

Metal Trades

<p>___ Machinist 600.280.022</p> <p>___ Model Maker 600.260.018</p> <p>___ Tool & Die Maker 601.280.046</p> <p>___ Die Maker 601.381.014</p> <p>___ Toolmaker 601.280.042</p> <p>___ Die Sinker 601.280.022</p> <p>___ Toolmaker (<i>Bench</i>) 601.281.026</p>	<p>___ Pattern Maker 600.280.050</p> <p>___ Carbide Toolmaker 601.380.042</p> <p>___ Mold Maker (<i>Plastic</i>) 601.280.030</p> <p>___ Maintenance Machinist 600.280.042</p> <p>___ Experimental Machinist 600.280.038</p> <p>___ Gage Maker 601.281.010</p> <p>___ Die Maker (<i>Four-Slide</i>) 601.281.010</p>
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Alternate Trade: Machinist (CNC), Hours: 6000, D.O.T. Number: 600.380.018
 (all code numbers are 4th Edition)

WORK SCHEDULE

The following schedule of work experience is intended as a guide. It need not be followed in any particular sequence, and it is understood that some adjustments may be necessary in the hours allotted for different work experience. In all cases, the apprentice is to receive sufficient experience to become fully competent and use good workmanship in all work processes which are a part of the trade. The apprentice will be fully instructed in safety and OSHA requirements.

The Machinery Hand Book will be considered the approved reference publication to be used in conjunction with all facets.

SUMMARY

		Hours	Alternate
A	Orientation	200	200
B	Lathes	1000	600
C	Milling machines	1000	1000
D	Grinding	1000	500
E	Sawing Cutoff	100	100
F	Drills	600	368
G	Metal Processing	400	300
H	Bench Assembly	1000	500
I	Trade Specialty	2100	2000
J	Related Training	600	432
TOTAL		8000	6000

- A. ORIENTATION - 200 Hours
 - 1. Safety procedures and housekeeping.
 - 2. Machine identification and functions.
 - 3. Tool Crib - familiarization and care of measuring tools and accessory tooling.
 - 4. Lubrication and general maintenance of machines, proper use of coolant.
 - 5. Layout procedures - measure, mark and scribe - determine sequence of job operations.

- B. LATHES - 1,000 Hours / *Machinist (CNC)* 600 Hours
 - 1. Safety.
 - 2. Lubrication.
 - 3. Use of collets, chucks, & tool post holder.
 - 4. Drilling, reaming and cutting off in chuck or collet with use of cut-off tool.
 - 5. Die threading and tapping.
 - 6. Mandrel and arbor work - turning on centers.
 - 7. Setting up for four-jaw chuck work.
 - 8. Face plate set-up - boring and turning methods.
 - 9. Use of taper attachment, compound and tailstock.
 - 10. Eccentric and offset work.
 - 11. External and internal threading techniques.
 - 12. Use of steady rest.
 - 13. Special lathes - numerical control, tracer and turret.
 - 14. Use of tool post grinder.
 - 15. Grinding, sharpening, and geometry of high-speed & carbide tooling.

- C. MILLING MACHINES, HORIZONTAL AND VERTICAL - 1000 Hours
 - 1. Safety.
 - 2. Lubrication.
 - 3. Plain milling, vise work - use of indicator.
 - 4. Plain milling, table work - manual & automatic (*speeds & feeds*).
 - 5. Angle milling (*Use of sine bar*).
 - 6. Index & dividing head work.
 - 7. Milling table - locating holes, use of optical systems.
 - 8. Form work.
 - 9. Special milling.
 - 10. Numeric control milling.
 - 11. Drilling, reaming, boring - use of and knowledge of high-speed and carbide tools.

- D. GRINDING - 1000 Hours / *Machinist (CNC)* 500 Hours
1. Safety.
 2. Lubrication & coolant.
 3. Cylindrical Grinding - OD & ID, and plunge form.
 4. Face plate, centers, chuck, collet, four-jaw chuck, and magnetic chuck.
 5. Surface grinding - use of optical devices; angle iron, V blocks, etc.
 6. Form grinding (*Cylindrical & Surface*).
 7. Cutter grinding (*plain & spiral*).
 8. Sharpening of tool bits - manual grinding.
 9. Use of shadow graph, optical systems, air gages, etc.
 10. Wheel dressing - proper use & care of industrial diamonds and wheel dressers.
 11. Grinding wheels - proper wheel selection - grades & grists - identification per manufacturer's code.
 12. Diamond wheels - care of and balancing.
 13. Lapping, honing, and polishing techniques (*micro techniques*).
- E. SAWING & CUT OFF - 100 Hours
1. Safety.
 2. Lubrication & Coolant.
 3. Band saw use, contour sawing, machine filling, blade welding & changing.
 4. Hack saw use - automatic & hand.
 5. Rubber wheel cut off.
- F. DRILLS - RADIAL, UPRIGHT MODEL AND BENCH - 600 Hours / *Machinist (CNC)* 368 Hours
1. Safety.
 2. Lubrication.
 3. Methods of setting up - use of vise, straps, angle irons, and V Blocks.
 4. Hand & jig drilling, reaming, tapping, counter sink, counter boring, lapping, and honing.
 5. Sharpening of drills - modification of drills for use on special materials.
- G. METAL PROCESSING - 400 Hours / *Machinist (CNC)* 300 Hours
1. Familiarization with different types of alloys & exotic materials.
 2. Basic heat treating techniques and theory.
 3. Electrical chemical milling or electrical discharge machines (*EDM*) or equivalent machine operation.
- H. BENCH ASSEMBLY - 1,000 Hours / *Machinist (CNC)* 500 Hours
1. Safety
 2. Prepare, inspect, and assemble all mechanical parts under supervision of qualified journey person.
 3. Hand filing and fitting.

4. Theory and actual practice of brazing, welding, as well as silver and lead soldering.

Work schedule as outlined to this point will give apprentice sufficient background to enter any one of various branches of metal trades.

- I. TRADE SPECIALTY - 2,100 Hours / *Machinist (CNC)* 2,000 Hours
The final 2,100, (2,000) hours of apprenticeship will be work specialization in repairing, fabricating, or maintenance of machines, tooling, gages, fixtures, dies, models, molds, *etc. as required for the trade objective. All work processes will be under close supervision of a qualified journey person.
*CNC set up operations (*programming optional*)
- J. RELATED TRAINING - 600 Hours / *Machinist (CNC)* 432 Hours
Trade theory will require completion of 16 units of instruction at a facility approved for purposes.

TOTAL - 8000 Hours / *Machinist (CNC)* - 6000 Hours

WAGE SCHEDULE

0 - 1000	Hours	_____
1001 - 2000	Hours	_____
2001 - 3000	Hours	_____
3001 - 4000	Hours	_____
4001 - 5000	Hours	_____
5001 - 6000	Hours	_____
6001 - 7000	Hours	_____
7001 - 8000	Hours	_____
Journeyman Rate		_____