

STATE OF NEW YORK
DEPARTMENT OF LABOR



APPENDIX A

MACHINIST (CNC)

D.O.T. CODE 600.280-022

O*NET CODE 51-4041.00

As Revised for Council of Industry

This training outline is a minimum standard for Work Processes and Related Instruction. Changes in technology and regulations may result in the need for additional on-the-job or classroom training.

WORK PROCESSES

	<u>Approximate Hours</u>
A. <u>Workplace and Machining Fundamentals</u>	2000
1. Health and Safety/Personal Protective Equipment (PPE)	
2. Lock-Out/Tag-Out	
3. Handling Hazardous Materials (if applicable)	
4. Shop practices	
5. Make machinist calculations	
6. Read engineering prints and drawings	
7. Benchwork	
8. Use saws	
9. Use drills	
10. Use grinders	
11. Use turning machines (e.g., lathes)	
12. Use milling machines	
B. <u>Principles of CNC Machining</u>	250
1. Principles of safety and shop practice	
2. Basic CNC language and function of the machine	
3. Nomenclature and controls of the machine	

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C. Operating CNC Mills/Lathes/Turning Mills/Grinders 1250
(minimum of CNC Mills/Lathes required)

1. Learn all functions of computer which controls axis moves, tool changes, settings, automatic modes, set-up elements, and coolant operation
2. Maintain maximum quality and production of finished pieces
3. Use computer control key board to load all tools in proper location according to set up instructions for part number being run
4. Insure all tools are of good quality and properly loaded as per manufacturing instructions
5. Check work against blue prints
6. Monitor tool wear
7. Understand various alarms and how to cancel them

D. Supervised Setup and Operation of Mills/Lathes/Turning Mills/Grinders 1500
(minimum of CNC Mills/Lathes required)

1. Make physical and programmable adjustments on drills, reamers, die heads, taps, and insert tools
2. Assemble all tools per tool sheet
3. Load CNC program
4. Assemble/install fixtures per setup documentation
5. Obtain tool offsets (pre-setter/part touch off, etc.)
6. Set Work Coordinate System (WCS) per setup sheet
7. Adjust programmed feeds and speeds
8. Grind and set boring bars, drill and tap holder, burnishing tools, slotting Saws, and mills
9. Perform advanced tool grinding using drill grinding attachments and use optical comparator to check work
10. Check work against blueprints
11. Perform general shop maintenance

E. Independent Setup and Operation of CNC Mills/Lathes/Turning Mills/Grinders 2000
(minimum of CNC Mills/Lathes required)

1. Gather materials, such as set-up sheets, part process sheets, blueprints, programs, attachments, etc.
2. Assemble all tools per tool sheet
3. Assemble/install fixtures per setup documentation
4. Obtain tool offsets (pre-setter/part touch off, etc.)
5. Set WCS per setup sheet
6. Adjust programmed feeds and speeds
7. Perform data changes to job programs, offsets, tool wear, tool geometry, and subroutines

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- 8. Monitor tool wear, remove, sharpen, and replace tools as required
- 9. Check work against blueprints
- 10. Perform general shop maintenance

H. Writing Basic Programs 1000

- 1. Understand and execute proper codes (300-400 hrs)
- 2. Introduction to CAM programming

Total hours 8,000

Apprenticeship work processes are applicable only to training curricula for apprentices in approved programs. Apprenticeship work processes have no impact on classification determinations under Article 8 or 9 of the Labor Law. For guidance regarding classification for purposes of Article 8 or 9 of the Labor Law, please refer to <http://www.labor.state.ny.us/workerprotection/publicwork/PDFs/Article8FAQS.pdf>.

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APPENDIX B
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RELATED INSTRUCTION

Safety

Personal protective equipment
Handling, storing, and disposing of job-related hazardous materials
Trade safety, including all applicable OSHA and EPA regulations, standards and rules
First Aid - minimum 6.5 hours every 3 years

Blueprint Reading and Drawing

Blueprint reading and mechanical drawing
Geometric Dimensioning and Tolerancing
Fundamentals of Computer-Aided Design (CAD) (optional)

Mathematics

Intermediate algebra
Geometry
Trigonometry
Applied statistics (optional)

Industrial and Labor Relations (20 hours)

History and Background (6 hours, first year)
Current Laws and Practices (14 hours, second year)

Sexual Harassment Prevention Training -minimum 3 hours

Trade Theory and Science

Practical Metallurgy (including plastic, ceramic, other materials)
Introduction to Machine Tools
Machining Processes
Dimensional Metrology (utilization of measuring devices)
Introduction to Computer Numerical Control (CNC)

Suggested Additional Topics

Physics
Statistical Process Control
Drill Point Geometry
Machine Design
Fixture Design
Welding
Heat Treatment
Sheet Metal Working
Keyboarding
CNC Programming
Familiarization with Computer Software (Word Processing, Data Base, Spreadsheet, Graphics)

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Written and Oral Communications
Team building
Problem solving
ISO 9000 qualifying systems

Other Related Courses as Necessary

A Minimum of 144 Hours of Related Instruction are Required for Each Apprentice for Each Year.

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