented an overriding desire to maintain a certain level of production. To the Hodsons at Hathorn or P.A. Warden at Gibbs and Canning, payments from the fund of the Association were no compensation for being unable to maintain the employment of skilled staff or making a product that they believed to be intrinsically worthwhile.

During the times of slack demand and unprofitable prices the directors and managers appear to have sought to maintain the labour and infrastructure of the works ready for an upturn in the market. Such policies may have been pragmatically justifiable in the circumstances of such fluctuations,but they drastically affected the long term viability of what could have been, and with some firms was, a valuably profitable line of manufacture.

G.N. Hodson regarded the cultivation of close ties with architects who frequently employed architectural ceramics as the key to achieving his desired continuity of production, and used a combination of near faultless service and discounts to gain such allegiance. In fact the management of the terracotta sections at all the major works was characterised by an almost unqualified willingness to respond to the changing demands of architects and their clients. Therefore, bearing in mind the patterns of technical innovation and shifts in the economics of production, it is to the architectural profession that one must turn to understand the form and design of terracotta and faience.