HIGHER TECHNICAL INSTITUTE

MECHANICAL ENGINEERING DEPARTMENT

DIPLOMA PROJECT

DEVELOPMENT OF A SIMPLE CAD/CAM POST PROCESSOR

BY

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JUNE 1988

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1996

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PROJECT NO
2606

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Project Report

Submitted to

the Department of Mechanical Engineering

of the Higher Technical Institute

Nicosia Cyprus

in partial fulfillment of the requirements

for the diploma of

TECHNICIAN ENGINEER

in

MECHANICAL ENGINEERING

June 1996

Project Supervisor: Dr L.G. Lazari

HIGHER TECHNICAL INSTITUTE
PROJECT NO
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PREFACE

This project aim was to design a post processor which will be used to perform the functions of a simple CAD/CAM system, which is to achieve the link between computer aided design and computer aided manufacturing.

An extended discussion on CAD/CAM systems is performed in this project and also the programming of a computer routine to make real the link between the CAD and the CAM system. As a CAD system the very popular CAD program Autocad is used and as a CAM system a small CNC lathe. The link is established by the program routine which take's the necessary drawing information from the CAD database and construct's the part program required by the CNC lathe. The part program is send to the CNC lathe via a communication cable.

This project was achieved through Autocad customization. The author's aim in this project was not to make a survey on CAD/CAM systems and neither to construct a post processor because both of the above have been performed in great detail by other researchers. There are hundreds of books describing and analyzing CAD/CAM systems in the best possible way and there are also firms which have designed CAD/CAM systems that can perform virtually anything. The aim of the author is to show through this project the possibilities of customizing CAD systems. This project is presented as an example of CAD systems customization. By customizing CAD systems an engineer can perform any functions and construct any routines that he finds useful for his needs.

ACKNOWLEDGMENTS

I would like to express my sincere thanks to my project supervisor Mr. P. Demetriou for his valuable help and guidance given to me throughout the project period. I would also like to thank Mr. L. Lazari for his valuable help in testing the post processor and providing guidance on the CNC operation.

I am also indebted to the CAD staff of the Technical University of Dresden, Germany for there contribution in teaching me the AutoCAD customization during my summer training in 1995 which the project is based on. My special thanks to Mrs. E. Gnikke, Dr. Niptrich, Prof. J. Klose and Mr. Wolfgang.

I thank my family for their support throughout the completion of this project and Miss Elena Sofocleous for her understanding and help.

Finally I would like to dedicate this project to the Higher Technical Institute and everybody that will benefit from it and acknowledge its value and contribution in the engineering field.

George Louca

SUMMARY

DEVELOPMENT OF A SIMPLE CAD/CAM POST PROCESSOR

This whole project deals with the CAD/CAM systems, what are these systems what they do, how they work. CAD/CAM systems are the introduction of computers in industry. Computers achieved to build a link between the Design functions and the Manufacturing functions. CNC machines are the beginnings of CAM, fully programmable machines which can perform machining or other metal processing virtually unattended. CAD systems enable the designer to visualize the design better, perform engineering calculations like finite element analysis which were not practical, time consuming and inaccurate in the past.

The post processor programmed for the EMCO COMPACT 5 CNC LATHE is small CAD/CAM system. It can perform automatically part programming, transfer the part program to the CNC through communications cables and perform mass properties calculations. It also can provide 3D modeling and finish presentation of the part that is to be machined.

The post processor programmed was achieved by customization of AutoCAD and can handle turning, facing, tapering and finishing cut.

The main conclusion is that the post processor developed is quite simple, versatile, fast and user friendly. It solved the problem of performing part programming for the parts that are to be machined on the CNC Lathe and reduced the time of doing this to practically nothing.

George Louca

Introduction

Since 1770, two centuries ago when the industrial revolution began the foundations for replacing the humans with machines were set. Today the word mechanization has disappeared from the technical vocabulary and the word Automation has taken it's place. Automation today is being applied to all industries throughout the world. Automation includes the application of robotics, CAD/CAM (computer-aided design/computer-aided manufacturing) systems, flexible manufacturing systems and machine vision. All new systems involve the interaction of computer systems to analyze production schedules, design new products, perform engineering analysis and guide the machines to perform the various products. In addition automated guided vehicles known as AGV's are used to carry the various parts throughout the manufacturing plant.

CAD/CAM systems are the hard core of the automation systems applied in the various industrial applications of automation. As mentioned above CAD/CAM is a system which connects the design function with the manufacturing function. This link is achieved with the use of computer systems. CAD is the part where the products are being designed with the help of computers, while CAM systems are those involving the efficient use of the computer technology in the planning, management, and control of the manufacturing function. The application of CAM in the manufacturing can be either "off line" in which case the computer does not have direct connection with the process and the "on line" in which the computer is directly connected with the process, controls the production, directs the machines and also receives information about current status, problems, breakdowns or needs.

However, in order to achieve automation the use of CNC (computer numerical control) machines which are able to operate unmanned with the guidance of a computer program and there electronic processor. These machines can be directly connected with remote controllers and thus being controlled from a distance without being attended by

humans. They can also provide feedback to the computer about there present status, change cutting tools, lubricate etc.

CNC machines, have a programming language of there own in order to produce these various parts. Therefore computer programs are needed to perform this task which is to read a design and construct the part program needed to be loaded on the machine in order to produce the required part. These programs are called post processors and are used as the link between the design systems and the manufacturing systems and are composing a new system, called the CAD/CAM. Therefore a complete CAD/CAM system must be able to design and also perform various mass, stress or thermal property calculations concerning the designed part and also to be able to perform post processing in order to generate the part program which is required by the CNC machine and finally to be able to contact the machine in order to initiate the production of the part.