

Some parts of this thesis may have been removed for copyright restrictions.

If you have discovered material in AURA which is unlawful e.g. breaches copyright, (either yours or that of a third party) or any other law, including but not limited to those relating to patent, trademark, confidentiality, data protection, obscenity, defamation, libel, then please read our [Takedown Policy](#) and [contact the service](#) immediately

**A STUDY OF THE IMPACT OF LEAN ON UK MANUFACTURING
ORGANISATIONS THAT VIEW IT AS A PHILOSOPHY**

VOL. 2

SANJAY BHASIN

Doctor of Philosophy

ASTON UNIVERSITY

January 2010

This copy of the thesis has been supplied on condition that anyone who consults it is understood to recognise that its copyright rests with its author and that no quotation from the thesis and no information derived from it may be published without proper acknowledgement.

CONTENTS

Vol. 2

APPENDIX 1 THE SURVEY QUESTIONNAIRE	4
APPENDIX 2 LEAN AUDIT QUESTIONNAIRE	13
APPENDIX 3 LEAN AUDIT RESULTS FOR ORGANISATIONS	30
APPENDIX 4 THE LEAN AUDIT FEEDBACK QUESTIONNAIRE	51
APPENDIX 5 CASE STUDY MANAGEMENT INTERVIEW SCHEDULES	72
APPENDIX 6 CASE STUDY MANAGEMENT QUESTIONNAIRE	80
APPENDIX 7 CASE STUDY SHOP-FLOOR INTERVIEW SCHEDULE	88
APPENDIX 8 CASE STUDY SHOP-FLOOR QUESTIONNAIRE	94
APPENDIX 9 CASE STUDY PROTOCOL	100
APPENDIX 10 DRAYTON BEAUMONT CASE STUDY	110
APPENDIX 11 FLETCHER MOORLAND CASE STUDY	131
APPENDIX 12 LEONI CASE STUDY	151
APPENDIX 13 PERKINS ENGINES CASE STUDY	171
APPENDIX 14 RICARDO CASE STUDY	192
APPENDIX 15 ROYAL DOULTON PLC CASE STUDY	212
APPENDIX 16 TRENTEX ENGINEERING CASE STUDY	232
APPENDIX 17 CHI SQUARE AND CORRELATION ANALYSIS	249

APPENDIX 18
A SHOP-FLOOR AND MANAGEMENT CASE STUDY RESPONSE
REGARDS CULTURE

APPENDIX ONE

The Survey Questionnaire

A blank copy of the Survey Questionnaire used in the research; this was undertaken in sixty-eight organisations.

On every occasion a visit was made to the manufacturing organisation in question to ensure that it was completed by the designated personnel.

Lean Manufacturing Philosophy Questionnaire

Section A : General Background

- A1** Please state the name of your organisation
- A2** If the organisation is a subsidiary of another could you please specify the name of the parent company
- A3** Indicate the core business the organisation is engaged in
- A4** Using the table below indicate the turnover of the Group last year

Turnover	
Less than or equal to £2.8Millions [net]	
More than £2.8 millions but less than 11.2 millions [net]	
More than £ 11.2 millions but less than £50 millions [net]	
More than £50 millions but less than £150 millions	
More than £150 millions but less than £300 millions	
More than £300 millions	

- A5** Indicate approximately the number of employees in your organisation

Number of employees	
---------------------	--

- A6** Could you state the value of your aggregate gross assets by placing a "Y" against one of the three options.

Aggregate gross assets	
less than or equal to £1.4 millions [net]	
more than £1.4m but less than or equal to £5.6m [net]	
More than £5.6m [net]	

Section B : Lean adoption

- B1** From the list below, indicate the major factors contributing to your organisation's decision to embrace Lean manufacturing;
 [Scoring guide : 1 : if totally irrelevant and not applicable to your organisation's decision to embrace lean; 10: if extremely relevant and was a major contributing factor in the organisation's uptake of Lean.]

	Reasons for Lean Adoption	Score
1	Pressure from customers	
2	To improve performance (efficiency, productivity, profitability)	
3	Competitive pressures	
4	Create team Spirit / Motivational tool	
5	Pressure from Investors / owners	
6	Promoted by a group of individuals from within the organisation	
7	Learned through experience with other companies	
8	Became aware of the benefits at a special event / conference	
9	Other (please specify below)	

B2

Summarising your organisations experience to date indicate any barriers(s) to either uptake Lean or to widen its adoption.[Score 1 - 10 is applicable] :

"10" if posed a major barrier which has proven difficult to breakdown;

"5" if whilst a barrier it was possible to overcome with relative ease;

"1" if it caused no concern and posed no difficulties.]

	Barriers	Score
1	insufficient understanding of the potential benefits	
2	insufficient internal funding	
3	insufficient external funding	
4	insufficient senior management skills to implement Lean	
5	insufficient supervisory skills to implement Lean	
6	insufficient workforce skills to implement Lean	
7	need to convince shareholders / owners	
8	insufficient management time	
9	employee attitudes / resistance to change	
10	cost of the investment	
11	cultural issues	
12	others [please specify below]	

B3 Please provide an indication of how the organisation tracks the impact of Lean in the organisation ["Y" if applicable and "N" if not]

Tracking the results of Lean initiatives		
1	weekly process reviews	
2	monthly process reviews	
3	quarterly process reviews	
4	half yearly process reviews	
5	Ad-hoc process reviews	
6	Reviewed at board meetings only	
7	Other (please specify below)	

Section C : Expectations as a consequence of adopting lean manufacturing

From the list below, indicate your organisations major aspirations as a direct consequence of adopting Lean: [using the scoring guide below]

[score: a score of 1 - 10 is applicable; award a "10" if it was hoped definitely to achieve this as a result of Lean; "5" if generally this factor was discussed but did not form a particular goal; "1" if this factor was not even discussed nor felt that it would materialise even as an associated consequence of another. Please score in the box.]

Aspirations as a result of adopting lean		
1	higher profitability	
2	higher productivity	
3	lower manufacturing costs	
4	attain improved delivery records	
5	generally carry less stock : finished, WIP and raw materials	
6	improve the supply chain management	
7	improved teamwork	
8	improved employee performance	
9	improved customer service	
10	improved market share	
11	reduced lost or down time	
12	increased efficiency	
13	increased competitiveness	
14	the elimination of waste	
15	other (please specify below)	

Section D : Cultural implications - technical

D1 Indicate the extent to which Lean is administered within the organisation [indicate "y" for yes and "n" for no]

1	Across the whole value chain including an attempt to involve suppliers	
2	Across the whole internal organisation	
3	Across manufacturing and supply functions only	
4	Across the manufacturing or the supply function only	
5	Across some, but not all, units of manufacturing or supply	
6	Have embraced only a few isolated tools i.e., Kanban or 5s in parts of some departments	
7	other (please specify in the space below)	

D2 From the list of Lean tools below please indicate which one(s) apply to your organisation;

[Scoring guide : "1" to be awarded if this tool is not applicable within the organisation and there are no plans to implement it in the imminent future; "10" to be awarded if it is fully operational within the company and total commitment awarded to it]

		Score
1	Continuous improvement / Kaizen	
2	Cellular manufacturing	
3	Kanban systems	
4	Single piece flow operations	
5	Process mapping	
6	Single Minute Exchange of Dies [SMED]	
7	Step Change / Kaikaku	
8	Supplier Development - activating links with suppliers	
9	Supplier base reduction	
10	5's and general visual management	
11	Total Productive Maintenance	
12	Attacking value and the seven wastes	
13	Other [please specify below]	

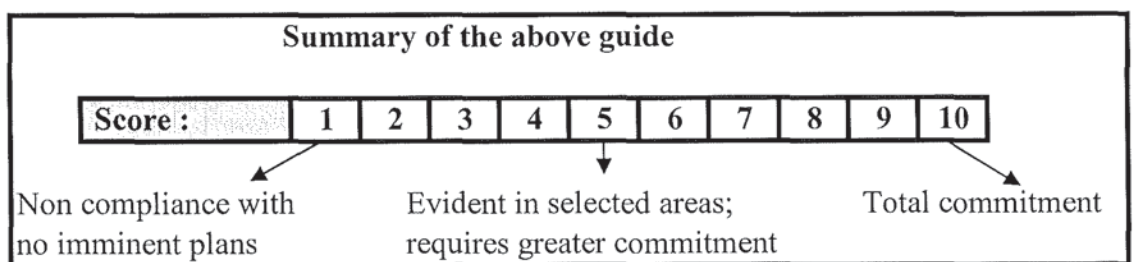
D3 For each category below provide an indication of how long the Lean tool - in years - has been in operation within the organisation.

		Years
1	Continuous improvement / Kaizen	
2	Cellular manufacturing	
3	Kanban systems	
4	Single piece flow operations	
5	Process mapping	
6	Single Minute Exchange of Dies [SMED]	
7	Step Change / Kaikaku	
8	Supplier Development - activating links with suppliers	
9	Supplier base reduction	
10	5's and general visual management	
11	Total Preventative Maintenance	
12	Attacking value and the seven wastes	
13	Other [please specify]	

Section E : Cultural considerations - related issues

The following questions focus upon the prevailing cultural issues which surround Lean manufacturing within your organisation. In order to gain an insight of this position could you please utilise the scoring guide during your responses.

[Scoring guide : "10" is to be awarded if the statement holds total validity and there exists a genuine conscientious effort within the organisation to ensure that the intimated assertion within the statement is executed. "1" is to be awarded if the intimated assertion within the statement is not applicable to your organisation and neither is there any prevailing evidence to implement it in the foreseeable future.]



- E1** Decisions within your organisation are made at the lowest level possible. An important gauge could well be whether the number of organisation levels have shrunk in the previous two years.

Score :	1	2	3	4	5	6	7	8	9	10

- E2** There persists a clear and definite clarity of vision within the organisation concerning the Lean transformation so that the organisation recognises what the structure will resemble once the transformation is complete.

Score :	1	2	3	4	5	6	7	8	9	10

- E3** There is evident a strategy of change and one in which the organisation clearly communicates how the goals will be accomplished.

Score :	1	2	3	4	5	6	7	8	9	10

- E4** Responsibilities regards the Lean transformation have been assigned;

Score :	1	2	3	4	5	6	7	8	9	10

- E5** It is clearly evident who is championing the Lean transformation internally

Score :	1	2	3	4	5	6	7	8	9	10

- E6** A Lean training programme is clearly visible within the organisation and forms part of an effective and visible learning environment which can be assessed using an appropriate performance index ,i.e., training hours / total employees

Score :	1	2	3	4	5	6	7	8	9	10

- E7** There is clear evidence of Lean leadership at all levels within the entire organisation and this can be witnessed by the existence of Lean facilitators at various levels of the hierarchy.

Score :	1	2	3	4	5	6	7	8	9	10

- E8** The organisation promotes a culture which maintains the challenges of existing processes by proactive systems such as "Standard operating procedures"

Score :	1	2	3	4	5	6	7	8	9	10

E9 The organisation offers customer assistance to suppliers and maintains "Supplier Development Teams"

Score :	1	2	3	4	5	6	7	8	9	10

E10 The organisation makes a conscientious effort to maximise stability in a changing environment whereby an attempt is made to reduce, eg., schedule changes, program restructures and procurement quantities

Score :	1	2	3	4	5	6	7	8	9	10

SECTION F : Sustainability

The categories below explore the level of Lean adoption within your organisation. In order to provide an indication of this would you please insert a percentage score in the box provided.

F1 Provide an indication of the proportion of the organisation's departments operating under the Lean umbrella.

Percentage score :	
--------------------	--

F2 Provide an indication of the proportion of the organisations employees operating under Lean conditions.

Percentage score :	
--------------------	--

SECTION G : Performance indicators

The next section examines the outcome of your Lean adoption through a combination of performance measures. For each measure you are required to indicate the percentage alteration - either a deterioration or improvement - made to that specific parameter as a direct consequence of adopting Lean.

% deterioration	Actual measurement	% Improvement
Finance	Profit after interest and tax	
	Rate of return on capital employed	
	Current ratio - [current assets:current liabilities]	
	Earnings per share	
Customer	Market share by Product group	
	Customer satisfaction index	
	Customer retention rate	
	Service quality	
	Responsiveness (customer defined)	
	On - time delivery (customer defined)	
Process	NPD lead time	
	Cycle time	
	Time to market for new products	
	Quality of new product development and project management processes	
	Quality costs	
	Quality ratings	
	Defects of critical products / components	
	Material costs	
	Manufacturing costs	
	Labour productivity	
	Space productivity	
	Capital efficiency	
	Raw material inventory	
	WIP materials inventory	
	Finished goods inventory	
	Stock turnover	
People	Employee Perception surveys	
	Health and Safety per employee : - accidents - absenteeism - labour turnover	
	Retention of top employees	
	Quality of prof / technical development	
	Quality of leadership development	
Future	Depth and quality of strategic planning	
	Anticipating future changes	
	New market development	
	New technology development	
	% sales from new products (< 5 yrs)	

APPENDIX TWO

The Lean Audit Questionnaire

A copy of the Lean Audit questionnaire is included.

The extensive Lean Audit was undertaken in twenty organisations and took approximately between 6 -9 hours depending on the size of the organisation. (This was after a considerable degree of background work had already been undertaken)

On Page 28 is an example of the summary scoring sheet which was devised and on page 29 the Rader chart used to record the scores.

Lean Philosophy Audit Questionnaire

Organisation :

Date(s) audit undertaken:

Contributor(s):

General Background

<p>Please State the name of your company</p>	
<p>State the name of your parent organisation (if applicable)</p>	
<p>Indicate the core business the organisation is engaged in</p>	
<p>Please indicate the location of your business</p>	
<p>Indicate the turnover of the Group last year (net)</p>	
<p>Less than or equal to £2.8m</p>	
<p>More than £2.8 but less than £11.2millions</p>	
<p>More than £11.2 millions but less than £50 millions</p>	
<p>More than £50 but less than £150 millions</p>	
<p>More than £150 millions but less than £300 millions</p>	
<p>More than £300 millions</p>	
<p>Indicate approximately the total number of employees</p>	
<p>Please state the value of your aggregate gross assets (net)</p>	
<p>Less than or equal to £1.4 millions</p>	
<p>More than £1.4 but less than or equal to £5.6 millions</p>	
<p>More than £5.6 millions</p>	

1] Overall Safety, Cleanliness and Orderliness				Score
Criteria	Indicative scoring		Comments	Score
	Rating of one	Rating of 10		
Health and Safety	Totally unsafe, numerous hazards and poorly enforced procedures	Totally safe; no hazards with full adherence to polices		
Cleanliness	Very dirty with no procedures for general maintenance	Spotlessly clean coupled with a structured cleaning program for administration areas too		
Orderliness	Absolutely cluttered; very disorganised and much time is wasted trying to find tools	Just necessary items readily available; clear markings for tools		
Maximum points = 30 Points scores = Category score =				
divided by 3				

2] Production and Operational Flow				Score
Criteria	Indicative scoring		Comments	Score
	Rating of one	Rating of 10		
Continuous flow	Very disjointed with large batches and groups of machines	Sophisticated flow and very small batches		
Process Definition	Generally in print form and often is out of date	Expected performance of all processes defined and documented; documented processes match actual processes		
Pull	No planning; production to forecasts with substantial MRP use	Robust Kanban system, MRP only for planning and is built to customer demand only		

Line switches and Machine Setup	Virtually hours	Line switches within one TAKT time, batch change in less than 10 minutes	
Customer Service and Scheduling	Totally separate function and is heavily MRP driven	Total integration; seeks one hour between order entry and the order on the shop floor; scheduling takes place at cell level	
Maximum points = 50 Points scores = Category score = <div style="text-align: center;">divided by 5</div>			

3] Processes and Operations			
Criteria	Indicative scoring		Comments
	Rating of one	Rating of 10	
Ability to accommodate fluctuations in short-term customer demand	Cannot easily adapt	Can easily adapt up to 25%	
Responsiveness to changes in product mix	Very difficult	Poses no problems	
Manufacturing steps organised in work cells or whereby there is zero WIP between them	Less than 25%	75% or above	
Manufacturing process	Each operation has its own independent schedule	Exclusively one-piece flow	
Manufacturing process engineering	Large size lot sizes which are mostly office based	Machine designed for flow and not capacity; equally there is full factory floor representation	
Total Productive Maintenance	Essentially not in existence	A thorough TPM system	

% maintenance spent on unplanned or emergency repairs	More than 40%	10% or less	
Average OEE of production equipment	Generally less than .60	Overall 0.85 or above	
Quick changeover or SMED training of 8 or more hours is provided	Less than 15% of workforce	More than 50% of the workforce	
Maximum points = 90 Points scores = Category score =			
divided by 9			

4] Visual Management				Comments	Score
Criteria	Indicative scoring		Rating of 10		
	Rating of one	Rating of 10			
Visual Pictorial Presentation	None existent	Totally prominent; team performance also in the offices			
Warehouse inventory	Random access locations and computer driven	Totally fixed locations with clear minimum and maximum inventories			
Shop floor inventory	Totally minimum control; mostly stacked in work locations in random order	FIFO adherence, fixed locations and Kanban squares utilised			
Visual indicator update	Hardly ever used	Continuously in use			
Visual controls to support production	None in evidence	Data tracked regularly for trends to spot problems; used for root cause solutions			
Maximum points = 50 Points scores = Category score =					
divided by 5					

5] Quality Designed into the Product				
Criteria	Indicative scoring		Comments	Score
	Rating of one	Rating of 10		
5s is integral in the Design process	None existent	Totally integrated		
Equipment designs identify defects and stop production	None existent	Total stoppage when faults occur		
Authority to operatives to stop production	None existent	Virtual individual authority is granted		
Mistake proofing to avert defects	None existent	Total usage on all essential processes		
FIFO inventory	None existent	Total adherence		
Closed loop quality problem solution	None existent	All problems have a detailed development plan		
Root cause problem solving	Totally rare and when used it is by formal technical project teams	Routine methodological approach to root cause solutions		
Standardised working and maintained	No work standards	Fully standardised with monthly reviews and updated as required		
Goods-in Quality	No self certified suppliers	All key suppliers are self certified and constantly updated		
Visual Controls	None in evidence	Regularly analysed to identify top three interrupters/problems; leads to the root cause problem solving		
% of Production processes controlled by SPC	Less than 15%	More than 70%		
Product engineering	Little contact with customers; new designs take over one year	Joint effort with new designs taking less than 6 months		

Disciplined adherence to Process	Attention mainly on exception in results	Pareto drives improvements; frequent reviews of production and related processes	
Maximum points = 130 Points scores = Category score = divided by 13			

Continuous Improvement				
Criteria	Indicative scoring		Comments	Score
	Rating of one	Rating of 10		
Process of Change implementation	None existent	Whole organisation responds and requests for support; response within 2 days		
Change implementation	Instigated by engineers and management approved	Most personnel have authority and responsibility to implement change		
Impact of change is tracked	Results are not communicated or seldom even collated	Results are clearly communicated and measured objectively		
Operators and office personnel have regular meetings	Very occasionally, one/two per month	Everyday for about 10 minutes and 30 minute weekly meetings		
Continuous improvement team	Not existent	Large numbers following established rules with quantifiable results		
Process improvement	Made by formal project teams or in response to disasters	Line leaders see this within their responsibility		
Waste Culture	Not existent	Total commitment		
Tracking the results of Lean	Totally ad hoc or at Board meetings only	At Weekly process Meetings		

Use of Advancing Technology	Manual line design, paper based Kanban-support; No ERP solutions	Integrated solution; real time scheduling and based on order mix; enterprise level tracking and score carding	
Maximum points = 90 Points scores = Category score = divided by 9			

Lean change strategy				
Criteria	Indicative scoring		Comments	Score
	Rating of one	Rating of 10		
Top management Support	Support viewed as lip service	Total and active support from top management		
Recognition of prevailing Culture	Simply imposing other organisation's experiences	Full effort to alter behaviour		
Lean Champion is evident	Not clear who has overall Lean responsibility	Clearly communicated strategy regards the Lean Champion		
Linking Culture to the organisation's performance	No effort exerted; Felt no relationship between the two	Total recognition of the association; every effort to link the two		
Consistent Vision is needed	No clear message	Lean becomes the underlying vision		
Roll-out of Lean	Little consistency and no evidence of continuous improvement	Possible to audit trail it from the pilot stage to the entire value chain		
Future State Maps exist	No attempt to view the future Lean journey	Systematic Lean journey clearly evident		
Sensei and other experts used	Occasional assistance from experts and not internalised	Working eventually towards internalising the expertise		
Continuous improvement and compensation link is evident	No efforts made to explore this correlation	Every effort made as it is recognised that these two are correlated		

Promotion of Positive culture	Little evidence of sustaining or adapting a more conducive culture	Combining culture and strategy viewing Lean seen as a journey	
Genuine efforts to cascade a culture promoting greater Stability in a changing environment	No genuine efforts to maximise stability	Every effort is made to maximise stability, i.e., schedule changes, program restructures and procurement quantities	
Sub-cultures recognised	No effort to deter or recognise sub-cultures	Recognised but strenuous efforts made to ensure that the aims/objectives stay the same	
Maximum points = 120 Points scores = Category score =			

8] Lean Sustainability				
Criteria	Lean Sustainability scoring		Comments	Score
	Rating of one	Rating of 10		
Application of the Lean Tools	Embraced few – generally 2 or less tools	Simultaneous application of 6 or more appropriate and relevant tools		
Lean Toolbox sustainability	Two or less tools have been in operation for several years with little expansion	Simultaneous application of 6 or more appropriate and relevant tools for three or more years		
Areas of Application	Limited to the manufacturing division only	Across the whole value chain and spread to suppliers too		
Lean Departments	Less than 10% operating under Lean conditions	Over 70 % of the organisations Cost Centres operating under Lean conditions		

New Market development	None and evidence of maturing markets	New markets constantly being secured	
Sales from new products – less than 5 years	Less than 10%	50% or more	
Not seen as a value stream	Concentration on one product value stream only	Recognised and viewed as combinations of value streams	
Maximum points = 70			
Points scores =	divided by 7		
Category score =			

9] Culture – employee oriented				
Criteria	Indicative scoring		Comments	Score
	Rating of one	Rating of 10		
Levels of Hierarchy	Highly layered generally 4 or above between the General Manager and the Shop Floor	Very flat structure		
Organised by customer families	Little attention is paid to organising flow to the product families	Total organisation is dictated by customer families		
Process focused management	Little ownership of the processes	Total ownership and people recognise how they are assisting customers		
Organisational structure	Divided by departments	Fully integrated		
Self Directed teams	Essentially none	Evidence of a high degree of team empowerment in making decisions		
Employees participated on improvement teams in the last 6 months	Less than 15%	80% or more		

Team empowerment	Virtually none	Full allocation of responsibility and authority	
HRM training	Not existent or very limited	Quite extensive; can be in excess of 80 hours per employee annually with quantifiable achievements	
Styles of leadership	Totally autocratic	Participative	
Communication	Bureaucratic	Very open communication	
Maximum points = 100 Points scores = Category score = divided by 10			

10] Organisational Culture – organisational practices			
Criteria	Indicative scoring		Comments
	Rating of one	Rating of 10	
Overall self reliance	Little control of outsourced products/ services	Total control though organisation retains its internal capability	
Finance and administration control	Traditional standard costing and not integrated with the rest of the functions	Lean accounting procedures clearly evident; metrics in existence to help the shop-floor	
Purchasing approach	Suppliers seen as adversaries and MRP driven	Full involvement and is kanban driven; “Supplier Development Teams”	
Early involvement of suppliers	Very rarely	Company policy	
Purchasing idealism	Constant conflict with other departments	Fully integrated	
Human Resources	Seen as a traditional staff role	Recognised that training and communication will bring the culture in line	

Lean Leadership at all levels	Not obvious and ad hoc system of distinguishing Lean leaders	Clearly visible Lean leaders at all levels supporting people	
HRM evaluations	Only the senior management	Often a 360° approach with continuous support for both personal and professional growth	
Compensation	Directly correlated to the seniority of management positions	Skills based	
Lean transformation responsibilities are assigned	Ad hoc communication and Lean responsibilities	Fully communicated and assigned duties for Lean	
Marketing	Marketing seen as a separate function and not part of the organisation	Promotion, marketing and selling of every improvement	
Office Layout	Managers offices are not readily available to the shop floor	Offices with transparent glass with easy access	
Daily accountability process	Plant and Value meetings focus only on production/shortage issues	Accountability is routine; supervisors grasp concepts; use basic project management skills	
Maximum points = 130			
Points scores =			
Category score =			
divided by 13			

Lean treated as a Business			
Criteria	Indicative scoring		Comments
	Rating of one	Rating of 10	
Formal strategic planning undertaken	Ad-hoc planning and Lean treated similarly	Long term strategic plans evident with Lean integral	
Future State Maps exist	No attempt to view the future Lean journey	Lean journey clearly evident	
			Score

Metrics include categories in financial, process, customer satisfaction, quality, employee satisfaction , future and supplier performance	Two or less categories are covered and not comprehensively	All categories are covered comprehensively	
Metrics linked to the key success factors and/or strategic goals and objectives allowing us to differentiate ourselves from competitors	Measures are either too many / too few or no alignment to the overall Lean journey	Lean measures are fully aligned to the immediate and long term Lean journey	
Metrics are fully understood and impact of individuals on the company performance	No ownership and little knowledge regards the impact an individual's performance would have on the organisation	Employees understand the metrics and recognise how their individual performances impact company performance	
Link between value streams and competing streams or support functions clear	The two seen as totally different and not impacting on each other	Recognition that altering a value stream impacts on a competing stream or the support functions	
Lean not viewed tactically	Lean seen to be limited to manufacturing	Lean seen as an overall strategy (not as manufacturing alone or as one strategy)	
Lean viewed as market supremacy	Lean simply seen as a cost cutting exercise	View of Lean is that it will lead to market supremacy	
Lean not limited to operational improvements	Lean and operational improvements seen as the same package	Broader view of Lean; higher profits and ability to compete	
Maximum points = 90 Points scores = Category score =			
divided by 9			

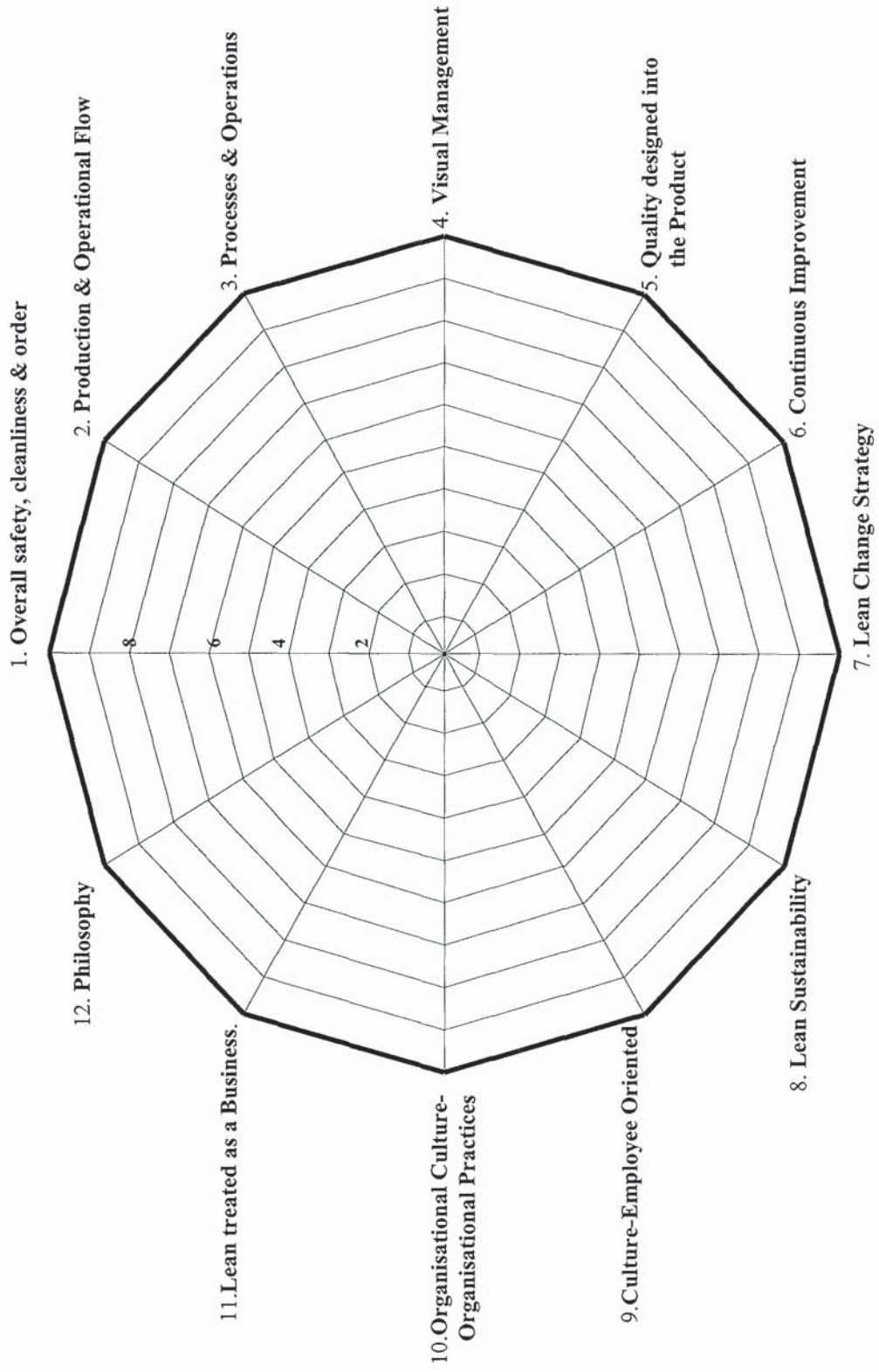
12] Philosophy				Comments	Score
Criteria	Indicative scoring		Rating of 10		
	Rating of one	Rating of 10			
Definite clarity of vision	Organisation has little idea of its Lean journey	Lean journey fully mapped out			
Way of thinking	Lean seen as a process but with little commitment	Lean is viewed as a way of thinking			
Lean seen as an ideology	Little or no commitment	As an ideology, (not religion) since statements are challenged			
Tools viewed as techniques	Lean and tools seen in isolation	Tools seen as techniques devised to solve problems			
Training culture	Isolated with little overall strategy	Training geared towards changing behaviour			
Process focused management	Not in evidence at all	Process focused leadership geared totally towards the customer			
To build a successful and robust Business	Simply a cost conscious culture	Profit remains the ultimate but through a successful and robust business			
Reflection becomes the norm; clear expectations from Lean	Reflection is on a very ad hoc basis	The implementation plan is regularly reviewed			
TPS not the Toyota Way	TPS is seen in a restricted fashion with emphasis on the tools solely	TPS is an ideology but is adapted to local conditions			
Maximum points = 90 Points scores = Category score =					
divided by 9					

Lean Assessment scoring sheet		
Organisation name:		
Category	Maximum score available	Score achieved
Overall safety, cleanliness and orderliness	30	
Production and operational flow	50	
Processes and operations	90	
Visual management	50	
Quality designed into the product	130	
Continuous improvement	90	
Lean change strategy	120	
Lean sustainability	70	
Culture employee oriented	100	
Organisational culture – organisational practices	130	
Lean treated as a business	90	
Philosophy	90	
Total score :		
% score :		
Lean stage:		

Lean Assessment scoring system		
Lean stage	Required Points	% of the maximum score of 1,040 points available
Ideological	936	> 90%
Innovative	780	> 75%
Holistic	624	> 60%
Enhanced	468	> 45%
Mechanical	312	> 30%
Developmental	156	> 15%
Planning	0 - 155	0% - 15%

General comments: _____

Lean Audit



APPENDIX THREE

The Lean audit results for each of the twenty organisations

The Lean Audit results are summarised on this pro-forma for each of the twenty organisations which consented to be audited. Whilst the detailed pro-forma was completed for every organisation (example included in Appendix 2); this appendix provides a synopsis of the results each organisation secured against all the categories.

Furthermore, the score secured assists to place the organisation on a particular Lean juncture.

Lean Assessment scoring sheet		
Organisation name:	3M (UK) Plc	
Category	Maximum score available	Score achieved
Overall safety, cleanliness and orderliness	30	20
Production and operational flow	50	33
Processes and operations	90	60
Visual management	50	32
Quality designed into the product	130	80
Continuous improvement	90	49
Lean change strategy	120	59
Lean sustainability	70	44
Culture employee oriented	100	50
Organisational culture – organisational practices	130	69
Lean treated as a business	90	41
Philosophy	90	33
Total score : 570		
% score : 55%		
Lean stage: Enhanced		

Lean Assessment scoring system		
Lean stage	Required Points	% of the maximum score of 1,040 points available
Ideological	936	90%
Innovative	780	75%
Holistic	624	60%
Enhanced	468	45%
Mechanical	312	30%
Developmental	156	15%
Planning	0 – 155	0% - 15%

General comments:

The generic evidence extracted from the Lean Audit is that whilst the organisation is aware of the benefits Lean can bring, its Lean initiative needs a fresh impetus since there was very little evidence of any progress being made in the last four years. Whilst in total, ten tools are presently in operation; their level of implementation needs to be extended. The low scores secured for culture (50% and 53%) and philosophy (37%) certainly sums up the work required to ensure that the organisation broadens its commitment towards its Lean journey.

The appraisal system, remuneration principles, its accounting practices and the degree of teamwork are amongst the most important areas that need to be addressed. The organisation promotes that 60% of its employees operate under Lean conditions; whilst the above analysis does not dispute this figure, the level of commitment discovered means that the possibility of attaining a higher Lean audit score is certainly questionable. The factors mentioned are definitely curtailing further progress.

Lean Assessment scoring sheet		
Organisation name: Blanc Aero Industries		
Category	Maximum score available	Score achieved
Overall safety, cleanliness and orderliness	30	16
Production and operational flow	50	32
Processes and operations	90	51
Visual management	50	30
Quality designed into the product	130	80
Continuous improvement	90	36
Lean change strategy	120	45
Lean sustainability	70	31
Culture employee oriented	100	44
Organisational culture – organisational practices	130	51
Lean treated as a business	90	32
Philosophy	90	26
Total score : 474		
% score : 46%		
Lean stage: Enhanced		

Lean Assessment scoring system		
Lean stage	Required Points	% of the maximum score of 1,040 points available
Ideological	936	90%
Innovative	780	75%
Holistic	624	60%
Enhanced	468	45%
Mechanical	312	30%
Developmental	156	15%
Planning	0 - 155	0% - 15%

General comments:

Whilst the audit overall mark just secures an enhanced position for the organisation; this tends to hide the fact that the procedures and policies seem to be dictating towards a mechanical score. The implementation of the tools has taken place in a haphazard fashion and needs to be re-visited and coordinated better. Many of the supporting systems need to be addressed; namely communications, empowerment, access to the Lean continuous improvement team and the embracing of suppliers to a much greater degree.

There is also a considerable amount of work necessary to ensure that the principles are extended across the whole of the value chain. The tools in place were not properly planned and the association between them is weak; consequently their full potential is not being fully explored. Whilst there is a dedicated team looking into Lean, too often the perception of them on the shop-floor is either neutral or negative. In fact, certain key shop floor supervisors were still not aware of exactly what the team's role was.

Lean Assessment scoring sheet		
Organisation name: BMW Petrol Engines		
Category	Maximum score available	Score achieved
Overall safety, cleanliness and orderliness	30	24
Production and operational flow	50	31
Processes and operations	90	56
Visual management	50	20
Quality designed into the product	130	76
Continuous improvement	90	49
Lean change strategy	120	61
Lean sustainability	70	44
Culture employee oriented	100	52
Organisational culture – organisational practices	130	70
Lean treated as a business	90	39
Philosophy	90	19
Total score : 541		
% score : 52%		
Lean stage: Enhanced		

Lean Assessment scoring system		
Lean stage	Required Points	% of the maximum score of 1,040 points available
Ideological	936	90%
Innovative	780	75%
Holistic	624	60%
Enhanced	468	45%
Mechanical	312	30%
Developmental	156	15%
Planning	0 – 155	0% - 15%

General comments:

Whilst the organisation managed to secure an overall score of 52%; this was largely attributable to a dedicated “*Continuous Improvement*” team. It was felt that more progress should have been made. Some of the basic issues were being allowed to manifest and become part of everyday practice; examples being the high levels of WIP, long changeover times, a lack of training and the potential conflict between the shop floor and the management tiers. Whilst there are also rumours regarding the future of the plant, further substantive progress is unlikely to be achieved until these issues are resolved and confidence infused.

A good effort has been made to implement the key tools but little consideration has been awarded to the relationship between the tools in place and the breadth of their application. Moreover, the relatively low scores achieved for culture (52% and 54% respectively) and in particular philosophy (21%) depict that the supporting structures are not in place to support an advancement of Lean.

Lean Assessment scoring sheet		
Organisation name:		Corus Colours
Category	Maximum score available	Score achieved
Overall safety, cleanliness and orderliness	30	23
Production and operational flow	50	34
Processes and operations	90	65
Visual management	50	35
Quality designed into the product	130	80
Continuous improvement	90	60
Lean change strategy	120	83
Lean sustainability	70	53
Culture employee oriented	100	65
Organisational culture – organisational practices	130	85
Lean treated as a business	90	61
Philosophy	90	49
Total score : 693		
% score : 67%		
Lean stage: Holistic		

Lean Assessment scoring system		
Lean stage	Required Points	% of the maximum score of 1,040 points available
Ideological	936	90%
Innovative	780	75%
Holistic	624	60%
Enhanced	468	45%
Mechanical	312	30%
Developmental	156	15%
Planning	0 – 155	0% - 15%

General comments:

The overall evidence discovered generally depicts an organisation that has embraced Lean for numerous years. This is reinforced by the fact that nine of the tools are presently in use whilst two have been utilised for over ten years. Nonetheless, despite claims that virtually every department and 100% of the organisation’s employees are operating under Lean conditions, there is room for considerable improvement. Further advancement is hindered by certain key factors; namely the accounting policies pursued and the heavy reliance on costs regards the metrics utilised.

Moreover, some of the cultural factors are hampering the effectiveness of some of the tools in operation. Equally, whilst the organisation has undeniably benefited from its Lean journey, there exists a deficiency of available monies for the investment required to facilitate the Lean journey further. Whilst an efficient “*continuous improvement*” team exists, the negative perception from the shop-floor needs to be confronted through better communications.

Lean Assessment scoring sheet		
Organisation name: Drayton Beaumont Limited		
Category	Maximum score available	Score achieved
Overall safety, cleanliness and orderliness	30	13
Production and operational flow	50	25
Processes and operations	90	35
Visual management	50	18
Quality designed into the product	130	42
Continuous improvement	90	34
Lean change strategy	120	37
Lean sustainability	70	25
Culture employee oriented	100	34
Organisational culture – organisational practices	130	37
Lean treated as a business	90	18
Philosophy	90	23
Total score : 341		
% score : 33%		
Lean stage: Mechanical		

Lean Assessment scoring system		
Lean stage	Required Points	% of the maximum score of 1,040 points available
Ideological	936	90%
Innovative	780	75%
Holistic	624	60%
Enhanced	468	45%
Mechanical	312	30%
Developmental	156	15%
Planning	0 – 155	0% - 15%

General comments:

Generally a very poor imitation of a Lean application; very few isolated tools are being applied and with equally little conviction. Moreover, the audit demonstrated that there was no intention to widen the overall application of Lean or any signs to show greater commitment towards their Lean journey. Whilst it has top management support, some of this enthusiasm is ill-advised and very cost driven.

Lean was not viewed as a total system and predominantly the intention was to cut costs. The organisational development factors required for Lean such as sustainability, culture and change scored badly, often below 30%. The ultimate set of metrics used to assess whether Lean was viewed as a philosophy, the organisation only managed to secure a score of 26%. In summary, it could be concluded that unlike the Lean implementations of the more successful organisations, this organisation is unlikely to ever reach the ideological state.

Lean Assessment scoring sheet		
Organisation name: Fletcher Moorland Limited		
Category	Maximum score available	Score achieved
Overall safety, cleanliness and orderliness	30	12
Production and operational flow	50	20
Processes and operations	90	45
Visual management	50	22
Quality designed into the product	130	41
Continuous improvement	90	28
Lean change strategy	120	35
Lean sustainability	70	24
Culture employee oriented	100	33
Organisational culture – organisational practices	130	36
Lean treated as a business	90	24
Philosophy	90	25
Total score : 345		
% score : 33%		
Lean stage: Mechanical		

Lean Assessment scoring system		
Lean stage	Required Points	% of the maximum score of 1,040 points available
Ideological	936	90%
Innovative	780	75%
Holistic	624	60%
Enhanced	468	45%
Mechanical	312	30%
Developmental	156	15%
Planning	0 - 155	0% - 15%

General comments:

Overall, whilst the organisation stresses that it is on the Lean journey, there is considerable work required to increase its level of commitment. Few isolated tools have been in place since 2002 (4 years) and no progress has happened within that time. Elements of the shop floor regard Lean as a historic initiative – something they tried few years ago. Unfortunately, Lean is viewed as a cost cutting exercise which was clearly evident from the tool selection.

The supporting infrastructure; namely, culture, organisational development, investment and sustainability scored badly, often below 30%. Moreover, when applying the metrics utilised to assess whether Lean was viewed as a philosophy, the organisation only secured a score of 28%. In summary, it could be concluded that unlike the Lean implementations of successful organisations, this implementation has peaked and is unlikely to ever reach the ideological state. The management team have introduced Lean but are not actively promoting it. Moreover, there is a definite need for an external sensei which is not being recognised by the management team.

Lean Assessment scoring sheet		
Organisation name:		Ford (Bridgend Engine Plant)
Category	Maximum score available	Score achieved
Overall safety, cleanliness and orderliness	30	24
Production and operational flow	50	37
Processes and operations	90	61
Visual management	50	36
Quality designed into the product	130	90
Continuous improvement	90	64
Lean change strategy	120	74
Lean sustainability	70	54
Culture employee oriented	100	51
Organisational culture – organisational practices	130	63
Lean treated as a business	90	39
Philosophy	90	32
Total score : 625		
% score : 60%		
Lean stage: Holistic		

Lean Assessment scoring system		
Lean stage	Required Points	% of the maximum score of 1,040 points available
Ideological	936	90%
Innovative	780	75%
Holistic	624	60%
Enhanced	468	45%
Mechanical	312	30%
Developmental	156	15%
Planning	0 – 155	0% - 15%

General comments:

The overall evidence generally depicts an example of an organisation that has embraced Lean for numerous years. This is reinforced by the fact that seven of the tools that are presently in use have been in operation for over eight years. Nonetheless, some key factors are affecting progress; namely the standard accounting policies pursued; the non-alignment of the metrics with view towards the organisation’s overall objectives, and its lack of commitment in tackling the prominent cultural factors.

The organisation promotes that 70% of its employees operate under the Lean umbrella; whilst the audit does not dispute this, the level of commitment and application of the tools is certainly in question. Likewise, little consideration seems to have been applied in the selection of the tools in use. Similarly the cultural implications, i.e., empowerment, communications, level of training and the embracing of suppliers and customers needs to be awarded greater precedence. The organisation needs to tackle the aforementioned aspects should it be serious towards fully implementing Lean within the organisation.

Lean Assessment scoring sheet		
Organisation name:		Perkins Engines
Category	Maximum score available	Score achieved
Overall safety, cleanliness and orderliness	30	22
Production and operational flow	50	31
Processes and operations	90	52
Visual management	50	30
Quality designed into the product	130	83
Continuous improvement	90	59
Lean change strategy	120	61
Lean sustainability	70	33
Culture employee oriented	100	47
Organisational culture – organisational practices	130	52
Lean treated as a business	90	33
Philosophy	90	29
Total score : 532		
% score : 51%		
Lean stage: Enhanced		

Lean Assessment scoring system		
Lean stage	Required Points	% of the maximum score of 1,040 points available
Ideological	936	90%
Innovative	780	75%
Holistic	624	60%
Enhanced	468	45%
Mechanical	312	30%
Developmental	156	15%
Planning	0 - 155	0% - 15%

General comments:

The organisation has had the services of a sensei for three years and few of the Lean tools have been fully embedded. Whilst waste and Kaizen is taken seriously, there has been room to extend the number and breadth of tools which has not materialised to date. Sustainability (47%), philosophy (32%) and culture (47% and 40% respectively) essentially highlights where the problem exists. The infrastructure needed to support the Lean journey of the organisation was seen to be lacking.

There was evidence of some tension between the management tiers and the shop floor. This needs urgent attention since it would certainly influence the progress of the implementation of Lean. Equally, the parent company needs to reinforce its commitment towards the Lean initiative which has not been as explicit as it may have been. In summary, more tools need to be introduced and the organisational development factors addressed if Perkins wishes to fully implement Lean within the organisation.

Lean Assessment scoring sheet		
Organisation name: Timken Aerospace		
Category	Maximum score available	Score achieved
Overall safety, cleanliness and orderliness	30	18
Production and operational flow	50	30
Processes and operations	90	55
Visual management	50	31
Quality designed into the product	130	78
Continuous improvement	90	49
Lean change strategy	120	70
Lean sustainability	70	47
Culture employee oriented	100	61
Organisational culture – organisational practices	130	78
Lean treated as a business	90	56
Philosophy	90	55
Total score : 628		
% score : 60%		
Lean stage: Holistic		

Lean Assessment scoring system		
Lean stage	Required Points	% of the maximum score of 1,040 points available
Ideological	936	90%
Innovative	780	75%
Holistic	624	60%
Enhanced	468	45%
Mechanical	312	30%
Developmental	156	15%
Planning	0 – 155	0% - 15%

General comments:

On the whole the comprehensive audit results reflect an organisation committed towards Lean though certain issues require further attention which are acting as barriers in their efforts to achieve a higher score. Whilst Process Mapping, Kaizen and SMED have been in place for over five years, eight other components of the toolbox have only been in operation for over one year. Equally, the organisation claims that 50% of its departments and 20% of the employees are operating under the Lean conditions.

This supports the audit score achieved. A wider application of the tools is required in order to increase the level of implementation. Various prominent issues; namely training, closed loop root cause quality analysis, the accounting methodology and its Total Preventative Maintenance structures and regimes require to be addressed. The organisation has benefited from its Lean journey to date, though whilst considering its size and apparent commitment, there is a possibility that the organisation will increase its level of implementation provided the issues identified are tackled.

Lean Assessment scoring sheet		
Organisation name: Trentex Engineering		
Category	Maximum score available	Score achieved
Overall safety, cleanliness and orderliness	30	17
Production and operational flow	50	25
Processes and operations	90	40
Visual management	50	17
Quality designed into the product	130	51
Continuous improvement	90	35
Lean change strategy	120	37
Lean sustainability	70	21
Culture employee oriented	100	25
Organisational culture – organisational practices	130	39
Lean treated as a business	90	26
Philosophy	90	22
Total score : 355		
% score : 34%		
Lean stage: Mechanical		

Lean Assessment scoring system		
Lean stage	Required Points	% of the maximum score of 1,040 points available
Ideological	936	90%
Innovative	780	75%
Holistic	624	60%
Enhanced	468	45%
Mechanical	312	30%
Developmental	156	15%
Planning	0 – 155	0% - 15%

General comments:

Overall a rather poor application of Lean was discovered; few isolated tools are being applied with very little conviction. The tools implemented have been in place for three years but have totally stagnated with no expansion evident. Frustratingly, the entity size could easily reap benefits from Lean if properly implemented. Equally, the audit demonstrated that there was no intention to widen the overall application of Lean or to show greater commitment towards their Lean journey. Lean is generally viewed as a manufacturing tool and the specific components have been used with little evidence of sustainability.

The organisational development factors required for Lean such as sustainability, culture and change scored badly, often below 30%. The ultimate set of metrics used to assess whether Lean was viewed as a philosophy, the organisation only secured a score of 24%. In summary, it could be concluded that unlike the path taken of a successful Lean implementation, this organisation is unlikely to ever reach the ideological state.

Lean Assessment scoring sheet		
Organisation name:	Unilever (UK) Foods	
Category	Maximum score available	Score achieved
Overall safety, cleanliness and orderliness	30	22
Production and operational flow	50	38
Processes and operations	90	68
Visual management	50	37
Quality designed into the product	130	91
Continuous improvement	90	67
Lean change strategy	120	89
Lean sustainability	70	53
Culture employee oriented	100	75
Organisational culture – organisational practices	130	93
Lean treated as a business	90	66
Philosophy	90	59
Total score : 758		
% score : 73%		
Lean stage: Holistic		

Lean Assessment scoring system		
Lean stage	Required Points	% of the maximum score of 1,040 points available
Ideological	936	90%
Innovative	780	75%
Holistic	624	60%
Enhanced	468	45%
Mechanical	312	30%
Developmental	156	15%
Planning	0 – 155	0% - 15%

General comments:

Undeniably having secured a score of 73%, the comprehensive audit's results point towards an organisation committed towards the Lean principles. Nonetheless, there existed certain issues which if left, would expose the organisation and adversely affect its overall efficiency; consequently, these were picked up by the audit analysis. They claimed a 100% of the departments and employees were considered to be operating under the Lean umbrella. Nevertheless, there was some evidence of complacency whereby the organisation has falsely anticipated that the Lean progress would both be sustained and further improved without the need to embed some of the required processes.

Nine key tools have been in operation in excess of six years with both process mapping and continuous improvement having been in operation for fifteen and twelve years respectively. Certain key factors are hampering the organisation in its efforts to embed Lean as an ideology; namely, its accounting methodologies, extension of the Lean principles to the whole value chain and whilst process mapping is treated with a level of commitment, some of the targets need to be more challenging.

Lean Assessment scoring sheet		
Organisation name:	Vauxhall Motors Limited	
	Maximum score available	Score achieved
Overall safety, cleanliness and orderliness	30	25
Production and operational flow	50	38
Processes and operations	90	69
Visual management	50	37
Quality designed into the product	130	100
Continuous improvement	90	73
Lean change strategy	120	94
Lean sustainability	70	56
Culture employee oriented	100	73
Organisational culture – organisational practices	130	103
Lean treated as a business	90	74
Philosophy	90	69
Total score : 811		
% score : 78%		
Lean stage: Innovative		

Lean Assessment scoring system		
Lean stage	Required Points	% of the maximum score of 1,040 points available
Ideological	936	90%
Innovative	780	75%
Holistic	624	60%
Enhanced	468	45%
Mechanical	312	30%
Developmental	156	15%
Planning	0 – 155	0% - 15%

General comments:

Vauxhall Motors Limited has fully embraced Lean and evidently it views Lean as an over-riding ideology that will help to secure its long term strategic commitments. An overall score of 78% undoubtedly reinforces this point. Moreover, the organisation over the entire set of twelve categories listed above, achieved in excess of 73% in every category which reflects its commitment towards Lean. There was solid evidence found of a rolling five year strategic plan whereby Lean played a prominent role.

Equally, the organisation has been on the Lean journey in excess of fifteen years and presently simultaneously applies twelve of the tools. Nonetheless, there are some critical issues that it needs to address which are hampering further Lean success; namely its need to reinforce the positive culture, build the links between continuous improvement and the compensation systems whilst addressing its accounting methodology in order to align it to the Lean ideology.

Lean Assessment scoring sheet		
Organisation name:		Excel Electronics
Category	Maximum score available	Score achieved
Overall safety, cleanliness and orderliness	30	20
Production and operational flow	50	23
Processes and operations	90	34
Visual management	50	37
Quality designed into the product	130	75
Continuous improvement	90	41
Lean change strategy	120	72
Lean sustainability	70	55
Culture employee oriented	100	65
Organisational culture – organisational practices	130	86
Lean treated as a business	90	67
Philosophy	90	53
Total score : 628		
% score : 60%		
Lean stage: Holistic		

Lean Assessment scoring system		
Lean stage	Required Points	% of the maximum score of 1,040 points available
Ideological	936	90%
Innovative	780	75%
Holistic	624	60%
Enhanced	468	45%
Mechanical	312	30%
Developmental	156	15%
Planning	0 – 155	0% - 15%

General comments:

The overall evidence generally depicts a situation of an organisation that has embraced Lean for numerous years. This is reinforced by the fact that nine of the tools are presently in use whilst two: Kaizen and the relentless attack on wastes have been pursued for over five years. Nonetheless, despite claims that 75% of the departments and 75% of the employees are operating under Lean conditions, the organisation has key issues to address; namely its accounting methodology, its total preventative maintenance structures and regimes that need to be formalised and communicated better.

Whilst the organisation has secured certain benefits from its Lean journey to date, the overall future does seem less certain owing to the potential competition it faces from China in particular. Invariably some tools were chosen as they were seen to be appropriate; these require to be applied with more conviction should the organisation hope to fully succeed at implementing Lean. Equally, since the organisation only employs approximately 80 people, the training provision offered to both the management and shop floor is preventing further progress to be made.

Lean Assessment scoring sheet		
Organisation name:		Ilford Imaging Limited
Category	Maximum score available	Score achieved
Overall safety, cleanliness and orderliness	30	13
Production and operational flow	50	20
Processes and operations	90	31
Visual management	50	19
Quality designed into the product	130	42
Continuous improvement	90	29
Lean change strategy	120	40
Lean sustainability	70	24
Culture employee oriented	100	34
Organisational culture – organisational practices	130	40
Lean treated as a business	90	28
Philosophy	90	29
Total score : 349		
% score : 34%		
Lean stage: Mechanical		

Lean Assessment scoring system		
Lean stage	Required Points	% of the maximum score of 1,040 points available
Ideological	936	90%
Innovative	780	75%
Holistic	624	60%
Enhanced	468	45%
Mechanical	312	30%
Developmental	156	15%
Planning	0 – 155	0% - 15%

General comments:

The Lean Audit's results of 34% exhaustively demonstrated that whilst the organisation is on the Lean journey it does have major obstacles to overcome in its intention to fully embrace the Lean philosophy. Its initial reasons for embracing Lean centred on a need to reduce its lead-time and on-time delivery. Undoubtedly, whilst some improvements have been made; in the previous six years that Lean has been in place the organisation has not managed to adequately demonstrate a widening of its scope and application.

Lean is still viewed primarily as a manufacturing phenomenon and this is reflected in the figure of only 45% of its employees operating under the Lean conditions, as defined by the organisation. The next stage is to apply it to the whole internal organisation as the processes and procedures, i.e., accounting practices, remuneration systems, design of quality systems and the prevailing cultural implications are hindering its progress and ultimately the full benefits that Ilford Imaging Limited would reap.

Lean Assessment scoring sheet		
Organisation name:	Ina Bearing Company Ltd	
Category	Maximum score available	Score achieved
Overall safety, cleanliness and orderliness	30	24
Production and operational flow	50	34
Processes and operations	90	60
Visual management	50	37
Quality designed into the product	130	82
Continuous improvement	90	62
Lean change strategy	120	84
Lean sustainability	70	48
Culture employee oriented	100	46
Organisational culture – organisational practices	130	81
Lean treated as a business	90	55
Philosophy	90	51
Total score : 664		
% score : 64%		
Lean stage: Holistic		

Lean Assessment scoring system		
Lean stage	Required Points	% of the maximum score of 1,040 points available
Ideological	936	90%
Innovative	780	75%
Holistic	624	60%
Enhanced	468	45%
Mechanical	312	30%
Developmental	156	15%
Planning	0 – 155	0% - 15%

General comments:

Ina Bearing's audit results reflect an organisation that has embraced Lean for numerous years; this is reinforced by the fact that ten of the tools presently in operation alongside cellular manufacturing have been utilised for over ten years. Nonetheless, despite assertions that every department and 100% of the employees are operating under Lean conditions, the organisation has the difficult task of needing to address certain key issues; namely its appraisal system which largely ignores the skills based methodology, remuneration systems, the types of metrics used and the prevailing accounting methodology.

Equally, whilst the organisation has benefited from its Lean journey, there exists uncertainty regards the organisation's future. Invariably, some tools chosen need to be applied with more rigour if the organisation is to fully implement Lean. Moreover, some of the progress is hampered through ineffective communications and the general failure of the management team in dealing with the negative sub-cultures which have developed.

Lean Assessment scoring sheet		
Organisation name: Jaquar Cars Limited		
Category	Maximum score available	Score achieved
Overall safety, cleanliness and orderliness	30	20
Production and operational flow	50	36
Processes and operations	90	60
Visual management	50	28
Quality designed into the product	130	82
Continuous improvement	90	55
Lean change strategy	120	64
Lean sustainability	70	45
Culture employee oriented	100	49
Organisational culture – organisational practices	130	58
Lean treated as a business	90	47
Philosophy	90	41
Total score : 585		
% score : 56%		
Lean stage: Enhanced		

Lean Assessment scoring system		
Lean stage	Required Points	% of the maximum score of 1,040 points available
Ideological	936	90%
Innovative	780	75%
Holistic	624	60%
Enhanced	468	45%
Mechanical	312	30%
Developmental	156	15%
Planning	0 – 155	0% - 15%

General comments:

An organisation which at the beginning of the audit was seen as a potential candidate to perform well; unfortunately the analysis reflected a situation whereby in the last three years very little genuine progress had been made. Whilst most of the Lean tools have been in operation in excess of eight years, their implementation level seems to have reached a plateau. When, coupled with the low scores verified for culture (49% and 45%) and philosophy (46%) the evidence seems to point towards a situation whereby too much concentration has occurred on the application of the Lean tools and not enough on the surrounding organisational developmental and cultural considerations required to fully embrace Lean.

Unfortunately, the organisation is undergoing a possible internal re-organisational change and the ensuing level of uncertainty is adversely affecting their Lean journey. Whilst a dedicated “Continuous Improvement” team exists, many of the initiatives should have been cascaded downwards and consequently facilitated empowerment; often there was evidence of too much silo working.

Lean Assessment scoring sheet		
Organisation name:	Leoni	
	Maximum score available	Score achieved
Overall safety, cleanliness and orderliness	30	17
Production and operational flow	50	28
Processes and operations	90	51
Visual management	50	29
Quality designed into the product	130	73
Continuous improvement	90	46
Lean change strategy	120	68
Lean sustainability	70	43
Culture employee oriented	100	46
Organisational culture – organisational practices	130	62
Lean treated as a business	90	45
Philosophy	90	36
Total score : 544		
% score : 52		
Lean stage: Enhanced		

Lean Assessment scoring system		
Lean stage	Required Points	% of the maximum score of 1,040 points available
Ideological	936	90%
Innovative	780	75%
Holistic	624	60%
Enhanced	468	45%
Mechanical	312	30%
Developmental	156	15%
Planning	0 – 155	0% - 15%

General comments:

A commitment towards Lean is clearly evident; a continuous improvement team has been in place in excess of six years. Two tools: SMED and Kaizen, have been implemented for in excess of ten years. Nonetheless, the CI team is seen as a specialist unit but one which operates in an insular manner; consequently the perception on the shop-floor of the team is poor and this was discovered in some of the communications it endeavoured to undertake within the organisation.

Unfortunately the rumours are rife regards a major re-organisation which has undeniably taken some of the focus away from any advancement of the Lean implementation. The “Lean sustainability” set of indices which secured a score of 61% whilst a reasonable score, does mask some underlying problems. In the last three years there has been no progress made on the Lean implementation journey. Equally, Leoni needs to ensure that a well coordinated effort of both adopting more Lean tools and embracing those which would contribute the most to the organisation at this stage of the Lean journey occurs whilst addressing some of the cultural factors.

Organisation name: Ricardo Ltd		
Category	Maximum score available	Score achieved
Overall safety, cleanliness and orderliness	30	15
Production and operational flow	50	25
Processes and operations	90	42
Visual management	50	23
Quality designed into the product	130	52
Continuous improvement	90	32
Lean change strategy	120	37
Lean sustainability	70	24
Culture employee oriented	100	34
Organisational culture – organisational practices	130	41
Lean treated as a business	90	24
Philosophy	90	24
Total score : 373		
% score : 36%		
Lean stage: Mechanical		

Lean Assessment scoring system		
Lean stage	Required Points	% of the maximum score of 1,040 points available
Ideological	936	90%
Innovative	780	75%
Holistic	624	60%
Enhanced	468	45%
Mechanical	312	30%
Developmental	156	15%
Planning	0 – 155	0% - 15%

General comments:

Overall, whilst seven of the Lean tools are in place, the commitment demonstrated is lacking; this when coupled with a lack of technical expertise within Lean proceeds to form a dangerous cocktail. There seems to be little progress from the start of its Lean journey since there has not occurred either a widening application of the existing tools or an adoption of new ones. Lean was not viewed as a total system and predominantly the intention was to cut costs.

The organisational developmental factors required for Lean such as sustainability (34%), culture (34% and 32%) and change (31%) scored poorly. In regards the ultimate set of metrics used to assess whether Lean was viewed as a philosophy, the organisation only secured a score of 27%. In summary, it could be concluded that unlike the Lean journeys of successful implementations, without considerably more work happening, this organisation is unlikely to reap the full benefits Lean has to offer. Overall an efficient organisation but under-performing as it accepts the indices presently adopted.

Lean Assessment scoring sheet		
Organisation name:		Royal Doulton Plc
Category	Maximum score available	Score achieved
Overall safety, cleanliness and orderliness	30	13
Production and operational flow	50	12
Processes and operations	90	33
Visual management	50	21
Quality designed into the product	130	46
Continuous improvement	90	26
Lean change strategy	120	42
Lean sustainability	70	11
Culture employee oriented	100	25
Organisational culture – organisational practices	130	31
Lean treated as a business	90	20
Philosophy	90	18
Total score : 298		
% score : 29%		
Lean stage: Developmental		

Lean Assessment scoring system		
Lean stage	Required Points	% of the maximum score of 1,040 points available
Ideological	936	90%
Innovative	780	75%
Holistic	624	60%
Enhanced	468	45%
Mechanical	312	30%
Developmental	156	15%
Planning	0 – 155	0% - 15%

General comments:

Royal Doulton Plc depicted a conventional situation of an organisation failing to implement Lean and the extensive audit reinforced this point. The highest score it secured in any category was 43%. In its Sustainability and Philosophy category it only managed to secure scores of 16% and 20% respectively; consequently this assisted to explain why the Lean implementation failed. The organisation never seemed to be serious about Lean and generally viewed it as a viable strategy to reduce costs. Whilst, this is feasible the commitment from senior management regards both time and finance was never exhibited.

Many of the linkages were never recognised such as culture (25% and 24%) and change (35%); this when combined with the application of a few Lean tools to manufacturing alone without the assistance of the indispensable organisational developmental aspects meant that Lean never even approached an overall implementation rate of 35%. A vast improvement in the prevailing labour relations and the trust in management is crucial for Lean to flourish further.

Lean Assessment scoring sheet		
Organisation name:		Scapa (UK) Ltd
Category	Maximum score available	Score achieved
Overall safety, cleanliness and orderliness	30	22
Production and operational flow	50	26
Processes and operations	90	46
Visual management	50	32
Quality designed into the product	130	64
Continuous improvement	90	46
Lean change strategy	120	60
Lean sustainability	70	33
Culture employee oriented	100	40
Organisational culture – organisational practices	130	47
Lean treated as a business	90	30
Philosophy	90	31
Total score : 477		
% score : 46%		
Lean stage: Enhanced		

Lean Assessment scoring system		
Lean stage	Required Points	% of the maximum score of 1,040 points available
Ideological	936	90%
Innovative	780	75%
Holistic	624	60%
Enhanced	468	45%
Mechanical	312	30%
Developmental	156	15%
Planning	0 – 155	0% - 15%

General comments:

Generally the overall audit results pointed towards an organisation trying to embrace Lean in its entirety but one whereby the momentum needs to be increased if it is to adopt Lean as an ideology. Whilst eight of the Lean tools are in operation, their level of implementation has not witnessed a great deal of progress in the last three years. When coupled with the low scores established for Culture (40% and 36% respectively) and philosophy (35%) this exhibits a need for a considerable amount of extra work. An overall score of 46% just manages to secure the organisation on the fourth of the seven stages of the Lean implementation.

The level of commitment towards the possibility of securing a higher score is certainly in debate at present. The organisational developmental factors such as organisational design and cultural implications such as management styles and empowerment need to be tackled. Equally, the application of the existing tools needs to be re-visited and the correlations explored further to assess how the relevant tools fit into the organisation's long term objectives.

APPENDIX FOUR

The Lean Audit feedback questionnaire

The twenty Lean Audit feedback questionnaires received; these were offered to the relevant organisations in which a detailed audit had been undertaken.

It awarded an opportunity to the respective organisations to respond to the audit score they had received.

Lean Audit feedback Questionnaire

Section A: General Background

Please State name of your company	3M (UK) Plc
Please name the auditor(s)	Sanjay Bhasin

Section B: Summary of the Lean Audit score

Lean Audit %: 55%	Lean Stage: Enhanced
--------------------------	-----------------------------

Section C: Feedback on the scores achieved in each category

Using a score of 1-10 could you indicate your assessment of the score achieved in each category; 10 if you totally agree with the Lean audit score; 1 if you totally disagree with the Lean audit score?

Categories	Your score
Overall safety, cleanliness and orderliness	9
Production and operational flow	9
Processes and operations	8
Visual management	9
Quality designed into the product	8
Continuous improvement	9
Lean change strategy	8
Lean sustainability	9
Culture employee oriented	8
Organisational culture – organisational practices	8
Lean treated as a business	9
Philosophy	9
Average score obtained for the twelve categories	8

Section D: Any additional comments to be made about the Lean Audit

Generally we felt that the scores quoted on the audit were overall accurate in their assessment of our Lean implementation. We did initially feel that the two culture scores were low; however, after consultations it did become evident that large groups of personnel are still not covered by the Lean implementation. Lean has proven successful within the organisation but it is not wide spread as would be the case with the TPS at Toyota. Nonetheless, we do need to improve our record of extending Lean to the whole value chain should we hope to achieve a higher score on similar audits in the future.

Lean Audit feedback Questionnaire

Section A: General Background

Please State name of your company	Blank Aero Industries
Please name the auditor(s)	Sanjay Bhasin

Section B: Summary of the Lean Audit score

Lean Audit %: 46%	Lean Stage: Enhanced
--------------------------	-----------------------------

Section C: Feedback on the scores achieved in each category

Using a score of 1-10 could you indicate your assessment of the score achieved in each category; 10 if you totally agree with the Lean audit score; 1 if you totally disagree with the Lean audit score?

Categories	Your score
Overall safety, cleanliness and orderliness	9
Production and operational flow	9
Processes and operations	8
Visual management	9
Quality designed into the product	8
Continuous improvement	9
Lean change strategy	8
Lean sustainability	9
Culture employee oriented	9
Organisational culture – organisational practices	8
Lean treated as a business	9
Philosophy	9
Average score obtained for the twelve categories	9

Section D: Any additional comments to be made about the Lean Audit

The Lean Audit scores did in the main reveal a position which we did consider ourselves to be in; undoubtedly there is a commitment towards Lean but we are at a stage whereby the organisation seems unsure regards its next steps in respect towards moving Lean on. The results revealed that whilst Lean tools had been implemented that the implementation had been disorganized; whilst this may have been a little unforgiving we recognise where this assertion might have arisen from. We were not privy to some of the new research and our progress might reflect this situation. Unquestionably, more work is necessary to alter the culture and improve our sustainability thus permitting Lean to flourish.

Lean Audit feedback Questionnaire

Section A: General Background

Please State name of your company	BMW Petrol Engines
Please name the auditor(s)	Sanjay Bhasin

Section B: Summary of the Lean Audit score

Lean Audit %:	52%	Lean Stage:	Enhanced
---------------	-----	-------------	----------

Section C: Feedback on the scores achieved in each category

Using a score of 1-10 could you indicate your assessment of the score achieved in each category; 10 if you totally agree with the Lean audit score; 1 if you totally disagree with the Lean audit score?

Categories	Your score
Overall safety, cleanliness and orderliness	9
Production and operational flow	10
Processes and operations	9
Visual management	9
Quality designed into the product	8
Continuous improvement	9
Lean change strategy	7
Lean sustainability	8
Culture employee oriented	8
Organisational culture – organisational practices	8
Lean treated as a business	6
Philosophy	10
Average score obtained for the twelve categories	8

Section D: Any additional comments to be made about the Lean Audit

Whilst generally speaking we are in agreement with the overall scores quoted on the audit; there were two areas in particular we felt the score should have been higher; namely "Lean change strategy" and "Lean treated as a business". We feel we have a good record of managing change though the audit found evidence of sub-cultures; equally Lean is also used to drive our business which the audit seemed not to totally grasp. We appreciate that the culture score was low as we seem to have been pre-occupied with the technical components of Lean. Nonetheless, on the whole it did highlight areas we can use as an action plan to pursue our Lean journey further.

Lean Audit feedback Questionnaire

Section A: General Background

Please State name of your company	Ford – Bridgend Engine Plant
Please name the auditor(s)	Sanjay Bhasin

Section B: Summary of the Lean Audit score

Lean Audit %: 60%	Lean Stage: Holistic
--------------------------	------------------------------------

Section C: Feedback on the scores achieved in each category

Using a score of 1-10 could you indicate your assessment of the score achieved in each category; 10 if you totally agree with the Lean audit score; 1 if you totally disagree with the Lean audit score?

Categories	Your score
Overall safety, cleanliness and orderliness	9
Production and operational flow	8
Processes and operations	8
Visual management	9
Quality designed into the product	8
Continuous improvement	9
Lean change strategy	9
Lean sustainability	8
Culture employee oriented	8
Organisational culture – organisational practices	8
Lean treated as a business	8
Philosophy	8
Average score obtained for the twelve categories	8

Section D: Any additional comments to be made about the Lean Audit

Needless, to add that when we first received the audit scores – the over-riding impression seemed to be that the scores were somewhat harsh. However, having had the opportunity to review them, the existing perception of the scores is that they are quite fair. We have been on the Lean journey for over eight years and have in excess of 70% of our employees operating under Lean conditions. Unfortunately, we should have extended the Lean principles across the whole value chain as is implied by the audit author; consequently the culture and philosophy scores seem to have reflected this situation aptly.

Lean Audit feedback Questionnaire

Section A: General Background

Please State name of your company	Corus Colours
Please name the auditor(s)	Sanjay Bhasin

Section B: Summary of the Lean Audit score

Lean Audit %: 67%	Lean Stage: Holistic
--------------------------	-----------------------------

Section C: Feedback on the scores achieved in each category

Using a score of 1-10 could you indicate your assessment of the score achieved in each category; 10 if you totally agree with the Lean audit score; 1 if you totally disagree with the Lean audit score?

Categories	Your score
Overall safety, cleanliness and orderliness	8
Production and operational flow	10
Processes and operations	8
Visual management	9
Quality designed into the product	9
Continuous improvement	8
Lean change strategy	9
Lean sustainability	9
Culture employee oriented	9
Organisational culture – organisational practices	9
Lean treated as a business	9
Philosophy	9
Average score obtained for the twelve categories	9

Section D: Any additional comments to be made about the Lean Audit

The Lean Audit scores and the overall investigation was a useful exercise for the organisation. We stumbled across Lean a few years ago and in reality felt correctly that this was the course of action for the organisation. However, practically, the everyday business has always taken priority and we now recognise that Lean would require a considerable investment in both money and time. We have investigated how Lean has proven successful in many organisations and comprehend that to reap the entire benefits of Lean; the organisation needs to fully implement Lean. In regards the Lean audit, whilst very revealing, we remain sceptical regards its relevance to an organisation such as ours.

Lean Audit feedback Questionnaire

Section A: General Background

Please State name of your company	Drayton
Please name the auditor(s)	Sanjay Bhasin

Section B: Summary of the Lean Audit score

Lean Audit %: 33%	Lean Stage: Mechanical
--------------------------	-------------------------------

Section C: Feedback on the scores achieved in each category

Using a score of 1-10 could you indicate your assessment of the score achieved in each category; 10 if you totally agree with the Lean audit score; 1 if you totally disagree with the Lean audit score?

Categories	Your score
Overall safety, cleanliness and orderliness	9
Production and operational flow	10
Processes and operations	8
Visual management	9
Quality designed into the product	8
Continuous improvement	9
Lean change strategy	9
Lean sustainability	10
Culture employee oriented	10
Organisational culture – organisational practices	10
Lean treated as a business	9
Philosophy	10
Average score obtained for the twelve categories	9

Section D: Any additional comments to be made about the Lean Audit

The Lean audit was a very useful piece of evidence that we required to assist a fresh push of the Lean initiative within the organisation. Whilst reasonably new to the whole concept of Lean we had not fully appreciated the task ahead and just how comprehensive the audit undertaken would be. Whilst a small organisation, one thing that has become obvious is that we need to either recruit or secure the services of a Lean expert from outside, since there is obviously a lack of internal expertise within the organisation. We need to concentrate our efforts on areas where we scored very low since it is expected that these would start to hinder further progress. After consultation with Sanjay – it seems that the areas we need to address are those which could pose as major barriers if left alone.

Lean Audit feedback Questionnaire

Section A: General Background

Please State name of your company	Excel Electronics
Please name the auditor(s)	Sanjay Bhasin

Section B: Summary of the Lean Audit score

Lean Audit %: 60%	Lean Stage: Holistic
--------------------------	-----------------------------

Section C: Feedback on the scores achieved in each category

Using a score of 1-10 could you indicate your assessment of the score achieved in each category; 10 if you totally agree with the Lean audit score; 1 if you totally disagree with the Lean audit score?

Categories	Your score
Overall safety, cleanliness and orderliness	9
Production and operational flow	9
Processes and operations	9
Visual management	9
Quality designed into the product	8
Continuous improvement	9
Lean change strategy	8
Lean sustainability	5
Culture employee oriented	8
Organisational culture – organisational practices	9
Lean treated as a business	8
Philosophy	9
Average score obtained for the twelve categories	8

Section D: Any additional comments to be made about the Lean Audit

On the whole we felt that the Lean audit results managed to capture precisely the state of play regards our Lean initiative. We are trying to ensure that the whole organisation's departments and employees begin to work under Lean and only then, will we be able to make further progress. We were not in agreement about the Lean sustainability score since it was felt that the organisation has maintained progress since the decision to embrace Lean had been undertaken. However, having had the post-consultation, we appreciated why the score was lower than we expected but the assumptions made may not materialise – only time will tell! On the whole, the audit has given us an insight into what additional work is needed.

Lean Audit feedback Questionnaire

Section A: General Background

Please State name of your company	Fletcher Moorland Limited
Please name the auditor(s)	Sanjay Bhasin

Section B: Summary of the Lean Audit score

Lean Audit %: 33%	Lean Stage: Mechanical
--------------------------	-------------------------------

Section C: Feedback on the scores achieved in each category

Using a score of 1-10 could you indicate your assessment of the score achieved in each category; 10 if you totally agree with the Lean audit score; 1 if you totally disagree with the Lean audit score?

Categories	Your score
Overall safety, cleanliness and orderliness	8
Production and operational flow	10
Processes and operations	8
Visual management	9
Quality designed into the product	9
Continuous improvement	5
Lean change strategy	9
Lean sustainability	9
Culture employee oriented	9
Organisational culture – organisational practices	9
Lean treated as a business	9
Philosophy	10
Average score obtained for the twelve categories	9

Section D: Any additional comments to be made about the Lean Audit

The organisation has been on the Lean journey for over four years and the audit results acted as a harsh reality check. We agreed with most of the scorings except the continuous improvement score since most of what we perform can be encapsulated under the category of continuous improvement. However, we presume, the results and indices under this category were more concerned with the Lean journey specifically. We did feel that the audit, if undertaken, in two years time would have yielded much better results since we aim to tackle many of the issues indicated in the audit questionnaire. We, also, felt that the investment and effort required for some of these improvements was not fully recognised.

Lean Audit feedback Questionnaire

Section A: General Background

Please State name of your company	Ilford Imaging Limited
Please name the auditor(s)	Sanjay Bhasin

Section B: Summary of the Lean Audit score

Lean Audit %: 34%	Lean Stage: Mechanical
--------------------------	-------------------------------

Section C: Feedback on the scores achieved in each category

Using a score of 1-10 could you indicate your assessment of the score achieved in each category; 10 if you totally agree with the Lean audit score; 1 if you totally disagree with the Lean audit score?

Categories	Your score
Overall safety, cleanliness and orderliness	8
Production and operational flow	9
Processes and operations	9
Visual management	9
Quality designed into the product	8
Continuous improvement	9
Lean change strategy	9
Lean sustainability	9
Culture employee oriented	8
Organisational culture – organisational practices	9
Lean treated as a business	9
Philosophy	9
Average score obtained for the twelve categories	9

Section D: Any additional comments to be made about the Lean Audit

I have to confess that the Lean Audit results have received a very mixed reaction internally within the organisation; few of us who are familiar with Lean feel that overall it is a fair reflection of where the organisation is on the Lean Journey. However, some of the senior management team had felt that Lean had been embedded much more within the whole organisation; they feel that some of the results were rather harsh. The six years since Lean was introduced within the organisation, further progress should and could have been made. Since the cultural implications have been lacking the audit results showed how the overall results were watered down and this will continue to be the case until these issues are addressed.

Lean Audit feedback Questionnaire

Section A: General Background

Please State name of your company	Ina Bearing Company Limited
Please name the auditor(s)	Sanjay Bhasin

Section B: Summary of the Lean Audit score

Lean Audit %: 64%	Lean Stage: Holistic
--------------------------	------------------------------------

Section C: Feedback on the scores achieved in each category

Using a score of 1-10 could you indicate your assessment of the score achieved in each category; 10 if you totally agree with the Lean audit score; 1 if you totally disagree with the Lean audit score?

Categories	Your score
Overall safety, cleanliness and orderliness	9
Production and operational flow	9
Processes and operations	9
Visual management	9
Quality designed into the product	8
Continuous improvement	9
Lean change strategy	8
Lean sustainability	8
Culture employee oriented	7
Organisational culture – organisational practices	7
Lean treated as a business	7
Philosophy	7
Average score obtained for the twelve categories	8

Section D: Any additional comments to be made about the Lean Audit

Whilst, largely, we have accepted the audit scores we do feel that the scoring was somewhat severe in certain areas. Lean has been in operation for over ten years and it covers, we feel, every individual in the organisation. We accept the indices used in the audit but we considered ourselves to be stronger than the score which the audit results have indicated. Whilst the processes and tools were an accurate indication, it is particularly the culture and philosophy scores that we feel were too low. The indices used were extensive and the scores probably did not totally mirror the progress our organisation has achieved in regards culture, sustainability and change.

Lean Audit feedback Questionnaire

Section A: General Background

Please State name of your company	Jaguar Cars
Please name the auditor(s)	Sanjay Bhasin

Section B: Summary of the Lean Audit score

Lean Audit %: 56%	Lean Stage: Enhanced
--------------------------	-----------------------------

Section C: Feedback on the scores achieved in each category

Using a score of 1-10 could you indicate your assessment of the score achieved in each category; 10 if you totally agree with the Lean audit score; 1 if you totally disagree with the Lean audit score?

Categories	Your score
Overall safety, cleanliness and orderliness	8
Production and operational flow	9
Processes and operations	9
Visual management	9
Quality designed into the product	8
Continuous improvement	9
Lean change strategy	9
Lean sustainability	10
Culture employee oriented	8
Organisational culture – organisational practices	8
Lean treated as a business	8
Philosophy	6
Average score obtained for the twelve categories	8

Section D: Any additional comments to be made about the Lean Audit

Whilst by and large we had expected to perform as the scores materialised in the audit, and that the general grades were reasonably fair. However, we felt that the cultural and philosophy marks were somewhat harsher than would have been generally expected. We have an established "Kaizen" team and feel that since many of the tools were in place, the cultural factors were, indeed, being addressed. We do feel that a major reason for some of the low scores can be attributed to the re-organisation that the organisation is imminently expecting to go through. This must have had a bearing on some of the indices. One year ago, the scores might have been different. On the positive side, a detailed action plan could now be derived from the audit results.

Lean Audit feedback Questionnaire

Section A: General Background

Please State name of your company	Leoni Plc
Please name the auditor(s)	Sanjay Bhasin

Section B: Summary of the Lean Audit score

Lean Audit %: 52%	Lean Stage: Enhanced
--------------------------	-----------------------------

Section C: Feedback on the scores achieved in each category

Using a score of 1-10 could you indicate your assessment of the score achieved in each category; 10 if you totally agree with the Lean audit score; 1 if you totally disagree with the Lean audit score?

Categories	Your score
Overall safety, cleanliness and orderliness	9
Production and operational flow	8
Processes and operations	8
Visual management	8
Quality designed into the product	9
Continuous improvement	9
Lean change strategy	9
Lean sustainability	9
Culture employee oriented	8
Organisational culture – organisational practices	10
Lean treated as a business	9
Philosophy	9
Average score obtained for the twelve categories	9

Section D: Any additional comments to be made about the Lean Audit

Whilst we felt that the audit results were generally quite fair, the timing of the audit, from the perspective of the organisation, could have not been much worse; we are probably encountering an imminent major reorganisation whereby some of the impetus we were proud of through our Continuous Improvement team has slipped within the last few years.

Evidently, some of the HR factors so important to Lean have not received the same level of attention and this would have been gathered by the extensive audit.

Nonetheless, one year either after the re-organisation or one year prior to the time the audit was taken may have yielded better audit results for the organisation.

Lean Audit feedback Questionnaire

Section A: General Background

Please State name of your company	Perkins Engines
Please name the auditor(s)	Sanjay Bhasin

Section B: Summary of the Lean Audit score

Lean Audit %: 51%	Lean Stage: Enhanced
--------------------------	-----------------------------

Section C: Feedback on the scores achieved in each category

Using a score of 1-10 could you indicate your assessment of the score achieved in each category; 10 if you totally agree with the Lean audit score; 1 if you totally disagree with the Lean audit score?

Categories	Your score
Overall safety, cleanliness and orderliness	10
Production and operational flow	9
Processes and operations	8
Visual management	9
Quality designed into the product	9
Continuous improvement	7
Lean change strategy	9
Lean sustainability	9
Culture employee oriented	10
Organisational culture – organisational practices	9
Lean treated as a business	9
Philosophy	10
Average score obtained for the twelve categories	9

Section D: Any additional comments to be made about the Lean Audit

The Lean audit results made very interesting reading since generally they accurately depicted the existing situation. We have been on the Lean journey for over seven years and for the last three years have used a sensei who also became an employee of the organisation. However, it was quickly recognised that the internal expertise we had was limited to the application of the tools alone; this position generally was well documented by the audit. Nevertheless, the continuous improvement score was the only one we could have contested; it is an area we take seriously and maybe was not awarded the status that it deserved. We consider that all of our processes have the kaizen principles fully embedded.

Lean Audit feedback Questionnaire

Section A: General Background

Please State name of your company	Ricardo
Please name the auditor(s)	Sanjay Bhasin

Section B: Summary of the Lean Audit score

Lean Audit %: 36%	Lean Stage: Mechanical
--------------------------	-------------------------------

Section C: Feedback on the scores achieved in each category

Using a score of 1-10 could you indicate your assessment of the score achieved in each category; 10 if you totally agree with the Lean audit score; 1 if you totally disagree with the Lean audit score?

Categories	Your score
Overall safety, cleanliness and orderliness	8
Production and operational flow	10
Processes and operations	9
Visual management	9
Quality designed into the product	8
Continuous improvement	9
Lean change strategy	9
Lean sustainability	10
Culture employee oriented	9
Organisational culture – organisational practices	9
Lean treated as a business	9
Philosophy	10
Average score obtained for the twelve categories	9

Section D: Any additional comments to be made about the Lean Audit

Whilst initially the audit results did seem somewhat unsympathetic; it is only after consultations with other Lean consultants whereby there was an overall recognition of our present state of play. We are relatively new to this journey yet had mistaken the level of effort required to reach the higher stages quoted on the Audit scoring sheet. The most important realisation for Ricardo had been that whilst we always strived towards empowerment and improving our communications, the package needed to ensure that Lean is successful goes much deeper than we had anticipated. The philosophy score essentially highlighted the work needed for the company should it wish to take Lean seriously.

Lean Audit feedback Questionnaire

Section A: General Background

Please State name of your company	Royal Doulton Plc
Please name the auditor(s)	Sanjay Bhasin

Section B: Summary of the Lean Audit score

Lean Audit %: 29%	Lean Stage: Developmental
--------------------------	----------------------------------

Section C: Feedback on the scores achieved in each category

Using a score of 1-10 could you indicate your assessment of the score achieved in each category; 10 if you totally agree with the Lean audit score; 1 if you totally disagree with the Lean audit score?

Categories	Your score
Overall safety, cleanliness and orderliness	10
Production and operational flow	9
Processes and operations	9
Visual management	9
Quality designed into the product	8
Continuous improvement	9
Lean change strategy	9
Lean sustainability	10
Culture employee oriented	8
Organisational culture – organisational practices	8
Lean treated as a business	9
Philosophy	8
Average score obtained for the twelve categories	9

Section D: Any additional comments to be made about the Lean Audit

Overall, very few surprises were made evident by the audit carried out. Clearly the scores for our technical elements of the Lean implementation were probably expected; the difficult ones to digest were the culture and philosophy ones; however, after consulting with the audit results in great detail, they too were a fair reflection of our present state of play.

We probably did not appreciate the impact that the supporting infra-structure, i.e., culture, sustainability and change have on an overall Lean audit and feel many organisations in our position would perform similarly. One main lesson learnt was the recognition of the holistic approach that is needed for Lean to flourish.

Lean Audit feedback Questionnaire

Section A: General Background

Please State name of your company	Scapa
Please name the auditor(s)	Sanjay Bhasin

Section B: Summary of the Lean Audit score

Lean Audit %: 46%	Lean Stage: Enhanced
--------------------------	-----------------------------

Section C: Feedback on the scores achieved in each category

Using a score of 1-10 could you indicate your assessment of the score achieved in each category; 10 if you totally agree with the Lean audit score; 1 if you totally disagree with the Lean audit score?

Categories	Your score
Overall safety, cleanliness and orderliness	8
Production and operational flow	10
Processes and operations	9
Visual management	9
Quality designed into the product	8
Continuous improvement	9
Lean change strategy	9
Lean sustainability	8
Culture employee oriented	9
Organisational culture – organisational practices	9
Lean treated as a business	9
Philosophy	9
Average score obtained for the twelve categories	9

Section D: Any additional comments to be made about the Lean Audit

The Lean audit results in essence did not really reveal too much new information that the Continuous Improvement Team were not generally aware of. There was an overall appreciation that whilst Lean has been in operation for a few years that there has existed a pre-occupation with the manufacturing division. There has been some internal wrangling to try and widen the scope of Lean within the whole organisation. Unfortunately we have stumbled across several major barriers; namely suppliers and the money needed to extend Lean to new horizons. The commitment towards Lean is not in question and with that in mind the audit score could have been higher; nonetheless the barriers may have hampered this.

Lean Audit feedback Questionnaire

Section A: General Background

Please State name of your company	Timken Aerospace
Please name the auditor(s)	Sanjay Bhasin

Section B: Summary of the Lean Audit score

Lean Audit %: 60%	Lean Stage: Holistic
--------------------------	------------------------------------

Section C: Feedback on the scores achieved in each category

Using a score of 1-10 could you indicate your assessment of the score achieved in each category; 10 if you totally agree with the Lean audit score; 1 if you totally disagree with the Lean audit score?

Categories	Your score
Overall safety, cleanliness and orderliness	8
Production and operational flow	10
Processes and operations	8
Visual management	9
Quality designed into the product	8
Continuous improvement	9
Lean change strategy	8
Lean sustainability	9
Culture employee oriented	9
Organisational culture – organisational practices	8
Lean treated as a business	9
Philosophy	10
Average score obtained for the twelve categories	9

Section D: Any additional comments to be made about the Lean Audit

The scores we achieved as an organisation on the detailed Lean audit confirmed for us both the progress we have made and ironically the work ahead to fully implement Lean. Some of our tools have been in place in excess of five years and we had a fresh impetus last year. We are not sure as to whether the Lean Audit results fully compensated for this; it was felt that we would have achieved a higher score if the audit had been undertaken in another year's time. However, there is a general admission within the organisation that the supporting structures needed require attention, i.e., communications and culture generally. We were a little surprised at the "change" score since we have always felt that we performed this well.

Lean Audit feedback Questionnaire

Section A: General Background

Please State name of your company	Trentex Engineering
Please name the auditor(s)	Sanjay Bhasin

Section B: Summary of the Lean Audit score

Lean Audit %: 34%	Lean Stage: Mechanical
--------------------------	-------------------------------

Section C: Feedback on the scores achieved in each category

Using a score of 1-10 could you indicate your assessment of the score achieved in each category; 10 if you totally agree with the Lean audit score; 1 if you totally disagree with the Lean audit score?

Categories	Your score
Overall safety, cleanliness and orderliness	8
Production and operational flow	10
Processes and operations	8
Visual management	9
Quality designed into the product	9
Continuous improvement	9
Lean change strategy	9
Lean sustainability	9
Culture employee oriented	10
Organisational culture – organisational practices	9
Lean treated as a business	9
Philosophy	10
Average score obtained for the twelve categories	9

Section D: Any additional comments to be made about the Lean Audit

It was felt that whilst the Lean Audit results were most revealing that they only managed to confirm the task ahead should the company hope to implement Lean earnestly. We have probably played at Lean and whilst there is and has been a commitment, unfortunately the everyday business has always taken precedence. The Lean audit scores have merely reiterated the task ahead should the organisation wish to increase its association with Lean. The company has witnessed the benefits of Lean, but the audit helped to demonstrate that to a large degree we need to view Lean as a long term investment. Equally, owing to the size of the organisation, it is felt that we could achieve much more from Lean since the changes needed should be possible to integrate into the organisation.

Lean Audit feedback Questionnaire

Section A: General Background

Please State name of your company	Unilever
Please name the auditor(s)	Sanjay Bhasin

Section B: Summary of the Lean Audit score

Lean Audit %: 73%	Lean Stage: Holistic
-------------------	----------------------

Section C: Feedback on the scores achieved in each category

Using a score of 1-10 could you indicate your assessment of the score achieved in each category; 10 if you totally agree with the Lean audit score; 1 if you totally disagree with the Lean audit score?

Categories	Your score
Overall safety, cleanliness and orderliness	8
Production and operational flow	9
Processes and operations	8
Visual management	8
Quality designed into the product	8
Continuous improvement	6
Lean change strategy	8
Lean sustainability	9
Culture employee oriented	9
Organisational culture – organisational practices	8
Lean treated as a business	9
Philosophy	9
Average score obtained for the twelve categories	8

Section D: Any additional comments to be made about the Lean Audit

When we received the Lean Audit results, there was initially a mixed reaction within the organisation; firstly we felt that some of the marks were indicative of the progress made, since an overall mark of 73% is quite good; however, we also felt some scores we secured did not fully credit us with the progress the organisation has made. We have been on the Lean journey in excess of fifteen years and felt that we had moved on from just viewing Lean as a toolbox! We have discussed this with Sanjay regards the results and whilst recognise his viewpoint, we felt that the "continuous improvement" score (74%) should have been much higher. We, nonetheless, accept the rigid indices which have been applied and it will prove a useful exercise which we can use to assist us on our journey.

Lean Audit feedback Questionnaire

Section A: General Background

Please State name of your company	Vauxhall Motors Limited
Please name the auditor(s)	Sanjay Bhasin

Section B: Summary of the Lean Audit score

Lean Audit %: 78%	Lean Stage: Innovative
--------------------------	-------------------------------

Section C: Feedback on the scores achieved in each category

Using a score of 1-10 could you indicate your assessment of the score achieved in each category; 10 if you totally agree with the Lean audit score; 1 if you totally disagree with the Lean audit score.

Categories	Your score
Overall safety, cleanliness and orderliness	9
Production and operational flow	9
Processes and operations	8
Visual management	9
Quality designed into the product	8
Continuous improvement	8
Lean change strategy	8
Lean sustainability	9
Culture employee oriented	9
Organisational culture – organisational practices	9
Lean treated as a business	9
Philosophy	10
Average score obtained for the twelve categories	9

Section D: Any additional comments to be made about the Lean Audit

Evidently, when the Lean audit results were communicated to us, whilst the initial reaction was that the results secured on the Lean Audit were slightly derisory, it was also quickly realised that an overall score of 78% on what was considered to be an extensive audit should be clearly celebrated. We are not at the stage whereby the organisation feels it can actually strive towards; consequently we did not secure a score reflecting the “ideological” stage at this juncture. We had a slight concern about the “change” and “continuous improvement” scores; clearly the indices chosen were very stringent and would have had an association with further progress the organisation could have make. Nonetheless, on reflection, we are not too disgruntled with the overall score achieved.

APPENDIX FIVE

The Case Study Management Interview Schedule

A blank copy of the Case Study management interview schedule which was used as part of the Case Study analysis undertaken in seven different organisations.

At least two different informants were used in each organisation in order to complete this form.

Manager's interview schedule

[Hello! Thank you, for being willing to take part in this interview; my Name is Sanjay Bhasin; the information you provide is merely for my benefit as part of a PhD programme I am nearing completion at Aston University. I assure you that the responses you give will remain completely anonymous and no records of the interview will be kept with your name on them.]

Section A: General Background

A1 Name of the organisation: _____

A2 Could you summarise your position in the company:

A3 Please briefly describe your understanding of the term **Lean manufacturing/Lean enterprise/ Lean**:

Section B: Lean adoption

[In Britain there are numerous reasons forwarded for the adoption of Lean. This section tries to examine the reasons why your organisation (name) decided to adopt Lean in the first instance.] Could you indicate what factors you feel prompted your organisation to embark upon Lean; please state the most important first, proceeding to the least significant:

Most important



Least significant

[May need to probe the status of: customer pressure, improving performance, competitor pressure, create team spirit, owner/investor pressure, working conditions and attending a special conference amongst others.]

Section C : Lean progress

[The UK's record regards Lean has been mixed; it would be interesting to gain an insight into the operational aspects of Lean within your organisation (name).] Using a scale of 1 – 10, i.e., “10” if you agree with the statement read to you without any reservations and unequivocally; “1” if you feel that the statement is totally false and you disagree with its content wholeheartedly; “5” if it is somewhere in the middle, i.e., you agree with the content of the statement but equally feel that there is room for improvement.

Statement	Score 1 - 10
I have the necessary tools to implement Lean	
The tools used in the company are of good quality	
Appropriate training is provided to operate Lean	
Appropriate time is given to make improvements	
Senior management's attitude is right to accept Lean	
Middle management's attitude is appropriate for Lean	
Workers approach is right to implement change and accept Lean	
Organisational culture aids Lean	

Are there any other points you wish to make regards Lean's progress within your organisation which have not been covered above:

Section D: What does Lean mean for you personally?

[Undoubtedly, companies introduce initiatives which they feel will benefit the whole organisation; nonetheless; for individuals initiatives are often viewed from a very personal perspective]. Can you briefly summarise the effect Lean has on you personally; Please indicate the most important first and proceeding to the least significant finally.

Most important

↓

Least Significant

[May need to probe the status of: more pay, job security, potentially more pressure and better career prospects amongst others.]

Section E: Potential barriers to Lean

[The record of Lean in the UK is mixed]; for your organisation please indicate any barriers to either uptake Lean or to widen its adoption (scoring guide: “1” to be awarded if it posed no concern and no difficulties; “10” to be awarded if it posed a major barrier and has proven difficult to breakdown.)

Barriers		Score
1	Insufficient understanding of the potential benefits	
2	Insufficient internal funding	
3	Insufficient external funding	
4	Insufficient senior management skills to implement Lean	
5	Insufficient supervisory skills to implement Lean	
6	Insufficient workforce skills to implement Lean	
7	The need to convince shareholders / owners	
8	Insufficient management time	
9	Employee attitudes /resistance to change	
10	Cost of the investment	
11	Cultural issues	
12	Others (please specify below)	

Are there any other aspects you wish to mention at this stage?

Section F: Why do you feel the organisation has embraced Lean?

[Moving away from the technical aspects; your organisation’s (name company) senior management have taken the decision to embrace Lean with view towards accomplishing certain goals.] For the statements to be read to you, please use a scoring scale of 1 – 10, i.e., “10” if you agree with the statement read to you without any reservations and unequivocally; “1” if you feel that the statement is totally false and you disagree with its content wholeheartedly; “5” if it is somewhere in the middle, i.e., you agree with the content of the statement but equally feel that there is room for improvement.

Statement	Score 1 –10
Higher profitability	
Higher productivity	
Lower costs	
Attain improved delivery records	
To carry less stock	
Improve relations with suppliers / customers	
Improve relations between shop floor and management	
Improve communications between departments	
Better teamwork	
Improve worker production	
Improve customer service	

Improve market share	
Improve efficiency	
Reduce down time	
Become more competitive	
Reduce any waste	

Do you feel you wish to add or clarify further points in reference to the reasons why the company (*name of the company*) adopted Lean:

Section G: Cultural implications (technical)

1] *[This section examines the extent of Lean adoption within your organisation (name)].* You are merely required to respond to its true level of adoption within your value chain by agreeing with one of the following statements:

Lean occurs across whole value chain	
Lean is in our company only	
Lean is in Manufacturing and Supply sections only	
Lean is in Manufacturing or supply sections	
Lean is in some units of manufacturing or supply departments	
Only a few isolated tools are used	

2] Could you indicate how long Lean or Continuous improvement has been practised in your organisation without interruption:

Period: _____

3] *[We often hear the phrase “Lean Toolbox” which is a collective term for the appropriate technical components that in concert form the systems incorporated under the Lean umbrella. The following section has a list of the respective tools and you are requested to indicate each one’s level of adoption within the company].* Could you utilise a scoring guide of 1 – 10; (“1” to be awarded if this tool is not applicable within the organisation and there are no plans to implement it in the future; “10” to be awarded if it is fully operational within the company and total commitment is awarded to it)

1	Kiazen / continuous improvement	
2	Cellular manufacturing	
3	Kanban systems	
4	Single piece flow operations	
5	Process mapping	
6	Single Minute Exchange of Dies (SMED)	
7	Step change / kaikaku	
8	Supplier Development – activating links with suppliers	
9	Supplier base reduction	
10	5’s and general visual management	
11	Total Productive Maintenance	
12	Attacking value and the seven wastes	

Please add any thing else you wish regards the adoption of Lean tools within your organisation:

Section H: Cultural implications

[The following section is a gauge of the cultural implications existing within the organisation (name) to assist the spread of Lean within it]. Please use the following scale to reflect whether or not you agree with the statement. “**Strongly agree**” if the statement is an absolutely accurate reflection and you agree with its content unreservedly; “**Strongly disagree**” if the content of the statement is felt to be totally false and one with which you entirely disagree with.

Decisions in the organisations are made at the lowest level possible:

Strongly Agree	Agree	Somewhat agree	disagree	Strongly Disagree

The shop-floor is listened to more widely than was the case before Lean:

Strongly Agree	Agree	Somewhat agree	disagree	Strongly Disagree

All management levels are listened to more widely now, than before Lean:

Strongly Agree	Agree	Somewhat agree	disagree	Strongly Disagree

The organisation’s direction and destination for 5 years is now much clearer:

Strongly agree	Agree	Somewhat agree	disagree	Strongly Disagree

The company has one particular person who is directing operations and the proposals are clearly communicated:

Strongly agree	Agree	Somewhat agree	disagree	Strongly Disagree

People are clear regarding their expectations from Lean:

Strongly agree	Agree	Somewhat agree	disagree	Strongly Disagree

There is adequate training to assist Lean’s progress:

Strongly agree	Agree	Somewhat agree	disagree	Strongly Disagree

All managers' tiers seem to be pulling in the same direction to make Lean work:

Strongly agree	Agree	Somewhat agree	disagree	Strongly Disagree

The company is now a better place to work in since the introduction of Lean:

Strongly agree	Agree	Somewhat agree	disagree	Strongly Disagree

I fully understand why Lean is needed in the organisation:

Strongly agree	Agree	Somewhat agree	disagree	Strongly Disagree

The various departments seem to work better and have a healthier relationship than was the case prior to Lean:

Strongly agree	Agree	Somewhat agree	disagree	Strongly disagree

The outcomes of Lean have been communicated thoroughly:

Strongly agree	Agree	Somewhat agree	disagree	Strongly Disagree

Metrics to judge Lean are clear to observe and the information is cascaded downwards regularly:

Strongly agree	Agree	Somewhat agree	disagree	Strongly Disagree

Greater efforts are made to involve suppliers than was the case before Lean:

Strongly agree	Agree	Somewhat agree	disagree	Strongly Disagree

Greater efforts are made to involve customers than was the case before Lean:

Strongly agree	Agree	Somewhat agree	disagree	Strongly Disagree

The Lean journey is linked to the organisation's mission statement / vision:

Strongly Agree	Agree	Somewhat agree	disagree	Strongly Disagree

Please add any other aspects you think are important and relevant regards the cultural implications:

Section I : What do you think Lean has accomplished?

[The following section explores the accomplishments of Lean; again the evidence on this is mixed, so it would be beneficial to view it from your organisation's (name) perspective.]

This section requires you to suggest the actual impact you feel Lean has had on your organisation (name) with view to certain indices. It does not require protruded calculations but an indication of a percentage improvement or deterioration for each parameter would be useful. *[If you can estimate a percentage please do so, otherwise, indicate in your opinion whether it has improved or not]*

- Deterioration	Measurement	+ Improvement
Finance	Company profitability	
	Company share prices	
	Company liquidity	
	Earnings per share	
Customer	More satisfied customers	
	Market Share	
	Service quality	
	Delivery records	
	Better relationship with customers	
Process	NPD lead time	
	Overall cycle time	
	Quality of new products	
	Quality costs	
	Defects of critical products /Components	
	Raw material costs	
	Capital efficiency	
	Labour efficiency	
	Finished stock	
	WIP stock	
People	Absenteeism	
	Labour turnover	
	Quality of leadership development	
	The relationship between management and the shop-floor	
	Better communications	
Future	New product development	
	Looking for new markets	
	Investment in new technology	
	Sales from new products (< 5 years)	
	Anticipating new changes	

[Finally, I wish to take this opportunity to thank you very much for helping me and in giving up your time]. Before we finish, can I finally ask you, if you think there is any aspect of your experience within the context discussed that has not been covered in the interview:

[Many thanks for your cooperation and I will keep you informed of my findings; equally to reiterate that your responses will remain completely anonymous regards the organisation (name) is concerned. Many thanks again and I wish you the best of luck.]

APPENDIX SIX

The Case Study Management Questionnaire

A blank copy of the Case Study Management questionnaire which was used as part of the Case Study analysis undertaken in seven different organisations.

At least two different informants were used in each organisation in order to complete this form.

Manager's Questionnaire

Section A: General Background

A1 Please state the name of your organisation: _____

A2 Could you summarise your role in the company:

A3 Briefly describe your understanding of the term *Lean manufacturing/Lean enterprise/ Lean*:

Section B: Lean adoption

Using the scale below, could you indicate what factors you feel prompted your organisation to consider Lean in the first instance:

Statement	Scale				
	Strongly Agree	Agree	Somewhat agree	disagree	Strongly disagree
Customer pressure					
To improve performance					
Competitor pressure					
Create team spirit / motivational tool					
Owner / Investor pressure					
Better working conditions					
As a result of attending a special event/conference					

Please specify any other factors you may consider relevant:

Section C : Lean progress

Using the scale below, could you indicate the extent to which you agree with each Statement concerning Lean’s progress within your organisation:

Statement	Scale				
	Strongly agree	Agree	Somewhat agree	disagree	Strongly disagree
I have the necessary tools to implement Lean					
Tools used are of good quality					
Appropriate training is provided					
Appropriate time is given to make improvements					
Senior management attitude/commitment is right to accept Lean					
Middle managers’ approach is right to implement Lean					
Workers approach is right to implement change					
Organisation’s culture aids Lean					

Please specify any other factors you may consider relevant:

Section D : What does Lean mean for you personally?

Using the scale below, could you indicate the extent to which you agree with each statement concerning Lean and you (on a personal level):

Statement	Scale				
	Strongly agree	Agree	Somewhat agree	disagree	Strongly disagree
Will result in more pay					
My job is more secure					
I will encounter more pressure					
Better career prospects					

Section E: Potential barriers to Lean

Indicate any barriers to either uptake Lean or to widen its adoption (scoring guide: “1”: if it posed no concern and no difficulties; “10” if it posed a major barrier and has proven difficult to breakdown.)

Barriers		Score
1	Insufficient understanding of the potential benefits	
2	Insufficient internal funding	
3	Insufficient external funding	
4	Insufficient senior management skills to implement Lean	
5	Insufficient supervisory skills to implement Lean	
6	Insufficient workforce skills to implement Lean	
7	The need to convince shareholders / owners	
8	Insufficient management time	
9	Employee attitudes /resistance to change	
10	Cost of the investment	
11	Cultural issues	
12	Others (please specify below)	

Please specify other factors, regards barriers, which you feel are relevant at this stage:

Section F Why do you feel the organisation has embraced Lean?

Using the scale below, please indicate the extent to which you agree with each of the statements concerning why Lean was introduced to your organisation:

Statement	Scale				
	Strongly agree	Agree	Somewhat agree	disagree	Strongly disagree
Higher profitability					
Higher productivity					
Lower costs					
Improved delivery records					
To carry less stock					
Improve relations with suppliers / customers					
Improve relations between shop floor and management					
Improve communications between departments					
Better teamwork					
Improve worker production					
Improve customer service					
Improve market share					

Improve efficiency					
Reduce down time					
Become more competitive					
Reduce any waste					

Please specify any other factors you may consider relevant:

Section G: Cultural (technical)

1a] **Using the table below, could you indicate the extent to which Lean operates within your organisation:**

Lean occurs across the whole value chain	
Lean is in our company only	
Manufacturing and Supply functions only	
Manufacturing or supply functions only	
Some units of manufacturing or supply functions only	
Few isolated tools are used	

1b] **Indicate the length of time the organisation has continuously been on the Lean journey:**

0 - 6 months	7 months - 1 year	1 - 2 years	3 - 4 years	5 -6 years	7+ years

2] **From the list of Lean tools below, please indicate which ones apply to your organisation** (scoring guide: “1” to be awarded if this tool is not applicable within the organisation and there are no plans to implement it in the future; “10” to be awarded if it is fully operational within the company and total commitment is awarded to it)

1	Kiazen / continuous improvement	
2	Cellular manufacturing	
3	Kanban systems	
4	Single piece flow operations	
5	Process mapping	
6	Single Minute Exchange of Dies (SMED)	
7	Step change / kaikaku	
8	Supplier Development – activating links with suppliers	
9	Supplier base reduction	
10	5’s and general visual management	
11	Total Productive Maintenance	
12	Attacking value and the seven wastes	

Please specify any other factors you may consider relevant:

Section H: Cultural implications

The following section is intended to gauge the cultural implications in place to assist the organisation on its Lean journey. Please use the following scale to reflect whether or not you agree with the statement:

Statement					
	Scale				
	Strongly agree	Agree	Somewhat agree	disagree	Strongly disagree

Decisions in the organisations are made at the lowest level possible:

Strongly Agree	Agree	Somewhat agree	disagree	Strongly Disagree

The shop-floor is listened to more widely than was the case before Lean:

Strongly Agree	Agree	Somewhat agree	disagree	Strongly Disagree

All management levels are listened to more widely now, than before Lean:

Strongly Agree	Agree	Somewhat agree	disagree	Strongly Disagree

The organisation's direction and destination for 5 years is now much clearer:

Strongly agree	Agree	Somewhat agree	disagree	Strongly Disagree

The company has one particular person directing operations and the proposals are clearly communicated:

Strongly agree	Agree	Somewhat agree	disagree	Strongly Disagree

People are clear regarding their expectations from Lean:

Strongly agree	Agree	Somewhat agree	disagree	Strongly Disagree

There is adequate training to assist Lean's progress:

Strongly agree	Agree	Somewhat agree	disagree	Strongly Disagree

All managers' tiers seem to be pulling in the same direction to make Lean work:

Strongly agree	Agree	Somewhat agree	disagree	Strongly Disagree

The company is now a better place to work in since the introduction of Lean:

Strongly agree	Agree	Somewhat agree	disagree	Strongly Disagree

I fully understand why Lean is needed in the organisation:

Strongly agree	Agree	Somewhat agree	disagree	Strongly Disagree

The various departments seem to work better and have a healthier relationship than was the case prior to Lean:

Strongly agree	Agree	Somewhat agree	disagree	Strongly disagree

The outcomes of Lean have been communicated thoroughly:

Strongly agree	Agree	Somewhat agree	disagree	Strongly Disagree

Metrics to judge Lean are clear to observe and the information is cascaded downwards regularly:

Strongly agree	Agree	Somewhat agree	disagree	Strongly Disagree

Greater efforts are made to involve suppliers than was the case before Lean:

Strongly agree	Agree	Somewhat agree	disagree	Strongly Disagree

Greater efforts are made to involve customers than was the case before Lean:

Strongly agree	Agree	Somewhat agree	disagree	Strongly Disagree

The Lean journey is linked to the organisation's mission statement / vision:

Strongly Agree	Agree	Somewhat agree	disagree	Strongly Disagree

Section I: What has Lean accomplished for your organisation?

In the following section you are required to state whether the following parameters or indices have improved or deteriorated as a result of adopting Lean?

[if you can estimate a percentage please do so, otherwise, indicate whether in your opinion it has improved or not]

- Deterioration	Measurement	+ Improvement
Finance	Company profitability	
	Company share prices	
	Company liquidity	
	Earnings per share	
Customer	More satisfied customers	
	Market Share	
	Service quality	
	Delivery records	
	Better relationship with customers	
Process	NPD lead time	
	Overall cycle time	
	Quality of new products	
	Quality costs	
	Defects of critical products /components	
	Raw material costs	
	Capital efficiency	
	Labour efficiency	
	Finished stock	
	WIP stock	
People	Absenteeism	
	Labour turnover	
	Quality of leadership development	
	The relationship between management and the shop-floor	
	Better communications	
Future	New product development	
	Looking for new markets	
	Investment in new technology	
	Sales from new products (< 5 years)	
	Anticipating new changes	

Please add any other information you feel is relevant regards Lean but have not had the opportunity in the earlier sections:

Thank you for taking the time to complete the form. I can assure you that the responses you gave will remain completely anonymous and no records of the interview will be kept with your name on them. The information you provided is merely for my benefit as part of a PhD programme I am nearing completion at Aston University.

Sanjay Bhasin

e-mail:sanjay.bhasin@hmpps.gsi.gov.uk

APPENDIX SEVEN

The Case Study Shop-floor Interview Schedule

A blank copy of the Case Study Shop Floor Interview schedule which was used as part of the Case Study analysis undertaken in seven different organisations.

At least two different informants were used in each organisation in order to complete this form.

Shop Floor Interview Schedule

[Hello! my name is Sanjay Bhasin; Thank you for being willing to take part in this interview; can I first of all assure you that the responses you give will remain completely anonymous and no records of the interview will be kept with your name on them. The information you provide is merely for my benefit as part of a PhD programme which I am nearing completion at Aston University.]

Section A: General Background

A1 Please state your Company's name _____

A2 Could you summarise your role in the company:

A3 Briefly describe what you understand by the term *Lean manufacturing/Lean enterprise/ Lean*:

Section B: Lean adoption

[This section tries to examine the reasons why your organisation (name) decided to adopt Lean in the first instance.] Could you indicate what factors you feel prompted your organisation to embark upon Lean; please state the most important first and proceed to the least significant:

Most Important	
↓	
↓	
↓	
Least Significant	

[May need to probe the status of : customer pressure, improving performance, competitor and/or management pressure and working conditions amongst others .]

Section C : Lean progress

[The record in Britain regards Lean has been mixed; it would be interesting to gain an insight into the operational aspects of Lean within your organisation.] Using a scale of 1 – 10, i.e., “10” if you agree with the statement read to you without any reservations and unequivocally; “1” if you feel that the statement is totally false and you disagree with its content wholeheartedly; equally “5” if it is somewhere in the middle, i.e., you agree with the content of the statement but equally feel there is room for improvement.

Statement	Score 1-10
You have the necessary tools to implement Lean	
The tools used in the company are of good quality	
Appropriate training is provided to operate Lean	
Appropriate time is given to make improvements	
Management attitude / commitment is right to accept Lean	

Workers approach is right to implement change and accept Lean	
Organisational culture aids Lean	

Please state any other factors you may feel relevant regards the progress of Lean within the organisation:

Section D: What does Lean mean to you on a purely personal level?

[Undoubtedly, companies introduce initiatives which they feel will benefit the whole organisation; nonetheless, any initiative is viewed from a personal perspective by all of us; can you briefly summarise the effects of Lean on you personally.] Could you please mention the most important first and proceed to the least significant finally.

Most Important

↓

Least Significant

[May need to probe the status of: more pay, job security, potentially more pressure and better career prospects amongst others.]

Section E: Why do you feel the organisation has embraced Lean

[Moving away from the personal perspective, the company's (name company) senior management team have taken the decision to embrace Lean with view towards accomplishing certain goals.] In respect to the statements to be read to you, please use a scoring scale of 1 – 10, i.e., “10” if you agree with the statement read to you without any reservations and unequivocally; “1” if you feel that the statement read to you is totally false and you disagree with its content wholeheartedly.

Statement – that the company adopted Lean in order to secure:	Score 1 - 10
Higher profitability	
Higher productivity	
Lower costs	
To carry less stock	
Improve relations with suppliers / customers	
Improve relations between shop floor and management	
Improve communications between departments	
Better teamwork	
Improve worker production	
Improve customer service	
Improve market share	
Reduce down time	
Become more competitive	
Reduce any waste <i>[may need to explain the concept]</i>	

Do you wish to add further points to clarify the reasons why, you feel, your company (*name the company*) adopted Lean:

Section F: Cultural implications

[The following section is a gauge of the cultural implications prevalent within the organisation (name) to assist the spread of Lean within it.] Please, use the following scale to reflect your thoughts on each statement. “**Strongly agree**” if the statement is an absolutely true indication and you agree with its content unreservedly; “**Strongly disagree**” if the content of the statement is felt to be totally false and one with which you entirely disagree with.

The Shop-floor is listened to more widely than was the case before Lean:

Strongly agree	Agree	Somewhat agree	Disagree	Strongly Disagree

There is a clear sense of direction now as regards where the company wishes to be in a few years time:

Strongly agree	Agree	Somewhat agree	disagree	Strongly Disagree

The company has one particular person who is directing operations and the proposals are clearly communicated:

Strongly agree	Agree	Somewhat agree	disagree	Strongly Disagree

People are clear regards their expectations from Lean:

Strongly agree	Agree	Somewhat agree	disagree	Strongly Disagree

There is adequate training available to assist the whole concept of Lean to be successful:

Strongly agree	Agree	Somewhat agree	disagree	Strongly Disagree

The managers at all levels seem to be pulling in the same direction to make Lean work within the organisation:

Strongly agree	Agree	Somewhat agree	disagree	Strongly disagree

The company is now a better place to work in since the introduction of Lean:

Strongly agree	Agree	Somewhat agree	disagree	Strongly disagree

I fully understand why Lean is needed in the organisation:

Strongly agree	Agree	Somewhat agree	disagree	Strongly disagree

The various departments seem to work better and have a healthier relationship than was the case prior to Lean:

Strongly agree	Agree	Somewhat agree	disagree	Strongly disagree

The outcomes of Lean have been communicated thoroughly:

Strongly agree	Agree	Somewhat agree	disagree	Strongly Disagree

Metrics to judge Lean are clear to observe and the information is cascaded downwards regularly:

Strongly agree	Agree	Somewhat agree	disagree	Strongly Disagree

Efforts are made to involve customers more as a result of Lean:

Strongly agree	Agree	Somewhat agree	disagree	Strongly Disagree

Efforts are made to involve suppliers more as a result of Lean:

Strongly agree	Agree	Somewhat agree	disagree	Strongly Disagree

Section G: What do you think Lean has accomplished:

[We are now approaching the end of the interview and I acknowledge your co-operation; the final section examines the influence Lean has had upon your organisation (name) in respect to various indices.]

This section requires you to suggest the actual impact you feel Lean has had on your organisation (*name*). It does not require protruded calculations but an indication of a percentage improvement or deterioration as a result of Lean for each parameter that will be presented to you. *[If you can estimate a percentage please do so, otherwise, indicate whether in your opinion it has led to an improvement or not.]*

- Deterioration	Measurement	+ Improvement
Finance	Company profitability	
	Company share prices	
	Has more available cash	
Customer	More satisfied customers	
	Market share	
	Service quality	
	Delivery records	
	Better relationship with customers	
Process	NPD lead time	
	Overall cycle time	
	Quality of new product development	
	Quality costs	
	Raw material costs	
	Finished stock	
People	Absenteeism	
	Labour turnover	
	The relationship between management and the shop-floor	
	Better communications	
Future	New product development	
	Looking for new markets	
	Investment in new technology	
	Sales from new products (< 5 years)	

[Finally, I wish to take this opportunity to thank you very much for helping me and in giving up your time. Before we finish, is any aspect of your experience within the context we have discussed which has not been covered or you wish to clarify further?]

[Many thanks for your cooperation and I will keep you informed of my findings; equally, to reiterate that your responses will remain completely anonymous in regards the organisation (name) is concerned. Again, I appreciate your time and wish you the best of luck!]

APPENDIX EIGHT

The Case Study Shop-floor Questionnaire

A blank copy of the Case Study Shop Floor Questionnaire used as part of the Case Study analysis undertaken in seven different organisations.

At least two different informants were used in each organisation in order to complete this form.

Shop Floor Questionnaire

Section A: General Background

A1 Please state your organisation's name: _____

A2 Could you summarise your role in the company:

A3 Briefly describe your understanding of the term *Lean manufacturing / Lean Enterprise / Lean*:

Section B: Lean adoption

Using the scale below, could you indicate what factors you feel prompted your organisation to consider Lean in the first instance:

Statement	Scale				
	Strongly Agree	Agree	Somewhat agree	disagree	Strongly disagree
Customer pressure					
To improve performance					
Competitor pressure					
Better working conditions					
As a result of attending a special event/conference					

Please specify any other factors you may consider relevant:

Section C: Lean Progress

Using the scale below, could you indicate the extent to which you agree with each statement concerning Lean's progress within your organisation:

Statement	Scale				
	Strongly Agree	Agree	Somewhat agree	disagree	Strongly Disagree
I have the necessary tools to implement Lean					
Tools used are of good quality					
Appropriate training is provided					
Appropriate time is given to make improvements					
Management attitude / commitment is right to accept Lean					
Workers approach is right to implement change					
Organisation's culture aids Lean					

Please specify any other factors you may consider relevant:

Section D: What does Lean mean for you on a purely personal Level?

Using the scale below, could you indicate the extent to which you agree with each statement concerning Lean and you (on a personal level):

Statement	Scale				
	Strongly Agree	Agree	Somewhat agree	Disagree	Strongly disagree
Will result in more pay					
My job is more secure					
I will encounter more pressure					
Better career prospects					

Section E: Why do you feel the organisation has embraced Lean?

Using the scale below, please indicate the extent to which you agree with each of the statements regards the expectations from Lean in your organisation:

Statement	Scale				
	Strongly Agree	Agree	Somewhat agree	Disagree	Strongly disagree
Higher profitability					
Higher productivity					
Lower costs					
To carry less stock					
Improve relations with suppliers / customers					
Improve relations between shop floor and management					
Improve communications between departments					
Better teamwork					
Improve worker production					
Improve customer service					
Improve market share					
Reduce down time					
Improve our competitiveness					
Reduce any waste					

Please specify any other factors you may consider relevant:

Section F: Cultural implications

The following section is intended to gauge the cultural implications in place to assist your organisation on its Lean journey. Please use the following scale to reflect the degree to which you agree with each statement:

Statement	Scale				
	Strongly Agree	Agree	Somewhat agree	Disagree	Strongly disagree

The Shop-floor is listened to more widely than was the case before Lean:

Strongly agree	Agree	Somewhat agree	disagree	Strongly Disagree

There is a clear sense of direction now as regards where the company wishes to be in a few years time:

Strongly agree	Agree	Somewhat agree	disagree	Strongly Disagree

The company has one particular person who is directing operations and the proposals are clearly communicated:

Strongly agree	Agree	Somewhat agree	disagree	Strongly Disagree

People are clear regards their expectations from Lean:

Strongly agree	Agree	Somewhat agree	disagree	Strongly Disagree

Adequate training is available to assist the organisation on its Lean journey:

Strongly Agree	Agree	Somewhat agree	disagree	Strongly Disagree

The managers at all levels seem to be pulling in the same direction to make Lean work within the organisation:

Strongly agree	Agree	Somewhat agree	disagree	Strongly Disagree

The company is now a better place to work in since the introduction of Lean:

Strongly agree	Agree	Somewhat agree	disagree	Strongly Disagree

I fully understand why Lean is needed in the organisation:

Strongly agree	Agree	Somewhat agree	disagree	Strongly Disagree

The various departments seem to work better and have a healthier relationship than was the case prior to Lean:

Strongly agree	Agree	Somewhat agree	disagree	Strongly disagree

The outcomes of Lean have been communicated thoroughly:

Strongly agree	Agree	Somewhat agree	disagree	Strongly Disagree

Measures to judge Lean progress are clear to observe and the information is cascaded downwards regularly:

Strongly agree	Agree	Somewhat agree	disagree	Strongly Disagree

Greater efforts are made to involve Customers than was the case before Lean:

Strongly agree	Agree	Somewhat agree	Disagree	Strongly Disagree

--	--	--	--	--

Greater efforts are made to involve suppliers than was the case before Lean:

Strongly agree	Agree	Somewhat agree	disagree	Strongly Disagree

Section G: What has Lean accomplished for your section and the company?

In the following section you are required to state whether the following indices or parameters have improved or deteriorated as a result of adopting Lean?

[if you can estimate a percentage please do so, otherwise, indicate whether in your opinion it has improved or not]

- Deterioration	Measurement	+ Improvement
Finance	Company profitability	
	Company share prices	
	Has more available cash	
Customer	Better satisfied customers	
	Market share	
	Service quality	
	Delivery records	
	Better relationship with customers	
Process	NPD lead time	
	Overall cycle time	
	Quality of new product development	
	Quality costs	
	Raw material costs	
	Finished stock	
People	Absenteeism	
	Labour turnover	
	The relationship between management and the shop-floor	
	Better communications	
Future	New product development	
	Looking for new markets	
	Investment in new technology	
	Sales from new products (< 5 years)	

Please add any other information you feel is relevant regards Lean but have not had the opportunity to do so in the earlier sections:

Thank you for taking the time to complete the form. I can assure you that the responses you gave will remain completely anonymous and no records of the interview will be kept with your name on them. The information you provided is merely for my benefit as part of a PhD programme which I am nearing completion at Aston University.

Sanjay Bhasin

e-mail: sanjay.bhasin@hmps.gsi.gov.uk

APPENDIX NINE

The Case Study Protocol

It was considered imperative to outline the Case study protocol that the research pursued. In reference to this investigation the protocol essentially contains not only the process for the research, but also the procedures and the general rules that were followed using the instrument; namely:

- The overview of the study project (objectives, issues, literature and research)
- Key relevant issues of the investigation,
- Field procedures (access to respective organisations, sources of information),
- Case study methodology adopted,
- The key classifications,
- Additional investigations undertaken and
- A guide for the Case study report.

Case Study Protocol

Contents

Section		Page
1.0	Case Study Protocol	103
1.1	Objectives of the Research	103
1.2	Key Issues of the Research	103
1.3	Specific Issues	103
1.4	Field Procedures	104
1.4.1	Company Personnel involved	104
1.5	Case Study Methodology	104
1.5.1	Interviews	105
1.5.2	Questionnaires	105
1.5.2.1	<i>Questionnaire evaluation</i>	105
1.5.3	Pilot Case Study	106
1.5.4	The Puttick Grid	106
1.5.4.1	<i>The Puttick Classification</i>	106
1.5.4.2	<i>Small, Medium or Large</i>	107
1.5.5	Case Study organisations	107
1.6	Subsequent Visit	107
1.6.1	Lean Audit	108
1.6.2	Feedback on the Lean Audit	108
1.7	Case Study Report guidelines	108
1.7.1	Report Structure	109

1.0 Case Study Protocol

It was considered imperative to outline the Case study protocol that the research pursued. In reference to this investigation the protocol essentially contains not only the process for the research, but also the procedures and the general rules that were followed using the instrument; namely:

- The overview of the study project (objectives, issues, literature and research),
- Key relevant issues of the investigation,
- Field procedures (access to respective organisations, sources of information)
- Case study methodology adopted,
- The key classifications,
- Additional investigations undertaken,
- A guide for the Case study report

1.1 Objectives of the research

The predominant objective of the research using Case Studies was to obtain evidence with view towards further exploring three foremost aims:

- the need to specifically and precisely determine whether an organisation has adopted “*Lean as a philosophy*” as opposed to another process or strategy. This required the need to clarify accurately:
 - what is meant by philosophy within the Lean context and
 - undertake an assessment to evaluate whether an organisation had embraced specific criteria viewed as imperative in order to construe that it had adopted Lean as an ideology,
- Consequently, it is necessary to be able to assess whether the organisations embracing Lean as an ideology were more successful; to evaluate this it was necessary to judge their performance utilising key strategic indices, and
- to categorize the juncture of a Lean Journey an organisation occupies at any particular phase of its overall Lean implementation. Accordingly, once the stages were clarified and an organisation’s position was established it would then be feasible to make recommendations in order to facilitate an organisation’s progress whereby it embraces Lean as a philosophy.

1.2 Key issues of the research

Essentially, the Case studies were used to augment the Survey Questionnaires already undertaken within the respective organisation; in total sixty-eight organisations consented to complete the Survey questionnaire and the seven case studies assisted to initially supplement and then subsequently augment the findings.

1.3 Specific issues

Specifically in relation to the hypothesis there were several key issues of the research:

- to investigate whether Lean is simply perceived as another strategy which the organisation can either replace or recoil from; or
- is Lean viewed as a philosophy whereby inherently the company views itself on a perpetual journey; equally,
- do the perceptions regards Lean coincide between both the management team and the shop floor?
- Similarly, an extensive audit questionnaire has been developed utilising a radar chart that was intended to establish at which juncture of the Lean journey the organisation presently occupies. Twelve categories with accompanying set of indices for each cluster were used in the assessment:
 - Overall safety, cleanliness and order,
 - Production and operation flow,
 - Process and operations,

- Visual management,
- Quality designed into the product,
- Continuous improvement,
- Lean change strategy,
- Lean sustainability,
- Culture – employee oriented,
- Organisational culture – organisational practices,
- Lean treated as a business and
- Lean philosophy.

Whilst, there is a specific category allocated towards judging whether the organisation views Lean as a philosophy, it is crucial to stress that all twelve categories were used to determine exactly the phase of the Lean journey that the organisation currently occupies.

1.4 Field procedures

It is important to acknowledge the appropriate procedures followed since these both aided the data capture process and provided rigour to the subsequent analysis. At least eight informants were used in each case study; the split was as follows:

- two managers interviewed in a semi-structured manner using interview schedules,
- two shop floor operatives interviewed in a semi structured manner again utilising interview schedules,
- two different managers were requested to complete a questionnaire,
- two different shop floor operatives were also asked to complete a questionnaire; subsequently the organisation was re-visited and
- a detailed Lean audit was undertaken to substantiate the findings of both the Case studies and the Survey questionnaire. The Lean audit permitted the placing of the organisation on a particular juncture of its Lean journey; and
- accordingly the organisation was awarded the opportunity to complete a questionnaire to either refute or substantiate the results of the extensive Lean audit.

1.4.1 Company Personnel involved

It was also decided that at least one informant taking part in both the interview schedule and the questionnaire would need to hold the role of a senior manager, i.e., an individual who is either a member or directly reports to the company's Board of Directors. Access to information, on every occasion, was obtained through a trusted intermediary. The initial contact with the respondent firm was also made at the highest level possible. A friendly gatekeeper or guide was utilised as soon as was possible. The documentary evidence was sought to support the verbal information. Similarly an attempt was made to secure multiple interviews per site to make it both efficient in time and the level of inconvenience exerted upon the respondent organisation. Every effort was made to interview the informants in their immediate surrounding, i.e. office or in the case of operatives on the shop floor. Likewise, strenuous efforts were made to engage as many members of the staff as possible, including administration staff and union representatives in general conversation about the firm. This triangulation was chiefly for the purposes of data validation and moderately assisted to assess the prevailing culture of the organisation too.

1.5 Case Study Methodology

It was important to secure responses from both the management team and the shop floor. Consequently, the data capture needed to reflect the views of these groups of people; consequently, the following were utilised:

- Shop-floor questionnaire,
- Management questionnaire,
- Shop-floor interview schedule and a
- Management interview schedule.

1.5.1 Interviews

Interviews were chosen since they can be associated with both positivist and phenomenological methodologies. It was important to take advantage of interviews. Whilst evidently, there exists the free range interview with a fluid agenda and open ended questions it was decided to pursue the commonly used middle ground based on semi-structured interviews; this decision was largely reached since the interviewer has clearly defined purposes, whilst seeking to achieve them through some flexibility in wording and in the order of presenting the questions. In the context of this analysis, the face-to-face interview was seen as a powerful tool, though not without its potential problems; namely, theoretical, practical and analytical.

The style of interview fell under the umbrella of “*respondent interviews*” (Robson, page 231), whereby it is important to remain in control as the interviewer. There were various reasons for using the semi-structured interview schedule; namely:

- They permitted the opportunity to probe further when it was necessary for the interviewees to explain or build on their responses,
- Often the questions might have seemed complex as organisations and consequently the interviewees varied in their knowledge of Lean,
- It was necessary on occasions to vary the order and logic of the questioning,
- Owing to the complexity of the subject matter, it was felt that the interview was the ideal method of data capture.

1.5.2 Questionnaires

Likewise Questionnaires were utilised, as they are easy to analyze. It was felt that the data entry and tabulation for nearly all questionnaires could be easily performed with many computer software packages.

1.5.2.1 Questionnaire evaluation

Questionnaires are familiar to most people. Nearly everyone has had some experience completing questionnaires and they generally do not make people apprehensive. Moreover, questionnaires could lead to a reduction in bias. There was a uniform question presentation and no middleman bias. It was considered that even the researcher’s own views would not influence the respondent to answer any question in a certain manner. Equally, there were no verbal or visual clues to influence the respondent. Moreover, the questionnaires were seen as being less intrusive than telephone or face-to-face surveys. To some degree the respondent was free to complete the questionnaire in his/her own time. Unlike other research methods, this research instrument does not interrupt the respondent.

Similarly, the potential disadvantages of written questionnaires were considered. Low response is the curse of statistical analysis. It can dramatically lower our confidence in the results. Nonetheless, by being on site, this acted as a constant reminder to the individual. Another disadvantage of questionnaires is the inability to probe responses. Questionnaires can act as structured instruments. They allow little flexibility to the respondent with respect to response format. In essence, they often lose the “*flavour of the response*” (i.e., respondents often want to qualify their answers). By allowing frequent space for comments, an attempt was made to partially overcome this shortcoming. Comments were considered amongst the most helpful of all the information on the questionnaire, and they usually provide discerning information that would have otherwise been lost.

Nearly ninety percent of all communication is visual. Gestures and other visual cues are not accessible with written questionnaires. The lack of personal contact will have different effects depending on the type of information being requested. A questionnaire requesting factual information will probably not be affected by the lack of personal contact. A questionnaire probing sensitive issues or attitudes may be severely affected. Finally, questionnaires are

simply not suited for some people; for example, a written survey to a group of poorly educated people might not work because of reading skill problems. More frequently, people are distrustful of written questionnaires because of misuse.

1.5.3 Pilot Case Study

A pilot Case Study was undertaken (Royal Doulton Plc) which was used to test out the substantive and methodological issues that assisted to develop more relevant lines of questioning. Undeniably, this was selected on the grounds of convenience, access and geographical proximity. Stake (2000) and Yin (1994) identified at least six sources of evidence in case studies. The following is not an ordered list, but is indicative of the research undertaken in each organisation:

- Documents, i.e., Lean measures being used,
- Archival records, i.e., historical records of the Lean journey,
- Interviews were an inherent part of the investigation,
- Direct observation, i.e., processes and procedures being used,
- Participant-observation, i.e., the training undertaken in each company,
- Physical artefacts, i.e., CEDAC Boards used by the organisation.

1.5.4 The Puttick Grid

Despite the restrictions encountered in respect of undertaking this level of data capture it was still important to retain a high degree of credibility in the results. Consequently, the Puttick Grid (developed by John Puttick whilst at “P.A. consulting”) was also utilised to ensure that the major types of manufacturing activity were represented in the overall analysis and, in this instance, particularly within the Case Studies.

1.5.4.1 The Puttick Classification

The objective was that each segment was well represented. Table 3.3 demonstrates that the organisations chosen reflected a respectable distribution.

U N C E R T A I N T Y	High	<p>Capital equipment</p> <p>“Made to order products”</p> <ul style="list-style-type: none"> - Ricardo - Perkins Engines <p style="text-align: center;">Number = 2</p>	<p>Fashion / Jobbing</p> <p>“Made to order/fast response”</p> <ul style="list-style-type: none"> - Fletcher Moorland - Trentex Engineering <p style="text-align: center;">Number = 2</p>	
	Low	<p>Modular Products; sub-assemblies</p> <p>“Made to forecast”</p> <ul style="list-style-type: none"> - Leoni Wiring Systems - Royal Doulton <p style="text-align: center;">Number = 2</p>	<p>Commodity products / raw materials</p> <p>“made to schedule/stock”</p> <ul style="list-style-type: none"> - Drayton Beaumont <p style="text-align: center;">Number = 1</p>	
		High	COMPLEXITY	Low

Table 3.3
Summary of Organisations represented in the Case Studies

The Puttick grid differentiates organisations according to:

- the amount of uncertainty faced in the organisation's market by using indices such as sales and product mix, and
- the level of complexity of the organisation's products; this examines factors such as product and process complexity.

1.5.4.2 Small, Medium or Large

In order to further ensure credibility in the results, the following (CIMA, 2005) classification was utilised as depicted in the Table 2.1 according to the prevailing British classification,

	Small	Medium
Turnover (less than or equal to)	£3.1 millions (net) £3.76 m (gross)	£12.2 m (net) £14.5 m (gross)
Aggregate gross assets (less than or equal to)	£1.9 millions (net) £2.18 m (gross)	£6.6 m (net) £7.72 m (gross)
Employees (less than or equal to)	50	250

Table 2.1
Classification of British Organisations

(CIMA, 2005), to be regarded as small or medium it is necessary to fulfil any two of the criteria listed above.

1.5.5 Case Study Organisations

The Case Study organisations are illustrated in Table 3.7. The purpose was to ensure that the seven Case Study organisations were representative of small, medium and large entities.

Organisations represented by the Case Studies	
Size of the organisation	Number of organisations represented
Small organisations	Fletcher Moorland and Trentex Engineering
Medium sized organisations	Drayton Beaumont
Large organisations	Royal Doulton, Perkins Engines, Leoni and Ricardo

Table 3.7
Summary of Case Study organisations by Size

1.6 Subsequent Visit

Each organisation was paid a subsequent visit whereby a detailed Lean audit was undertaken in order to deduce the stage at which the organisation's Lean journey had reached. The Lean audit was undertaken over one full working day and various stakeholders acted as participants during this process; for example:

- Managers at different levels within the organisations and in differing sections,
- Shop floor employees in the various sections,
- Trade unions,
- HRM sections,
- IT departments and
- The Lean facilitator of the organisation.

1.6.1 Lean Audit

Once the audit was completed, it was possible to place the organisation on one of seven levels in reference to its Lean journey. Table 5.9 presents an indication of the seven levels and the indicative corresponding statements reflecting the characteristics of its respective contemporary Lean status.

Stages of a Lean Journey	
Seven Stages	Indicative organisational characteristics
Planning	No implementation; benefits evident but no infrastructure and organisational decisions implemented
Developmental	Implementation started; pilot area selected and work commenced; no roll out; few tools with little subsequent commitment may have been implemented in other areas; importance of culture not recognised
Mechanical	Pilot progressing well; few tools embedded within internal organisation but largely within manufacturing only; tools are implemented in a piecemeal fashion with little consideration of correlations; importance of culture not recognised
Enhanced	Pilot proven successful; roll out programme progressing in other key areas within internal organisation; predominantly manufacturing based; recognition that culture, organisational practices and culture needs addressing but few tangible signs visible towards accomplishing this;
Holistic	Roll out programme on track; internal organisation nearly incorporated; suppliers embraced and signs towards integration of the whole value chain; organisational and culture developments still in their infancy;
Innovative	Lean principles applied across the whole internal organisation; good progress towards integration across the whole value chain; some cultural and organisational development issues fully implemented but further progress required; ingrained as a strategy
Ideological	Lean tools, culture and organisational practices alongside the ideology implemented across every component of the value chain; recognised as a combination of value streams, Lean viewed as the way of working with a quest for perfection apparent

Table 5.9
Lean stages clarified

1.6.2 Feedback on the Lean Audit

In order to gauge the organisation's judgment of the extensive audit undertaken, a further questionnaire was developed which permitted the company to feedback on the results. Every one of the seven organisations consented to this request and the relevant findings are summarised under each Case Study write-up.

1.7 Case Study Report guidelines

The following are major headings that were established as the key focal points of the case study reports. These were established early in the research process so that they could be used as a supplementary aide-memoire for the structured interviews with the informants. Both the questionnaires and the interview schedules, as can be seen by the examples, attempted to

explore the organisation's record of its Lean implementation and overall journey under several categories.

1.7.1 Report Structure

Consequently the following formed the structure of the reports:

- introduction and general background of the organisation including its registration details and brief history,
- some background on the market sector of the organisation,
- some financial background relating to the organisation,

This was followed by a comprehensive analysis of the organisation which was a product of the methodology adopted and examined in detail the:

- understanding of the concept of Lean,
- internal reasons for adopting Lean,
- the progress of Lean to date,
- personal views of what Lean meant to the respondents,
- potential barriers the organisation encountered,
- the overall reasons for engaging with Lean,
- an indication of the technical application of Lean,
- the overall Lean tools used within the organisation,
- surrounding cultural implications of Lean, and the
- notion of treating Lean as a business case

The final sections of the report provided:

- a summary of the Lean audit undertaken along with the feedback from the respective organisation regarding its audit results,
- an overall summary of the case study, Audit and survey questionnaire analysis, and
- ended with a proposed three year strategy for the organisation as a direct consequence of the preceding analysis.

APPENDIX TEN

The Drayton Beaumont Case Study

The Case Study fully written up; it contains information provided in a standardised format and this comprises of the following:

- Company Name
- Company Address
- Registration details
- Company number
- Market Sector
- Employee details
- Position of company contact
- Product Company details
 - History
- Finance details
- Lean Journey
 - Lean History
 - Case Study analysis
 - Meaning of “Lean”
 - Internal Reasons for Lean
 - How Lean was progressing
 - Lean and its personal implication
 - Lean obstacles
 - Reasons for Lean adoption
 - Lean application
 - Tools used within the organisation
 - Cultural implications of Lean
 - Lean as a Business Case
- Lean audit
- Summary of the analysis
 - Case Study Summary
 - Lean Audit
 - Survey Questionnaire
- Three year strategy

DRAYTON BEAUMONT LIMITED



	Page
2.0 Company Name	112
3.0 Company Address	112
4.0 Registration details	112
5.0 Company number	112
6.0 Market Sector	112
6.1 Special Features of the Sector	112
7.0 Employee details	112
8.0 Position of company contact	112
9.0 Product Company details	112
9.1 Overseas manufacturing	114
10.0 Finance details	114
11.0 Lean Journey	116
11.1 Lean History	116
11.2 Case Study analysis	116
11.2.1 Meaning of “Lean”	116
11.2.2 Internal reasons for Lean	116
11.2.3 How Lean was progressing	117
11.2.4 Lean and its personal implication	118
11.2.5 Lean obstacles	119
11.2.6 Reasons for Lean adoption	120
11.2.7 Lean application	121
11.2.8 Tools used within the organisation	122
11.2.9 Cultural implications of Lean	122
11.2.10 Lean as a Business Case	123
11.3 Lean audit	124
12.0 Summary of the analysis	127
12.1 Case Study Summary	127
12.2 Lean Audit	128
12.3 Survey Questionnaire	128
13.0 Three year strategy	129

2.0 Company Name

Drayton Beaumont Limited

3.0 Company Address

Drayton Beaumont Group,
Walley Street Buildings,
Walley Street,
Burslem,
Stoke on Trent.
ST6 2AH
Tel; +44-(0)1782-810689
Fax; +44-(0)1782-813227

The Drayton Beaumont Group relocated both its factory and offices to their Burslem site, Stoke-on-Trent. This was after having spent the last three years operating their administration from the Trentham offices and manufacturing at Burslem. Drayton Beaumont confirmed that they will be housing both the administrative and manufacturing parts of the business from the same site; this commenced on October 31st 2005.

4.0 Registration Details

Name: Drayton Beaumont Kilns Limited
Registered Office: Whalley Street Buildings, Burslem, Stoke-on-Trent, ST6 2AH.

5.0 Company number

Company No: 04477375

6.0 Market Sector

Manufacturers of furnaces and furnace burners

7.0 Employee Details

The company currently employs 75 people in the following categories:

Directors:	6
Managers:	6
Supervisors:	6
Electricians:	5
Mechanical Fitters:	10
Refractory Bricklayers:	4
Commissioning Engineers:	4
Store-man:	1
Drivers:	2
General Labourers:	19
Drawing Office:	8
Administration:	4

8.0 Position of Company Contact

The Works Manager provided the majority of the background information.

9.0 Product/Company Details

As the Drayton Beaumont Group of companies has expanded the services they provide have grown; it had become increasingly apparent that specialists were needed to develop the business further and continue to enhance the services they provided to their customers. The consolidation of the Drayton Beaumont Services Team including the appointment of a

specialist management team and the opening of the new offices demonstrated the commitment to provide the professionalism that their existing customers have become accustomed to expect. The Drayton Beaumont Group brings together the best disciplines and expertise in heat treatment and engineering services to industry. Drayton Beaumont Kilns Ltd is registered as a private limited company, and first started trading under its current name in 1985. It is involved in the manufacture, service and repair of kilns. The company is part of the Drayton Beaumont Group, which consists of:

- Drayton Beaumont Kilns Ltd,
- Kilnstruct Ltd and
- Drayton Beaumont Furnaces Ltd.

The companies bring together expertise in heat treatment and engineering services to industry. It has its origins in the pottery industry of Stoke-on-Trent but has substantially diversified as the local industry has contracted. This diversification is indicated by the company's experience of having undertaken installations in thirty-nine different countries, and in every continent of the world. Drayton Beaumont Kilns manufactures gas and electric kilns for a range of industrial applications including ceramics, pharmaceutical, food and aerospace. Kilnstruct provides after-sales support and back up for all the company's products, and also offers refurbishment and relocation packages for its client's equipment. Drayton Beaumont Furnaces was established in 2003 and offers a flexible range of furnaces.

Drayton Beaumont kilns has a global reputation for the supply of Tunnel Kilns for all industry sectors especially in ceramics, whether it be for:

- Tableware,
- Sanitaryware,
- Technical Ceramics,
- Heavy Clays or for
- Shuttle/Intermittent Kilns - sometimes referred to as Batch or Periodic Kilns; these can be supplied as electric or gas; the decision is largely dependant upon the application and fuel costs and/or fuel availability.

The size, design and detail of a kiln are infinite and include the ability to add many bespoke features as dictated by respective customers. However, the following list provides a reasonable indication of the types of features that are possible from Drayton Beaumont Kilns Limited:

- layouts to suit factory and process flows,
- unrivalled temperature uniformity,
- gas or electric fuel supplies,
- kiln car designs to suit product requirements,
- fully automatic operation,
- fast turnaround offering maximum production,
- consistent firing conditions,
- moving hood / "top hat" kilns - are normally required by the technical or special ceramics industries where product movement after setting is impossible or difficult; in those circumstances the kiln is taken to the load,
- special purpose kilns embrace everything else that has not been previously featured; they include all kilns that are bespoke to the particular customer,
- high temperature kilns – these are manufactured to operate at temperatures up to 1800° c; with the technical nature and design of high temperature kilns; experience is paramount. It is important that a kiln builder with the experience and confirmed reference is used. They have secured world wide experience and knowledge for these type of kilns; an example being the zirconia kiln with a maximum temperature for the lining of 1800° c.

The design and specification of these kilns is often highly confidential and is developed as part of an exclusive partnership, where they provide the technology and apply it to a specific need. Examples include:

- The Pharmaceutical Industry,
- Technical and Special Ceramics Industries,
- Food Industry and the
- Aerospace Industry.

9.1 Overseas Manufacturing - *Drayton Beaumont's Kiln Building Partnerships*

One of Drayton Beaumont's most recent contracts is in India and involves the supply of two kilns, one being a 38 cubic meter shuttle kiln and the other an 8 cubic meter shuttle kiln. Additionally Drayton Beaumont are also refurbishing a third kiln for the same client; this contract has seen Drayton Beaumont's project engineering team in India sourcing a suitable manufacturing partner to help build a large proportion of the kiln from within the country of purchase. It was decided during the tendering phase of the contract to have some parts of the kiln built in India with the design, project management and essential parts being supplied from the UK. This is not the first time Drayton Beaumont and this particular client have implemented contracts in this way. Previous successful builds for the same customer happened within China during 2003 and Eastern Europe during 2004 reflecting a trend that is likely to continue. Sales and Marketing Director, Lee Rawle at Drayton Beaumont said "*with good design, careful communication and supportive supervision we have proved that our products can be manufactured anywhere in the world*" (2007 Company Promotion Brochure; page 4).

10.0 Finance details

Registration number: 04477375

Drayton Beaumont Kilns Limited

Abbreviated accounts

For the year ending: 30th September, 2006

Drayton Beaumont Kilns Limited

Abbreviated Balance Sheet as at 30 September 2006

	£	£
Fixed Assets		
Intangible assets	-	
Current Assets		
Stocks and WIP	61,721	
Debtors	856,376	
Cash at Bank and in Hand	<u>77,281</u>	
	995,378	
Creditors: Amounts falling due		
Within one year	<u>(800,238)</u>	
		<u>195,140</u>
Total Assets less current liabilities		195,140
Creditors falling due after more than one year		<u>(50,000)</u>
		<u>145,140</u>
Capital and Reserves		
Called up share capital		1
Subordinate Loan		194,800
Profit and Loss Reserve		<u>(49,661)</u>
Equity Shareholders funds		<u>145,140</u>

(Source: Companies House 30/07/2007)

11.0 Lean Journey

Drayton Beaumont Ltd has been on the Lean journey in excess of four years; the organisation should have made more progress than is evident. This was both scrutinized and evaluated subsequently with the aid of the following:

- the original survey questionnaire,
- two management interview schedules,
- two operative interview schedules,
- two management questionnaires,
- two shop floor questionnaires, and an extensive
- Lean audit undertaken to determine the organisation's Lean status.

11.1 Drayton's Lean History

Drayton Beaumont's Lean excursion began in 2003 when they originally sought the help of CERAM, based in Stoke, who offer a range of services and products designed to assist manufacturers, suppliers and users to improve competitiveness and profitability. CERAM has many years experience working with international clients in the materials industries, helping them improve their performance and profitability. They are involved in many aspects of materials, product and manufacturing technology with core strengths spanning testing, research, process engineering, product design and consultancy. It was Steve Beaumont, Managing Director, who originally introduced CERAM to Drayton with a view towards improving the organisation's overall efficiency. He states that there were three main objectives:

- Improve lead-time of converting design into the production stages,
- To deduce the under-lying reasons for losing some major service contracts and
- Improve the existing communication loop with existing customers on their database.

11.2 Drayton's Lean analysis

11.2.1 Meaning of "Lean"


Initially it was important to gauge precisely what was understood by the term "Lean" in the organisation.


The understanding of the term Lean	
Questionnaires	
Manager 1:	"reduce all the over-production and cut down on stock"
Manager 2:	"only make products we have invoices for and reduce scrap"
Shop-floor 1:	"keep costs down; scrap and re-work"
Shop floor 2:	"not sure – reduce stock"
Interview schedules:	
Manager 1:	"to produce at the rate of demand and improve first time quality"
Manager 2:	"to remove waste; improve relationship with supplier and reduce cost"
Shop floor 1:	"to plan everything first and produce to order"
Shop floor 2:	"departments to work better; else do not know"


11.2.2 Internal reasons for "Lean"

Both the questionnaires and the interview schedules sought to discover the initial reasons for adopting Lean within the organisation:

Reasons for adopting Lean – questionnaire														
Statement	Scale													
	Strongly Agree			Agree			Somewhat agree			disagree			Strongly disagree	
Customer pressure														
To improve performance														
Competitor pressure														
Create team spirit / motivational tool														
Owner / Investor pressure														
Better working conditions														
As a result of attending a special event/conference														

Key:  = Question not posed to the shop floor

 = Shop floor operative response

 = Management response


Reasons for adopting Lean – interview schedules (Listed in order of importance by the participant)			
Manager one	Manager two	Operative one	Operative two
Delivery records	Cut waste	Cut scrap	Cut costs i.e. poor work
Company image	Reduce production costs	Improve quality	Cut O/T
Poor quality	Improve supplier relationships	Better service	Reduce stock
Costs of production	Improve image	To cut wage bill (O/T)	


11.2.3 How Lean was progressing?

The following questionnaire responses were received in regards how Lean was seen to be progressing within the organisation.

Progress of Lean with the organisation – Questionnaire responses														
Statement	Scale													
	Strongly Agree			Agree			Some - what agree			disagree			Strongly disagree	
I have the necessary tools to implement Lean														
Tools used are of good quality														
Appropriate training is provided														
Appropriate time is given to make improvements														

Statement	Strongly agree			Agree			Somewhat agree			disagree			Strongly disagree		
Will result in more pay															
My job is more secure															
I will encounter more pressure															
Better career prospects															

 = Shop floor operative response

 = Management response

What Lean means on a purely personal level – interview schedules (Listed in order of importance by the participant)			
Manager one	Manager two	Operative one	Operative two
Stronger company/position	Improve pay/profits	More work & planning	Probably more work
Job security	Improve image	More bite size work	Smaller orders
More pressure – change	Stronger company	Less O/T	Job safety
Delegating responsibility	Better working relationships	Probably better job security	

11.2.5 Lean obstacles

Owing to the nature of information required, only the managers were asked to determine the possible stumbling blocks to Lean.

[a score of 1-10 was used; “1”: if they felt it posed no concern and no difficulties;

“10” if they felt that it posed a major barrier and has proven impossible to breakdown.)

Barriers organisation encountered/encounters towards Lean						
	Barriers	Score				Total
		Questionnaire	Schedules			
1	Insufficient understanding of the potential benefits	4	6	6	4	20
2	Insufficient internal funding	9	10	10	7	36
3	Insufficient external funding	2	9	7	0	18
4	Insufficient senior management skills to implement Lean	8	9	6	8	31
5	Insufficient supervisory skills to implement Lean	8	7	6	9	30
6	Insufficient workforce skills to implement Lean	9	9	8	9	35
7	The need to convince shareholders / owners	4	5	2	3	14
8	Insufficient management time	5	4	2	7	18
9	Employee attitudes /resistance to change	6	7	6	6	25
10	Cost of the investment	10	9	10	8	37
11	Cultural issues	7	8	8	6	29
12	Others (please specify below)	0	0	0	0	0

11.2.6 Reasons for Lean adoption

The questionnaires and interview schedules tried to ascertain the underlying reasons from the participants' perspective for Lean being introduced into the organisation.

Why do you feel the organisation has embraced Lean? – Questionnaire responses																				
	Strongly agree				Agree				Somewhat agree				disagree				Strongly disagree			
Higher profitability	█	█	█	█					█											
Higher productivity	█	█	█	█																
Lower costs	█	█	█	█																
Improved delivery records									█											
To carry less stock	█	█	█	█																
Improve relations with suppliers / customers	█										█	█		█			█		█	
Improve relations between shop floor and management	█	█									█	█	█	█						
Improve communications between departments						█			█	█	█		█							
Better teamwork						█							█	█	█		█			
Improve worker production	█	█	█	█		█														
Improve customer service	█	█	█	█																
Improve market share	█	█	█	█					█											
Improve efficiency									█	█	█									
Reduce down time	█	█	█	█																
Become more competitive	█	█	█	█																
Reduce any waste	█	█	█	█					█											

[For the **interview schedules**, a scoring scale of 1 – 10 was utilised; “10” if there was total agreement with the statement without any reservations and unequivocally; “1” if the statement was totally false and they disagreed with its content wholeheartedly.]

Interview schedule responses regards why the Organisation embraced Lean					
Statement	Score 1 –10				Total
	Higher profitability	9	9	9	
Higher productivity	9	8	9	10	36
Lower costs	10	10	10	10	40
Attain improved delivery records			9	10	19
To carry less stock	8	9	10	10	37
Improve relations with suppliers / customers	4	4	6	7	21
Improve relations between shop floor and management	7	8	6	8	29
Improve communications between departments	8	4	8	8	28
Better teamwork	8	5	7	6	26
Improve worker production	10	9	10	10	39
Improve customer service	7	9	8	8	32
Improve market share	9	9	7	8	33
Improve efficiency			9	10	19
Reduce down time	10	10	9	10	39
Become more competitive	9	9	9	10	37
Reduce any waste	10	9	10	10	39

Key: = Shop floor operative response = Management response
 = Question not posed to the shop floor

11.2.7 Lean application

The next two sections revealed from the contributors' view both the spread of Lean within the organisation and how long it had been on the Lean journey; owing to the nature of information needed, the question was only posed to managers:

Application of Lean is across the following					
Lean occurs across the whole value chain					
Lean is in our company only					
Manufacturing and Supply functions only					
Manufacturing or supply functions only					
Some units of manufacturing or supply functions only					
Few isolated tools are used					

Length of time the organisation has continuously been on the Lean journey					
0 – 6 months					
7 months - 1 year					
1 – 2 years					
3 – 4 years					
5 -6 years					
7+ years					

11.2.8 Tools used within the organisation

The data capture also sought to establish which tools the organisation had introduced as integral to its Lean journey; owing to the nature of the information sought, this section only applied to managers. [a scoring of 1-10 was used; “1” to be awarded if the participant considered that this tool is not applicable within the organisation and there are no plans to implement it in the future; “10” to be awarded if it is fully operational within the company and total commitment is awarded to it.]

Lean Tools applied in the organisation						
1	Kiazen / continuous improvement	Questionnaire		Schedules		Total
		8	6	6	8	
2	Cellular manufacturing	1	1	1	2	5
3	Kanban systems	1	1	2	2	6
4	Single piece flow operations	8	5	7	7	27
5	Process mapping	7	8	6	8	29
6	Single Minute Exchange of Dies (SMED)	1	1	1	2	5
7	Step change / kaikaku	1	1	1	2	5
8	Supplier Development – activating links with suppliers	1	1	1	2	5
9	Supplier base reduction	1	1	6	7	15
10	5's and general visual management	7	5	1	2	15
11	Total Productive Maintenance	1	1	1	2	5
12	Attacking value and the seven wastes	1	1	4	5	11

11.2.9 Cultural implications of Lean

The questionnaires and interview schedules played an important role in determining the prevailing organisation’s culture through the following set of questions:

Statement	Strongly agree	Agree	Somewhat agree	Disagree	Strongly disagree
Decisions in the organisations are made at the lowest level possible			3	1	
The shop-floor is listened to more widely than was the case before Lean	1	1	1	2	
All management levels are listened to more widely than was the case before Lean		2	2		
The organisation’s direction and destination for 5 years is now much clearer		2	2	2	
The company has one particular person directing operations and the proposals are clearly communicated	1	1	1	1	
People are clear regarding their expectations from Lean		1	2	2	
There is adequate training to assist the progress of Lean			1	3	
All managers’ tiers seem to be pulling in the same direction to make Lean work		1	2	4	
The company is now a better place to work in since the introduction of Lean		1	2	2	
I fully understand why Lean is needed in the			3	1	

organisation	1	2	1		
The various departments seem to work better and have a healthier relationship than was the case prior to Lean		2	2	2	
The outcomes of Lean have been communicated thoroughly		1	3	2	
Lean metrics are clear to observe and the information is cascaded downwards regularly		1	2	3	
Greater efforts are made to involve suppliers than was the case before Lean		1	3	1	
Greater efforts are made to involve customers than was the case before Lean		1	4		
The Lean journey is linked to the mission statement / vision		1	3		

Key: = Question not posed to the shop floor

= Shop floor operative response = Management response

11.2.10 Lean as a Business case

It was important to establish whether Lean had assisted the organisation to secure benefits and the following section attempted to infer this [a percentage figure was sought ideally; otherwise an indication whether the relevant measure had improved as a result of Lean]:

What has Lean accomplished for the organisation										
Deterioration	Measurement	Improvement								Total
Finance	Company profitability	10	0	5	5	5	10	10	20	65
	Company share prices	0	0	0	0	0	0	0	0	0
	Company liquidity	15	10	15	10	15	10	10	15	100
	Earnings per share					0	0	0	0	0
Customer	More satisfied customers	10	5	5	10	10	15	15	25	95
	Market Share	5	10	5	0	0	0	5	10	35
	Service quality	15	10	15	10	15	20	10	20	115
	Delivery records	15	5	10	15	10	20	15	25	115
	Better relationship with customers	10	10	10	5	10	15	10	15	85
Process	NPD lead time	5	0	15	5	15	10	15	10	75
	Overall cycle time	5	5	15	5	20	20	10	10	90
	Quality of new products	5	5	10	10	25	20	10	15	100
	Quality costs	10	10	20	10	20	15	15	20	120
	Defects of critical products /components					25	20	20	20	85
	Raw material costs	10	10	10	5	15	10	10	15	85
	Capital efficiency					15	10	15	20	60

	Labour efficiency					15	10	15	15	55
	Finished stock	10	10	10	15	20	10	20	10	105
	WIP stock					15	15	15	10	55
People	Absenteeism	5	5	5	10	0	0	0	0	25
	Labour turnover	0	5	0	0	0	0	0	0	5
	Quality of leadership development					0	0	10	10	20
	The relationship between management and the shop-floor	5	10	5	0	5	10	10	10	55
	Better communications	5	5	10	5	5	10	10	10	60
Future	New product development	5	5	5	0	5	5	5	5	35
	Looking for new markets	10	10	5	0	5	5	5	5	45
	Investment in new technology	5	5	10	0	5	10	0	15	50
	Sales from new products (< 5 years)	5	0	5	0	0	0	0	0	10
	Anticipating new changes					0	0	0	5	5

Key: = Question not posed to the shop floor

= Shop floor operative response

= Management response

11.3 Lean Audit

A detailed Lean audit was undertaken with the assistance of Steve Beaumont (the Managing Director), which showed that the organisation whilst contending to be on the Lean journey shows all the signs of ultimate failure. A summary of the results is shown below. Equally, Drayton Beaumont was also requested to complete a pro-forma, which extracted their view on the audit undertaken. It was gratifying to note that overall they agreed with the decision of the extensive audit. This too is included below:

Lean Assessment scoring sheet		
Organisation name: <i>Drayton Beaumont Limited</i>		
Category	Maximum score available	Score achieved
Overall safety, cleanliness and orderliness	30	13
Production and operational flow	50	25
Processes and operations	90	35
Visual management	50	18
Quality designed into the product	130	42
Continuous improvement	90	34
Lean change strategy	120	37
Lean sustainability	70	25
Culture employee oriented	100	34
Organisational culture – organisational practices	130	37
Lean treated as a business	90	18
Philosophy	90	23
Total score : 341		
% score : 33%		
Lean stage: Mechanical		

Lean Assessment scoring system		
Lean stage	Required Points	% of the maximum score of 1,040 points available
Ideological	936	90%
Innovative	780	75%
Holistic	624	60%
Enhanced	468	45%
Mechanical	312	30%
Developmental	156	15%
Planning	0 – 155	0% - 15%

General comments:

Generally a very poor imitation of a Lean application; few isolated tools are being applied with little coordination and even less conviction. Equally, the audit demonstrated that there was no intention to widen the overall application of Lean or to show greater commitment towards their Lean journey. The organisation whilst promoting the benefits of Lean is reluctant to undertake the necessary investment to ensure that these actually materialise. Undeniably, the organisation needs to re-evaluate its expectations from Lean and align its Lean strategy towards its overall organisational strategy.

Lean was not viewed as a total system and predominantly the intention was to cut costs. The organisational development factors required for Lean such as sustainability, culture and Change scored badly, often below 30%. The ultimate set of metrics used to assess whether Lean was viewed as a philosophy, the organisation only secured a score of 26%. In summary, it could be concluded that unlike the Lean implementations of the more successful organisations, this organisation is unlikely to ever reach the ideological state.

Lean Audit feedback Questionnaire

Section A: General Background

Please State name of your company	Drayton
Please name the auditor(s)	Sanjay Bhasin

Section B: Summary of the Lean Audit score

Lean Audit %: 33%	Lean Stage: Mechanical
--------------------------	-------------------------------

Section C: Feedback on the scores achieved in each category

Using a score of 1-10 could you indicate your assessment of the score achieved in each category; 10 if you totally agree with the Lean audit score; 1 if you totally disagree with the Lean audit score.

Categories	Your score
Overall safety, cleanliness and orderliness	9
Production and operational flow	10
Processes and operations	8
Visual management	9
Quality designed into the product	8
Continuous improvement	9
Lean change strategy	9
Lean sustainability	10
Culture employee oriented	10
Organisational culture – organisational practices	10
Lean treated as a business	9
Philosophy	10
Average score obtained for the twelve categories	9

Section D: Any additional comments to be made about the Lean Audit

The Lean audit was a very useful piece of evidence, which we required to push the Lean initiative within the organisation. Whilst reasonably new to the whole Lean initiative we had not fully appreciated the task ahead and just how comprehensive the audit would be. Whilst a small organisation, one thing that has become obvious is that we need to either recruit, or secure the services from outside, of a Lean expert's input, since there is obviously a lack of internal expertise within the organisation. We need to concentrate our efforts on areas where we scored very low since it is expected that these would start to hinder further progress.

12.0 SUMMARY OF THE ANALYSIS

12.1 Case study Summary

The participants were asked about their understanding of the concept of Lean; there was a heavy emphasis towards cost cutting or reducing scrap. This was reiterated by the interview schedules searching why Lean was introduced to Drayton. All four candidates mentioned costs and in fact gave it the maximum score. When probing the progress of Lean, the questionnaires produced intriguing responses as the worst scores achieved stated:

- that the training was insufficient,
- the time permitted to embrace Lean was insufficient,

Surprisingly, the two highest scores were achieved for:

- the culture was conducive for Lean and interestingly,
- the SMT style and attitude was appropriate for Lean.

Owing to the degree of complexity, only the managers were posed the question regards the possible barriers to Lean within their organisation; Bearing in mind that they could have scored a maximum 40; the following three were the highest scores achieved:

Barriers	Total score out of a maximum of 40
Cost of the investment	37
Lack of internal funding	36
Lack of workforce skills	35

All the participants were asked to state the reasons they considered for the organisation embracing Lean; there was considerable consistency between the questionnaires and the interview schedules. However, since the interview schedules included a score (maximum 40), it was possible to rank the replies:

Reasons for Lean adoption	Total score out of a maximum of 40
Reduce costs	40
Improve worker production	39
Reduce waste	39
Reduce stock	37
Become more competitive	37
Improve productivity	36

Ironically the lowest scores secured on the interview schedules were:

Reasons for Lean adoption	Total score out of a maximum of 40
Improve teamwork	26
Improve links with suppliers /customers	21

Whilst the interview scores substantiated the above, an important distinction was “*customer service*” which scored joint highest as a possible reason for adopting Lean.

When the participants were asked about the Lean tools in place; generally the scores were reasonably positive;

Lean Tools used	Total score out of a maximum of 40
Process mapping	29
Kaizen	28
Single piece flow	27

Ironically the lowest scores were recorded for:

Lean Tools used	Total score out of a maximum of 40
TPM	5
Cellular production	5
Supplier development	5

Equally the culture questions revealed the amount of work needed within the organisation; the highest score was awarded to:

- that personnel could identify who was leading Lean internally,

However, the lowest scores stressed that:

- the expectations from Lean were unclear,
- managers were not pulling in the same direction,
- training for Lean was inadequate,
- the Lean metrics were poorly communicated, and that
- the supplier/customer involvement was lacking.

All the participants' opinions were also sought on the potential benefits of Lean on various indices; the six highest were as follows:

Indices	Averaged % improvement
Quality costs	15
Service quality	14
Delivery records	14
Finished stock	13
Company liquidity	13
Satisfied customers	12

The lowest scores were recorded for the following:

(ignoring earnings per share, share prices, labour turnover and absenteeism)

Indices	Average % improvement
Market share	4
Sales from new products	1.3

12.2 Lean Audit

Generally Drayton had demonstrated a commitment towards Lean and had been pursuing Lean for over three years. However, whilst assistance was sought from an external sensei, there was an insight gained whereby the directors now wanted to internalise the Lean journey. Whilst ultimately, this would be an appropriate policy, considerable work is needed to reach this stage. Drayton only managed to secure a score of 33% on the extensive Lean Audit undertaken and various factors contributed to this low score:

- The few Lean tools implemented have been applied in a haphazard fashion with little consideration about their linkages,
- No real efforts have been made to tackle the cultural issues,
- The long term plan for Lean is unclear,
- No real measurement metrics have been instigated for Lean, and
- A narrow view of Lean is held; namely not viewed as an ideology.

12.3 The Survey questionnaire

Generally, the survey questionnaire substantiated the Case Study analysis; it did give a narrower view since it was completed by one of the directors. An interesting factor centred

around the initial reasons for Lean adoption; whilst the operational factors figured highly; the top scores were awarded to the

- Pressure from customers, and
- The need to improve performance.

The barriers to Lean witnessed four top scores:

- insufficient internal funding,
- insufficient external funding,
- a lack of supervisory skills and
- employee attitude / resistance to change.

When the Survey questionnaire focused on the aspirations from their Lean journey; the top four scores were bestowed to

- increased efficiency,
- increased competitiveness,
- higher profitability and
- higher productivity.

Equally when looking at the impact Lean has had on the organisation; the highest scores were recorded for:

- on time delivery,
- customer satisfaction,
- service quality, and
- defects of critical products/components.

13.0 THREE YEAR STRATEGY

Evidently, the Lean journey required an increased momentum. The detailed Lean audit had suggested that the organisational and cultural issues needed addressing. Whilst, the directors seem to be committed towards Lean, there is a great deal of work required and the focus needs altering. Equally some complacency requires to be addressed; namely through:

- Additional training,
- Using an external sensei,
- Examine the tools in place,
- Apply the most relevant tools, and
- Begin to concentrate on the cultural issues.

The Gantt chart below proposes a three years strategy for the organisation with view towards improving its Lean implementation and its corresponding impact on the organisation's overall performance:

Processes required	Three Year Time frame					
	Year one		Year two		Year three	
Employ the services of a sensei						
Increased concentration on training						
Implement the most relevant tools, i.e., TPM and Six Sigma						
Start training and using an Internal Lean Champion						
Widen implementation of the existing Lean Tools						
Tackle the key cultural issues						

Broaden Lean to all aspects of the internal organisation						
Implement and monitor the Lean indices						
Widen application of Lean tools towards suppliers						
Begin to look at Lean across the value chain						

APPENDIX ELEVEN

The Fletcher Moorland Case Study

The Case Study fully written up; it contains information provided in a standardised format and this comprises of the following:

- Company Name
- Company Address
- Registration details
- Company number
- Market Sector
- Employee details
- Position of company contact
- Product Company details
 - History
- Finance details
- Lean Journey
 - Lean History
 - Case Study analysis
 - Meaning of “Lean”
 - Internal reasons for Lean
 - How Lean was progressing
 - Lean and its personal implication
 - Lean obstacles
 - Reasons for Lean adoption
 - Lean application
 - Tools used within the organisation
 - Cultural implications of Lean
 - Lean as a Business Case
- Lean audit
- Summary of the analysis
 - Case Study Summary
 - Lean Audit
 - Survey Questionnaire
- Three year strategy

Fletcher Moorland



	Page
2.0 Company Name	133
3.0 Company Address	133
4.0 Registration details	133
5.0 Company number	133
6.0 Market Sector	133
7.0 Employee details	133
8.0 Position of company contact	133
9.0 Product Company details	133
9.1 History	134
10.0 Finance details	135
11.0 Lean Journey	137
11.1 Lean History	137
11.2 Case Study analysis	137
11.2.1 Meaning of “Lean”	137
11.2.2 Internal reasons for Lean	138
11.2.3 How Lean was progressing	138
11.2.4 Lean and its personal implication	139
11.2.5 Lean obstacles	140
11.2.6 Reasons for Lean adoption	141
11.2.7 Lean application	142
11.2.8 Tools used within the organisation	142
11.2.9 Cultural implications of Lean	143
11.2.10 Lean as a Business Case	144
11.3 Lean audit	145
12.0 Summary of the analysis	148
12.1 Case Study Summary	148
12.2 Lean Audit	149
12.3 Survey Questionnaire	149
13.0 Three year strategy	150

2.0 Company Name

Fletcher Moorland Limited

3.0 Company address

Elenora Street,
Stoke-on-Trent,
ST4 1QG.

4.0 Registration Details

Name: Fletcher Moorland Limited
Registered Office: Elenora Street, Stoke-on-Trent, ST4 1QG.

5.0 Company Number

Number: 02984467
Section D; Subsection DL
Classification Number 31.62 and 33.30

6.0 Market sector

31.62 Manufacture other electrical equipment
33.30 Manufacture industrial process control equipment

7.0 EMPLOYEE DETAILS

The company currently employs 74 people in the following categories:

Directors:	3
General Manager:	2
Administration:	12
Engineers:	50
General:	7

8.0 Position of company contact

The primary source of information was the General Manager.

9.0 Product / Company details

The company is registered as a private limited company, and first started trading in 1946. It offers a range of electrical/mechanical/electronic engineering services to its customers. The company started life as an electric motor repairs company servicing the local pottery, steel, mining and associated engineering industries. It has made substantial progress in its sixty-year history as a result of its ability to develop new skills and meet the needs of the changing economy. It now offers a 24 hour, 365 days a year service from a 20,000 sq. ft. workshop space. Activities now cover a complete range of electronic and electro-mechanical equipment.

Most recent company developments include a new Conference / Training facility for 30 delegates, and the most advanced test facility for servomotors in the UK. Fletcher Moorland is an established servo and spindle systems repair specialist. They have experience with virtually every make and type of servo drive and motor. The servo systems workshop has dedicated test and verification rigs to ensure each repair is carried out correctly and to the highest standard. Many of the leading manufacturers have appointed Fletcher Moorland as their approved repair specialist. Fletcher Moorland Limited has provided a Mechanical Repair and Maintenance Service for industrial plant and equipment for over 50 years. Its experience and expertise represents a single source of repair of any type of mechanical failures. The service is available 24 hours per day, 365 days per year and is guaranteed to be reliable and fast, whereby reducing downtime to a minimum

Fletcher Moorland Limited is a single source of repair and maintenance across all of the following:

- Wrapping equipment,
- Mixers,
- Pressing equipment,
- Packing equipment,
- Extraction units,
- Hoists Drives; Motors; Pumps; gearboxes; Conveyers and
- Guillotines.

9.1 Brief History

1990's

Matt Fletcher joined the business after achieving a BSc in Electrical & Electronic Engineering (1996)

Fletcher Moorland Limited was formed merging *Fletcher Bickerton Limited* (Electro-Mechanical Engineers) and *Moorland Electronics Limited*. (Electronic Engineers) (1996)

Consolidation of the five businesses, operating from different premises, into one 20,000 sq ft facility, manned 24 hours a Day, 365 Days a Year; focused towards the complete electronic, electrical and mechanical Repair occurred in 1996.

1980's

Sadly the founder, *Sam W Fletcher*, passed away in his eighty first year. The legacy he left of quality and service forms the cornerstones of the business today. (1984)

Moorland Electronics Ltd was formed; this was probably the first independent electronics repair company in the UK. It was their first diversification from the traditional electrical and mechanical based service. *Moorland Electronics Ltd* experienced a meteoric expansion including trail blazing confidential service partnerships with a number of OEM's. (1981)

Fletcher Bickerton Ltd workshops inaugurated 24 Hours a Day, 365 Days a Year Manned Workshops (1985)

Fletcher Bickerton Ltd became one of the first UK Service Companies to achieve to BS 5750 (now BS EN 9001:2000). Later *Moorland Electronics Ltd* and other Subsidiary companies achieved similar quality assurance systems (1988)

Fletcher Bickerton (Northern) Ltd was formed in Trafford Park Manchester (1988). This was subsequently subject to a management buyout.

Material Handling Ltd and *Mechanical Services* were formed (1987). These companies were subsequently integrated into *Fletcher Bickerton Ltd*

1970's

Fletcher Bickerton Ltd expanded consistently with all the profits earned invested into the business

1960's

Malcolm Fletcher joined the company after completing his training at the English Electric Company, Stafford (1966)

S W Fletcher (Contracts) Ltd was formed. This was a diversification into specialist electric motor manufacture as a subcontractor for a leading UK company involved in the Nuclear Propulsion for the UK's Ministry of Defence (1960)

Fletcher Bickerton Ltd was incorporated to take over the original partnership of *Electrical Rewinds & Supplies* (1961)

1950's

S W Fletcher (Electric Motors) Ltd was incorporated as Control Gear Manufacturer and sales agent for various Electric Motor Manufactures (1958)

Part of the present works, 32a Elenora Street, Stoke on Trent was purchased. The building dated back to the 1850's and was formally a coal merchant's yard and stable. The horse had to be removed before the first electric motor could be repaired in 1952.

1940's and before

The founder and his colleagues formed "*Electrical Rewinds & Supplies*" as repairers and re-winders of electric motors for the local industries such as pottery manufacture, coal mines, steelworks, tyre manufacture and quarries. The fledgling company operated from stables at the former home of *Sam Fletcher* at 2 Talbot Street, Hanley (1946). In 1946 *Sam Fletcher* laid the foundations upon which their success was built. The founder *Sam Fletcher*, three days after his thirteenth birthday (1916) began his bound and indentured apprenticeship with Howells Electric Motors Ltd, which was one of the emerging electric motor, manufacturers at the beginning of the last century. Whilst at Howells, *Sam Fletcher* met his colleagues, Harold Bickerton and Derek Ratcliffe; they helped him to form the company.

10.0 Financial Details

The following page provides details of an abbreviated Balance Sheet (no other financial information was available).

Registration number: 02984467

Fletcher Moorland Limited

Abbreviated accounts

For the year ending: 30th September, 2006

Fletcher Moorland Limited

Abbreviated Balance Sheet as at 30 September 2006

	£	£
Fixed Assets		
Intangible assets	-	
Tangible		105,282
Current Assets		
Stocks and WIP	121,441	
Debtors	878,924	
Cash at Bank and in Hand	<u>46,454</u>	
	1,046,819	
Creditors:		
Amounts falling due		
Within one year	<u>(380,109)</u>	
Net Current Assets		<u>666,710</u>
Total Assets less current liabilities		771,992
Creditors falling due after		
more than one year		(3,283)
Provision for Liabilities		<u>(4,984)</u>
Net Assets		<u>763,725</u>
Capital and Reserves		
Called up share capital		600,000
Subordinate Loan		-
Profit and Loss Reserve		<u>163,725</u>
Equity Shareholders funds		<u>763,725</u>

(Source: Companies House 30/07/2007)

11.0 Lean Journey

Fletcher Moorland Ltd has been on the Lean journey for over four years and exhibiting evidence of a mixed a record to date; this was both scrutinized and evaluated subsequently with the aid of the following:

- the original survey questionnaire,
- two management interview schedules,
- two operative interview schedules,
- two management questionnaires,
- two shop floor questionnaires, and a detailed
- Lean audit undertaken to determine the organisations Lean status.

11.1 Lean History

Fletcher Moorland’s Lean journey began in 1999 through assistance offered by “*The Manufacturing Advisory Service*” of the West Midlands (MAS-WM); a body dedicated to making a difference to the manufacturing sector within the region. This is one of the regional centres established by the former DTI and funded by *Advantage West Midlands*. MAS-WM aims to address the practical needs of manufacturers by delivering hands-on advice and business support through Specialist Manufacturing Advisors and a network of expert associate providers. MAS-WM assist with any aspect of manufacturing; namely: productivity improvements, new and enhanced product development and operational efficiency. Fletcher Moorland’s initial association with MAS-WM pivoted around the need to:

- develop its diagnostic testing procedures and method of feeding back to customers,
- enhance its space utilisation and
- Improve its lead times.

Whilst the MAS-WM was initially approached in 1999; the preliminary assistance took the form of seminars and workshops only. The Lean Journey since 2002 has been largely internalised with little external assistance. This became apparent with the Lean audit undertaken and is summarised later in the analysis.

11.2 Case Study Analysis

11.2.1 Meaning of “Lean”

Initially it was important to gauge precisely what was understood by the term “Lean” in the organisation.

The understanding of the term Lean	
Questionnaires	
Manager 1:	“build good relationship with suppliers/customers in order to reduce stock and produce to exact customer specifications”
Manager 2:	“make to customer requirements... keep costs down and pass them on to the customers”
Shop-floor 1:	“cut down on costs, i.e., stock and rework”
Shop floor 2:	“ to cut overtime by producing all stuff correct 1 st time”
Interview schedules:	
Manager 1:	“customers dictate quantity and quality; will improve customer orders/delivery”
Manager 2:	“cut down scrap and rework by standardisation”
Shop floor 1:	“only send out when customer ready to receive; no stocks”
Shop Floor 2:	“cut costs by making things right first time”

11.2.2 Internal reasons for “Lean”

Both the questionnaires and the interview schedules sought to discover the initial reasons for adopting Lean within the organisation:

Reasons for adopting Lean – questionnaire																			
Statement	Scale																		
	Strongly Agree			Agree			Somewhat agree			disagree			Strongly disagree						
Customer pressure																			
To improve performance																			
Competitor pressure																			
Create team spirit / motivational tool																			
Owner / Investor pressure																			
Better working conditions																			
As a result of attending a special event/conference																			

Key: = Question not posed to the shop floor

= Shop floor operative response

= Management response

Reasons for adopting Lean – interview schedules (Listed in order of importance by the participant)			
Manager one	Manager two	Operative one	Operative two
Delivery	Scrap rates	Cut space needed	Cut costs of O/T
Perception	Delivery	Cut production	Too much Stock
Cost of production / materials	O/T	Cut costs	More competitive
	Costs		

11.2.3 How Lean was progressing?

The following questionnaire responses were received in regards how Lean was seen to be progressing within the organisation.

Progress of Lean with the organisation – Questionnaire responses																			
Statement	Scale																		
	Strongly Agree			Agree			Some - what agree			disagree			Strongly disagree						
I have the necessary tools to implement Lean																			
Tools used are of good quality																			
Appropriate training is provided																			

What Lean means on a purely personal level – Questionnaire responses													
Statement	Scale												
	Strongly agree			Agree			Somewhat agree			disagree			Strongly disagree
Will result in more pay													
My job is more secure													
I will encounter more pressure													
Better career prospects													

 = Shop floor operative response  = Management response

What Lean means on a purely personal level – interview schedules (Listed in order of importance by the participant)			
Manager one	Manager two	Operative one	Operative two
Improved company perception	More work – smaller orders	Busier-small but more orders	More work – repairs etc
Reduced wage bill	Pressure – get right 1 st time	More pressure	Better working conditions
Cost effective	If fine – company secure	Maybe safer job	Better job prospects
Stronger organisation			

11.2.5 Lean obstacles

Owing to the nature of the information required, only the managers were asked to determine the possible stumbling blocks to Lean.

[a score of 1-10 was used; “1”: if they felt it posed no concern and no difficulties; “10” if they felt that it posed a major barrier and has proven impossible to breakdown.]

Barriers organisation encountered/encounters towards Lean						
1	Barriers	Score				Total
		Questionnaire	Schedules	Schedules	Schedules	
1	Insufficient understanding of the potential benefits	7	5	6	7	25
2	Insufficient internal funding	10	8	8	9	35
3	Insufficient external funding	0	0	3	4	7
4	Insufficient senior management skills to implement Lean	6	5	8	8	27
5	Insufficient supervisory skills to implement Lean	8	7	9	8	32
6	Insufficient workforce skills to implement Lean	9	7	9	9	34
7	The need to convince shareholders / owners	3	2	3	3	11
8	Insufficient management time	7	8	7	8	30
9	Employee attitudes/ resistance to change	6	8	8	9	31
10	Cost of the investment	10	9	9	10	38
11	Cultural issues	9	8	8	8	33
12	Others (please specify below)	0	0	0	0	0

11.2.6 Reasons for Lean adoption

The questionnaires and interview schedules tried to ascertain the underlying reasons from the participants' perspective for Lean being introduced into the organisation.

Why do you feel the organisation has embraced Lean? – Questionnaire responses															
	Strongly agree			Agree			Somewhat agree			disagree			Strongly disagree		
Higher profitability	■		■	■	■										
Higher productivity	■		■	■	■										
Lower costs	■		■	■	■										
Improved delivery records			■							■					
To carry less stock	■		■	■	■										
Improve relations with suppliers / customers							■	■	■		■				
Improve relations between shop floor and management							■		■		■	■			
Improve communications between departments				■				■	■				■		
Better teamwork											■	■	■		
Improve worker production	■		■	■	■										
Improve customer service	■			■					■						
Improve market share	■	■							■	■					
Improve efficiency			■						■						
Reduce down time	■		■	■	■										
Become more competitive	■	■		■					■						
Reduce any waste	■	■	■						■						

For the **interview schedules**, a scoring scale of 1 – 10 was utilised; “10” if there was total agreement with the statement without any reservations and unequivocally; “1” if the statement was totally false and they disagreed with its content wholeheartedly.]

Interview schedule responses regards why the Organisation embraced Lean					
Statement	Score 1 –10				Total
Higher profitability	7	8	10	8	33
Higher productivity	7	7	10	8	32
Lower costs	9	9	10	10	38
Attain improved delivery records			10	9	19
To carry less stock	10	9	9	8	36
Improve relations with suppliers / customers	4	4	7	6	21
Improve relations between shop floor and management	4	4	7	5	20
Improve communications between departments	3	5	6	6	20
Better teamwork	4	5	8	5	22
Improve worker production	9	9	9	9	36
Improve customer service	8	8	9	9	34
Improve market share	4	8	8	5	25
Improve efficiency			10	10	20
Reduce down time	9	10	10	9	38

Become more competitive	9	9	10	9	36
Reduce any waste	9	9	10	9	36

Key: = Question not posed to the shop floor

= Shop floor operative response

= Management response

11.2.7 Lean application

The next two sections revealed from the contributors' view both the spread of Lean within the organisation and how long it had been on the Lean journey; owing to the nature of information needed, the question was only posed to managers:

Application of Lean is across the following					
Lean occurs across the whole value chain					
Lean is in our company only					
Manufacturing and Supply functions only					
Manufacturing or supply functions only					
Some units of manufacturing or supply functions only					
Few isolated tools are used					

Length of time the organisation has continuously been on the Lean journey					
0 – 6 months					
7 months - 1 year					
1 – 2 years					
3 – 4 years					
5 -6 years					
7+ years					

11.2.8 Tools used within the organisation

The data capture also sought to establish which tools the organisation had introduced as integral to its Lean journey; owing to the nature of the information sought, this section only applied to managers. [a scoring of 1-10 was used; “1” to be awarded if the participant considered that this tool is not applicable within the organisation and there are no plans to implement it in the future; “10” to be awarded if it is fully operational within the company and total commitment is awarded to it.]

Lean Tools applied in the organisation						
		Questionnaire		Schedules		Total
		1	Kiazen / continuous improvement	9	8	
2	Cellular manufacturing	1	2	3	2	8
3	Kanban systems	3	4	4	3	14
4	Single piece flow operations	2	2	2	2	8
5	Process mapping	4	6	5	4	19

6	Single Minute Exchange of Dies (SMED)	1	1	1	1	4
7	Step change / kaikaku	1	1	1	1	4
8	Supplier Development – activating links with suppliers	1	1	1	1	4
9	Supplier base reduction	9	8	9	8	34
10	5's and general visual management	9	9	8	7	33
11	Total Productive Maintenance	9	8	8	8	33
12	Attacking value and the seven wastes	4	4	5	5	18

11.2.9 Cultural implications of Lean

The questionnaires and interview schedules played an important role in determining the prevailing organisation's culture through the following set of questions:

Statement	Strongly agree	Agree	Somewhat agree	Disagree	Strongly disagree
Decisions in the organisations are made at the lowest level possible			4		
The shop-floor is listened to more widely than was the case before Lean		2	2	3	
All management levels are listened to more widely than was the case before Lean		1	3		
The organisation's direction and destination for 5 years is now much clearer		2	1	4	
The company has one particular person directing operations and the proposals are clearly communicated	1	1	1	1	
People are clear regarding their expectations from Lean	1	3	2	2	
There is adequate training to assist the progress of Lean			1	2	1
All managers' tiers seem to be pulling in the same direction to make Lean work			1	3	
The company is now a better place to work in since the introduction of Lean		1	3	1	
I fully understand why Lean is needed in the organisation	1		2	4	

The various departments seem to work better and have a healthier relationship than was the case prior to Lean			3	1	
	1	2	1		
The outcomes of Lean have been communicated thoroughly		2	2		
	1	1	2		
Lean metrics are clear to observe and the information is cascaded downwards regularly			4		
		1	3		
Greater efforts are made to involve suppliers than was the case before Lean		3	1		
	1	2	1		
Greater efforts are made to involve customers than was the case before Lean		2	2		
	1	3			
The Lean journey is linked to the mission statement / vision					
		1	2	1	

Key: = Question not posed to the shop floor

= Shop floor operative response


= Management response


11.2.10 Lean as a Business case


It was important to establish whether Lean had assisted the organisation to secure benefits and the following section attempted to infer this [a percentage figure was sought ideally; otherwise an indication whether the relevant measure had improved as a result of Lean]:

What has Lean accomplished for the organisation											
-	Deterioration	Measurement	+								Total
			Improvement								
	Finance	Company profitability	10	10	5	5	5	0	10	0	45
		Company share prices	0	0	0	0	0	0	0	0	0
		Company liquidity	5	5	10	5	20	15	15	10	85
		Earnings per share					0	0	0	0	0
	Customer	More satisfied customers	5	10	15	10	15	5	15	15	90
		Market Share	0	5	5	5	0	0	10	5	30
		Service quality	0	10	10	10	10	5	15	15	75
		Delivery records	5	15	5	10	10	10	20	15	90
		Better relationship with customers	5	10	10	10	25	15	15	20	110
	Process	NPD lead time	5	5	10	10	10	5	5	10	60
		Overall cycle time	5	5	5	5	10	5	10	10	55
		Quality of new products	5	10	5	10	10	5	10	5	60
		Quality costs	5	5	10	5	15	10	5	10	65
		Defects of critical					15	10	15	15	55

	products /components									
	Raw material costs	5	5	15	10	10	10	10	10	75
	Capital efficiency					5	5	5	5	20
	Labour efficiency					5	0	5	5	15
	Finished stock	5	10	10	10	10	10	15	10	80
	WIP stock					15	10	10	5	40
People	Absenteeism	5	0	0	5	0	0	0	0	10
	Labour turnover	0	5	5	0	0	0	0	0	10
	Quality of leadership development					0	0	5	0	5
	The relationship between management and the shop-floor	0	5	0	0	5	10	10	5	35
	Better communications	5	10	5	5	5	10	10	5	55
Future	New product development	0	5	0	0	5	5	5	10	30
	Looking for new markets	0	10	0	0	10	5	5	0	30
	Investment in new technology	5	5	10	5	10	10	15	10	70
	Sales from new products (< 5 years)	0	5	0	0	5	0	5	0	15
	Anticipating new changes					0	0	5	0	5

Key:  = Question not posed to the shop floor

 = Shop floor operative response

 = Management response

11.3 Lean Audit

A detailed Lean audit was undertaken over one day's duration with the assistance of various personnel in the organisation; it showed that the organisation whilst contending to be on the Lean journey illustrated all the signs of ultimate stagnation. The audit is not included; the overall summary is detailed below. Overall the whole commitment towards Lean needs reviewing since it is purely viewed as an operational instrument. Consequently, the organisational and cultural issues are not recognised. One of the major concerns is focused on the reaction forwarded by the organisation that it did not embrace the incremental nature of Lean.

Organisation name: Fletcher Moorland Limited		
Category	Maximum score available	Score achieved
Overall safety, cleanliness and orderliness	30	12
Production and operational flow	50	20
Processes and operations	90	45
Visual management	50	22
Quality designed into the product	130	41
Continuous improvement	90	28
Lean change strategy	120	35
Lean sustainability	70	24
Culture employee oriented	100	33
Organisational culture – organisational practices	130	36
Lean treated as a business	90	24
Philosophy	90	25
Total score : 345		
% score : 33%		
Lean stage: Mechanical		

Lean Assessment scoring system		
Lean stage	Required Points	% of the maximum score of 1,040 points available
Ideological	936	90%
Innovative	780	75%
Holistic	624	60%
Enhanced	468	45%
Mechanical	312	30%
Developmental	156	15%
Planning	0 - 155	0% - 15%

General comments:

Overall, whilst the organisation stresses that it is on the Lean journey, there is considerable work required since the commitment is certainly devoid. Few isolated tools have been in place since 2002 (4 years) and no progress has happened within that time. Unfortunately, Lean is viewed as a cost cutting exercise and this was clearly evident from the tool selection. Fletcher Moorland needs to review its reasons for adopting Lean and embrace it as a total package. The organisation's value streams are not complex and coupled with the size of the organisation, it should be able to widen the scope for Lean; however, it requires external expertise and needs to be able to accept this notion.

The supporting infrastructure; namely, culture, organisational development, investment and sustainability scored badly, very often below 30%. Moreover, when applying the metrics utilised to assess whether Lean was viewed as a philosophy, the organisation only secured a score of 28%. In summary, it could be concluded that unlike the Lean implementations of successful organisations, this implementation has peaked and is unlikely to ever reach the ideological state. Extraordinarily, when feedback was sought on the results of the audit; the organisation accepted the findings as is reflected in the audit feedback form below:

Section A: General Background

Please State name of your company	Fletcher Moorland Limited
Please name the auditor(s)	Sanjay Bhasin

Section B: Summary of the Lean Audit score

Lean Audit %:	33%	Lean Stage:	Mechanical
----------------------	-----	--------------------	-------------------

Section C: Feedback on the scores achieved in each category

Using a score of 1-10 could you indicate your assessment of the score achieved in each category; 10 if you totally agree with the Lean audit score; 1 if you totally disagree with the Lean audit score.

Categories	Your score
Overall safety, cleanliness and orderliness	8
Production and operational flow	10
Processes and operations	8
Visual management	9
Quality designed into the product	9
Continuous improvement	5
Lean change strategy	9
Lean sustainability	9
Culture employee oriented	9
Organisational culture – organisational practices	9
Lean treated as a business	9
Philosophy	10
Average score obtained for the twelve categories	9

Section D: Any additional comments to be made about the Lean Audit

The organisation has been on the Lean journey for over four years and the audit results acted as a harsh reality check. We agreed with most of the scorings, except the continuous improvement score, since most of what we perform really comes under the category of continuous improvement. However, we presume, the results and indices under this category were more concerned with the Lean journey specifically. We did feel that the audit, if undertaken, in two years time would have yielded much better results since we aim to tackle many of the issues indicated in the audit questionnaire. We, also, felt that the investment and effort required for some of these improvements was not fully recognised.

12.0 Summary of the analysis

12.1 Case study summary

The participants were asked about their understanding of the concept of Lean; interestingly, the general concept of Lean seems to have been well understood amongst the managers but the shop floor predominantly saw it as a cost costing exercise; besides the operational references:

- Relationships with customers and
- suppliers were mentioned, but there was a heavy reference to
- the need to reduce stock.

Equally candidates were asked about the original reasons for Fletcher Moorland primarily adopting Lean; the common responses focused on the following:

- Improve performance,
- Need to reduce stock,
- Competitor pressure and
- Reduce costs.

When views were sought on the effect of Lean purely on a personal level; the highest scores were as follows:

- Encountering more pressure, and
- The company's perception.

The following were indicated as potentially having the least personal impact from Lean:

- More job security,
- More pay and
- Career prospects.

Owing to the degree of complexity, only the managers were posed the question regards the potential barriers encountered towards Lean within their organisation; bearing in mind that they could have scored a maximum 40; the following were the highest scores achieved:

Barriers	Total score out of a maximum of 40
Cost of the investment	38
Insufficient internal funding	35
Insufficient workforce skills to implement Lean	34
Cultural Issues	33
Insufficient supervisory skills	32

All the participants were asked to state the reasons they considered that the organisation embraced Lean; there was significant consistency between the questionnaires and the interview schedules. However, since the interview schedules included a score, it was possible to rank the replies:

Reasons for Lean adoption	Total score out of a maximum of 40
Lower costs	38
Reduce down time	38
To carry less stock	36
Improve worker production	36
Become more competitive	36
Reduce waste	36
Improve customer service	34

Higher profitability	34
Higher productivity	32

When the participants were asked about the Lean tools in place; generally the scores reflected the stage the organisation is on its Lean journey; ironically the lowest scores were recorded for:

- Supplier development (4/40)
- Single piece flow operation (8/40)
- Cellular manufacturing (8/80)

The cultural questions provided a good insight of the problems faced by the organisation; the aspects that scored the lowest were that:

- Lean outcomes had been communicated poorly,
- the company was not a better place to work in as a result of Lean,
- Lean metrics were not identified, and
- Efforts to embrace customers had not improved. (The score below did not substantiate this!)

All the participants' opinions were also sought on the potential benefits of Lean on various indices; the highest were as follows:

Indices	Averaged % improvement
Better relationship with customers	13.8
Delivery records	11.2
More satisfied customers	11.2
Company liquidity	10.6
Finished stock	10

Amongst the lowest scores; the following were recorded:

Indices	Average % improvement
Sales from new products	1.9
Relationship between management and shop floor	4.3

12.2 Lean Audit

Generally Fletcher Moorland reflected an organisation that whilst recognising the benefits of Lean and equally wishing to enjoy these positives, it seems reluctant to increase its level of commitment towards Lean. The following category scores show the amount of work needed:

- designing quality in the product – 32%
- Lean sustainability - 34%
- Culture score - 30% (average) and
- Lean as a philosophy - 28%

Whilst some Lean tools have been introduced, more concentration was needed on:

- Process mapping
- Continuous improvement and
- The indices by which Lean is tracked within the organisation.

12.3 The Survey questionnaire

The Survey questionnaire largely helped to reinforce the Case Study analysis by stating that the top two reasons for the initial adoption of Lean were:

- To improve performance and

- Competitive pressures.

The main barriers cited towards Lean or their wider adoptions were:

- Internal funding, External funding,
- Cost of the investment,
- Insufficient management skills to implement Lean, and
- Insufficient management time.

Equally there were five main aspirations from the Lean adoption:

- Higher profitability,
- Higher productivity,
- Lower manufacturing costs,
- Increased efficiency and
- Increased competitiveness.

An inconsistency of responses between the Case Study and the Survey Questionnaire surrounded around the Lean tools in place; the survey scored four top scores:

- Kaizen,
- Visual management,
- TPM and
- Attacking the wastes.

13.0 THREE YEAR STRATEGY

Evidently, the Lean journey requires a fresh impetus; the detailed Lean audit had confirmed the findings of the survey questionnaire whereby about 50% of the departments and employees were operating under Lean conditions despite the size of the organisation. The term “Lean” was certainly used erroneously. External help was required and the tools used needed consideration. With the appropriate commitment, it was felt that the Lean journey would gain momentum but major cultural, change and sustainability issues needed confronting. The following three-year plan is proposed for the organisation, if it is genuine regards its Lean journey:

Processes required	Three Year Time frame					
	Year one		Year two		Year three	
Appoint an external sensei						
Train an internal Lean champion						
Plan ahead in response to the audit						
Ensure funds are made available for Lean						
Widen implementation of the existing Tools						
Decide upon a strategy about the most appropriate tools and implement them						
Disciplined Lean training is to be introduced						
Tackle the key cultural issues						
Alter the Lean indices						
Begin to look at Lean across the value chain						

APPENDIX TWELVE

The Leoni Case Study

The Case Study fully written up; it contains information provided in a standardised format and this comprises of the following:

- Company Name
- Company Address
- Registration details
- Company number
- Market Sector
- Employee details
- Position of company contact
- Product Company details
 - History
- Finance details
- Lean Journey
 - Lean History
 - Case Study analysis
 - Meaning of “Lean”
 - Internal reasons for Lean
 - How Lean was progressing
 - Lean and its personal implication
 - Lean obstacles
 - Reasons for Lean adoption
 - Lean application
 - Tools used within the organisation
 - Cultural implications of Lean
 - Lean as a Business Case
- Lean audit
- Summary of the analysis
 - Case Study Summary
 - Lean Audit
 - Survey Questionnaire
- Three year strategy

Leoni Wiring Systems UK Ltd



	Page
2.0 Company Name	153
3.0 Company Address	153
4.0 Registration details	153
5.0 Company number	153
6.0 Market Sector	153
7.0 Employee details	153
8.0 Position of company contact	153
9.0 Brief History	153
9.1 Product Company details	154
10.0 Finance details	155
11.0 Lean Journey	157
11.1 Lean History	157
11.2 Case Study analysis	157
11.2.1 Meaning of “Lean”	157
11.2.2 Internal reasons for Lean	158
11.2.3 How Lean was progressing	159
11.2.4 Lean and its personal implication	160
11.2.5 Lean obstacles	160
11.2.6 Reasons for Lean adoption	161
11.2.7 Lean application	162
11.2.8 Tools used within the organisation	162
11.2.9 Cultural implications of Lean	163
11.2.10 Lean as a Business Case	164
11.3 Lean audit	165
12.0 Summary of the analysis	168
12.1 Case Study Summary	168
12.2 Lean Audit	169
12.3 Survey Questionnaire	169
13.0 Three year strategy	170

2.0 Company Name

Leoni Wiring Systems U.K. Ltd.

3.0 Company Address

LEONI Wiring Systems U.K. Ltd.

Lower Milehouse Lane,

Newcastle-under-Lyme,

Staffordshire,

ST5 9BT.

Telephone +44 (0)1782-563366.

LEONI Wiring system generic background information	
Chief Executive:	Jack Grindrod
Address:	Lower Milehouse Lane, Newcastle-Under-Lyme, Staffs. ST5 9BT. UNITED KINGDOM
Telephone:	0178 256 3366
Fax:	0178 260 4822
Email:	info@leoniwiring.co.uk
Website:	http://www.leoni.com
Employees:	2,300

4.0 Registration Details

Name: **LEONI Wiring Systems U.K. Ltd.**

Registered Office: Lower Milehouse Lane, Newcastle-Under-Lyme, Staffs., ST5 9BT

5.0 Company number

Classification Number **3918171**

6.0 Market Sector - Business activity

Development and distribution of cable harnesses and complete wiring systems for the UK automotive industry.

7.0 Employee Details

At the time of undertaking the case Study, there were approximately 1,980 employees.

8.0 Position of Company Contact

The information was primarily secured as a result of assistance offered by Allan Wootton (Work Study Manager.)

9.0 Brief History

From a Franconian wire factory to the global LEONI Group; it is difficult to believe that a small, 16th century wire factory in the Franconia region of Bavaria could have laid the foundation for today's global player - LEONI. In 1596, Frenchman Anthoni Fournier began with a handful of staff in Nuremberg to produce finest gold and silver threads, known as Lyonesse wares, for precious woven products. His sons operated additional production facilities in Nuremberg. From these beginnings, Leonische Werke Roth-Nürnberg AG emerged in 1917.

9.1 Product/Company Details

From a wire manufacturer to a global market leader for automotive cables, LEONI is a global supplier of wires, cables and wiring systems. With more than 34,000 employees at about 100 facilities, the German MDAX-listed group of companies generates consolidated sales of more than EUR 2.1 billion (2006). The principal customer base is the automotive industry, for which LEONI develops and produces technically sophisticated goods: from single-core automotive cables to complete wiring systems with integrated electronics. Leoni is a full service supplier to customers, which includes all design and test verification.

Competitive Strengths

Leoni Wiring Systems UK is part of a multi-national globally positioned supplier of automotive wiring harnesses. It has Facilities in Europe, East Europe, India, China, North and South America, North and South Africa. It supplies to the heavy vehicle sector including, DAF Trucks, Caterpillar, Pacar and JCB. The quality Accreditations include: TS 16949, QS 9000, ISO 14001. Leoni has secured supplier awards from various customers.

Product / Service Classification:

- Professional Services - Design Engineering,
- Electrical / Electronic Parts and Systems - Fuses / circuit protection,
- Electrical / Electronic Parts and Systems - Wiring systems.

Successful in a variety of markets

In addition to products for the car and commercial vehicle industry, LEONI's range of products and services comprises special cables tailor-made to customer specifications, ready-to-fit cable systems, wired modules, data cables and network components, insulated high-voltage cables, control cables, coaxial and instrumentation cables, power cords, copper wires and strands, as well as radiation cross-linking of cables and tubes. The customers are primarily companies in the capital goods, communications, electrical appliances, and medical engineering industries. LEONI's customer base includes well-known names as Audi, BMW, Bosch, Daimler Chrysler, Deutsche Telekom, Ericsson, General Motors, Land Rover, Miele, Philips, Porsche, Siemens, and VW.

Expertise as development services provider and systems supplier

The trend nowadays in both car manufacturing and other industrial sectors is towards more complex cables systems, through to fully wired, ready-to-install modules. Successful suppliers, such as Leoni, do not only have special expertise in cable assembly but also have a comprehensive understanding of operating conditions and the technical correlations on the user side to conceive optimum product solutions. Leoni has precisely this knowledge; largely attributable to decades of experience and strong developmental work. Added to this is a value chain, unique in the sector, ranging from single wires to cables and through to wiring systems, which holds valuable synergistic benefits.

Division Wire and Cable Solutions

The Wire and Cable Solutions Division has an exceedingly broad range of products, which leaves nothing to be desired as far as variety and quality are concerned. Special emphasis is placed on the ready-to-install assembly of cables as well as the development and manufacture of complete cable systems. In addition to non-insulated wires, strands, highly flexible ropes and tapes, two types of cables are produced:

- special cables, tailor-made to customer specifications,
- standard cables, in compliance with German and international standards (VDE, DIN, HAR, UL, CSA, SAE and others) as well as manufacturer standards.

In order to guarantee being close to the customer and the market, the Wire and Cable Solutions Division is divided into business units, which have many years of experience with specific cable needs in the industries they support.

10.0 Finance Details

Registration number: 3918171

Leoni Wiring Systems UK Ltd Abbreviated accounts For the year ending: 31st December, 2005

Consolidated Income Statement
For the year ending 31st December 2005

	2005	2004
	£000	£000
Revenue	120,042	92,264
Cost of Sales	(98,548)	(76,559)
Gross Margin	21,494	15,705
Administrative expenses	(8,564)	(10,164)
Distribution expenses	(4,479)	(2,058)
Research and Development	(5,386)	(7,219)
Other operating Income	883	897
Other operating expenses	(5,257)	(1,703)
Operating Profit/ (Loss)	(1,309)	(4,542)
Finance Revenue	-	-
Finance Costs	(1,941)	(1,742)
Loss on ordinary activities before taxation	(3,250)	(6,273)
Tax on loss on ordinary activities	(372)	-
Retained Loss for the Year	(3,622)	(6,273)
Attributable to:		
Equity holders of the Parent	(3,622)	(6,273)

Leoni Limited
Balance Sheet as at 31st December 2005

	£ 2005 £000	£ 2004 £000
Fixed Assets		
Non Current Assets		
Property, Plant Equipment	3,056	2,954
Intangible assets	6,915	5,902
Pension asset	7,680	8,109
Investments	-	-
	<hr/>	<hr/>
	17,651	16,965
Current Assets		
Trade and other receivables	16,249	18,928
Inventories	8,214	17,241
Cash and short term Deposits	3	-
Assets classified as for Sale	-	-
	<hr/>	<hr/>
	24,466	36,169
Total Assets	42,117	53,134
Liabilities		
Current Liabilities		
Trade and other payables	10,233	14,297
Financial liabilities	-	19,499
Provisions	716	-
	<hr/>	<hr/>
	10,949	33,796
Non Current Liabilities		
Financial liabilities	20,335	5,000
	<hr/>	<hr/>
	31,284	38,796
Net Assets	<hr/> 10,833 <hr/>	<hr/> 14,338 <hr/>
Capital and Reserves		
Equity Share Capital	30,000	30,000
Effect of Cash Flow Hedges	-	(117)
Retained earnings	(19,167)	(15,545)
	<hr/>	<hr/>
Total equity	10,833 <hr/>	14,338 <hr/>

(Source: Companies House; February 2008)

11.0 Leoni Wiring Systems Lean Journey

Leoni has been on the Lean journey for over ten years; the evidence dictates a record, which in all probability should have been better. This was both scrutinized and evaluated subsequently with the aid of the following:

- the original survey questionnaire,
- two management interview schedules,
- two operative interview schedules,
- two management questionnaires,
- two shop floor questionnaires, and a detailed
- Lean audit undertaken to determine the organisation's Lean status.

11.1 Leoni's Lean History

Leoni has been on the Lean journey in excess of ten years. It now has a dedicated "Continuous Improvement" Team and since 1996 has received help from the SMMT forum. The forum began in 1996 with the aim of achieving world competitive sustainable growth in the UK based vehicle and component industry. It is a unique collaboration between the government and vehicle industry. The activities of the Industry Forum stem from the collaboration between the major players in the industry, whereby Master Engineers, world experts in manufacturing process improvement and acknowledged practitioners in this subject, began working together in the UK. These Master Engineers came from Honda, Nissan, Toyota, General Motors and Volkswagen; never before had these companies collaborated in a single industry focussed programme of improvement activities.

These Master Engineers became the trainers for a collection of UK engineers. The tools and techniques used by the Master Engineers would be transferred. These Industry Forum engineers would then transfer the skills, knowledge and delivery techniques of process improvement into the companies with whom they worked. This was the essence of the "*Learning by doing*" programmes developed by the Industry Forum. The Master Engineers have now returned to their respective companies and training of *Industry Forum Engineers* is undertaken by Senior Industry Forum Engineers who carry on this high standard of work. Since 1996 the SMMT Industry Forum has worked with over 450 car and components manufacturers to improve their performance and has also trained engineers from a number of other sectors in the tools and techniques of manufacturing process improvement. According to the senior management team at Leoni, the main areas, since 2003, that Lean has intended to resolve are:

- Improve productivity,
- Better teamwork, and
- Improved ability to understand their partners' Lean systems.

11.2 Case Study Analysis

11.2.1 Meaning of "Lean"


Initially it was important to gauge precisely what was understood by the term "Lean" in the organisation.



The understanding of the term Lean	
Questionnaires	
Manager 1:	“produce as and when orders are received; ..will cut stock and costs”
Manager 2:	“generally to reduce scrap and cost reduction”
Shop-floor 1:	“Reduce promotion for which we have no orders; cut costs”
Shop floor 2:	“Produce once orders are received; will cut costs, stock”
Interview schedules:	
Manager 1:	“to speed flow of production by reducing waste”
Manager 2:	“cut production costs by BPR”
Shop floor 1:	“tries to make sure that no faults occur”
Shop Floor 2:	“cut costs by not producing too much”

11.2.2 Internal reasons for “Lean”

Both the questionnaires and the interview schedules sought to discover the initial reasons for adopting Lean within the organisation:

Reasons for adopting Lean – Questionnaire												
Statement	Scale											
	Strongly Agree			Agree			Somewhat agree			disagree		Strongly disagree
Customer pressure												
To improve performance												
Competitor pressure												
Create team spirit / motivational tool												
Owner / Investor pressure												
Better working conditions												
As a result of attending a special event/conference												

Key:  = Question not posed to the shop floor

 = Shop floor operative response  = Management response

Reasons for adopting Lean – interview schedules			
(Listed in order of importance by the participant)			
Manager one	Manager two	Operative one	Operative two
Customer knowledge	Some customers have Lean	Reduce down time	Cut costs
Competitive pressure	Cut wage costs	Cut costs – wastage	Salaries – too high
Reduce costs of production	Reduce stock levels	Better products first time	Cut materials needed
Better quality	Better space utilisation		Less storage space

11.2.3 How Lean was progressing?

The following questionnaire responses were received in regards how Lean was seen to be progressing within the organisation.

Progress of Lean with the organisation – Questionnaire responses																			
Statement	Scale																		
	Strongly Agree				Agree				Some - what agree				disagree				Strongly disagree		
I have the necessary tools to implement Lean																			
Tools used are of good quality																			
Appropriate training is provided																			
Appropriate time is given to make improvements																			
Senior management attitude/commitment is right to accept Lean																			
Middle managers' approach is right to implement Lean																			
Workers approach is right to implement change																			
Organisation's culture aids Lean																			



[* Senior and middle management were considered as synonymous in regards the operatives' questionnaires.]

 = Shop floor operative response  = Management response

For the **interview schedules**, a score of 1-10 was used; “10” if there was an absolute agreement with the statement without any reservations and unequivocally; “1” if the statement was seen to be totally false and they disagreed with its content wholeheartedly.

Interview Schedules responses regards Lean Progress					
Statement	Score 1 - 10				Total
I have the necessary tools to implement Lean	3	3	4	4	
The tools used in the company are of good quality	4	3	4	4	15
Appropriate training is provided to operate Lean	3	2	3	3	11
Appropriate time is given to make improvements	3	2	4	3	12
Senior management's attitude is right to accept Lean	2	1	5	2	10
Middle management's attitude is appropriate for Lean	2	1	4	4	11
Workers approach is right to implement change and accept Lean	5	3	3	2	13
Organisational culture aids Lean	3	2	3	2	10


[* Senior and middle management were considered as synonymous in regards the operatives' schedules.]

 = Shop floor operative response  = Management response

11.2.4 Lean and its personal implications

Both the questionnaires and the interview schedules attempted to gauge the participants' personal perception of what Lean would mean for them:

What Lean means on a purely personal level – Questionnaire responses														
Statement	Scale													
	Strongly agree			Agree			Somewhat agree			disagree			Strongly disagree	
Will result in more pay														
My job is more secure														
I will encounter more pressure														
Better career prospects														

 = Shop floor operative response  = Management response

What Lean means on a purely personal level – interview schedules (Listed in order of importance by the participant)			
Manager one	Manager two	Operative one	Operative two
Better image of company	Stronger role for Industrial Engineers	More work – more orders	Less space needed
More price competitive	Reduce costs	Less time wasted	Cut costs – salaries, materials
Reduce costs	Happier customers	To please suppliers	Better customer responses
Less pressure on space	More orders		

11.2.5 Lean obstacles

Owing to the nature of information required, only the managers were asked to determine the possible stumbling blocks to Lean. [a score of 1-10 was used; “1”: if they felt it posed no concern and no difficulties; “10” if they felt that it posed a major barrier and has proven impossible to breakdown.]

Barriers organisation encountered/encounters towards Lean						
Barriers		Score				Total
		Questionnaire		Schedules		
1	Insufficient understanding of the potential benefits	6	6	3	4	19
2	Insufficient internal funding	10	9	7	9	35
3	Insufficient external funding	10	9	7	8	34
4	Insufficient senior management skills to	8	9	5	8	30

	implement Lean					
5	Insufficient supervisory skills to implement Lean	10	10	8	9	37
6	Insufficient workforce skills to implement Lean	9	9	9	9	36
7	The need to convince shareholders / owners	6	6	7	2	21
8	Insufficient management time	9	9	7	5	30
9	Employee attitudes / resistance to change	7	10	8	9	34
10	Cost of the investment	9	9	5	8	31
11	Cultural issues	9	9	8	9	35
12	Others (please specify below)					

11.2.6 Reasons for Lean adoption

The questionnaires and interview schedules tried to ascertain the underlying reasons from the participants' perspective for Lean being introduced into the organisation.

Why do you feel the organisation has embraced Lean? – Questionnaire responses											
	Strongly agree			Agree			Somewhat agree			disagree	Strongly disagree
Higher profitability											
Higher productivity											
Lower costs											
Improved delivery records											
To carry less stock											
Improve relations with suppliers / customers											
Improve relations between shop floor and management											
Improve communications between departments											
Better teamwork											
Improve worker production											
Improve customer service											
Improve market share											
Improve efficiency											
Reduce down time											
Become more competitive											
Reduce any waste											

For the **interview schedules**, a scoring scale of 1 – 10 was utilised; [“10” if there was total agreement with the statement without any reservations and unequivocally; “1” if the statement was totally false and they disagreed with its content wholeheartedly.]

Interview schedule responses regards why the Organisation embraced Lean					
Statement	Score 1 –10				Total
Higher profitability	8	10	10	10	38
Higher productivity	9	10	10	10	39

Lower costs	9	9	10	10	38
Attain improved delivery records			9	9	18
To carry less stock	8	10	10	8	36
Improve relations with suppliers / customers	4	5	8	4	21
Improve relations between shop floor and management	3	3	5	2	13
Improve communications between departments	4	3	6	3	16
Better teamwork	3	2	6	3	14
Improve worker production	9	9	9	9	36
Improve customer service	8	8	9	9	34
Improve market share	8	9	10	10	37
Improve efficiency			10	10	20
Reduce down time	9	10	10	10	39
Become more competitive	9	10	10	9	38
Reduce any waste	9	9	10	10	38

Key: = Question not posed to the shop floor

= Shop floor operative response

= Management response

11.2.7 Lean application

The next two sections revealed from the contributors' view both the spread of Lean within the organisation and how long it had been on the Lean journey; owing to the nature of information needed, the question was only posed to managers:

Application of Lean is across the following					
Lean occurs across the whole value chain					
Lean is in our company only					
Manufacturing and Supply functions only					
Manufacturing or supply functions only					
Some units of manufacturing or supply functions only					
Few isolated tools are used					

Length of time the organisation has continuously been on the Lean journey					
0 – 6 months					
7 months - 1 year					
1 – 2 years					
3 – 4 years					
5 -6 years					
7+ years					

11.2.8 Tools used within the organisation

The data capture also sought to establish which tools the organisation had introduced as integral to its Lean journey; owing to the nature of the information sought, this section only applied to managers. [a scoring of 1-10 was used; “1” to be awarded if the participant considered that this tool is not applicable within the organisation and there are no plans to implement it in the future; “10” to be awarded if it is fully operational within the company and total commitment is awarded to it.]

Lean Tools applied in the organisation						
1	Kiazan / continuous improvement	Questionnaire		Schedules		Total
		8	8	6	4	
2	Cellular manufacturing	7	8	7	5	27
3	Kanban systems	7	8	4	3	22
4	Single piece flow operations	4	7	5	2	18
5	Process mapping	8	9	8	5	30
6	Single Minute Exchange of Dies (SMED)	2	4	6	2	14
7	Step change / kaikaku	0	1	3	2	6
8	Supplier Development – activating links with suppliers	1	1	7	2	11
9	Supplier base reduction	1	1	6	3	11
10	5's and general visual management	8	7	8	6	29
11	Total Productive Maintenance	6	7	7	3	23
12	Attacking value and the seven wastes	8	9	9	4	30

11.2.9 Cultural implications of Lean

The questionnaires and interview schedules played an important role in determining the prevailing organisation's culture through the following set of questions:

Statement	Strongly agree	Agree	Somewhat at agree	Disagree	Strongly disagree
Decisions in the organisations are made at the lowest level possible		2	1	1	
The shop-floor is listened to more widely than was the case before Lean		1	2	2	1
All management levels are listened to more widely than was the case before Lean		1	2	1	
The organisation's direction and destination for 5 years is now much clearer	1	2	1	2	
The company has one particular person directing operations and the proposals are clearly communicated	2	3	2	1	
People are clear regarding their expectations from Lean	2	2	1	1	
There is adequate training to assist the progress of Lean	1	1	1	3	1
All managers' tiers seem to be pulling in the same direction to make Lean work		2	2	2	
The company is now a better place to work in since the introduction of Lean		1	1	2	
I fully understand why Lean is needed in the organisation	2	3	2	1	
The various departments seem to work better and have a healthier relationship than was the case prior to			3	1	

Lean		2	2		
The outcomes of Lean have been communicated thoroughly	1	3	3	1	
Lean metrics are clear to observe and the information is cascaded downwards regularly		1	3		
Greater efforts are made to involve suppliers than was the case before Lean		3	1		
Greater efforts are made to involve customers than was the case before Lean		1	3		
Greater efforts are made to involve customers than was the case before Lean	1	2	2	1	
The Lean journey is linked to the mission statement / vision		3	1		

Key: = Question not posed to the shop floor

= Shop floor operative response


= Management response


11.2.10 Lean as a Business case

It was important to establish whether Lean had assisted the organisation to secure benefits and the following section attempted to infer this [a percentage figure was sought ideally; otherwise an indication whether the relevant measure had improved as a result of Lean]:

What has Lean accomplished for the organisation										
-	Measurement	+								
Deterioration		Improvement								
Finance	Company profitability	0	15	10	10	5	10	5	0	55
	Company share prices	0	10	5	15	10	10	0	0	50
	Company liquidity	5	5	10	10	5	10	15	10	70
	Earnings per share					0	5	5	5	15
Customer	More satisfied customers	10	10	25	10	10	15	25	20	125
	Market Share	5	5	5	5	5	5	5	10	45
	Service quality	5	5	20	0	5	10	5	10	60
	Delivery records	15	10	15	10	5	20	15	0	90
	Better relationship with customers	5	5	20	15	5	10	10	30	100
Process	NPD lead time	5	0	5	0	10	10	0	0	30
	Overall cycle time	10	10	10	0	10	10	10	10	70
	Quality of new products	10	0	10	0	20	5	0	0	45
	Quality costs	5	10	10	10	15	10	5	10	75

	Defects of critical products /components					15	15	10	35	75
	Raw material costs	5	10	5	10	10	15	15	20	90
	Capital efficiency					15	10	10	15	50
	Labour efficiency					15	0	15	20	50
	Finished stock	5	10	20	10	15	5	20	30	115
	WIP stock					10	5	15	40	70
People	Absenteeism	0	0	0	0	0	0	0	0	0
	Labour turnover	0	5	0	0	0	0	0	0	5
	Quality of leadership development					0	0	0	0	0
	The relationship between management and the shop-floor	0	0	0	0	0	5	0	0	5
	Better communications	0	0	0	0	5	10	0	0	15
Future	New product development	0	5	0	0	0	5	0	0	10
	Looking for new markets	0	0	0	0	0	0	0	10	10
	Investment in new technology	0	0	10	0	0	0	10	10	30
	Sales from new products (< 5 years)	5	0	0	0	0	0	0	0	5
	Anticipating new changes					0	0	0	0	0

Key:  = Question not posed to the shop floor

 = Shop floor operative response  = Management response

11.3 LEAN AUDIT

A detailed Lean audit was undertaken with the assistance of Allan Wootton (the Work-Study Manager), which showed that the organisation whilst contending to be on the Lean journey shows all the signs of ultimate failure. The audit is included as an appendix but the overall summary is detailed below. The pro-forma following the audit summary is the feedback sought from the organisation in response to the audit results they received. Unpredictably, there was a general consensus with the audit grades.

Lean Assessment scoring sheet		
Organisation name:	Leoni	
	Maximum score available	Score achieved
Overall safety, cleanliness and orderliness	30	17
Production and operational flow	50	28
Processes and operations	90	51
Visual management	50	29
Quality designed into the product	130	73
Continuous improvement	90	46
Lean change strategy	120	68
Lean sustainability	70	43
Culture employee oriented	100	46
Organisational culture – organisational practices	130	62
Lean treated as a business	90	45
Philosophy	90	36
Total score : 544		
% score : 52		
Lean stage: Enhanced		

Lean Assessment scoring system		
Lean stage	Required Points	% of the maximum score of 1,040 points available
Ideological	936	>90%
Innovative	780	>75%
Holistic	624	>60%
Enhanced	468	>45%
Mechanical	312	>30%
Developmental	156	>15%
Planning	0 – 155	0% - 15%

General comments:

A commitment towards Lean is clearly evident; a continuous improvement team has been in place in excess of six years. Two tools, SMED and Kaizen, have been implemented in excess of ten years. Nonetheless, the CI team is seen as a specialist unit but one, which operates in an insular manner; consequently the perception on the shop floor of the team is poor and this was discovered in some of the communications it endeavoured to undertake within the internal organisation. Unfortunately the rumours are rife regards a major re-organisation which has undeniably taken some of the focus away from further Lean implementation. The “Lean sustainability” set of indices secured a score of 61%, whilst a reasonable score, does mask some underlying problems. In the last three years there has been no progress made on the Lean implementation journey. Equally, Leoni needs to ensure that a well coordinated effort of both adopting more Lean tools and embracing those which would contribute the most to the organisation at its stage of the Lean journey occurs whilst addressing some of the cultural factors.

Section A: General Background

Please State name of your company	Leoni Plc
Please name the auditor(s)	Sanjay Bhasin

Section B: Summary of the Lean Audit score

Lean Audit %: 52%	Lean Stage: Enhanced
--------------------------	-----------------------------

Section C: Feedback on the scores achieved in each category
--

Using a score of 1-10 could you indicate your assessment of the score achieved in each category; 10 if you totally agree with the Lean audit score; 1 if you totally disagree with the Lean audit score.

Categories	Your score
Overall safety, cleanliness and orderliness	9
Production and operational flow	8
Processes and operations	8
Visual management	8
Quality designed into the product	9
Continuous improvement	9
Lean change strategy	9
Lean sustainability	9
Culture employee oriented	8
Organisational culture – organisational practices	10
Lean treated as a business	9
Philosophy	9
Average score obtained for the twelve categories	9

Section D: Any additional comments to be made about the Lean Audit

Whilst we felt that the audit results were generally quite fair, the timing could not have been much worse; we are probably encountering an imminent major re-organisational change whereby some of the impetus we were proud of through our Continuous Improvement team has slipped within the last few years. Evidently, some of the HR factors so important to Lean have not received the same level of attention and this would have been gathered by the extensive audit. Nonetheless, one year either after the re-organisation or one year prior to the time the audit was taken, it is considered that quite different results may have been accomplished by the organisation.

12.0 SUMMARY OF THE ANALYSIS

12.1 Case study Summary

The participants were asked about their understanding of the concept of Lean; six out of eight witnessed it as a cost cutting exercise. This was reiterated by the interview schedules searching why Lean was introduced to Leoni; all four candidates mentioned costs. When probing the progress of Lean, the questionnaires produced intriguing responses as the three worst scores achieved stated:

- that the training was insufficient,
- the workers approach was not encouraging Lean, and
- that the culture was not conducive for Lean.

The interview schedules reinforced the above findings since the statements securing the lowest scores (10/40) stated that:

- the culture was not conducive for Lean and interestingly,
- the SMT style and attitude was not appropriate for Lean.

Owing to the degree of complexity, only the managers were posed the question regards the barriers to Lean within their organisation; Bearing in mind that they could have scored a maximum 40; the following four were the highest scores achieved:

Barriers	Total score out of a maximum of 40
Supervisory skills	37
Workforce skills	36
Internal funding	35
Culture	35

All the participants were asked to state the reasons they considered that the organisation embraced Lean; there was considerable consistency between the questionnaires and the interview schedules. However, since the interview schedules included a score, it was possible to rank the replies:

Reasons for Lean adoption	Total score out of a maximum of 40
Reduce down time	39
Increased productivity	39
Lower costs	38
Increased competition	38
Improve profitability	38
Reduce waste	38
Increased market share	37
Improve worker production	36

When the participants were asked about the Lean tools in place; generally the scores were reasonably positive; ironically the lowest scores were recorded for:

- supplier development and
- supplier reduction; (both only securing an 11/40)

All the participants' opinions were also sought on the potential benefits of Lean on various indices; the four highest were as follows:

Indices	Averaged % improvement
Satisfied customers	15.6
Reduced finished stock	14.4

Better relations with customers	12.5
Better delivery records	11.5

The lowest scores were recorded for the following:

Indices	Average % improvement
Improved communications	1.8%
Looking for new markets	1.3%
NPD	1.3%
Sales from new products	0.6%

12.2 Lean Audit

Generally Leoni had demonstrated a commitment towards Lean and had been pursuing Lean for over ten years. A dedicated Continuous Improvement team reinforced this; part of the problem was that this team operated without a great deal of consultation with others in the organisation. Moreover, there were rumours of a major re-organisation that had hindered some cultural factors to fully develop. Whilst the organisation had secured an overall 52%, this score had suffered from the recent lack of support awarded to the Lean initiative. Evidently, there had been little progress made towards enhancing their Lean efforts in the last three years. Undoubtedly, this factor needs to be addressed for Lean advancement within the organisation. It was pleasing to secure an overall score of 90% (9/10) from the feedback questionnaire the organisation completed once the Lean audit results had been communicated to the organisation.

12.3 The Survey questionnaire

An interesting factor centred around the initial reasons for Lean adoption; whilst the operational factors figured highly; the top scores were awarded to the

- need to create a team spirit/motivational tool and
- pressure from customers.

The barriers to Lean witnessed four top scores:

- insufficient senior management time,
- insufficient supervisory skills,
- a lack of workforce skills and
- a lack of management time.

There were some core differences between the Case Studies and the Survey questionnaire; one centred on the question of potential aspirations from the Lean journey; the survey questionnaire's top three scores were bestowed to

- improved teamwork,
- higher profitability and
- higher productivity.

The Case Studies predominantly pointed towards the operational performance factors whereas the Survey suggested an equal importance towards both the operational indices and the need to alter the prevailing culture of the organisation. Equally when looking at the impact Lean has had on the organisation; the lowest score achieved in the Case study was:

- 0.6% - sales from new products; whereas in the survey questionnaire,
- this had achieved the joint highest score of 30%.

13.0 THREE YEAR STRATEGY

Evidently, the Lean journey required a fresh impetus; the detailed Lean audit had suggested that the previous several years had not witnessed a great deal of progress. The impending re-organisation was obstructing development and needed to be completed. Equally some complacency needed to be addressed; namely through:

- Additional training,
- Improving the Continuous Improvement Team’s perception with the shop-floor and its communications,
- Closer collaboration with both its suppliers and customers; this is particularly significant since many of its partners have embraced Lean.

The Gantt chart below proposes a three years strategy for the organisation with view towards improving its Lean implementation and its corresponding impact on the organisation’s overall performance.

Processes required	Three Year Time frame					
	Year one		Year two		Year three	
Complete the re-organisation						
Improved Lean training						
Improve the C.I. team’s perception and communications						
Secure a guarantee from Parent company that it values Lean						
Widen implementation of the existing Lean Tools						
Tackle the key cultural issues						
Broaden Lean to all aspects of the internal organisation						
Improve the mix of the Lean tools implemented						
Alter the Lean indices						
Closer collaboration with its suppliers						
Closer Collaboration with its customers						
Begin to look at Lean across the value chain						

APPENDIX THIRTEEN

The Perkins Engines Case Study

The Case Study fully written up; it contains information provided in a standardised format and this comprises of the following:

- Company Name
- Company Address
- Registration details
- Company number
- Market Sector
- Employee details
- Position of company contact
- Product Company details
 - History
- Finance details
- Lean Journey
 - Lean History
 - Case Study analysis
 - Meaning of “Lean”
 - Internal reasons for Lean
 - How Lean was progressing
 - Lean and its personal implication
 - Lean obstacles
 - Reasons for Lean adoption
 - Lean application
 - Tools used within the organisation
 - Cultural implications of Lean
 - Lean as a Business Case
- Lean audit
- Summary of the analysis
 - Case Study Summary
 - Lean Audit
 - Survey Questionnaire
- Three year strategy

Perkins Engines



	Page
2.0 Company Name	173
3.0 Company Address	173
4.0 Registration Details	173
5.0 Company Number	173
6.0 Market Sector	173
6.1 Special Features of the Sector	173
7.0 Employee details	173
8.0 Position of company contact	173
9.0 Product Company details	174
9.1 History	174
9.2 Special features of Perkins Operations	174
10.0 Finance details	175
11.0 Lean Journey	178
11.1 Lean History	178
11.2 Case Study analysis	178
11.2.1 Meaning of “Lean”	178
11.2.2 Internal reasons for Lean	179
11.2.3 How Lean was progressing	179
11.2.4 Lean and its personal implication	180
11.2.5 Lean obstacles	181
11.2.6 Reasons for Lean adoption	181
11.2.7 Lean application	183
11.2.8 Tools used within the organisation	183
11.2.9 Cultural implications of Lean	183
11.2.10 Lean as a Business Case	185
11.3 Lean audit	186
12.0 Summary of the analysis	189
12.1 Case Study Summary	189
12.2 Lean Audit	190
12.3 Survey Questionnaire	190
13.0 Three year strategy	191

2.0 Company Name

Perkins Engines Company Limited

3.0 Company Address

Perkins Engines Company Limited,
Tixall Road,
Stafford,
ST16 3UB.
Telephone +44 (0) 1785 215700.
Fax +44 (0) 1785 215110.

4.0 Registration Details

Registered office address:

Eastfield
Petersborough
PE1 5NA

5.0 Company Number

02089227 and was incorporated on the 14th January 1987

6.0 Market Sector

For over 75 years Perkins has been working with the makers of powered industrial equipment to design, deliver and support diesel engines and power solutions depicting the highest levels of performance and reliability.

6.1 Special Features of the Sector

To the customer, the benefits of remanufacturing in this sector are clear. Well-maintained units continue to provide service life almost indefinitely for modest expenditure. The pressure from emissions standards now prompts a re-examination of the performance every few years, with up-upgrades or swap-outs available. Auxiliary systems, such as electronic controls, are evolving but are relatively easy to upgrade as stand-alone packages. Based on diesel engines, technology improvement has seen progressive advances over the last ten years, and is expected to continue into the future. The use of sophisticated control electronics continues to add value to the product by both managing the power efficiency better, and by reducing its abuse. Value for money is an increasing priority for purchasers.

In the past, much of the income stream for products has come from aftermarket sales generally around year eight, after which a major overhaul may occur. Increasing reliability has now decreased this income stream, which has also been eroded by generic component suppliers. Remanufacturing and total service options including facilities management offer a route to reclaiming this value. Many more, independent operators are being driven out of the industry. They cannot secure sufficient trade to achieve economies of scale; nor can they keep pace with rapidly changing technologies, black box electronics and new production procedures; nor do they necessarily have the technical expertise required to work with large manufacturers.

7.0 Employee Details

Perkins Engines at Stafford employs in excess of 480 personnel.

8.0 Position of Company Contact

The prominent contact was Jim F Shaw, the Manufacturing Engineering Manager.

9.0 Product Company Details

Perkins Engines is a manufacturer of diesel engines; it is able to draw on the experience of its US parent, Caterpillar, to further its long established remanufacturing activity. For over 70 years, Perkins Engines has been making a range of diesel engines in the UK for use in OEM products in the 5-800 kw power range. End users are in agriculture, construction, mining and materials handling, military, auxiliary power (35%) and rail transport applications; it is also embedded into others' products. Perkins employs around 2,500 people in Peterborough, Shrewsbury and Stafford. Over its 70-year life, the company has manufactured around 15 million units, of which 5 million are still in the field of mobile or static applications. Remanufacturing is a significant proportion of the activity (about £25 - £30 million per year), but is hidden within the total service offering the overhaul, components, peripherals and consumables. Perkins also owns a remanufacturing operation in France that takes in core from all over Europe.

9.1 Brief History

The company's founder and namesake, Frank Perkins, was born in Peterborough on 20th February 1889. His father and grandfather were engineers and the family firm, Barford and Perkins, manufactured agricultural machinery and road rollers. While working at Rochester, Kent, Frank Perkins started to develop a light high-speed diesel engine with an engine designer, Charles Chapman. Before the engine was fully developed the depression had bankrupted the company. Frank was convinced diesel was the power unit of the future because of its superior fuel efficiency. He believed he could be the first to develop engines of comparable performance to petrol equivalents. Frank set up a private company to realise his vision on the 7th June 1932 at a time when the world was in recession and business was hard. Charles Chapman became the "Technical Director." The two men were very different: Frank was the enterprising aggressive salesman; Charles was a shy, retiring genius. They were both convinced of the potential of diesel power and set about developing their first engine, the Vixen, from small premises and a workshop in the centre of Peterborough. The first test run was made early on a Saturday evening in autumn 1932. The engine was started from cold by hand with the aid of combustion caps heated red hot in a coke stove and hurriedly fitted back into the combustion chamber. There were cheers as the engine fired and when it reached 4000 revs, it was swiftly switched off - there was no speed governor fitted. The Perkins engine was born. In 1937 the remarkable P6 engine was designed with prototypes running six months after the original blueprints. The revolutionary P6 firmly established Perkins in the diesel market developing 83bhp at 2400 rpm.

By 1938 the engine range included Wolf, Lynx, Leopard I and II engines in vehicle, industrial, marine and agricultural versions, with specifications to cover 650 different applications. Frank had already acquired land at Eastfield for expansion with his vision of becoming a world leader. Perkins had started its rapid growth path to provide the world's diesel power needs. December 1997 marked perhaps the most significant event in Perkins' history when it was announced that Caterpillar had agreed to acquire the company. Caterpillar ownership simply brings the financial strength, technology, manufacturing expertise and scale that provides an even brighter future for Perkins engines and makes it an important part of the world's largest and most successful engine company.

9.2 Special Features of Perkins Operations

Perkins has substantial experience of remanufacturing, and the skills and processes to support it. Its products are often embedded into other OEMs end products. This complicates control over the market for the goods. Engine remanufacturing has come in and out of fashion, heavily driven by the economic climate of the times. The parent, Caterpillar, has historically been more committed to recovery, largely through its roots within haulage in the USA. Large-inventory and cost-conscious haulage contractors have driven a need for sophisticated, integrated recovery and remanufacturing sites in the USA. This experience is being

transferred to Europe, and specifically to the UK. Caterpillar and Perkins will rely on remanufacturing as part of a future extended service offering. They will also take advantage of specific EU legislation that is reversing the trend in longer service lives, by forcing overhaul or swap-out to upgrade performance.

Key to the success of their remanufacturing facility will be the management of the core business, which will require the field teams to filter out what is or is not viable for remanufacture. In the USA, Caterpillars' dealerships screen and pre-sort all core so that only viable stock is returned; most rejects are sent direct to other recovery routes. In the UK it has become easier to obtain core, despite the lower overall number arising. This is because Perkins has reduced the number of variants, increasing the abundance of available core. Remanufacturing is seen as a way of offering upgrade paths and binding customers to the product. Part of the service offered is to re-engineer (upgrade) by specific mechanical modification, or a novel combination of proven components.

Millions of pounds have been invested in the development of engines capable of meeting the rigorous emissions requirements set by authorities around the world. A growing emphasis is being placed on reducing noise levels of machines for the benefit of operators and the general working environment. Perkins are world experts in noise reduction technologies on engines such that the latest generations of Perkins product (400 series and 1100D series - benchmarks for the industry). Perkins has a long-standing programme to recover and reclaim failed major components from the market place. It is called the "*Perkins Power Exchange Programme*" and covers components such as complete engines, turbochargers, injectors, starter motors, and alternators. The programme is set for growth with new investment in salvage techniques, remanufacturing, core management and logistics. They recognise their responsibility to minimise the effect of their activities on the environment and to protect it for future generations

10.0 Abbreviated accounts

Registration number: 3918171

**Perkins Engines Company Limited
Abbreviated accounts**

For the year ending: 31st December 2005

Consolidated Income Statement
For the year ending 31st December 2005

	2005	2004
	£000	£000
Revenue	904,920	845,207
Cost of Sales	(839,800)	(785,059)
Gross Margin	65,120	60,148
Distribution expenses	(31,617)	(35,265)
Administration Expenses	(96,070)	(91,550)
Other operating Income	3,558	2,764
Operating Profit/ (Loss)	(59,009)	(63,903)
Interest payable and similar charges	(16,169)	(14,177)
Loss on ordinary activities before taxation	(75,178)	(78,080)
Tax on Loss on ordinary activities	21,952	22,521
Loss on ordinary activities after taxation	(53,226)	(55,559)

(Source: Companies House; March 2008)

Perkins Limited Balance Sheet as at 31st December 2005

	£ 2005 £000		£ 2004 £000
	£000		£000
Fixed Assets			
Non Current Assets			
Intangible assets	162,278		182,327
Tangible Assets	187,308		194,354
	<u>349,586</u>		<u>376,681</u>
Current Assets			
Stock	85,365		94,720
Debtors	152,634		167,940
Cash at Bank	1,979		1,606
	<u>239,978</u>		<u>264,266</u>
Creditors: amounts falling due in one year	(136,904)		(270,998)
Net Current Assets/ Liabilities	103,078		(6,732)
Total Assets less liabilities	452,660		369,949
Creditors falling due after One year	(172,641)		(179,777)
Provisions for Liabilities	(14,968)		(17,895)
	<u>265,051</u>		<u>172,277</u>
Capital and Reserves			
Called up Share Capital	646,000		500,000
Profit and Loss account	(380,949)		(327,723)
Shareholders Funds	<u>265,051</u>		<u>172,277</u>

(Source: Companies House; March 2008)

11.0 Lean Journey

Perkins Engines Company has been on the Lean journey for six years with evidence of some moderate achievement. The journey and the contemporary situation was both scrutinized and evaluated subsequently with the aid of the following:

- the original survey questionnaire,
- two management interview schedules,
- two operative interview schedules,
- two management questionnaires,
- two shop floor questionnaires, and a detailed
- Lean audit undertaken to determine the organisation's Lean status.

11.1 Lean History

Their sensei Jim Shaw has acted as the Lean facilitator for the last three years and whilst he is imminently to retire, he hopes that the organisation continues to make progress on its Lean expedition. Occasionally external help has been brought in to assist the organisation's Lean initiative. In 2005 the "*Centre of Engineering Excellence*" (CEE) provided some consultancy to aid the implementation process. The "*Centre of Engineering Excellence*" (CEE) helps companies operating in the engineering and manufacturing sectors to become more competitive. CEE understands the individual needs of manufacturing companies.

The initial reasons for Lean being introduced into the organisation were as follows:

- to improve performance (efficiency, productivity and profitability),
- competitive pressures and
- improve the flow of operations.

Presently, strenuous efforts are made to extend Lean across the whole internal organisation. Perkins Engines hopes to secure the following main goals through its association of Lean:

- reduce lost or down time,
- increase efficiency,
- generally carry less stock, and
- the elimination of waste.

11.2 Case Study Analysis

11.2.1 Meaning of "Lean"

Initially it was important to gauge precisely what was understood by the term "Lean" in the organisation.

The understanding of the term Lean	
Questionnaires	
Manager 1:	"keep costs and stock down"
Manager 2:	"to always only produce to order and spec of customers"
Shop-floor 1:	"produce everything right and when needed"
Shop floor 2:	"reduce costs by removing the need to re-work"
Interview schedules:	
Manager 1:	"produce what customer wants thus keeping costs down"
Manager 2:	"produce to order and keep stock / costs down"
Shop floor 1:	"to cut costs as no rework or scrap happens"
Shop Floor 2:	"to only make stuff we have orders for"

11.2.2 Internal reasons for “Lean”

Both the questionnaires and the interview schedules sought to discover the initial reasons for adopting Lean within the organisation:

Reasons for adopting Lean – questionnaire															
Statement	Scale														
	Strongly Agree			Agree			Somewhat agree			disagree			Strongly disagree		
Customer pressure															
To improve performance															
Competitor pressure															
Create team spirit / motivational tool															
Owner / Investor pressure															
Better working conditions															
As a result of attending a special event/conference															

Key: = Question not posed to the shop floor

= Shop floor operative response

= Management response

Reasons for adopting Lean – interview schedules			
(Listed in order of importance by the participant)			
Manager one	Manager two	Operative one	Operative two
Cut costs	Cut Stock	Cut costs	Reduce Overtime
Reduce lead time	Reduce lead time	Cut Stock	Reduce stock
Reduce overtime	Produce to spec	Better Quality	Better delivery record
Improve Quality	Improve Quality		

11.2.3 How Lean was progressing?

The following questionnaire responses were received in regards how Lean was seen to be progressing within the organisation.

Progress of Lean with the organisation – Questionnaire responses															
Statement	Scale														
	Strongly Agree			Agree			Some - what agree			disagree			Strongly disagree		
I have the necessary tools to implement Lean															
Tools used are of good quality															
Appropriate training is provided															
Appropriate time is given to make improvements															

I will encounter more pressure	■	■	■	■																
Better career prospects						■	■	■	■											

■ = Shop floor operative response

■ = Management response

What Lean means on a purely personal level – interview schedules (Listed in order of importance by the participant)			
Manager one	Manager two	Operative one	Operative two
Stronger Company	Better prospects	Better status	Better relationships between departments
More pressure, right first time	Produce to specification	My opinion listened to	More freedom to do own work
More training	More trust shop floor	Safer Job	Listened to more often
Better communications	Better relations		

11.2.5 Lean obstacles

Owing to the nature of information required, only the managers were asked to determine the stumbling blocks to Lean. [a score of 1-10 was used; “1”: if they felt it posed no concern and no difficulties; “10” if they felt that it posed a major barrier and has proven impossible to breakdown.]

Barriers organisation encountered / encounters towards Lean						
Barriers		Score				Total
		Questionnaire	Schedules	Schedules	Schedules	
1	Insufficient understanding of the potential benefits	7	6	7	6	26
2	Insufficient internal funding	7	7	8	7	29
3	Insufficient external funding	8	7	7	7	29
4	Insufficient senior management skills to implement Lean	7	6	7	8	28
5	Insufficient supervisory skills to implement Lean	8	7	7	7	29
6	Insufficient workforce skills to implement Lean	8	7	6	6	27
7	The need to convince shareholders / owners	6	6	7	7	26
8	Insufficient management time	7	8	8	8	31
9	Employee attitudes / resistance to change	8	8	8	9	33
10	Cost of the investment	10	9	9	9	37
11	Cultural issues	9	8	8	9	34
12	Others (please specify below)	0	0	0	0	0

11.2.6 Reasons for Lean adoption

The questionnaires and interview schedules tried to ascertain the underlying reasons from the participants’ perspective for Lean being introduced into the organisation.

Why do you feel the organisation has embraced Lean? – Questionnaire responses															
	Strongly agree		Agree		Somewhat agree		disagree		Strongly disagree						
Higher profitability	■	■	■	■											
Higher productivity	■	■	■	■											
Lower costs	■	■	■	■											
Improved delivery records			■	■											
To carry less stock	■	■	■	■											
Improve relations with suppliers / customers	■						■	■		■					
Improve relations between shop floor and management							■	■	■	■					
Improve communications between departments							■	■	■	■					
Better teamwork							■	■	■	■					
Improve worker production	■		■	■			■								
Improve customer service		■			■		■		■						
Improve market share	■	■	■			■									
Improve efficiency			■	■											
Reduce down time	■	■	■	■											
Become more competitive	■	■	■	■											
Reduce any waste	■	■	■	■											

For the **interview schedules**, a scoring scale of 1 – 10 was utilised; “10” if there was total agreement with the statement without any reservations and unequivocally; “1” if the statement was totally false and they disagreed with its content wholeheartedly.

Interview schedule responses regards why the Organisation embraced Lean					
Statement	Score 1 – 10				Total
Higher profitability	9	10	10	9	38
Higher productivity	10	10	10	9	39
Lower costs	9	10	10	9	38
Attain improved delivery records			8	8	16
To carry less stock	10	10	6	8	34
Improve relations with suppliers / customers	4	5	6	5	20
Improve relations between shop floor and management	5	5	5	4	19
Improve communications between departments	5	5	5	5	20
Better teamwork	4	4	6	5	19
Improve worker production	10	9	9	10	38
Improve customer service	6	6	6	7	25
Improve market share	7	7	8	8	30
Improve efficiency			9	9	18
Reduce down time	10	9	10	10	39
Become more competitive	8	8	9	9	34
Reduce any waste	9	9	9	8	35

Key: ■ = Question **not** posed to the shop floor
 ■ = Shop floor operative response ■ = Management response

11.2.7 Lean application

The next two sections revealed from the contributors' view both the spread of Lean within the organisation and how long it had been on the Lean journey; owing to the nature of information needed, the question was posed only to managers:

Application of Lean is across the following					
Lean occurs across the whole value chain					
Lean is in our company only					
Manufacturing and Supply functions only					
Manufacturing or supply functions only					
Some units of manufacturing or supply functions only					
Few isolated tools are used					

Length of time the organisation has continuously been on the Lean journey					
0 – 6 months					
7 months - 1 year					
1 – 2 years					
3 – 4 years					
5 -6 years					
7+ years					

11.2.8 Tools used within the organisation

The data capture also sought to establish which tools the organisation had introduced as integral to its Lean journey; owing to the nature of the information sought, this section only applied to managers. [a scoring of 1-10 was used; “1” to be awarded if the participant considered that this tool is not applicable within the organisation and there are no plans to implement it in the future; “10” to be awarded if it is fully operational within the company and total commitment is awarded to it.]

Lean Tools applied in the organisation						
		Questionnaire		Schedules		Total
1	Kiazen / continuous improvement	8	8	8	9	33
2	Cellular manufacturing	8	8	6	5	27
3	Kanban systems	8	7	5	4	24
4	Single piece flow operations	3	5	6	5	19
5	Process mapping	5	5	7	6	23
6	Single Minute Exchange of Dies (SMED)	1	2	2	1	6
7	Step change / kaikaku	1	1	1	1	4
8	Supplier Development – activating links with suppliers	3	1	4	3	11
9	Supplier base reduction	1	1	1	1	4
10	5's and general visual management	8	7	6	5	26
11	Total Productive Maintenance	5	8	7	6	26
12	Attacking value and the seven wastes	9	8	7	8	32

11.2.9 Cultural implications of Lean

The questionnaires and interview schedules played an important role in determining the prevailing organisation's culture through the following set of questions:

Statement	Strongly agree	Agree	Somewh at agree	Disagree	Strongly disagree
Decisions in the organisations are made at the lowest level possible		1	2	1	
The shop-floor is listened to more widely than was the case before Lean		2	2		
		2	1	1	
All management levels are listened to more widely than was the case before Lean			4		
The organisation's direction and destination for 5 years is now much clearer		1	3		
		2	2		
The company has one particular person directing operations and the proposals are clearly communicated		2	2		
		1	3		
People are clear regarding their expectations from Lean		1	3	1	
There is adequate training to assist the progress of Lean			1	3	
			4		
All managers' tiers seem to be pulling in the same direction to make Lean work			2	2	
		1	3		
The company is now a better place to work in since the introduction of Lean		2	2		
			4		
I fully understand why Lean is needed in the organisation			4		
			4		
The various departments seem to work better and have a healthier relationship than was the case prior to Lean			4		
			4		
The outcomes of Lean have been communicated thoroughly			3	1	
		1	2	1	
Lean metrics are clear to observe and the information is cascaded downwards regularly			3	1	
			2	2	
Greater efforts are made to involve suppliers than was the case before Lean			2	2	
		1	2	1	
Greater efforts are made to involve customers than was the case before Lean		1	1	2	
		1		3	
The Lean journey is linked to the mission statement / vision			4		

Key: = Question **not** posed to the shop floor


= Shop floor operative response = Management response



11.2.10 Lean as a Business case

It was important to establish whether Lean had assisted the organisation to secure benefits and the following section attempted to infer this [a percentage figure was sought ideally; otherwise an indication whether the relevant measure had improved as a result of Lean]:

What has Lean accomplished for the organisation										
- Deterioration	Measurement	+ Improvement								Total
Finance	Company profitability	5	5	5	10	10	5	15	10	65
	Company share prices	10	5	5	10	10	10	10	10	70
	Company liquidity	10	10	5	5	5	10	10	5	60
	Earnings per share					5	5	5	5	20
Customer	More satisfied customers	15	10	15	10	15	15	20	15	115
	Market Share	10	5	5	5	15	10	10	5	65
	Service quality	15	15	15	10	20	15	25	15	130
	Delivery records	10	10	15	15	10	15	20	10	105
	Better relationship with customers	10	15	10	10	10	5	15	15	90
Process	NPD lead time	5	10	10	5	15	10	10	10	75
	Overall cycle time	5	10	10	5	10	10	15	10	75
	Quality of new products	10	10	10	10	15	5	20	10	90
	Quality costs	10	20	5	5	15	10	20	15	100
	Defects of critical products /components					10	15	20	10	55
	Raw material costs	15	15	10	15	10	10	15	10	100
	Capital efficiency					5	10	15	10	40
	Labour efficiency					5	10	10	10	35
	Finished stock	15	15	10	15	15	10	10	10	100
	WIP stock					15	10	15	10	50
People	Absenteeism	5	0	0	0	0	5	5	5	20
	Labour turnover	5	0	0	0	0	0	5	0	10
	Quality of leadership development					5	0	5	5	15
	The relationship between management and the shop-floor	10	10	10	5	5	5	5	5	55
	Better communications	5	5	10	10	5	5	5	5	50
Future	New product development	10	10	10	5	10	10	10	15	80
	Looking for new markets	10	5	5	5	10	5	10	10	60
	Investment in new technology	10	5	10	10	10	5	5	5	60
	Sales from new	10	0	10	10	10	5	10	10	65

	products (< 5 years)									
	Anticipating new changes					0	5	5	5	15

Key:  = Question not posed to the shop floor

 = Shop floor operative response  = Management response

11.3 Lean Audit

Whilst Perkins has been on the Lean journey in excess of seven years with some input prior to this period, the momentum undeniably had reduced. Equally, the organisation was in the middle of a re-organisation, whereby other factors were observed to have become more important and regarded vastly more relevant. Lean was primarily viewed as an operational phenomenon; consequently many elements comprising the supporting infrastructure were not fully embedded. The subsequent audit is a summary of the full audit undertaken and is enclosed as an appendix. Equally, whilst, some of the comments made on the audit were viewed as being harsh, intriguingly, there was an overall agreement of 90% by Perkins with the overall audit conclusions; this is included after the summary of the audit below.

Lean Assessment scoring sheet		
Organisation name:		Perkins Engines
Category	Maximum score available	Score achieved
Overall safety, cleanliness and orderliness	30	22
Production and operational flow	50	31
Processes and operations	90	52
Visual management	50	30
Quality designed into the product	130	83
Continuous improvement	90	59
Lean change strategy	120	61
Lean sustainability	70	33
Culture employee oriented	100	47
Organisational culture – organisational practices	130	52
Lean treated as a business	90	33
Philosophy	90	29
Total score : 532		
% score : 51%		
Lean stage: Enhanced		

Lean Assessment scoring system		
Lean stage	Required Points	% of the maximum score of 1,040 points available
Ideological	936	90%
Innovative	780	75%
Holistic	624	60%
Enhanced	468	45%
Mechanical	312	30%
Developmental	156	15%
Planning	0 - 155	0% - 15%

General comments:

The organisation has had the services of a dedicated sensei for three years and few of the Lean tools have been fully embedded. Whilst waste and Kaizen is taken seriously, there has been room to extend the number and breadth of tools, which has not materialised to date.

Undeniably there has been an over emphasis on cellular working; however, this too requires additional work. Sustainability (47%), philosophy (32%) and culture (47% and 40% respectively) scores essentially highlight where the problems exist. The infrastructure needed to support the Lean journey of the organisation was seen to be lacking. There was evidence of some tension between the management tiers and the shop floor. This needs urgent attention since it would certainly influence the progress of the Lean implementation. Equally, the parent company needs to reinforce its commitment towards the Lean initiative, which has not been explicitly acknowledged, as it should have been. In summary, more tools need to be introduced and the organisational development factors addressed if Perkins wishes to fully implement Lean within the organisation.

Section A: General Background

Please State name of your company	Perkins Engines
Please name the auditor(s)	Sanjay Bhasin

Section B: Summary of the Lean Audit score

Lean Audit %: 51%	Lean Stage: Enhanced
--------------------------	-----------------------------

Section C: Feedback on the scores achieved in each category
--

Using a score of 1-10 could you indicate your assessment of the score achieved in each category; 10 if you totally agree with the Lean audit score; 1 if you totally disagree with the Lean audit score awarded to you for the respective category.

Categories	Your score
Overall safety, cleanliness and orderliness	10
Production and operational flow	9
Processes and operations	8
Visual management	9
Quality designed into the product	9
Continuous improvement	7
Lean change strategy	9
Lean sustainability	9
Culture employee oriented	10
Organisational culture – organisational practices	9
Lean treated as a business	9
Philosophy	10
Average score obtained for the twelve categories	9

Section D: Any additional comments to be made about the Lean Audit

The Lean audit results made interesting reading since generally they accurately depicted the existing situation. We have been on the Lean journey for over seven years and for the last three years have used a sensei who became an employee of the organisation. However, it was quickly recognised that the internal expertise we had was limited as the concentration was on the application of the tools only; a position generally well documented by the audit. However, the continuous improvement score was the only one we could have contested; it is an area we take seriously and maybe was not awarded the status that it deserved.

12.0 SUMMARY OF THE ANALYSIS

12.1 Case study Summary

The participants were asked about their understanding of the concept of Lean; interestingly, the general concept of Lean was reasonably well understood amongst both the managers and the shop-floor; nonetheless, the dominant view was that of a cost cutting exercise; besides the operational references, other submissions were made towards:

- Producing what customers want,
- Producing everything correct, and
- Keep stock down.

Equally candidates were asked about the primary reasons they considered Perkins initially adopted Lean; the common responses focused on the following:

- Improve performance,
- Need to reduce stock,
- Competitor pressure and
- Reduce costs

Ironically, the lowest scores were recorded for:

- Team spirit / motivational tool and
- Improving quality.

When views were sought on the effect of Lean on a purely personal level; the highest scores were as follows:

- Encountering more pressure,
- Job security.

The following were indicated as potentially having the least personal impact as a result of Lean:

- Better communications,
- Better relations,
- More pay and
- Career prospects.

Owing to the degree of complexity, only the managers were posed the question regards the barriers to Lean within Perkins. Bearing in mind that they could have scored a maximum 40; the following were the highest scores achieved:

Barriers	Total score out of a maximum of 40
Cost of the investment	37
Cultural Issues	34
Employee attitude/resistance to change	33
Insufficient management time	31

All the participants were asked to state the reasons they considered for the organisation embracing Lean; there was considerable consistency between the questionnaires and the interview schedules. However, since the interview schedules included a score, it was possible to rank the replies:

Reasons for Lean adoption	Total score out of a maximum of 40
Higher productivity	39
Improve efficiency	39
Higher profitability	38
Lower costs	38

Improve worker production	38
Reduce waste	35
Become more competitive	34

When the participants were asked about the Lean tools in place; generally the scores reflected the stage of Lean adoption within the organisation; ironically the lowest scores were recorded for:

- Supplier base reduction (4/40) and
- Supplier development (11/40).

The cultural questions provided a good insight of the problems faced by the organisation in their quest to fully implement Lean; the lowest scores were recorded for:

- that inadequate training was offered,
- the Lean outcomes had been communicated poorly,
- the company was not a better place to work in as a result of Lean, and that the
- Lean metrics were not identified.

All the participants' opinions were also sought on the potential benefits of Lean on various indices; the highest were as follows:

Indices	Averaged % improvement
Service quality	16.3
More satisfied customers	14.4
Delivery records	13.1
Quality costs	12.5
Raw material costs	12.5
Finished stock	12.5

Amongst the lowest scores; the following were recorded:

Indices	Average % improvement
Relationship between management and shop floor	7
Better communication	6.2

12.2 Lean Audit

Generally Perkins reflected an organisation that promotes Lean and whilst recognising its benefits seems to have stagnated regards its level of commitment towards Lean. The following category scores reflected the amount of work needed:

- Lean philosophy - 32%
- Organisational Culture - 43% (averaged)
- Lean sustainability - 47%

Whilst some Lean tools have been introduced, more concentration was needed on:

- Process mapping,
- Lean change strategy and
- The indices by which Lean is tracked within the organisation.

12.3 The Survey questionnaire

The Survey questionnaire largely helped to reinforce the Case Study analysis by stating that the top two reasons for the initial adoption of Lean were:

- To improve performance and
- Competitive pressures.

The main barriers cited towards Lean or their wider adoptions were:

- Employee attitude / resistance to change

- Cost of the investment and
- Cultural issues

Equally there were four main aspirations for the adoption of Lean:

- Carry less stock,
- Reduce lost or down time,
- Increased efficiency and,
- The elimination of waste.

Whilst a group of Lean tools were in place; interestingly, the three that secured the lowest marks were as follows:

- Step change / Kaikaku,
- Supplier development, and
- Supplier base reduction.

13.0 THREE YEAR STRATEGY

Evidently, Perkins is committed to its Lean journey but its level of adoption has not witnessed any expansion in the previous three years. The detailed Lean audit had confirmed the Survey questionnaire's assertion whereby about 60% of the departments and 65% of the employees were operating under Lean conditions despite the history of Lean within the organisation. The term "Lean" was certainly used inaccurately. External help had been utilised and undoubtedly, the acquisition of the organisation by its parent organisation, Caterpillar, had adversely affected the Lean journey of the organisation. With the appropriate commitment, it was felt that the Lean journey could gain momentum but the tougher cultural, change and sustainability issues need confronting. The following three-year plan is proposed for the organisation, if it is to continue progressing with its Lean voyage:

Processes required	Three Year Time frame					
	Year one	Year two	Year three	Year three	Year three	Year three
Utilise an external sensei						
Secure the commitment from the Parent company						
Train an internal Lean champion						
Concentrate on process mapping						
Ensure funds are made available for Lean						
Widen implementation of the existing Tools to the whole internal organisation						
Decide upon a strategy about the most appropriate tools and implement						
Disciplined Lean training introduced						
Tackle the key cultural issues						
Improve the Communication strategy						
Alter the Lean indices						
Begin to look at Lean across the value chain						

APPENDIX FOURTEEN

The Ricardo Case Study

The Case Study fully written up; it contains information provided in a standardised format and this comprises of the following:

- Company Name
- Company Address
- Registration details
- Company number
- Market Sector
- Employee details
- Position of company contact
- Product Company details
 - History
- Finance details
- Lean Journey
 - Lean History
 - Case Study analysis
 - Meaning of “Lean”
 - Internal reasons for Lean
 - How Lean was progressing
 - Lean and its personal implication
 - Lean obstacles
 - Reasons for Lean adoption
 - Lean application
 - Tools used within the organisation
 - Cultural implications of Lean
 - Lean as a Business Case
- Lean audit
- Summary of the analysis
 - Case Study Summary
 - Lean Audit
 - Survey Questionnaire
- Three year strategy

Ricardo



	Page
2.0 Company name	194
3.0 Company address	194
4.0 Registration details	194
5.0 Company number	194
6.0 Market Sector	194
7.0 Employee details	194
8.0 Position of company contact	194
9.0 Brief History	194
9.1 Product / Company details	194
10.0 Finance details	196
11.0 Lean Journey	198
11.1 Lean History	198
11.2 Case Study analysis	198
11.2.1 Meaning of “Lean”	198
11.2.2 Internal reasons for Lean	198
11.2.3 How Lean was progressing	199
11.2.4 Lean and its personal implication	200
11.2.5 Lean obstacles	201
11.2.6 Reasons for Lean adoption	201
11.2.7 Lean application	202
11.2.8 Tools used within the organisation	203
11.2.9 Cultural implications of Lean	203
11.2.10 Lean as a Business Case	204
11.3 Lean audit	206
12.0 Summary of the analysis	208
12.1 Case Study Summary	208
12.2 Lean Audit	209
12.3 Survey Questionnaire	210
13.0 Three year strategy	210

2.0 Company Name

Ricardo UK Ltd

3.0 Company address

Ricardo UK Ltd.,
Southern Road,
Radford Semele,
Leamington Spa,
Warwickshire,
CV31 1FQ.

4.0 Registration details

Registered Office: Shoreham Technical Centre,
Shoreham-by-Sea,
West Sussex.
BN43 5FG.

5.0 Company number

222915

6.0 Market sector

A leader in the field of product innovation, technology, engineering and strategic consulting.

7.0 Employee details

On site there are over 620 people; 130 could be classified as administrative personnel.

8.0 Position of company contact

Most of the information was as a result of help from the Operations Director.

9.0 Brief company history

Sir Harry Ricardo was born in London in 1885 and educated at Rugby and Cambridge where he studied at Trinity College. Harry Ricardo founded Ricardo in 1915, and it has been providing engineering solutions to the automotive industry since then. Sir Harry Ricardo was knighted in 1948, in recognition of his work in the field of internal combustion engineering. Ricardo has a reputation of being a world leader in new technology and product innovation. The company encompasses the complete engineering process from concept design and analysis; through to detail design, prototype manufacture, test, development and validation; to small batch manufacture and service support. He was renowned for his research into the problem of knock in engines; the results of his work on fuel and reducing fuel consumption assisted Alcock and Brown to cross the Atlantic for the first time by aircraft. Over the years, he was responsible for significant developments in the design of piston-engines for a number of applications and derivatives of his original designs are still in production. He was elected Fellow of the Royal Society in 1929 and in 1948 was knighted in recognition of his long and distinguished services to the internal combustion engine industry. He died in 1974 at the age of 89. Ricardo is a private sector company owned by its shareholders.

9.1 Product / Company details

Ricardo is a leading provider of technology, product innovation, engineering solutions and strategic consulting to the global car industry. It combines business, product and process strategy with fundamental technical research and the implementation of large-scale new

product development programmes. Ricardo is able to take on the greatest challenges in the industry including business strategy and restructuring, process re-engineering, vehicle, engine transmission and driveline design engineering, testing and systems integration. With a network of advanced and well-equipped technical centres in the UK, North America, Germany and the Czech Republic, Ricardo serves a wide and balanced customer base represented by the leading global automakers, vehicle component and system manufacturers, and automotive regulatory agencies. Ricardo also serves other sectors such as motorcycle, heavy-duty truck, off-highway, military vehicle, marine and locomotive propulsion system manufacturers, as well as leading teams in motor-sport.

The need to minimise the environmental impact of future vehicles is a major driver for its own technology research programme and is one of the principal means by which Ricardo maintains its technological edge. Recent benefits of this approach are apparent, for example, the leading position Ricardo now occupies in the development of hybrid vehicle systems and diesel and gasoline engine technologies offering improved fuel economy, reduced CO₂ and low regulated exhaust emissions. With its commitment to excellence, industry leadership in technology and knowledge, its greatest asset is its people, approximately 70 per cent of who are highly qualified multi-disciplined professional engineers, consultants and technicians. Together, their vision is to make Ricardo the natural partner of choice for all its customers in all sectors. Ricardo is a global organisation employing over 1,800 people in its technical centres based in the UK, USA, Europe and the Far East. Due to globalisation, Ricardo often moves employees abroad, and has a dedicated HR Executive for International Assignments. There are three main technical centres in the UK, at Shoreham (STC), Cambridge and in the Midlands (MTC). STC employees over 500 people (and 100 contractors) specialising in Engine engineering, incorporating design, development, analysis, prototype manufacturing and testing. The Cambridge site employs 50 people specialising in Control and Electronics, and is a leading designer and developer of automotive electronics and associated software technologies.

Ricardo Midlands Technical Centre (MTC)

In 1994, Ricardo bought FF Developments (FFD), a British company founded in 1971 by Tony Rolt to exploit four-wheel drive technology. The resulting company was named FFD-Ricardo, and later Ricardo-FFD. FFD had diversified by 1990, into more general vehicle and transmission engineering, and was a natural acquisition when Ricardo looked to broaden its capability. This meant Ricardo could offer its clients transmission and driveline experience too. In 1998 the business moved to the bigger current site, at Radford Semele, and became Ricardo *Midlands Technical Centre* (MTC). Ricardo's transmission, high Performance and vehicle product groups are based at Leamington, as well as the design, development and manufacture of specialist transmissions for Ricardo's Motor sport Manufacturing Group.

Ricardo Strategic Consulting (RSC)

This is the global management-consulting subsidiary of the Ricardo Group and is a natural extension of Ricardo's high value-added engineering services in the automotive sector. The automotive and its affiliated industries are among the most sophisticated and demanding users of consulting services. Today's clients require broader and deeper capabilities from the management consultancies that have traditionally serviced the industry. RSC's unique value proposition is the coupling of technical and management consulting capabilities allowing it to address strategic issues with product implications in great detail. RSC offers a comprehensive portfolio of management consulting services in the extended product development area throughout the vehicle lifecycle. Functionally, they address high-impact issues in product development, manufacturing, supply chain and purchasing that have direct product implications. Experienced RSC consultants are currently at work with OEMs, suppliers, retailers, financial institutions and senior government officials on high-impact issues around

the world. Equally, rather than being an outsider to the industry, RSC shares in Ricardo's rich heritage as a valued partner and participant in the evolution of the automobile.

10.0 Financial Details

Registration number: 222915

Ricardo

Abbreviated accounts
For the year ending: 30th September, 2006

Consolidated Income Statement For the year ending 30th June 2007

	2007 £m	2006 £m
Revenue	171.5	171.9
Operating Profit	13.2	15.8
Operating Profits (excluding pensions credit)	13.2	12.1
Pensions Credit	-	3.7
Finance Income	2.0	1.4
Finance Costs	(3.0)	(2.7)
Profit before Taxation	12.2	14.5
Profit after Tax excluding pensions credit	12.2	10.8
Pensions Credit	-	3.7
Taxation	2.9	(2.3)
Profit for the Year	15.1	12.2
Profit after Tax excluding pensions credit	15.1	9.6
Pensions Credit	-	2.6
Profit attributable to minority interest	0.1	0.1
Profit attributable to equity shareholders	15.0	12.1
Earnings per ordinary share		
Basic	29.6p	24.0p
Diluted	29.5p	23.9p

(Source: Companies House; March, 2008)

Ricardo Plc
Balance Sheet as at 30th June 2007

	£	£
	Group	Company
Fixed Assets		
Non Current Assets		
Goodwill	15.6	-
Other intangibles	1.9	-
Property, Plant Equipment	44.5	9.5
Investments	-	18.0
Deferred Tax Assets	9.9	5.4
	71.9	32.9
Current Assets		
Inventories	7.5	-
Trade and other receivables	55.6	63.4
Current Taxation	0.5	0.1
Deferred Tax	1.7	0.5
Cash and Cash equivalents	15.4	3.8
Assets classified as for Sale	-	-
	80.7	67.8
Total Assets	152.6	100.7
Liabilities		
Current Liabilities		
Bank Loans and overdraft	(9.1)	(2.0)
Trade and other payables	(43.9)	(15.1)
Current Tax liabilities	(2.1)	-
Deferred Tax liabilities	(0.4)	-
Provisions	(0.5)	-
Liabilities (assets held for sale)	-	-
	(56.0)	(17.1)
Net current Assets	(24.7)	(50.7)
Non Current Liabilities		
Bank Loans	(13.5)	(11.4)
Retirement Obligations	(16.7)	(16.7)
Deferred tax liabilities	(4.7)	(0.8)
	(34.9)	(28.9)
Net Assets	61.7	54.7
Shareholders Equity		
Share Capital	12.7	12.7
Share Premium	13.3	13.3
Other reserves	(0.5)	(1.1)
Retained earnings	35.7	29.8
Minority interest in equity	0.5	-
	61.7	54.7

(Source: Companies House; March, 2008)

11.0 Lean Journey

Ricardo Plc has been on the Lean journey for over five years with a progress record that reveals a modest return; this was both scrutinized and evaluated subsequently with the aid of the following:

- the original survey questionnaire,
- two management interview schedules,
- two operative interview schedules,
- two management questionnaires,
- two shop floor questionnaires, and a detailed
- Lean audit undertaken to determine the organisation’s Lean status.

11.1 Lean History

Whilst Ricardo has been pursuing Lean for over five years, its record to date has been diffident. In the last two years they have utilised the services of a Lean champion who had virtually independently pursued the implementation of Lean within the organisation. There had been a concentration of certain tools but this was undertaken in a chaotic fashion and with little attention being paid to the linkages between the tools. Equally there seemed to be only modest attention paid to the supporting infrastructure required for Lean. The initial reasons, according to the Programme Director, for embracing Lean were as follows:

- Reduce the stock levels,
- Improve delivery,
- Trim down the lead time and
- Lower the down-time.

11.2 Case Study Analysis

11.2.1 Meaning of “Lean”

Initially it was important to gauge precisely what was understood by the term “Lean” in the organisation.



The understanding of the term Lean	
Questionnaires	
Manager 1:	“...significant continuous improvement by eliminating all waste...”
Manager 2:	“continuous improvement targeting....non value added workloads”
Shop-floor 1:	“eliminate waste in all areas of the business”
Shop floor 2:	“reduce waste and increase efficiency”
Interview schedules:	
Manager 1:	“minimising waste in all aspects of the business”
Manager 2:	“to reduce waste and improve delivery”
Shop floor 1:	“only produce materials once we have confirmed orders”
Shop Floor 2:	“elimination of waste”

11.2.2 Internal reasons for “Lean”

Both the questionnaires and the interview schedules sought to discover the initial reasons for adopting Lean within the organisation:

Reasons for adopting Lean – questionnaire													
Statement	Scale												
	Strongly Agree			Agree			Somewhat agree			disagree			Strongly disagree
Customer pressure													



[* Senior and middle management were considered as synonymous in regards the operatives' questionnaires.]

 = Shop floor operative response  = Management response

For the **interview schedules**, a score of 1-10 was used; "10" if there was an absolute agreement with the statement without any reservations and unequivocally; "1" if the statement was seen to be totally false and they disagreed with its content wholeheartedly.

Interview Schedules responses regards Lean Progress					
Statement	Score 1 - 10				Total
I have the necessary tools to implement Lean	4	4	4	4	16
The tools used in the company are of good quality	5	5	6	5	21
Appropriate training is provided to operate Lean	5	3	2	3	13
Appropriate time is given to make improvements	3	4	6	3	16
Senior management's attitude is right to accept Lean			8	6	14
Middle management's attitude is appropriate for Lean	6	5	8	5	24
Workers approach is right to implement change and accept Lean	7	6	5	4	22
Organisational culture aids Lean	5	4	10	6	25

[* Senior and middle management were considered as synonymous in regards the operatives' schedules.]

 = Shop floor operative response  = Management response

11.2.4 Lean and its personal implications

Both the questionnaires and the interview schedules attempted to gauge the participants' personal perception of what Lean would mean for them:

What Lean means on a purely personal level – Questionnaire responses													
Statement	Scale												
	Strongly agree			Agree			Somewhat agree			disagree			Strongly disagree
Will result in more pay													
My job is more secure													
I will encounter more pressure													
Better career prospects													

 = Shop floor operative response  = Management response

What Lean means on a purely personal level – interview schedules			
(Listed in order of importance by the participant)			
Manager one	Manager two	Operative one	Operative two

Profitability for the business	More work - appraisals	More work / varied	Job security
Future business prospect	Job safe-company	Less overtime	Better working conditions
Good challenge	More pressure - paperwork	More job security	Time to complete jobs
Interesting work		More pressure i.e. scrap	

11.2.5 Lean obstacles

Owing to the nature of the information required, only the managers were asked to determine the possible stumbling blocks to Lean.

[a score of 1-10 was used; “1”: if they felt it posed no concern and no difficulties; “10” if they felt that it posed a major barrier and has proven impossible to breakdown.]

Barriers organisation encountered / encounters towards Lean						
Barriers		Score				
		Questionnaire		Schedules		Total
1	Insufficient understanding of the potential benefits	8	8	5	4	25
2	Insufficient internal funding	7	3	7	8	25
3	Insufficient external funding	7	4	7	8	26
4	Insufficient senior management skills to implement Lean	7	1	5	7	20
5	Insufficient supervisory skills to implement Lean	8	3	7	9	27
6	Insufficient workforce skills to implement Lean	8	6	5	8	27
7	The need to convince shareholders / owners	3	1	3	5	12
8	Insufficient management time	7	4	5	6	22
9	Employee attitudes / resistance to change	6	9	7	8	30
10	Cost of the investment	6	8	8	9	31
11	Cultural issues	6	8	8	8	30
12	Others (please specify below)	0	0	0	0	0

11.2.6 Reasons for Lean adoption

The questionnaires and interview schedules tried to ascertain the underlying reasons from the participants’ perspective for Lean being introduced into the organisation.

Why do you feel the organisation has embraced Lean? – Questionnaire responses												
	Strongly agree			Agree			Somewhat agree			disagree		Strongly disagree
Higher profitability												
Higher productivity												
Lower costs												
Improved delivery records												
To carry less stock												

Improve relations with suppliers / customers																				
Improve relations between shop floor and management																				
Improve communications between departments																				
Better teamwork																				
Improve worker production																				
Improve customer service																				
Improve market share																				
Improve efficiency																				
Reduce down time																				
Become more competitive																				
Reduce any waste																				

For the **interview schedules**, a scoring scale of 1 – 10 was utilised; [“10” if there was total agreement with the statement without any reservations and unequivocally; “1” if the statement was totally false and they disagreed with its content wholeheartedly.]

Interview schedule responses regards why the Organisation embraced Lean					
Statement	Score 1 –10				Total
Higher profitability	9	7	9	9	34
Higher productivity	9	9	9	10	37
Lower costs	10	7	9	10	36
Attain improved delivery records			9	10	19
To carry less stock	10	5	5	10	30
Improve relations with suppliers / customers	4	9	5	8	26
Improve relations between shop floor and management	4	9	7	7	27
Improve communications between departments	5	9	8	8	30
Better teamwork	6	8	8	9	31
Improve worker production	10	8	9	8	35
Improve customer service	8	10	9	9	36
Improve market share	9	8	9	9	35
Improve efficiency			9	10	19
Reduce down time	10	5	8	10	33
Become more competitive	10	0	8	8	26
Reduce any waste	8	7	8	10	33

Key: = Question **not** posed to the shop floor
 = Shop floor operative response = Management response

11.2.7 Lean application

The next two sections revealed from the contributors’ view both the spread of Lean within the organisation and how long it had been on the Lean journey; owing to the nature of information needed, the question was only posed to managers:

Application of Lean is across the following					
Lean occurs across the whole value chain					
Lean is in our company only					
Manufacturing and Supply functions only					
Manufacturing or supply functions only					
Some units of manufacturing or supply functions only					
Few isolated tools are used					

Length of time the organisation has continuously been on the Lean journey					
0 – 6 months					
7 months - 1 year					
1 – 2 years					
3 – 4 years					
5 -6 years					
7+ years					

11.2.8 Tools used within the organisation

The data capture also sought to establish which tools the organisation had introduced as integral to its Lean journey; owing to the nature of the information sought, this section only applied to managers. [a scoring of 1-10 was used; “1” to be awarded if the participant considered that this tool is not applicable within the organisation and there are no plans to implement it in the future; “10” to be awarded if it is fully operational within the company and total commitment is awarded to it.]

Lean Tools applied in the organisation						
		Questionnaire		Schedules		Total
1	Kiazen / continuous improvement	5	7	8	4	24
2	Cellular manufacturing	7	1	1	2	11
3	Kanban systems	2	2	1	5	10
4	Single piece flow operations	2	2	1	3	8
5	Process mapping	10	2	5	7	24
6	Single Minute Exchange of Dies (SMED)	1	1	8	2	12
7	Step change / kaikaku	1	3	6	4	14
8	Supplier Development – activating links with suppliers	1	2	6	3	12
9	Supplier base reduction	1	3	3	3	10
10	5's and general visual management	4	3	9	7	23
11	Total Productive Maintenance	1	5	8	6	20
12	Attacking value and the seven wastes	6	2	8	5	21

11.2.9 Cultural implications of Lean

The questionnaires and interview schedules played an important role in determining the prevailing organisation’s culture through the following set of questions:

Statement	Strongly agree	Agree	Somewhat agree	Disagree	Strongly disagree
Decisions in the organisations are made at the lowest level possible			2	1	1

The shop-floor is listened to more widely than was the case before Lean		1	3 3	1	
All management levels are listened to more widely than was the case before Lean			4		
The organisation's direction and destination for 5 years is now much clearer	1	2	3 2		
The company has one particular person directing operations and the proposals are clearly communicated	2	2	2	2	
People are clear regarding their expectations from Lean			2 4	2	
There is adequate training to assist the progress of Lean	1		2 2	1 1	1
All managers' tiers seem to be pulling in the same direction to make Lean work	1	1 1	2 1	1 1	
The company is now a better place to work in since the introduction of Lean		1	3 3	1	
I fully understand why Lean is needed in the organisation	1 1	1 2	2	1	
The various departments seem to work better and have a healthier relationship than was the case prior to Lean		2	4 1	1	
The outcomes of Lean have been communicated thoroughly		1 2	1 2	2	
Lean metrics are clear to observe and the information is cascaded downwards regularly		1 1	1 2	2 1	
Greater efforts are made to involve suppliers than was the case before Lean		1	2 3	1 1	
Greater efforts are made to involve customers than was the case before Lean		1	2 3	1 1	
The Lean journey is linked to the mission statement / vision			3	1	

Key: = Question **not** posed to the shop floor




= Shop floor operative response = Management response

11.2.10 Lean as a Business case

It was important to establish whether Lean had assisted the organisation to secure benefits and the following section attempted to infer this [a percentage figure was sought ideally; otherwise an indication whether the relevant measure had improved as a result of Lean]:

What has Lean accomplished for the organisation											
-	Deterioration	Measurement	+								Total
			Improvement								
	Finance	Company profitability	5	5	5	5	10	10	5	5	50
		Company share prices	10	5	10	10	5	5	0	5	50
		Company liquidity	10	5	10	10	5	5	10	0	55
		Earnings per share					5	5	5	0	15

Customer	More satisfied customers	20	15	20	20	5	15	15	10	120
	Market Share	5	5	5	5	5	10	5	5	45
	Service quality	25	15	25	20	10	5	10	15	125
	Delivery records	10	10	10	20	10	5	10	10	85
	Better relationship with customers	10	15	10	5	10	10	5	10	75
Process	NPD lead time	10	5	10	0	5	5	10	10	55
	Overall cycle time	5	5	5	5	10	10	10	5	55
	Quality of new products	10	10	10	5	10	10	5	15	75
	Quality costs	5	10	5	10	5	10	5	10	60
	Defects of critical products /components					10	5	15	15	45
	Raw material costs	10	15	10	10	5	10	5	10	75
	Capital efficiency					5	10	5	10	30
	Labour efficiency					10	10	5	10	35
	Finished stock	10	15	10	10	10	15	5	10	85
	WIP stock					10	15	10	10	45
People	Absenteeism	0	0	0	0	5	0	0	0	5
	Labour turnover	0	5	0	0	5	0	5	0	15
	Quality of leadership development					10	5	5	5	25
	The relationship between management and the shop-floor	0	0	0	5	10	5	10	10	40
	Better communications	5	5	0	5	5	5	5	5	35
Future	New product development	0	0	0	5	10	10	5	5	35
	Looking for new markets	0	0	0	5	5	5	5	0	20
	Investment in new technology	0	5	0	10	5	5	0	0	25
	Sales from new products (< 5 years)	0	5	0	5	5	5	0	0	20
	Anticipating new changes					5	5	0	0	10

Key:  = Question not posed to the shop floor
 = Shop floor operative response  = Management response

11.3 LEAN AUDIT

A detailed Lean audit was undertaken with the assistance of Mark Barge (the Programme Director), which showed that the organisation whilst contending to be on the Lean journey shows signs of little commitment or Lean direction. The Lean champion has left the organisation and whilst five months have elapsed, the initial progress has not been promoted. The overall audit is not included; nonetheless, an overall summary is detailed below:

Organisation name: Ricardo Ltd		
Category	Maximum score available	Score achieved
Overall safety, cleanliness and orderliness	30	15
Production and operational flow	50	25
Processes and operations	90	42
Visual management	50	23
Quality designed into the product	130	52
Continuous improvement	90	32
Lean change strategy	120	37
Lean sustainability	70	24
Culture employee oriented	100	34
Organisational culture – organisational practices	130	41
Lean treated as a business	90	24
Philosophy	90	24
Total score : 373		
% score : 36%		
Lean stage: Mechanical		

Lean Assessment scoring system		
Lean stage	Required Points	% of the maximum score of 1,040 points available
Ideological	936	90%
Innovative	780	75%
Holistic	624	60%
Enhanced	468	45%
Mechanical	312	30%
Developmental	156	15%
Planning	0 – 155	0% - 15%

General comments:

Whilst seven tools are in place, the commitment demonstrated is lacking; this when coupled with a lack of technical expertise within Lean, proceeds to form a dangerous cocktail. There seems to be little progress from the start of its Lean journey since there has not occurred either a widening application of existing tools or an adoption of new ones. Lean was not viewed as a total system and predominantly the intention was to cut costs. The organisation development factors required for Lean such as sustainability (34%), culture (34% and 32%) and change (31%) scored poorly. In regards the ultimate set of metrics used to assess whether Lean was viewed as a philosophy, the organisation only secured a score of 27%. In summary, it could be concluded that unlike the Lean journeys of successful implementations, without considerably more work, this organisation is unlikely to reap the full benefits Lean has to

offer. The following pro-forma is the feedback sought from the organisation regards the audit results they received. Astoundingly, there was a general consensus with the audit grades.

Section A: General Background

Please State name of your company	Ricardo
Please name the auditor(s)	Sanjay Bhasin

Section B: Summary of the Lean Audit score

Lean Audit %: 36%	Lean Stage: Mechanical
--------------------------	-------------------------------

Section C: Feedback on the scores achieved in each category
--

Using a score of 1-10 could you indicate your assessment of the score achieved in each category; 10 if you totally agreed with the Lean audit score; 1 if you totally disagree with the Lean audit score.

Categories	Your score
Overall safety, cleanliness and orderliness	8
Production and operational flow	10
Processes and operations	9
Visual management	9
Quality designed into the product	8
Continuous improvement	9
Lean change strategy	9
Lean sustainability	10
Culture employee oriented	9
Organisational culture – organisational practices	9
Lean treated as a business	9
Philosophy	10
Average score obtained for the twelve categories	9

Section D: Any additional comments to be made about the Lean Audit

Whilst initially the audit results did seem somewhat harsh; it is only after consultations with other Lean consultants whereby there was an overall recognition of our present state of play. We are relatively new to this journey yet had mistakenly under-estimated both the commitment in time and money that is required to reach the higher stages quoted on the Audit scoring sheet.

The most important realisation for Ricardo had been that whilst we always strived towards empowerment and improving our communications, the package needed to ensure that Lean is successful goes much deeper than we had anticipated. The philosophy score essentially highlighted the work needed.

12.0 SUMMARY OF THE ANALYSIS

12.1 Case study Summary

The participants were asked about their understanding of the concept of Lean; captivatingly, the concept of Lean was very well understood amongst both managers and the shop floor. Seven of the eight responses mentioned the concept of eliminating waste. Linkages to the following were also identified:

- Continuous improvement,
- The need to improve delivery and
- attacking the non-value added work.

Equally candidates were asked about the primary reasons for Ricardo initially adopting Lean; the common responses focused on the following:

- Improve performance,
- Need to reduce scrap,
- Customer pressure,
- Profitability, and
- Delivery records.

Ironically, the lowest scores were recorded for:

- Better working conditions,
- Increased capacity and
- Reduce over time.

When views were sought on the effect of Lean purely on a personal level; the highest scores were recorded for the following:

- Profitability of the business,
- Job security, and
- More work / varied work.

The following were indicated as potentially having the least personal impact from Lean:

- More pressure,
- Interesting work, and
- Good challenge.

Owing to the degree of complexity, only the managers were posed the question regards the barriers to Lean within Ricardo. Bearing in mind that they could have scored a maximum of 40; the following were the highest scores achieved:

Barriers	Total score out of a maximum of 40
Cost of the investment	31
Employee attitude / resistance to change	30
Cultural issues	30
Insufficient supervisory skills	27
Insufficient workforce skills	27

All the participants were asked to state the reasons they considered for the organisation embracing Lean; there was considerable consistency between the questionnaires and the interview schedules. However, since the interview schedules included a score, it was possible to rank the replies:

Reasons for Lean adoption	Total score out of a maximum of 40
Higher productivity	37
Lower costs	36

Improve customer service	36
Improve market share	35
Improve worker production	35
Higher profitability	34
Reduce down-time	33

When the participants were asked about the Lean tools in place; generally the scores reflected the stage of the Lean adoption; ironically the lowest scores were recorded for:

- Single piece flow operations (8/40)
- Supplier base reduction (10/40)
- Kanban systems (10/40) and
- Supplier development (12/40)

The cultural questions provided a good insight of the problems faced by the organisation; the lowest scores indicated that there was a:

- Lack of adequate training for Lean,
- Little effort exerted to involve suppliers,
- Lack of enthusiasm towards involving customers,
- A poor communication policy regards Lean,
- A feeling that the company was not a better place to work in as a result of Lean, and
- That the Lean metrics were not identified.

All the participants' opinions were also sought on the potential benefits of Lean on various indices; the highest were as follows:

Indices	Averaged % improvement
Service quality	15.6
More satisfied customers	15.0
Delivery	10.6
Finished stock	10.6

Amongst the lowest scores; the following were recorded:

Indices	Average % improvement
Investment in new technology	3.1
Looking for new markets	2.5
Sales from new products	2.5

12.2 Lean Audit

Generally Ricardo reflected an organisation that promotes Lean and whilst recognising some of the benefits Lean would offer, is hesitant to increase its level of commitment. There are issues regards the divisions between the shop floor and management, which need addressing. A scattering of tools is in place but Ricardo needs to address:

- supplier development and reduction,
- single piece flow,
- kanbans and
- The HRM factors such as change and culture.

The following category scores show the amount of work needed:

- Lean philosophy - 27%
- Lean sustainability - 34%

- Organisational Culture - 33% (averaged)

Whilst some Lean tools have been introduced, more concentration was needed on the aforementioned; equally:

- Process mapping,
- Lean change strategy and
- The indices by which Lean is tracked within the organisation need to be tackled.

12.3 The Survey questionnaire

The Survey questionnaire largely helped to reinforce the Case Study analysis by reiterating that the top reasons for the initial adoption of Lean were:

- To improve performance,
- Competitive pressures and
- Pressure from customers.

Ironically, the following were also mentioned and secured the top marks but contradicted the Case Study analysis:

- Creating team spirit,
- Pressure from investors/owners.

The main barriers cited towards Lean or to widen its adoption were:

- Employee attitudes / resistance to change
- Insufficient supervisory skills,
- Insufficient workforce skills, and
- Cultural issues

Ironically, the cost of the investment was awarded the lowest score.

Equally there were numerous aspirations listed from the Lean adoption; ten receiving the joint highest scores:

- Highest profitability,
- Higher productivity,
- Lower manufacturing costs,
- Attain improved delivery records,
- Improved customer service,
- Increased efficiency,
- Increased competitiveness and
- The elimination of waste.

Equally, in contrast to the Case studies, the following two received the highest scores too:

- Improved teamwork, and
- Improve employee performance

Whilst a group of Lean tools were in place; interestingly, the joint lowest scores were recorded for the following:

- Process mapping,
- Single piece flow operations,
- Step change / Kaikaku,
- Supplier development, and
- Supplier base reduction.

13.0 THREE YEAR STRATEGY

Evidently, Ricardo is committed to its Lean journey but its level of adoption has been very slow. The detailed Lean audit had confirmed the Survey questionnaire's assertion whereby about 20% of the departments and 15% of the employees were operating under Lean conditions. This requires a need for further investigation and evidently, the term "Lean" is

certainly used inaccurately. External help had been utilised and this needs to be encouraged since the skills internally are insufficient to facilitate further progress. With the appropriate commitment, it was felt that the Lean journey would gain momentum but the tougher cultural, change and sustainability issues need confronting. The following three-year plan is proposed for the organisation, if it is to continue progressing on its Lean voyage:

Processes required	Three Year Time frame					
	Year one		Year two		Year three	
Secure services of an external sensei						
Secure the commitment from the Parent company						
Train an internal Lean champion						
Concentrate on the process mapping						
Ensure funds are made available for Lean						
Widen implementation of the existing Tools to the whole internal organisation						
Decide upon a strategy about the most appropriate tools and implement						
Disciplined Lean training introduced						
Tackle the key cultural issues						
Alter the Lean indices						
Begin to look at Lean across the value chain						

APPENDIX FIFTEEN

The Royal Doulton Plc Case Study

The Case Study fully written up; it contains information provided in a standardised format and this comprises of the following:

- Company Name
- Company Address
- Registration details
- Company number
- Market Sector
- Employee details
- Position of company contact
- Product Company details
 - History
- Finance details
- Lean Journey
 - Lean History
 - Case Study analysis
 - Meaning of “Lean”
 - Internal reasons for Lean
 - How Lean was progressing
 - Lean and its personal implication
 - Lean obstacles
 - Reasons for Lean adoption
 - Lean application
 - Tools used within the organisation
 - Cultural implications of Lean
 - Lean as a Business Case
- Lean audit
- Summary of the analysis
 - Case Study Summary
 - Lean Audit
 - Survey Questionnaire
- Three year strategy

Royal Doulton Plc



		Page
2.0	Company Name	214
3.0	Company Address	214
4.0	Registration details	214
5.0	Company number	214
6.0	Market Sector	214
7.0	Employee details	214
8.0	Position of company contact	214
9.0	Product Company details	214
9.1	Brief history	215
9.2	Royal Doulton at Present	215
	9.2.1 Recent turbulent history	215
10.0	Finance details	216
11.0	Lean Journey	219
11.1	Lean History	219
11.2	Case Study analysis	220
	11.2.1 Meaning of “Lean”	220
	11.2.2 Internal reasons for Lean	220
	11.2.3 How Lean was progressing	221
	11.2.4 Lean and its personal implication	222
	11.2.5 Lean obstacles	222
	11.2.6 Reasons for Lean adoption	223
	11.2.7 Lean application	224
	11.2.8 Tools used within the organisation	224
	11.2.9 Cultural implications of Lean	225
	11.2.10 Lean as a Business Case	226
11.3	Lean audit	227
12.0	Summary of the analysis	230
12.1	Case Study Summary	230
12.2	Lean Audit	231
12.3	Survey Questionnaire	231
13.0	Three year strategy	231

2.0 Company Name

Royal Doulton Plc

3.0 Company address - UK Head Office

Royal Doulton (UK) Limited,
Barlaston,
Stoke-on-Trent,
ST12 9ES.
United Kingdom.
Tel No: + 44 1782 404040
Fax No: + 44 1782 404254

4.0 Registration details

Royal Doulton (UK) Limited
Registered in England; Registered office address: Barlaston, Stoke on Trent ST12 9ES

5.0 Company Number

Registration no: 58357

6.0 Market sector

Manufacturer of luxury ceramic tableware, giftware and collectables

7.0 Employee details – on Nile Street factory

There are 700 people employed in the tableware section and 414 people employed in the giftware section; this excludes salaried staff, which accounted for another 120 personnel. The grand total on site was just less than 1,300 personnel.

8.0 Position of company contact

The prominent person was the “Director of Giftware”, Alan Porter.

9.0 Product company details

The Royal Doulton factory in Burslem covers 13.5 acres and has been producing the finest bone china with both lithographing and hand painted decoration since 1884. Tableware consists of lithographed and hand gilded ware. Lithographing is where the artist’s original designs are photographically transferred onto a sheet of fine paper which is then coated with plastic, soaked briefly in water to loosen transfer from backing and then slid onto the china, placed, and smoothed out using a rubber squeegee to remove the air. Gilded ware is a process where gold or platinum is applied to china using an artist’s brush; though the main process for decoration in tableware is lithographing. The range within the figure-decorating department consists of the following:

- Figurines,
- Prestige figures,
- Limited edition figures,
- Character figures,
- Decorative plaques and
- Burslem Art ware – which is a special process.

The Royal Doulton Company was one of the world’s leading manufactures of luxury ceramic tableware, giftware and collectables and had expanded into providing luxury home lifestyle ranges such as home furnishings and interior accessories. It is an international organisation, which distributes and sells to 80 different countries and has companies in Australia, Belgium, Canada, Japan, Hong Kong, Netherlands, and USA for the distribution and sales of tableware. In Indonesia Royal Doulton have nine manufacturing, distribution and sales outlets of

tableware, giftware and associated products. There are also 361 retail outlets worldwide. In regards employees; the group, worldwide, employed approximately 5,735 people (2003).

Operating sites within the UK

- Minton House, Etruria (Head Quarters)
- Royal Doulton, Burslem (Tableware/Giftware)
- Royal Doulton, Baddeley Green (Tableware)
- John Beswick, Longton (Giftware)

9.1 Brief History

The Doulton name comes from the family who established the business in 1815. John Doulton's first pottery company was situated on the banks of the Thames, in Lambeth, South London, with the production of utilitarian salt glaze and stoneware pieces such as jars, bottles and flasks. Five of John's sons joined him in the pottery industry. It was his second son, Henry, born in 1820, who joined the company as an apprentice, aged 15, and was the entrepreneur who diversified and expanded the company. The success of their sanitary ware business enabled Henry Doulton to attempt more artistic interests. In 1867 he employed George Tinworth to establish an art pottery in Lambeth. Tinworth's work achieved great public attention and the firm grew substantially to employ 300 men by the 1880s. Royal Doulton figurines were first launched in 1913, when the Queen Mary named "Darling", modelled by Charles Vyse, during a visit to the factory. Since 1913 in excess of 3,000 different figures have been produced reflecting a variety of subjects from the traditional ladies to clowns and wizards.

Charles Noke was the man behind revitalising the Staffordshire figure modelling tradition in the 1890s. However, the early models met with limited success. Today, Royal Doulton figurines are famous across the globe continuing the excellent work first started by George Tinworth. Sir Henry Doulton died in 1887 at the age of 77 and his insistence upon improvements, quality of materials and excellence of design has remained the basic Doulton policy to this day.

9.2 Royal Doulton at Present

The company has undergone a turbulent recent history with global sales demonstrating a sharp decline. This induced a major restructuring programme, which despite huge redundancies has not finished. This was reiterated by the chairman, Hamish Grossart in the "2001 Company Accounts":

"We see no reason to plan for any strengthening of sales in the remainder of the current year, but not withstanding this, we expect to make some further modest progress towards restoring the group to health, primarily through further cost reductions. The current period of weaker sales and less encouraging economic conditions will extend the group's recovery beyond 2002." (Page 2)

9.2.1 Recent Turbulent History

Below are examples of announcements made by the organisation's Press Office:

- Royal Doulton is planning to transfer 63 prestige pottery production workers from Burslem to a Wedgwood site in Barlaston, as part of the merger between the two companies. 02-Mar-2005
- Royal Doulton has received a £70m takeover offer from Waterford Wedgwood of Ireland. 25-Oct-2004

- Royal Doulton is to close its Nile Street pottery in Stoke-on-Trent by mid-2005 with the loss of 525 jobs, but has also confirmed plans to open a 20,000 sq ft factory and visitor centre at nearby Festival Park. 29-Mar-2004
- Royal Doulton has announced the loss of a further 250 jobs at its pottery operations in Stoke-on-Trent, and the closure of its Beswick factory has been brought forward by six months. 18-Nov-2002
- Royal Doulton is to close its Beswick pottery in Stoke-on-Trent with the loss of 200 jobs. 30-Sep-2002
- Royal Doulton is to invest £6m refitting many of its 300 shops around the world, and the fascia will change to Doulton & Co. 27-May-2002
- Royal Doulton is to close the Royal Albert ceramics factory in Stoke-on-Trent with the loss of 500 jobs in order to transfer production to Indonesia; while a further 500 jobs will be lost through the closure of 100 of its 400 retail outlets. 14-Feb-2002

10.0 Finance Details

Registration number: 58357

Royal Doulton Plc

Abbreviated accounts
For the year ending: 31st December, 2002

ROYAL DOULTON PLC

Balance Sheets As at 31 December 2002

	2002	2001
	£m	£m
Fixed assets		
Intangible assets	-	-
Tangible assets	-	-
Investments	10.5	17.0
	10.5	17.0
Current assets		
Stocks	-	-
Debtors	15.1	21.1
Assets held for resale	-	-
Cash at bank and in hand	20.7	1.4
	35.8	22.5
Creditors: amounts falling due within one year	(3.1)	-
Net current assets	32.7	22.5
Total assets less current liabilities	43.2	39.5
Creditors: amounts falling due after more than one year	-	-
Provisions for liabilities and charges	-	-
Net assets	43.2	39.5
Capital and reserves		
Called up share capital	85.6	83.1
Share premium account	49.9	33.7
Capital reserve	0.3	0.3
Other reserve	6.0	6.0
Profit and loss account	(98.6)	(83.6)
Equity shareholders' funds	43.2	39.5
Equity minority interests	-	-
	<hr style="width: 100%;"/>	<hr style="width: 100%;"/>
	43.2	39.5

Royal Doulton PLC

Consolidated Cash Flow Statement

For the year ended 31 December 2002

	2002	2001
	£m	£m
Net cash outflow from operating activities	(10.0)	(3.5)
Returns on investments and servicing of finance:		
Dividend paid to minority interest	-	(0.6)
Interest received	0.2	0.1
Interest paid	(1.7)	(2.0)
Interest element of finance leases	-	(0.1)
Net cash outflow from returns on investments and servicing of finance	(1.5)	(2.6)
Taxation	-	(0.9)
Capital expenditure and financial investment:		
Purchases of tangible fixed assets	(2.5)	(2.2)
Disposal of assets	8.7	-
Purchase of rights on own shares for long term incentive plan	(0.2)	-
Net cash inflow/(outflow) from capital expenditure and financial investment	6.0	(2.2)
Acquisitions and disposals:		
Purchases of shares in Indonesian subsidiary	(1.4)	-
Disposal of Caithness Glass subsidiary	-	5.3
Cash disposed of with subsidiary	-	(0.1)
Net cash (outflow)/inflow from acquisitions and disposals	(1.4)	5.2
Net cash outflow before financing	(6.9)	(4.0)
Financing:		
Issue of share capital net of costs	18.7	-
(Decrease)/Increase in borrowings	(12.2)	5.2
Principal payment under finance leases	(0.3)	(0.5)
Net cash inflow from financing	6.2	4.7
(Decrease)/Increase in cash during the year	(0.7)	0.7

11.0 Lean Journey

In accordance with the “*Company Annual Report*” (2000) the extensive restructuring Programme (Lean) was beginning to produce improvements with increase supply flexibility and new product sales. The whole of the figure-decorating department was involved in the initial pilot, which had commenced in 1998. This had resulted in the reorganisation of roles and responsibilities through which various managerial positions have materialised.

Royal Doulton Plc has been on the Lean journey for over Five years with evidence of a hazy track record to date; this was both scrutinized and evaluated subsequently with the aid of the following:

- the original survey questionnaire,
- two management interview schedules,
- two operative interview schedules,
- two management questionnaires,
- two shop floor questionnaires, and a detailed
- Lean audit undertaken to determine the organisations Lean status.

11.1 Royal Doulton’s Lean History

Royal Doulton Plc commenced on its Lean journey in 1997 with preliminary internal consultations with the Board of Directors; in April 1998 it chose a South Wales consultancy organisation (Lean Enterprise Implementing Group (LEIG)) whose Director Lindsey Jones had links with the “*Lean Enterprise Research Centre*” of Cardiff University. LEIG were awarded the contract until March 2002 with the possibility of a one-year extension. LEIG were seen as the sensei that would act as the facilitators of Lean into our giftware section. The weekly-expected output for the figure-decorating department was approximately 6,000 figures per week in the first quarter of 2002.

Royal Doulton Plc had already undergone a major re-organisation process having made an unprecedented decision to close its Royal Albert ceramics factory in Tunstall with the loss of 500 jobs in order to transfer production to Indonesia. The overall intention of Alan Porter, Director of Giftware, was to implement Lean with view towards solving three main objectives in 1998:

- Investigate reasons why a weekly production of 11,400 figures yields only 8,500 satisfactory final figurines (75%),
- labour and capital utilisation were running at 75% and 60% respectively, and
- the re-work labour bill was currently averaging £160,000 per month in the early part of 1998.

In an attempt to measure the added value, the 1997 “Figure of the Year”, “*Rachel*” was used and the following startling statistics were deduced:

Output of all the processes mapped in time	
Operation	25%
Transport	6%
Inspection	1%
Delay	68%

From discussions with other organisations and general background research undertaken by Alan Porter, he was convinced that LEIG and Lean would aid towards accomplishing the eradication of these main problem areas.

11.2 Case Study Analysis

11.2.1 Meaning of “Lean”


Initially it was important to gauge precisely what was understood by the term “Lean” in the organisation.


The understanding of the term Lean	
Questionnaires	
Manager 1:	“to cut out waste and reduce costs”
Manager 2:	“remove any waste in the process thus cutting costs”
Shop-floor 1:	“produce to order and cut down stock”
Shop floor 2:	“only produce what has been ordered for and reduce scrap”
Interview schedules:	
Manager 1:	“to improve throughput; remove waste and reduce scrap”
Manager 2:	“produce to customer wants and reduce waste, thus reducing costs”
Shop floor 1:	“improve our scrap rates”
Shop Floor 2:	“only make things we have orders for”


11.2.2 Internal reasons for “Lean”

Both the questionnaires and the interview schedules sought to discover the initial reasons for adopting Lean within the organisation:

Reasons for adopting Lean – questionnaire													
Statement	Scale												
	Strongly Agree			Agree			Somewhat agree			disagree			Strongly disagree
Customer pressure													
To improve performance													
Competitor pressure													
Create team spirit / motivational tool													
Owner / Investor pressure													
Better working conditions													
As a result of attending a special event/conference													

Key:  = Question **not** posed to the shop floor

 = Shop floor operative response

 = Management response

Reasons for adopting Lean – interview schedules			
(Listed in order of importance by the participant)			
Manager one	Manager two	Operative one	Operative two
Reduce scrap	Better cost base	Scrap rates	Cut too much production
Best first time	More competitive	Poor quality	Cut down waste
Produce to order	Better quality output	Cut jobs	Higher profits
Utilisation rates	Increased efficiency	Less rework	

11.2.3 How Lean was progressing?

The following questionnaire responses were received in regards how Lean was seen to be progressing within the organisation.

Progress of Lean with the organisation – Questionnaire responses													
Statement	Scale												
	Strongly Agree			Agree			Some - what agree			disagree			Strongly disagree
I have the necessary tools to implement Lean													
Tools used are of good quality													
Appropriate training is provided													
Appropriate time is given to make improvements													
Senior management attitude/commitment is right to accept Lean													
Middle managers' approach is right to implement Lean													
Workers approach is right to implement change													
Organisation's culture aids Lean													



[* Senior and middle management were considered as synonymous in regards the operatives' questionnaires.]

 = Shop floor operative response  = Management response

For the **interview schedules**, a score of 1-10 was used; “10” if there was an absolute agreement with the statement without any reservations and unequivocally; “1” if the statement was seen to be totally false and they disagreed with its content wholeheartedly.

Interview Schedules responses regards Lean Progress					
Statement	Score 1 - 10				Total
I have the necessary tools to implement Lean	3	2	5	7	17
The tools used in the company are of good quality	2	2	6	7	17
Appropriate training is provided to operate Lean	2	1	6	8	17
Appropriate time is given to make improvements	1	3	7	8	19
Senior management's attitude is right to accept Lean	1	2	7	9	19
Middle management's attitude is appropriate for Lean	1	2	6	7	16
Workers approach is right to implement change and accept Lean	3	4	3	5	15
Organisational culture aids Lean	2	2	4	6	14

[* Senior and middle management were considered as synonymous in regards the operatives' schedules.]

 = Shop floor operative response  = Management response

11.2.4 Lean and its personal implications

Both the questionnaires and the interview schedules attempted to gauge the participants' personal perception of what Lean would mean for them:

What Lean means on a purely personal level – Questionnaire responses																			
Statement	Scale																		
	Strongly agree				Agree				Somewhat agree				disagree				Strongly disagree		
Will result in more pay																			
My job is more secure																			
I will encounter more pressure																			
Better career prospects																			

 = Shop floor operative response  = Management response

What Lean means on a purely personal level – interview schedules (Listed in order of importance by the participant)			
Manager one	Manager two	Operative one	Operative two
Greater control	Better brand name	“Better products reaching me”	Produce right stuff only
Departments working together	Improved profits	Less scrap	Better working conditions – less stock
Better quality products	More competitive	More satisfied customers	Smoother working week
	Better market share	Stop blaming each other	

11.2.5 Lean obstacles

Owing to the nature of information required, only the managers were asked to determine the possible stumbling blocks to Lean.

[a score of 1-10 was used; “1”: if they felt it posed no concern and no difficulties; “10” if they felt that it posed a major barrier and has proven impossible to breakdown.)

Barriers organisation encountered / encounters towards Lean						
Barriers		Score				Total
		Questionnaire	Schedules			
1	Insufficient understanding of the potential benefits	2	2	6	4	14
2	Insufficient internal funding	9	9	7	6	31
3	Insufficient external funding	8	9	7	5	29
4	Insufficient senior management skills to	6	7	6	2	21

	implement Lean					
5	Insufficient supervisory skills to implement Lean	9	9	8	5	31
6	Insufficient workforce skills to implement Lean	10	8	8	5	31
7	The need to convince shareholders / owners	6	6	3	4	19
8	Insufficient management time	7	7	5	6	25
9	Employee attitudes / resistance to change	8	8	5	6	27
10	Cost of the investment	9	9	6	5	29
11	Cultural issues	8	8	6	6	28
12	Others (please specify below)					

11.2.6 Reasons for Lean adoption

The questionnaires and interview schedules tried to ascertain the underlying reasons from the participants' perspective for Lean being introduced into the organisation.

Why do you feel the organisation has embraced Lean? – Questionnaire responses												
	Strongly agree			Agree			Somewhat agree			disagree		Strongly disagree
Higher profitability												
Higher productivity												
Lower costs												
Improved delivery records												
To carry less stock												
Improve relations with suppliers / customers												
Improve relations between shop floor and management												
Improve communications between departments												
Better teamwork												
Improve worker production												
Improve customer service												
Improve market share												
Improve efficiency												
Reduce down time												
Become more competitive												
Reduce any waste												

For the **interview schedules**, a scoring scale of 1 – 10 was utilised; “10” if there was total agreement with the statement without any reservations and unequivocally; “1” if the statement was totally false and they disagreed with its content wholeheartedly.]

Interview schedule responses regards why the Organisation embraced Lean					
Statement	Score 1 –10				Total
Higher profitability	7	8	8	9	32
Higher productivity	8	7	10	10	35

Lower costs	8	9	9	10	36
Attain improved delivery records			8	10	18
To carry less stock	8	8	8	9	33
Improve relations with suppliers / customers	3	4	4	10	21
Improve relations between shop floor and management	2	4	6	8	20
Improve communications between departments	3	3	6	8	20
Better teamwork	2	3	5	6	16
Improve worker production	7	5	8	8	28
Improve customer service	3	3	9	8	23
Improve market share	6	6	8	10	30
Improve efficiency			9	10	19
Reduce down time	9	7	9	10	35
Become more competitive	8	7	9	10	34
Reduce any waste	8	9	9	9	35

Key: = Question not posed to the shop floor

= Shop floor operative response

= Management response

11.2.7 Lean application

The next two sections revealed from the contributors' view both the spread of Lean within the organisation and how long it had been on the Lean journey; owing to the nature of information needed, the question was only posed to managers:

Application of Lean is across the following					
Lean occurs across the whole value chain					
Lean is in our company only					
Manufacturing and Supply functions only					
Manufacturing or supply functions only					
Some units of manufacturing or supply functions only					
Few isolated tools are used					

Length of time the organisation has continuously been on the Lean journey					
0 – 6 months					
7 months - 1 year					
1 – 2 years					
3 – 4 years					
5 -6 years					
7+ years					

11.2.8 Tools used within the organisation

The data capture also sought to establish which tools the organisation had introduced as integral to its Lean journey; owing to the nature of the information sought, this section only applied to managers. [a scoring of 1-10 was used; “1” to be awarded if the participant considered that this tool is not applicable within the organisation and there are no plans to implement it in the future; “10” to be awarded if it was fully operational within the company and total commitment is awarded to it.]

Lean Tools applied in the organisation						
1	Kiazen / continuous improvement	Questionnaire		Schedules		Total
		6	6	4	7	

2	Cellular manufacturing	6	5	7	6	24
3	Kanban systems	5	7	5	6	23
4	Single piece flow operations	4	5	5	7	21
5	Process mapping	7	8	6	8	29
6	Single Minute Exchange of Dies (SMED)	2	2	3	4	11
7	Step change / kaikaku	1	1	3	3	8
8	Supplier Development – activating links with suppliers	1	1	2	3	7
9	Supplier base reduction	1	1	2	2	6
10	5's and general visual management	6	8	8	9	31
11	Total Productive Maintenance	4	7	4	5	20
12	Attacking value and the seven wastes	5	8	5	7	25

11.2.9 Cultural implications of Lean

The questionnaires and interview schedules played an important role in determining the prevailing organisation's culture through the following set of questions:

Statement	Strongly agree	Agree	Somewhat at agree	Disagree	Strongly disagree
Decisions in the organisations are made at the lowest level possible			4		
The shop-floor is listened to more widely than was the case before Lean		3	1	2	
All management levels are listened to more widely than was the case before Lean		3	1		
The organisation's direction and destination for 5 years is now much clearer	1	3	1		
The company has one particular person directing operations and the proposals are clearly communicated		3	1		
People are clear regarding their expectations from Lean	1	3	2	1	
There is adequate training to assist the progress of Lean		3	2	1	
All managers' tiers seem to be pulling in the same direction to make Lean work		3	1	4	
The company is now a better place to work in since the introduction of Lean	1	2	1	2	
I fully understand why Lean is needed in the organisation	1	1	2		
	2	2			
The various departments seem to work better and have a healthier relationship than was the case prior to Lean	1	1	2	2	

The outcomes of Lean have been communicated thoroughly	2	1	3 1	1	
Lean metrics are clear to observe and the information is cascaded downwards regularly		2 3	1	2	
Greater efforts are made to involve suppliers than was the case before Lean		2	2 2	2	
Greater efforts are made to involve customers than was the case before Lean		1 2	1 2	2	
The Lean journey is linked to the mission statement / vision	1	2	1		

Key: = Question not posed to the shop floor

= Shop floor operative response


= Management response


11.2.10 Lean as a Business case


It was important to establish whether Lean had assisted the organisation to secure benefits and the following section attempted to infer this [a percentage figure was sought ideally; otherwise an indication whether the relevant measure had improved as a result of Lean]:

What has Lean accomplished for the organisation										
-	Measurement	+								
Deterioration		Improvement								Total
Finance	Company profitability	0	10	5	10	10	10	10	5	60
	Company share prices	0	0	5	5	5	5	5	10	35
	Company liquidity	0	0	5	5	10	0	10	10	40
	Earnings per share					0	0	5	5	10
Customer	More satisfied customers	5	0	0	10	10	10	10	5	50
	Market Share	5	0	0	5	10	5	5	10	40
	Service quality	5	0	10	15	5	5	5	10	55
	Delivery records	10	5	10	15	10	10	10	15	85
	Better relationship with customers	0	0	5	10	10	5	10	10	50
Process	NPD lead time	0	0	5	10	0	10	5	5	35
	Overall cycle time	0	0	10	5	5	5	5	10	40
	Quality of new products	0	0	10	5	10	10	10	5	50
	Quality costs	10	0	5	5	10	5	5	10	50
	Defects of critical products /components					10	0	5	15	30
	Raw material costs	5	5	5	10	5	10	5	10	55
	Capital efficiency					10	5	10	10	35
	Labour efficiency					10	5	10	10	35
	Finished stock	5	10	5	10	10	15	20	15	90
	WIP stock					10	15	15	15	55
People	Absenteeism	5	0	0	10	5	10	0	0	30
	Labour turnover	10	10	0	0	10	0	0	5	35
	Quality of leadership development					0	0	0	10	10
	The relationship between	0	0	0	5	0	0	5	10	20

	management and the shop-floor									
	Better communications	0	0	0	0	5	5	5	5	20
Future	New product development	10	0	0	0	5	5	0	5	25
	Looking for new markets	0	0	0	0	5	10	0	0	15
	Investment in new technology	0	0	0	0	0	0	5	0	5
	Sales from new products (< 5 years)	0	0	0	0	0	0	0	5	5
	Anticipating new changes					0	0	0	5	5

Key:  = Question not posed to the shop floor

 = Shop floor operative response

 = Management response

11.3 LEAN AUDIT

The following section summarises the results of a detailed Lean audit undertaken to deduce the stage Royal Doulton Plc had reached on its Lean journey; it uses the results under the twelve categories and places Royal Doulton at the “*Developmental*” phase. This suggests that the:

- organisation had started its implementation of Lean,
- pilot area had been selected and work commenced,
- that the roll out has been very poor,
- Lean tools are implemented but with no overall strategy,
- Level of commitment within the organisation is unconvincing,
- importance of culture is certainly not recognised.

The ensuing response received on the results fed back to Royal Doulton are summarised in the subsequent pro-forma:

Lean Assessment scoring sheet		
Organisation name: Royal Doulton Plc		
Category	Maximum score available	Score achieved
Overall safety, cleanliness and orderliness	30	13
Production and operational flow	50	12
Processes and operations	90	33
Visual management	50	21
Quality designed into the product	130	46
Continuous improvement	90	26
Lean change strategy	120	42
Lean sustainability	70	11
Culture employee oriented	100	25
Organisational culture – organisational practices	130	31
Lean treated as a business	90	20
Philosophy	90	18
Total score : 298		
% score : 29%		
Lean stage: Developmental		

Lean Assessment scoring system		
Lean stage	Required Points	% of the maximum score of 1,040 points available
Ideological	936	90%
Innovative	780	75%
Holistic	624	60%
Enhanced	468	45%
Mechanical	312	30%
Developmental	156	15%
Planning	0 – 155	0% - 15%

General comments:

Royal Doulton Plc depicted a conventional situation of an organisation failing to implement Lean and the audit reinforced this point. The highest score it secured in any category was 43%. In its “Sustainability” and “Philosophy” category it only managed to secure scores of 16% and 20% respectively; consequently, assisting to explain why the Lean implementation failed. The organisation never seemed to be serious about Lean and generally viewed it as a viable strategy to reduce costs. Whilst, this is feasible, the commitment from senior management regards both time and finance was never exhibited.

Many of the linkages were never recognised such as culture (25% and 24%) and change (35%); this when combined with the application of a few Lean tools to manufacturing alone without the assistance of the indispensable organisational developmental aspects meant that Lean never even approached an overall implementation rate of 30%. An enormous improvement in the prevailing labour relations and the shop-floor’s trust in management is crucial for Lean to flourish further.

Section A: General Background	
Please State name of your company	Royal Doulton Plc
Please name the auditor(s)	Sanjay Bhasin

Section B: Summary of the Lean Audit score	
Lean Audit %: 29%	Lean Stage: Developmental

Section C: Feedback on the scores achieved in each category

Using a score of 1-10 could you indicate your assessment of the score achieved in each category; 10 if you totally agree with the Lean audit score; 1 if you totally disagree with the Lean audit score.

Categories	Your score
Overall safety, cleanliness and orderliness	10
Production and operational flow	9
Processes and operations	9
Visual management	9
Quality designed into the product	8
Continuous improvement	9
Lean change strategy	9
Lean sustainability	10
Culture employee oriented	8
Organisational culture – organisational practices	8
Lean treated as a business	9
Philosophy	8
Average score obtained for the twelve categories	9

Section D: Any additional comments to be made about the Lean Audit

Overall, few surprises were made evident; clearly the scores for our technical elements of the Lean implementation were probably expected; the difficult ones to digest were the culture and philosophy ones; however, after consulting with the audit results in great detail, they too were a fair reflection of our present state of play.

We probably did not appreciate the impact that the supporting infra-structure, i.e., culture, sustainability and change have on an overall Lean audit and feel many organisations in our position would perform similarly. Evidently there is a prevailing culture with considerable history, which needs addressing for Lean to succeed.

12.0 SUMMARY OF THE ANALYSIS

12.1 Case study Summary

Evidently there are major cultural implications, which did hinder further Lean progress; costs and operational measures figured prominent when both managers and operatives were asked why Lean was introduced within the organisation. Ironically, the interview schedules made no mention of:

- team spirit or
- better working conditions.

This was reiterated by the responses subsequently, when participants were asked about what objectives they considered Royal Doulton Plc wished to accomplish through their Lean implementation; all four participants who completed the questionnaires mentioned:

- lowering costs, and specified several
- operational indices.

The interview schedules rated the responses in the following order:

- lowering costs,
- productivity,
- reduced lead time and
- carrying less stock.

Criteria rated the lowest regards the reasons for adopting Lean were:

- better teamwork and
- improved communications.

There was conflicting evidence offered between both the operatives and management. The shop-floor felt that the management attitude towards Lean was wrong; the managers scored themselves much higher. When inquired about whether the “*senior management attitude was right to accept Lean*”; the shop floor interview schedules returned an average score of 1.5 out of 10; the managers, however, averaged 8 out of 10. Conversely, the lowest combined score was achieved on the culture question inquiring whether it was conducive towards Lean. Ironically, when asked about the highest potential personal impact of Lean on those questioned; the highest rating was awarded to the possibility of encountering more pressure at work.

The managers’ views were also sought on the main obstacles of Lean within the organisation; in order of importance, the following results were achieved:

- internal funding,
- insufficient internal skills,
- external funding,
- investment costs and
- cultural issues.

All the participants’ opinions were also sought on the potential benefits of Lean on several indices; the two highest were as follows:

Indices	Averaged % improvement
Finished stock	11.2
Delivery records	10.6

The lowest scores were recorded for the following:

Indices	Average % improvement
Looking for new markets	1.8
Sales from new products	0.5
Investment in new technology	0.5

12.2 Lean Audit

The Case Study results reinforce the findings from the extensive Lean audit undertaken to determine at which stage Royal Doulton was on its Lean journey; unfortunately with an overall score of 29% with the following category scores:

- 24.5% for culture,
- 20% for philosophy and
- 16% for Lean sustainability,

it was made apparent that unless key strides were undertaken, that not only would Lean suffer but that the organisation was heading for major problems. Ironically, when the organisation's views on the Lean audit undertaken were sought; they awarded an overall score of 9 out of 10 for its overall accuracy.

12.3 The Survey questionnaire

The survey confirmed the findings too; “*improving performance*” was ranked the highest in reference to the reasons Lean was adopted. The two biggest barriers to widening Lean quoted were internal funding and the cost of the investment. The three highest positioned indices it was hoped Lean would improve were:

- Productivity,
- Delivery records, and
- Carry less stock.

Equally, it was considered that Lean had contributed to the following main improvements:

- Lead time (50%) and
- Inventory (50%).

13.0 THREE YEAR STRATEGY

The dominant analysis points towards an organisation whose commitment towards Lean was controversial. The organisation embraced Lean with the main purpose to reduce costs; whilst this would have been achieved, the strategy they adopted failed to facilitate this process. Utilising an external sensei was appropriate but then Royal Doulton Plc made no efforts to internalise the expertise. The chart below summarises the three-year strategy that would have assisted the organisation to further implement Lean:

Processes required	Three year Time frame					
	Year one		Year two		Year three	
More Lean tools, i.e., Cells, Mapping, kaizen and suppliers						
Cascade it to other areas of the factory						
Alter the remuneration systems						
Train an internal Lean champion						
TPM to gain priority						
Align the Lean metrics to the organisations objectives						
Communicate the vision						
Improve the flow lines						
Extend Lean to all internal areas of the organisation						
Maintain the Training programme						

APPENDIX SIXTEEN

The Trentex Engineering Case Study

The Case Study fully written up; it contains information provided in a standardised format and this comprises of the following:

- Company Name
- Company Address
- Registration details
- Company number
- Market Sector
- Employee details
- Position of company contact
- Product Company details
 - History
- Finance details
- Lean Journey
 - Lean History
 - Case Study analysis
 - Meaning of “Lean”
 - Internal reasons for Lean
 - How Lean was progressing
 - Lean and its personal implication
 - Lean obstacles
 - Reasons for Lean adoption
 - Lean application
 - Tools used within the organisation
 - Cultural implications of Lean
 - Lean as a Business Case
- Lean audit
- Summary of the analysis
 - Case Study Summary
 - Lean Audit
 - Survey Questionnaire
- Three year strategy

Trentex Engineering



	Page
2.0 Company Name	234
3.0 Company Address	234
4.0 Registration details	234
5.0 SIC Code	234
6.0 Market Sector	234
6.1 Special Features of the Sector	234
7.0 Employee details	234
8.0 Position of company contact	234
9.0 Product Company details	234
10.0 Finance details	235
11.0 Lean Journey	236
11.1 Lean History	236
11.2 Case Study analysis	236
11.2.1 Meaning of “Lean”	236
11.2.2 Internal reasons for Lean	236
11.2.3 How Lean was progressing	237
11.2.4 Lean and its personal implication	238
11.2.5 Lean obstacles	239
11.2.6 Reasons for Lean adoption	239
11.2.7 Lean application	240
11.2.8 Tools used within the organisation	241
11.2.9 Cultural implications of Lean	241
11.2.10 Lean as a Business Case	242
11.3 Lean audit	243
12.0 Summary of the analysis	246
12.1 Case Study Summary	246
12.2 Lean Audit	247
12.3 Survey Questionnaire	247
13.0 Three year strategy	248

2.0 Company Name

Trentex Engineering Limited

3.0 Company address

Etruria works,
Garner Street,
Etruria,
Stoke on Trent
ST4 7AX

4.0 Registration details

Company No: 02822714

5.0 SIC CODE

Classification Number 28.52

6.0 Market sector

General mechanical engineering

7.0 EMPLOYEE DETAILS

The company currently employs 49 people in the following categories:

Directors:	2
Production:	28
Clerical:	4
Administration:	2
General Labourers:	13

8.0 Position of company contact

Predominantly, the information was either facilitated for or provided by one of the Directors of the company.

9.0 Product / Company details

The company is registered as a private limited company, and first started trading in 1993. It offers a range of engineering services to its customers including fabrication, machining and assembly from approximately 13000 sq. ft. of workshop space. Fabrication is carried out using carbon and stainless steels and aluminium. Welders are coded from BS4872 to BS EN 287 in both MIG and TIG welding. Machining is undertaken on a 'one-off' basis or in either small or medium batches and capacity includes turning, milling, grinding and horizontal boring.

Assembly facilities are available to facilitate offering customers a complete service, including where appropriate, the purchasing and assembly of all associated motors, cylinders, and bearings. Quality is embodied in the company's mission - to provide all customers with defect free products and services that are delivered on time. There is a documented quality system pursued (BS EN 130 9002: 1994). The system consists of quality manuals, operating systems and supporting documentation, with the requirement for personnel to adhere to these procedures. Trentex Engineering is a well-established engineering company with many years experience of precision machining, fabrication and assembly work on a sub-contract basis.

10.0 FINANCIAL DETAILS

Below are details of an abbreviated Balance Sheet - no other financial information was available.

Registration number: 2822714

Trentex Engineering Limited

Abbreviated accounts

For the year ending: 30th September, 2006

Trentex Engineering Limited

Abbreviated Balance Sheet as at 30 September 2006

	£	£
Fixed Assets		
Intangible assets	-	
Tangible	31,605	
Current Assets		
Stocks and WIP	74,088	
Debtors	169,532	
Cash at Bank and in Hand	<u>92,881</u>	
	336,501	
Creditors:		
Amounts falling due Within one year	<u>(308,111)</u>	
		<u>28,390</u>
Total Assets less current liabilities		59,995
Creditors falling due after more than one year		<u>(1,586)</u>
		<u>58,409</u>
Capital and Reserves		
Called up share capital		63
Subordinate Loan		-
Profit and Loss Reserve		<u>58,346</u>
Equity Shareholders funds		<u>58,409</u>

(Source: Companies House 30/07/2007)

11.0 LEAN JOURNEY

Trentex Engineering has been on the Lean journey for over five years without making the degree of progress towards Lean that might have been expected; this was both scrutinized and evaluated subsequently with the aid of the following:

- the original survey questionnaire,
- two management interview schedules,
- two operative interview schedules,
- two management questionnaires,
- two shop floor questionnaires, and a detailed
- Lean audit undertaken to determine the organisations Lean status.

11.1 Trentex Engineering's Lean history

Trentex Engineering's Lean excursion began in 2002 when they originally sought the help of CERAM, based in Stoke, who offer a range of services and products designed to assist manufacturers, suppliers and users with view towards improving competitiveness and profitability. CERAM has many years of experience working with International clients in the materials industries, helping them improve their performance and profitability. They are involved in many aspects of materials, product and manufacturing technology with core strengths spanning testing, research, process engineering, product design and consultancy. The original objective of the organisation through Lean was to:

- improve the layout of the overall operation,
- improve relationships with the few suppliers it uses, and
- generally reduce the lead-time of its main fabrication work undertaken.

11.2 Case Study Analysis

11.2.1 Meaning of "Lean"

Initially it was important to gauge precisely what was understood by the term "Lean" in the organisation.

The understanding of the term Lean	
Questionnaires	
Manager 1:	"better relationship with suppliers/customers and reduce stock"
Manager 2:	"make sure customers are involved early in the process to reduce any variation"
Shop-floor 1:	"cut out any re-work and reduce costs"
Shop floor 2:	"when an order is received, start work on it"
Interview schedules:	
Manager 1:	"design plans with quality and exactly to customer specification"
Manager 2:	"reduce stock and only produce for customers"
Shop floor 1:	"produce first time right; cut out overstocking"
Shop Floor 2:	"make sure all work has proper standards"

11.2.2 Internal reasons for "Lean"

Both the questionnaires and the interview schedules sought to discover the initial reasons for adopting Lean within the organisation:

Reasons for adopting Lean – questionnaire					
Statement	Scale				
	Strongly Agree	Agree	Somewhat agree	disagree	Strongly disagree

Customer pressure	■	■		■							■								
To improve performance		■		■		■													
Competitor pressure		■			■						■								
Create team spirit / motivational tool											■			■					
Owner / Investor pressure														■	■				
Better working conditions					■			■			■			■					
As a result of attending a special event / conference								■			■			■					■

Key: ■ = Question not posed to the shop floor



= Shop floor operative response



= Management response

Reasons for adopting Lean – interview schedules			
(Listed in order of importance by the participant)			
Manager one	Manager two	Operative one	Operative two
Too much stock	Poor delivery	Reduce costs - stock	Lost some orders
Monies tied up	Customer complaints	Cut wage bill : re-work	Cut O/T bill
Competition	Competition		Cut costs: stock

11.2.3 How Lean was progressing?

The following questionnaire responses were received in regards how Lean was seen to be progressing within the organisation.

Progress of Lean with the organisation – Questionnaire responses					
Statement	Scale				
	Strongly Agree	Agree	Some - what agree	disagree	Strongly disagree
I have the necessary tools to implement Lean			■	■	■
Tools used are of good quality			■	■	■
Appropriate training is provided			■	■	■
Appropriate time is given to make improvements			■	■	■
Senior management attitude / commitment is right to accept Lean		■		■	
Middle managers' approach is right to implement Lean			■	■	■
Workers approach is right to implement change			■	■	
Organisation's culture aids Lean			■	■	■

Will be heard by others	More scheduling	Makes job safer	Job Safer
Better job security	Better awareness	Maybe more pay	

11.2.5 Lean obstacles

Owing to the nature of information required, only the managers were asked to determine the possible stumbling blocks to Lean. [A score of 1-10 was used; “1”: if they felt it posed no concern and no difficulties; “10” if they felt that it posed a major barrier and has proven impossible to breakdown.]

Barriers organisation encountered/encounters towards Lean						
Barriers		Score				
		Questionnaire		Schedules		Total
1	Insufficient understanding of the potential benefits	4	5	6	4	19
2	Insufficient internal funding	9	8	7	4	28
3	Insufficient external funding	0	0	3	0	3
4	Insufficient senior management skills to implement Lean	7	8	8	6	29
5	Insufficient supervisory skills to implement Lean	8	9	7	7	31
6	Insufficient workforce skills to implement Lean	7	7	7	7	28
7	The need to convince shareholders / owners	3	2	7	0	12
8	Insufficient management time	6	6	8	4	24
9	Employee attitudes / resistance to change	7	7	7	8	29
10	Cost of the investment	9	10	9	9	37
11	Cultural issues	9	9	8	9	35
12	Others (please specify below)	0	0	0	0	0

11.2.6 Reasons for Lean adoption

The questionnaires and interview schedules tried to ascertain the underlying reasons from the participants’ perspective for Lean being introduced into the organisation.

Why do you feel the organisation has embraced Lean? – Questionnaire responses					
	Strongly agree	Agree	Somewhat agree	disagree	Strongly disagree
Higher profitability	■	■	■		
Higher productivity		■	■		
Lower costs	■	■			
Improved delivery records		■	■		
To carry less stock	■	■	■		
Improve relations with suppliers / customers		■	■		■
Improve relations between shop floor and management		■	■	■	■
Improve communications between departments	■	■	■		