COMPUTER AIDED MANUFACTURING OF GEOMETRIC MODELS

by

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SUMMARY

As systems for computer-aided-design and production of mechanical parts have developed. there has arisen a need for techniques for the comprehensive description of the desired part, including its 3-D shape. The creation and manipulation of shapes is generally known as geometric modelling. It is desirable that links be established between geometric modellers and machining programs.

Currently, unbounded APT and some bounded geometry systems are being widely used in manufacturing industry for machining operations such as: milling, drilling, boring and turning, applied mainly to engineering parts. APT systems, however, are presently only linked to wire-frame drafting systems. The combination of a geometric modeller and APT will provide a powerful manufacturing system for industry from the initial design right through part manufacture using NC machines.

This thesis describes a recently developed interface (ROMAPT) between a bounded geometry modeller (ROMULUS) and an unbounded NC processor (APT).

A new set of theoretical functions and practical algorithms for the computer aided manufacturing of 3D solid geometric model has been investigated.

This work has led to the development of a sophiscated computer program, ROMAPT, which provides a new link between CAD (in form of a geometric modeller ROMULUS) and CAM (in form of the APT NC system).

ROMAPT has been used to machine some engineering prototypes successfully both in soft foam material and aluminium.

It has been demonstrated above that both the theory and algorithms developed by the author for the development of computer aided manufacturing of 3D solid modelling are both valid and applicable.

ROMAPT allows the full potential of a solid geometric modeller (ROMULUS) to be further exploited for NC applications without requiring major investment in new NC processor. ROMAPT supports output in APT-AC, APT4 and the CAM-I SSR1 NC languages.

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COMPUTER AIDED MANUFACTURE, GEOMETRIC MODELLING, APT

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DECLARATION

The work carried out in my thesis "Computer Aided Manufacturing of Geometric Models" was my own work. No part of the work described in the thesis was done in collaboration, unless specifically so described and that the work has not been submitted for any other academic award in any other institution.

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October 1984

RESTRICTION OF ACCESS

No access to this thesis is permitted for 2 years after the date of acceptance by the University.

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