



APPENDIX A

MACHINE BUILDER D.O.T. CODE 600.281-022 O*NET CODE 51-2031.00

This training outline is the current standard for Work Processes and Related Instruction. Changes in technology, regulations, and safety/health issues may result in the need for additional on-the-job or classroom learning.

WORK PROCESSES

	<u>Approximate Hours</u>
A. <u>Boring Mill, Horizontal</u>	350
1. Following all safety procedures and policies	
2. Setting up work, using jigs, fixtures, vee blocks, bolts, straps, jacks, etc.	
3. Rough boring, relief boring, deep boring, internal recessing, end bar boring, boring to shoulders, drilling, tapping, reaming, spotfacing, counterboring, chamfering, grooving, grinding tools	
4. Adjusting feeds and speeds	
5. Using numerically controlled hobs (if applicable)	
6. Lubricating	
7. NC programming (if applicable)	
8. CNC programming (if applicable)	
B. <u>Lathe</u>	350
1. Following all safety procedures and policies	
2. Using faceplate, different types of chucks, mandrels, steady rests, follow rests, taper attachments, compound and offset tailstock	

3. Centering, straight turning, taper turning, facing, drilling, boring, reaming, necking, recessing, filing, lapping, tapping, polishing, thread cutting, knurling, form turning, eccentric turning, setting and grinding of tools
 4. Adjusting feeds and speeds
 5. Lubricating
 6. NC programming (if applicable)
 7. CNC programming (if applicable)
- C. Radial and Sensitive Drills 170
1. Following all safety procedures and policies
 2. Laying out holes, setting up work using straps, clamps, jigs and fixtures. Using leveling gauges
 3. Drilling, reaming, tapping, boring, spotfacing,
 4. Using templates, grinding tools, setting tools
 5. Lubricating
 6. NC programming (if applicable)
 7. CNC programming (if applicable)
- D. Milling Machine 210
1. Following all safety procedures and policies
 2. Keyway milling, spline milling, horizontal milling, vertical milling, planing
 3. Using fixtures, jigs, knees, and dividing head
 4. Using turntable; boring, reaming and drilling
 5. Milling splines, racks, squares, hexagons, spur gears, graduations, tee slots
 6. Adjusting feeds and speeds
 7. Lubricating
 8. NC programming (if applicable)
 9. CNC programming (if applicable)
- E. Grinders 210
1. Following all safety procedures and policies
 2. Operating internal, external, rotary and surface grinders
 3. Using magnetic chuck
 4. Loading and blocking work on the table
 5. Plain grinding, plunge, face and shoulder grinding, grinding bars, taper grinding, using taper bushings,

2. Using straight edges, parallels and surface plates to check surfaces and alignments
3. Using air drill and portable magnetic base drill to drill and ream as jobs require
4. Using tap wrenches and taps to thread holes
5. Learning difference of pipe taps, straight taps, coarse and fine threads and their applications
6. Using scales, squares, micrometers, vernier caliper and indicators
7. Correctly using basic mechanic's tools such as: hammer, hack saw, box and open end wrenches, scraper, files of various shapes and styles, tap wrenches, socket wrenches and torque wrenches

K. Sub-Assembly

1300

1. Inspecting and testing parts and accessories
2. Positioning and aligning components, manually or using hoists
3. Fitting brackets and gears on shafts; different types of fit required in assembly of gear boxes.
4. Fitting brackets in line boxes and spindles
5. Fitting keys and keyways, dowel pins, bronze bushings in sub-assemblies
6. Riveting to fasten parts together
7. Using proper techniques for the assembly, pre-loading with checking of bearings, and exercising proper care when working with bearings
8. Inspecting and testing sub-assembly units after completion

L. Basic and Electric Hydraulics

490

1. Bending tubing with assembly bending tools
2. Using correct procedure for fastening fittings on tubing
3. Identifying hydraulic pumps and valves using schematic drawings
4. Learning operation of hydraulic systems; troubleshooting problems

M.	<u>Welding</u>	210
	<ol style="list-style-type: none"> 1. Performing basic welding techniques on various steels 2. Knowing the different uses for various metals, such as: iron, steel, brass, bronze, aluminum, copper, etc. 	
N.	<u>Assembly Measurements</u>	210
	<ol style="list-style-type: none"> 1. Accurately using measuring devices, such as: electronic level, electric wire micrometer, spirit level, indicators, optical equipment, laser interferometer 	
O.	<u>Final Assembly and Testing</u>	2100
	<ol style="list-style-type: none"> 1. Performing final mechanical assembly operation on each category of machine manufactured by sponsor 2. Performing final electrical assembly operation on each category of machine manufactured by sponsor 3. Assisting in test running of machines; trouble-shooting 4. Installing machines in customers' places of operation (if applicable) 	
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

MACHINE BUILDER

RELATED INSTRUCTION

Safety and Health

OSHA 10-hour Safety Course for General Industry, or General Shop Safety
Proper Use of Personal Protective Equipment (PPE)
Machine Safety
Right-to-Know/Material Safety Data Sheets (MSDS)
Proper Lifting Techniques
First Aid – minimum 6.5 hours every 3 years

Blueprint Reading and Drawing

Reading and Interpreting Blueprints, Schematics, Drawings
Trade Drafting, including: scales, dimensioning, types of lines, types of drawings, tolerances, common abbreviations and symbols, blueprint format, electrical schematics

Mathematics

Metrics
Use of Calculator
Use of Machinist's Handbook and Machinery Handbook
Arithmetic
Plane Geometry for the Trade
Trigonometry for the Trade
Precision Measurement

Trade Theory and Science

Tools and Equipment: Proper Care and Use
Materials of the Trade and Their Characteristics
Fundamentals of Metallurgy
Strength of Materials
Trade Terminology
Machine Tools and Other Machines: Proper Care and Operation
Fundamentals of Mechanics
Fundamentals of Hydraulics
Basic Electrical Circuits
Production Control, including: materials, personnel, records, flow charts, shipping schedules

Engineering, including: design, operation, materials, manufacturing methods,
industrial standards, fabrication, transportation
Heat Treating (if applicable)
Testing: Destructive and Non-Destructive
Rigging, Signaling, Hoisting
Welding for the Trade
Layout: Rough, Semi-Precision, Precision
Millwright Principles, including: foundations, heavy equipment moving,
anchoring, setting, electrical hookup, machinery installation codes
(if applicable)

Other Workplace Skills

Oral Communication Skills
Customer Relations
Team Building Skills
Engineering and Manufacturing Economics
Time Management (optional)

Sexual Harassment Prevention Training – minimum 3 hours

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

