



PROGRAM PLANNING

Chapter 6



Review

- Coordinate system
 - *Axis*
 - *Planes*
 - *Origin*
- Quadrants
- Machine geometry

Objective

- Have a working knowledge of program planning
- Have a working knowledge of program structure
- Be able to begin planning and forming basic programs for workpieces

Program Planning

- Program planning begins with the concept
- In a formal setting this is in the form of a detailed engineering drawing
- Informally it can be just an idea, sketch, napkin, etc.
- This is the basis for all further steps in planning

Program Planning

- There is no absolute formula for planning all work
- The basic steps are
 1. *Initial information / tooling*
 2. *Part complexity*
 3. *Programming method*
 4. *Programming procedure*
 5. *Engineering data*
 6. *Method sheet*
 7. *Sequencing*
 8. *Tooling selection*
 9. *Part setup*
 10. *Tech decisions*
 11. *Sketch and calculations*
 12. *QC considerations*

1. Initial Information / Tooling

- Gather information about the job
 - *Finished shape, size, hardness*
- Gather information about the blank size
 - *What material size is best suited*
- Gather information about machines
 - *What process would be most effective*
- What else needs to be done
 - *Will it have follow on steps*

2. Part Complexity

- Is it something that can be manually programmed
- Is it something that the machines can even handle

3. Programming Method

- Manual programming
 - *Disadvantages*
 - Time
 - Verification
 - Machine down time
 - *Advantages*
 - Operator knows the machine
 - Can quickly modify or copy
 - Simple parts can be done quickly

3. Programming Method

- CAD/CAM programming
 - *Disadvantages*
 - Time
 - Experience – workforce
 - Mistakes from not using integration
 - *Advantages*
 - Can be used for extremely complex parts
 - Makes a record for follow on jobs
 - Can quickly modify or copy
 - Etc.

4. – 11. Programming Procedure

- This is the actual programming
 1. *Study information*
 2. *Material stock*
 3. *Machine tool specifications*
 4. *Control system*
 5. *Sequence of operations*
 6. *Tooling selection*
 7. *Setup of part*
 8. *Tech data*
 9. *Tool path*
 10. *Working sketch and calculations*
 11. *Program writing*
 12. *Testing and debugging*
 13. *Documentation*





PART PROGRAM STRUCTURE

Chapter 7



Basic Terms

- Character
 - *Digit 0-9*
 - *Letter A-Z*
 - *Symbols ., +, -, %, (,*
- Word
 - *Alpha-numerical code made of characters X-1, Z1, G00*
- Block
 - *Words that make a command – must have an end of block code*
- Program
 - *Multiple blocks that complete an operation*

Programming Formats

- Tab Sequential
 - *Obsolete – no decimal point – NC only*
- Fixed Format
 - *Obsolete – no decimal point – NC only*
- Word Address Format
 - *decimal point - NC or CNC*

Word Address Format

- The address – letter – must come first
 - *X1.2 not 1.2X*
- Words cannot have spaces
 - *X-1.1 not x – 1.1*
- Blocks can have spaces
 - *G00 X1 Y1 or G00X1Y1*
- Use caution – the wrong letter in a work cas had lerge consequences
 - *X dim. Switched with a Y dim.*
 - *G00 or a G01*
 - *F.5 or F5*
- Leading zero and “+” sym
 - *Do not need to be there but it is a good practice for trouble shooting*

Program Structure

- Header
 - *Primary information about the program – Use the “(“ and “)” to have the sys. Ignore them*
 - Located at the top / beginning of the program
 - See example in book 49 - 50
- Comments in program
 - *Helps programmer as well as operator*
 - Can assist in changes – knowledge – troubleshooting – etc.

Important Items

- You must have the following items in the headers on your programs
- O number – last 4 of student number
- Date – date program was completed
- Programmer – your name
- Control – machine you are running program on
- Operation – lab assignment number
- Stock – material you are using
- Material size – blank size
- Program zero – where your part zero is
- Feeds and speeds – CS / RPM and IPR / IPM

Homework

- None

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