

# MAINTENANCE MACHINIST (5 YEARS)

## APPENDIX A

O\*NET CODE 51-4041.00

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

	<b>Approximate Hours</b>
<b>A. Work Station and Tool Crib</b>	<b>400</b>
1. Keeping duty station clean and safe for work.	
2. Keeping tools, workbenches, manual equipment clean, maintained, safe for work.	
3. Learning names of raw materials.	
4. Learning names and uses of tools, holding devices, measuring devices.	
5. Accurately calibrating tools.	
<b>B Drills</b>	<b>700</b>
1. Following all safety procedures and policies.	
2. Job process planning.	
3. Layout.	
4. Learning sensitive, power, and radial drilling.	
5. Tapping, reaming, lapping, counterboring, countersinking.	
6. Grinding drills.	
7. Selecting proper speeds and feeds.	
8. Selecting and applying lubricants and coolants.	
9. Using quality instrumentation and processes.	
10. Operating drill press (optional*)	
<b>C. CNC Lathe</b>	<b>1100</b>
1. Following all safety procedures and policies.	
2. Job process planning.	
3. Layout.	
4. Programming.	

5. Selecting proper speeds and feeds.
6. Centering, facing, straight turning, shoulder turning, taper turning with taper attachment, threading, knurling, chuckwork (drilling, boring, reaming, finishing, chuck and face plate turning), steady rest and follower rest, offset tailstock and compound, bottoming, necking and recessing, filing, lapping, polishing, form turning, eccentric turning, tapping and spring winding, grinding lathe tools and centers.
7. Selecting and applying lubricants and coolants.
8. Using quality instrumentation and processes.
9. Care and cleaning of machine.

#### **D. CNC Milling Machine**

**1100**

1. Following all safety procedures and policies.
2. Job process planning.
3. Layout.
4. Programming.
5. Selecting proper speeds and feeds.
6. Selecting cutters.
7. Holding work by various methods (vise, clamps, dividing head, rotary table).
8. Tramming; indicating work holding.
9. Rough milling, plain or slab milling, surface milling.
10. Sawing, boring, flycutter milling, using slotting attachment and vertical head, keyway cutting, slotting, gang milling, form milling, tape and face milling, internal milling, radius cutting.
11. Spline milling, rack cutting, cutter milling, gear cutting, indexing.
12. Selecting and applying lubricants and coolants.
13. Using quality instrumentation and processes.
14. Care and cleaning of machine.

#### **E. Grinders**

**400**

1. Following all safety procedures and policies.
2. Job process planning.
3. Layout.
4. Selecting and inspecting grinding wheels.

5. Mounting wheels.
6. Holding work by various other methods.
7. Dressing wheels.
8. Grinding (for example: straight, surface, squaring, taper, face, angle, hole, cutter grinding, end mill grinding).
9. Using quality instrumentation and processes.
10. Care and cleaning of machine.

**F. Heat Treatment** **300**

1. Following all safety procedures and policies.
2. Learning kinds of steel.
3. S.A.E. classification.
4. Hardening, drawing, case and pack hardening, annealing.
5. Using pyrometer and color chart.
6. Hardness tests (Brinell and Rockwell).
7. Quenching baths.

**G. Bench Work** **900**

1. Following all safety procedures and policies.
2. Filing, scraping, chipping, using coated abrasives, deburring.
3. Lapping, tapping, threading, honing.
4. Dowel fitting.
5. Laying out and assembling.
6. Verifying dimensions and alignment using devices such as: gauge blocks, dial indicator, height gauge, thread gauge, pin gauge.
7. Using other quality instrumentation and processes.
8. Using proper lubricants and coolants.

**H. General Machinery Repair** **4200**

1. Following all safety procedures and policies.
2. Inspecting, adjusting, lubricating.
3. Diagnosing problems.
4. Use of vibration analysis equipment (if available).
5. Temperature monitoring.

6. Removing and replacing broken and worn parts of machines and machine tools.
7. Scraping bearings and ways.
8. Repairing or rebuilding machinery.
9. Welding in connection with the trade.
10. Cutting in connection with the trade (optional\*).
11. Brazing in connection with the trade (optional\*).

**I. Other Skills (optional\*)**

**900**

1. Following all safety procedures and policies.
2. Power sawing.
3. Sheet metal work associated with machinery repair:
  - a. job process planning
  - b. layout
  - c. shearing
  - d. punching
  - e. bending
4. Electrical repairs associated with machinery repair.

**Approximate Total Hours**

**10,000**

\*If optional components are not selected, the hours should be devoted to further mastery of the required work processes.

*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 <https://dol.ny.gov/public-work-and-prevailing-wage> .*

## **MAINTENANCE MACHINIST (5 YEARS)**

### **APPENDIX B**

#### **RELATED INSTRUCTION**

##### **Safety and Health**

1. General Safety Practices
2. Proper Use of Personal Protective Equipment (PPE)
3. Right-to-Know/MSDS
4. Proper Lifting Techniques
5. Blood-Borne Pathogens
6. First Aid – minimum 6.5 hours every 3 years

##### **Blueprints**

1. Basic Machine Blueprint Reading and Sketching
2. Advanced Machine Blueprint Reading and Sketching
3. Installation Blueprint Reading and Sketching
4. Using CAD/CAM Software (if used on-the-job)

##### **Mathematics**

1. Fundamentals
2. Elementary Trade Math (including algebra and geometry)
3. Advanced Trade Math (including trigonometry)
4. Precision Measurement
5. Using Handbooks, Tables, Etc.

##### **Trade Theory and Science**

1. Physics or Basic Mechanics
2. Materials of the Trade
3. Metallurgy
4. Trade Terminology
5. Tools, Machines, Equipment: Care, Maintenance, Operation
6. Cutting Tools
7. Operation and Programming of CNC Machine Tools
8. Using Machinist Software (if used on-the-job)
9. Abrasives

- 10. Heat Treatment
- 11. Welding
- 12. Machinery Maintenance
- 13. Diagnostics/Troubleshooting
- 14. Quality Assurance

**Other Workplace Skills**

- 1. Sexual Harassment Prevention Training – must comply with section 201-g of the Labor Law

**Other Related Courses as Necessary**

A minimum of 144 hours of Related Instruction is required for each apprentice for each year.

Appendix B topics are approved by New York State Education Department.