

WAGE GRADE CAREER PATH

WG 3416

Toolmaking

This occupation covers nonsupervisory work involved in the fabrication, manufacture, calibration, reconditioning, and repair of machine tools, jigs, fixtures, dies, punches, and gages used in the manufacture, overhaul, and repair of equipment.

Part 1 Journeyman

- 1 Continue required on-the-job and formal classroom training required in Civilian Training Plan
- 2 Complete task qualifications for current position
- 3 Complete task certifications for current position
- 5 Master common to complex work tasks. Grade 11 toolmakers must apply a comprehensive knowledge of and be skilled in using a variety of machine shop practices and techniques. Workers at this level must be skilled in planning and laying out work from blueprints, sketches, or other work specifications; applying advanced shop mathematics and handbook formulas to compute dimensions and plan and layout work; setting up and operating all conventional machine tools and attachments; selecting proper tools and machine operations to be used; and performing necessary handwork such as filing, scraping, grinding, and lapping to finish and assemble items. They must have a knowledge of standard cutting tools such as drills, reamers, taps, different kinds of milling cutters, form tools, and various carbide tools; the proper clearance and relief angles required on such tools based on the material to be machined; and the type of grit and bond, and size of grinding wheels needed to form and sharpen such tools.

Grade 11 toolmakers must have a knowledge of the construction of standard types of jigs and fixtures and their uses in the machine shop. They must be sufficiently familiar with punches and dies and their principles of operation to enable him to fabricate and assemble such types as are used for straight punching, forming, and blanking operations. They must have sufficient knowledge of commonly used plug, ring, snap, and caliper gages and their critical dimensions to enable them to fabricate these less complex types of gages to close tolerances. Grade 11 toolmakers must be familiar with and capable of using numerous types of measuring devices such as vernier calipers, height gages, squares, protractors, inside, outside, and depth micrometers, surface gages, vee blocks, parallels, space blocks, dial indicators, and optical and mechanical comparators to attain accurate dimensions and close tolerances. They must be familiar with hardening and annealing processes and their effect on the machinability of metals, and the dimensional allowances necessary to accommodate these processes.
- 6 Master common to complex work tasks. At Grade 13 Toolmakers apply a comprehensive knowledge of a wide variety of machine shop procedures and techniques and shop mathematics, as well as a high degree of skilled workmanship, in planning, laying out, machining, assembling, and hand fitting and finishing work to precise dimensions and close tolerances. They must have a knowledge of the physical properties of numerous metals, metal alloys, plastics, rubber, and other materials in order to determine their adaptability to the specifications required of the item to be made. They must have an intimate knowledge of and the ability to read and interpret complex multiview mechanical drawings and sketches, or the ability to develop and prepare their own sketches from oral or written instructions, to enable them to calculate and work to precise dimensions and very close tolerances, make detailed and exact work layouts, and accomplish complex machine setups.

Grade 13 toolmakers must have a working knowledge of and be able to use all precision measuring instruments common to the trade including vernier calipers, height gages, optical and electrical comparators, dial indicators, Johanssen and similar gage blocks, and various types of micrometers and supermicrometers. Similarly, they must use other types of measuring devices such as scales, dividers, surface gages, sine bars, protractors, steel squares, optical flats, and straight edges. They must be able to adapt and set up common machine tools to perform special and precise machining operations by devising and constructing their own fixtures and holding devices.

Grade 13 toolmakers must also be skilled in the setup and operation of specialized and precision machines such as jig borers, jig grinders, internal and external thread grinders, and various types of electrical discharge machines to manufacture, overhaul, and repair tools, dies, jigs, fixtures, molds and gages. Using precision measuring instruments and various fixtures and holding devices that they must often contrive, Grade 13 toolmakers must be able to check the accuracy of existing tools, jigs, fixtures, and gages; and fabricate, repair, modify and calibrate precision measuring instruments used in the machine shops such as vernier gages, various types of micrometers, plug and ring gages, snap gages, space blocks, and dial indicators.

Grade 13 toolmakers must be familiar with the effect of hardening, annealing and stress relieving on metals and metal alloys in order to choose the proper materials for specific items to be made and make dimensional allowances for these processes. They must have a thorough knowledge of grit-type, grit-size, and various bonds used in grinding wheels and, based on this knowledge, select a wheel of the proper grit, bond, and diameter, and compute the correct surface speed to be used in accordance with the material to be ground, edge or radius to be held, or other critical factors. Grade 13 toolmakers must have and maintain a knowledge of machine shop practices and processes, and keep abreast of technological changes as they occur and affect manufacturing procedures.
- 7 Provide production support services
- 8 Maintain successful to above average performance ratings

Part 2 Work Leader

- 1 Continue required Journeyman level on-the-job and formal classroom training required in Civilian Training Plan
- 2 Master ability to teach others
- 3 Master ability to inspect others

Part 3 Supervisors

- 1 Continue required Journeyman level on-the-job and formal classroom training required in Civilian Training Plan
- 2 Master ability to supervise groups of workers (one subordinate supervisor)
- 3 Master ability to supervise groups of workers (two or more levels of subordinate supervisors)

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