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 can had large 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
- 0 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
Alpena Community College TAACCCT Grant

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