HIGHER TECHNICAL INSTITUTE

MECHANICAL ENGINEERING COURSE

DIPLOMA PROJECT

PART PROGRAMMING AND MANUFACTURING OF VARIOUS COMPONENTS ON CNC VERTICAL MILLING MACHINE

M/950

DESIGN BY
PAVLIDES FEDONAS

JUNE 2002

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Project Report

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ABSTRACT

This project deals with the manufacturing of various components on CNC vertical milling machine.

First the theory of the project was prepared with the basic principles of Numerical control following a general study of Micron VCE 750, HAAS VP-Series control (compatible to Fanuc). Also a few word about programming and machining forces.

The main part of this project is the part programming for the manufacture of a complex geometrical component, by using linear interpolation and canned cycles.

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INTRODUCTION

What is Numerical control?

When we talk about N.C machine today we actually talk about C.N.C machines. When computers are used to control machine tools the machines are called N.C or C.N.C machine tools. By N.C we mean Numerical control and by C.N.C we mean Computer Numerical Control.

Numerical Control (N.C) is a form of programming automation in which the processing equipment is controlled by means of numbers, letters and other symbols. The numbers, letters and symbols are coded in or appropriate format to define a program of instructions for a particular workpad or a job which allows the machine tool to perform the desired component. When the job changes, the program of instruction is changed. The capability to change the program is what makes NC suitable gor low- and medium-volume production is mach easier to write new program than in make major alterations of the processing equipment.

Application of N.C.

The applications of numerical control range over a wide variety of processes. We can divide the applications into two categories: (1) machine and other metalworking, and (2) mon-macine tool applications such as assembly, drafting and inspection. The common operating principle of N.C in all these applications is control of the relative position of a tool or processing element with respect to the object being processed (e.g. the workpart).|

Types of machining processes:

a) turning

b) Drilling

c) Milling

d) Shaping

e) Planning

f) Grinding

Basic components of N.C

A numerical control system consists of the following three basic components:

1. Program of instructions
2. Machine control unit
3. Processing equipment

The program is fed into the control unit, which directs the processing equipment accordingly. The program of instructions is the detailed step-by-step commands that direct the processing equipment in its most common form, the commands refer to positions of a machine tool spindle with respect to the worktable on which the part is fixture. More advanced instructions include the selection of spindle speeds, cutting tools, and other magnetic tape cassettes and floppy diskettes. The programming is done by a person called part programmer. The machine control unit (M.C.U) consists of the electronics and control hardware that read and interpret the program of instructions and convert it into mechanical actions of the machine tool or other processing equipment. The processing equipment is the third basic component of N.C system. It is the component that performs useful work in the most common example of