INDUSTRIAL MACHINERY MECHANIC

APPENDIX A

O*NET 49-9041.00

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

Approximate Hours

A. Tools and Equipment **150**

1. Familiarization with names and uses of industrial tools and equipment used for machinery repair. Safe use and care of all such tools and equipment.
2. Familiarization with names and uses of precision measuring instruments used in the trade. Safe use and care of all such instruments.
3. Familiarization with names and uses of jigs and fixtures. Safe use and care of same.
4. Safe use and care of ladders, scaffolding and rigging.
5. Lift truck operation.

B. Materials **150**

1. Familiarization with names and properties of raw materials and metals.
2. Selecting appropriate materials for various applications.
3. Familiarization with various oils, greases, coolants, belts, hoses, and bearings.

C. Lathe **100**

1. Demonstrating knowledge of safe operating practices, use of personal protective equipment, environmental procedures.
2. Performing basic operations needed for maintenance and repair of industrial machinery/equipment.
3. Selecting proper speeds and feeds.
4. Selecting and applying lubricants and coolants.
5. Care and cleaning of lathe.

D. Milling Machine **100**

1. Demonstrating knowledge of safe operating practices, use of personal protective equipment, environmental procedures.
2. Selecting cutters.
3. Using various devices to hold workpieces.
4. Performing basic operations needed for maintenance and repair of industrial machinery/equipment.
5. Selecting proper speeds and feeds.
6. Selecting and applying lubricants and coolants.
7. Care and cleaning of milling machine.

E. Grinders **100**

1. Demonstrating knowledge of safe operating practices, use of personal protective equipment, environmental procedures.
2. Selecting, mounting, dressing wheels. 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. Performing basic operations needed for maintenance and repair of industrial machinery/equipment.
8. Care and cleaning of grinders.

F. Other Machine Tools **100**

1. Setting up, and safely operating, one or more of the following:
    a. borer
    b. boring mill
    c. drill press, sensitive, radial
    d. power saw, cutoff saw, and bandsaw

G. Basic Operation of Industrial Production Machinery/Equipment **300**

1. Following all safety practices and procedures.
2. Learning to run production machinery/equipment to get a basic understanding of how it works.
3. Demonstrating basic machine knowledge.

H. NC and CNC Machines **300**

1. Setting up
2. Safely operating
3. Programming
   a. basic machine functions
   b. M codes and G codes
   c. Fanuc *(brand name or generic?)* controls

I. Benchwork **200**

1. Following all safety procedures and practices.
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 blocks.
10. Selecting and applying lubricants.
11. Inspecting parts and assemblies.

J. Machine Maintenance, Repair and Troubleshooting **3,600**

1. Demonstrating knowledge of machine and equipment operating systems.
2. Performing preventive maintenance.
3. Observing and testing machinery, diagnosing problems or malfunctions; analyzing test results, machine error messages, and information obtained from operators.
4. Scraping bearings, ball screws, thrust bearings and ways.
5. Disassembling machinery.
6. Repairing or replacing defective parts, including such items as electrical boxes, air lines, or hydraulic lines and fittings.
7. Installing new or repaired parts.
8. Reassembling machinery.
9. Making adjustments as needed.

10. Maintaining lift trucks (electrical and gas), HVAC, air compressors.
11. Maintaining cabinet cooling for electronics.
12. Recording repairs and maintenance performed, using computer-based system.

K. Welding and Brazing **300**

1. Following all safety procedures and practices, including use of personal protective equipment.
2. Welding as it applies to the trade: gas, electric, arc, resistance.
3. Brazing and soldering as applied to the trade.

L. Tool Design and Operation **100**

M. Machine Installation, Layout, and Design **700**

1. Laying out machinery/equipment locations and hook-ups within the plant.
2. Installing machinery/equipment.
3. Constructing and operating various pneumatic and hydraulic actuators – e.g., linear, rotary, etc.
4. Demonstrating an understanding of the fundamentals of machining tool design:
   a. cutting machines
   b. forming machines
   c. special processes (laser, EDM, etc.)
5. Demonstrating an understanding of control systems and applications:
   a. manual
   b. CNC
6. Demonstrating an understanding of design life cycles:
   a. tooling
   b. peripheral equipment (such as tool changers, transfer mechanisms, robotics –servo/nonservo)

N. Drive Systems, Gearboxes, Transmissions **400**

1. Maintaining
2. Repairing
3. Troubleshooting

O. Electrical Systems That Operate Machinery/Equipment **300**

1. Maintaining
2. Repairing
3. Troubleshooting

P. Hydraulic and Pneumatic Systems **400**

1. Maintaining
2. Repairing
3. Troubleshooting

Q. Pumps and Valves **400**

1. Maintaining
2. Repairing/rebuilding
3. Troubleshooting

R. Fabrication of Steel and Sheet Metal Parts **300**

1. Following all safety procedures and policies.
2. Performing basic operations on fabricating machines to cut, bend, straighten stock
3. Shaping and finishing parts

Approximate 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 https://dol.ny.gov/public-work-and-prevailing-wage

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APPENDIX B

RELATED INSTRUCTION

Safety

Including the Following:

1. Use of Personal Protective Equipment
2. Fall Protection
3. Use, Storage and Disposal of Hazardous Materials
4. All Applicable OSHA and EPA Regulations, Standards and Rules
5. Lock Out / Tag Out
6. First Aid – minimum 6.5 hours every 3 years
7. Working Safely Around Machinery/Production Equipment
8. Sexual Harassment Prevention Training – must comply with section 201-g of the Labor Law

Blueprint Reading and Sketching

1. Fundamentals of Machine Blueprint Reading and Sketching
2. Reading Specifications and Work Orders
3. Reading Machinery/Equipment Manuals

Mathematics

1. Fundamentals
2. Applications to the Trade
3. Precision Measurement
4. Use of Handbooks, Tables, Etc.
5. Estimating Materials and Costs (optional)

Trade Theory and Science

1. Materials of the Trade
2. Tools, Machines, Equipment: Safe Care and Use
3. Trade Terminology
4. Basic Machine Design
5. Fundamentals of Machine Shop Processes

6. Layout
7. Introduction to Computers Used in Production Machinery/Equipment
8. Basic Manual and/or NC and/or CNC Programming
9. Fundamentals of Electricity and Electronics
10. Fundamentals of Hydraulics
11. Fundamentals of Pneumatics
12. Controls
13. Drive Systems
14. Gear Boxes
15. Transmissions
16. Pumps and Valves
17. Welding, Soldering, Brazing
18. Metal Fabrication

Other Related Courses As Needed

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.