STATE OF NEW YORK
DEPARTMENT OF LABOR

APPENDIX A

MACHINE REPAIRER
D.O.T. CODE 600.280-042

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.	Tools and Equipment	400
	1. Familiarization with names and uses of industrial tools and equipment. Safe use and care of all tools and equipment.	
	2. Familiarization with names and uses of precision measuring instruments. Safe use and care of all measuring instruments.	
	3. Familiarization with names and uses of jigs and fixtures. Safe use and care of jigs and fixtures.	
	4. Safe use and care of ladders, scaffolding and rigging.	
	5. Lift truck operation.	
B.	Materials	50
	1. Familiariztion with names of properties, raw materials, and metals.	
	2. Selecting appropriate materials for various applications.	
	3. Oils, greases, coolants, belts, hoses and bearings.	
C.	Lathe	800
	1. Safe operating practices, personal protective equipment and environmental procedures.	
	2. Centering, facing, straight turning, shoulder turning, taper turning, threading, knurling, chuckwork (drilling, boring, reaming, finishing, chuck and face plate turning), steady rest and follow rest, offset tailstock and compound recessing, filing, lapping, polishing, form turning, tapping, tools and centers.	

Approximate Hours

C. Lathe – Continued
   3. Selecting proper speeds and feeds.
   4. Selecting and applying lubricants and coolants.
   5. Care and cleaning of machine.

D. Milling Machine — 800
   1. Safe operating practices, personal protection equipment and environmental procedures.
   2. Selecting cutters.
   3. Work holding devices by various methods (vice, clamps, dividing head, circular table).
   4. Rough milling, plain or slab milling, surface milling.
   5. Sawing, boring, flycutter milling, using slotting attachment and vertical head, keyway cutting, slotting, gant milling, form milling, taper and face milling, internal milling, radius cutting.
   6. Milling to irregular laid cut line.
   7. Selecting proper speeds and feeds.
   8. Selecting and applying lubricants and collants.
   9. Care and cleaning of machine.

E. Grinders — 800
   1. Safe operating practices, personal protection equipment and environmental procedures.
   2. Selecting, mounting, dressing wheels, and balancing.
   3. Setting up attachments.
   4. Setting up for clearance and cutting angles.
   5. Holding work by various methods.
   6. Selecting proper speeds and feeds.
   7. Plain for surface grinding, angle grinding, form grinding, dovetail grinding.
   8. Straight, taper, angle, face, form and tool grinding.
   9. Care and cleaning of machines.
   10. I.D. and O.D. grinding.

F. Shaper and Planer — 300
   1. Safety.
   2. Holding work by various methods: vice, clamps, dividing head.
   3. Selecting proper speeds and feeds.
   4. Surface and angle cutting, keyway/cutting, squaring, dovetailing.
   5. Grinding cutting tools.

Machine Repairer – Continued — Approximate Hours

G. Other Machine Tools — 500

Setting up and safely operating one or more of the following:

1. Borer
2. Boring Mill
3. Drill Press, Sensitive, Radial
4. Power Saw, Cut Off and Bandsaw

H. NC and CNC Machines — 550

1. Setting up
2. Safely operating
3. Programming
   a. Basic machine functions
   b. M Codes and G Codes
   c. Fanuc controls

I. Benchwork — 1000

1. Safety
2. Interpreting blueprints, sketches, specifications.
3. Planning sequence of operations.
4. Measuring, marking and scribing stock.
5. Filing, using abrasive cloths, deburring.
6. Scraping and chipping.
7. Lapping, tapping, threading.
8. Assembling parts.
9. Verifying dimensions and alignment using instruments such as micrometer, height gauge and gauge blicks.
10. Selecting and applying lubricants.
11. Inspecting parts and assemblies.

J. Machine Maintenance Repair and Servicing — 2000

1. Knowledge of machine and equipment operating systems.
2. Lubrication.
3. Preventive maintenance.
4. Inspecting machinery, diagnosing problems or malfunctions.
5. Scraping bearings, ball screws, thrust bearings and ways.
6. Disassembling machinery.
7. Repairing or replacing defective parts including such items as electrical boxes, airlines, or hydraulic lines and fittings.
8. Installing new or repaired parts.

Machine Repairer – Continued — Approximate Hours

J. Machine Maintenance Repair and Servicing – Continued
   9. Reassembling machinery.
   10. Making adjustments as needed.
   11. Lift truck maintenance, electrical and gas models, HVAC, air compressors.
   12. Cabinet cooling for electronics.

K. Welding and Brazing — 200
   1. Safety, including use of protective clothing and equipment.
   2. Welding, gas, electric, arc, resistance.
   3. Brazing and soldering.

L. Heat Treatment (optional)* — 150
   1. Safety
   2. Learning kinds of steel, SAE classification.
   3. Hardening, drawing, use and pack hardening, annealing.
   4. Using pyrometer and color chart.
   5. Performing hardness tests (Brinnel & Rockwell)
   6. Doing quenching baths.

M. Machine Design — 450
   1. Construction and operation of various pneumatic and hydraulic actuators, e.g., linear, rotary, etc.
   2. Fundamentals of machining tool design.
      a. Cutting machines
      b. Forming machines
      c. Special processes, laser, EDM, etc.
   3. Control systems and applications
      a. Manual
      b. CNC
   4. Design life cycles
      a. Tooling
      b. Peripherial equipment
         (1) Tool chargers, transfer mechanisms, robotics (servo/nonservo)

Total Hours 8000

*If optional, Work Processes are not selected, the hours should be devoted to further mastery of 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 http://www.labor.state.ny.us/workerprotection/publicwork/PDFs/Article8FAQS.pdf.

APPENDIX B
MACHINE REPAIRER
RELATED INSTRUCTION

Safety
- Including the following:
  - Use of Personal Protective Equipment
  - Fall Protection
  - Use, Storage and Disposal of Hazardous Materials
  - All Applicable OSHA and EPA Regulations, Standards and Rules
  - First Aid and CPR (6.5 hours every 3 years)
  - Equipment Safe Operating Practices

Blueprint Reading and Drawing
- Fundamentals of Blueprint Reading and Drawing
- Orthgraphic, Isometric
- Advanced Blueprint Reading and Drawing

Mathematics
- Fundamentals
- Applications to the Trade
- Precision Measurement
- Using Handbooks, Tables, Etc.
- Estimating Materials and Costs (optional)

Trade Theory and Science
- Materials of the Trade
- Practical Metallurgy
- Physics
- Machine Shop Processes – Basic and Advanced
- Layout
- Introduction to Computers, CNC Programming
- Numerical Control Programming (if Work Process H-3 is selected)
- Hydraulics
- Electrical Controls and Basic Electronics
- Pneumatics
- Machine Design
- Welding, Soldering, Brazing

Industrial and Labor Relations (20 hours minimum)

Lock Out/Tag Out Safety

Fire Prevention Safety

Sexual Harassment Prevention Training (3 hours minimum)

144 hours of Related Instruction are required for each Apprentice for each year.