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 MACNY, The Manufacturers Association

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

		Approximate Hours
A.	Workplace and Machining Fundamentals	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.	Principles of CNC Machining	250

1. Principles of safety and shop practice
2. Basic CNC language and function of the machine
3. Nomenclature and controls of the machine

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

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

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

1. Make physical and progammable 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 (minimum of CNC Mills/Lathes required) 2000

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

F. 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.

APPENDIX B
MACHINIST (CNC)
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

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)

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.