MT-491

Computer Numerical Control

Computer Integrated Manufacturing (CMM)

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**Introduction**

Computer Integrated Manufacturing (CIM) is the process by which manufacturing is done with the use of computer-controlled machinery and the computer codes that control the entire process of fabrication or production. While Computer Numerical Control is the automation of the manufacturing process. The automation of this process increases the speed and accuracy at which parts can be produced. In this project the machine used was a CNC Lathe is controlled by a computer that is the control unit that machines a part based upon typed codes which are uploaded to the machine. The design of the parts were done using drafting software, this could either be SolidWorks or MasterCAM. These software are used to create a computerized 3D or 2D drawing, which can then be used to guide the computer or programmer. However, instead of running the actual machine a virtual one was used to produce the finished part. The name of these software are Predator CNC Editor and Predator Virtual CNC. Predator CNC Editor was used to type the codes that is used to instruct the CNC on the dimensions and features of the part. While, Predator Virtual CNC is a virtual CNC that mimics the actual CNC machine, which in this case was the lathe. The codes used in the editor are called G-codes. These codes along with dimensions are used to instruct the machine to perform a specific task or function.

**Program #1 Outline**

1. Design a part made out of a 4" diameter, 6" long bar. Use AutoCAD or Mastercam for design purposes.
2. Part should have (5) five cylinders with different length and diameters.
3. Dimension the part.
4. Use thicker lines for part outline and thinner for dimensions
5. Use 3 tools to rough, finish, cut-off the part.
6. Leave +.02 on atl the surfaces for finishing.
7. Use:

* Sl 500 and F.008 for roughing; S2200 and F.004 for finishing:
* Sl 000 and F.006 for cut-off

1. Write a program named "project I "to machine the part you designed Note: "0" XZ is on the face of the part.
2. Type in the program and verify the motion by use of the simulator.
3. Document the project.
4. Save all information in a folder.

**Program #2 Outline**

1. Design a part made out of a 4" diameter, 7" long bar. Use AutoCAD or Mastercam for design purposes.
2. Part should have (2) cylinders and (3) angular surfaces (cones, chamfers) with different length and diameters positioned in different order.
3. Dimension the part.
4. Use thicker lines for part outline and thinner for dimensions
5. Use 3 tools to rough, finish, cut-off the part.
6. Leave +.02 on all the surfaces for finishing.
7. Use. Sl 200 and F.OI for roughing; S2000 and F.005 for finishing:

* S800 and F.007 for cut-off

1. Write a program named "project2"to machine the part YOU designed. Note: "0" is on the face of the part.
2. Type in the program and verify the motion by use of the simulator.
3. Document the project.
4. Save all information in a folder.

**Program #3 Outline**

1. Design a part made out of a 3" diameter, 6" long bar. Use AutoCAD or Mastercam for design purposes.
2. Part should have minimum (5) cylinders and (4) internal and/or external radial surfaces with different length and diameters.
3. Dimension the part.
4. Use thicker lines for part outline and thinner for dimensions
5. Use 3 tools to rough, finish, cut-off the part 125 wide).
6. Leave +.OI on all the surfaces for finishing.
7. Use Sl 400 and F.012 for roughing; and F.006 for finishing:

* S800 and F.005 for cut-off

1. Write a program named "PROJECT3" to machine the part you designed. Note: "0" XZ is on the face of the part.
2. Type in the program and verify the motion by use of the simulator.
3. Document the project.
4. Save all information in a folder.

**Program #4 Outline**

1. Design a part made out of a 4" diameter, 5" long bar. Use AutoCAD or Mastercam for design purposes.
2. Part should have minimum (5) cylinders (2) angular surfaces and (2) internal and/or external radial surfaces with different length and diameters.
3. Dimension the part.
4. Use thicker lines for part outline and thinner for dimensions
5. Keep chuck length to l "
6. Use 3 tools to rough, finish, cut-off the part
7. Leave +001 5 on all the surfaces for finishing.
8. Use, Sl 800 and F.OI O for roughing;

* S2000 and F.004 for finishing:
* Sl 000 and F.004 for cut-off

1. While Using G70, G71 and G75 cycles write a program named

"PROJECT4" to machine the part YOU designed. In roughing cycle depth of cut should be .1 50. Note: "0" is on the face of the part

1. Type in the program and verify the motion by use of the simulator.
2. Document the project.
3. Save all information in a folder.

**Program #5 Outline**

1. Design a part made out of a 3" diameter, 6" long bar. Use AutoCAD or Mastercam for design purposes.
2. Part should have minimum (4) .2 wide grooves, (2) minimum .5 wide grooves and a hole with (3) different diameters.
3. Dimension the part.
4. Use thicker lines for part outline and thinner for dimensions
5. Submit design for approval
6. Keep chuck length to l".
7. Create a table with tools and operations (similar to the one on the board) .
8. While using G74 and G75 cycles write a program named "PROJECT5" to machine the part YOU designed.
9. Type in the program and verify the motion by use of the simulator.
10. Document the project.
11. Save all information in a folder.

**Conclusion**

The designing and creation of each part was done with the aid of Computer Integrated Machinery (CIM) along with the use of software that automated the manufacturing process (virtual). This enabled me to learn how to efficiently use CIM and CNC to produce a part. Not only is this a valuable skill to learn to use in the field or on a job, but it was also fun.