



United States
Office of Personnel Management

**FWS Job Grading Standard
for
Metal Forming Machine Operator**

3869

TS-50, 11/85

**Workforce Compensation and Performance Service
Classification Programs Division
June 1998, HRCD-5**

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COVERAGE OF STANDARD

This standard covers nonsupervisory work involved in setting up, adjusting, and operating metal forming machines such as sheet metal rolls, brakes, shears, hydraulic or mechanical presses, band saws, blanking presses, punch presses, cut-off saws, flank machines, combination beading machines, planishing machines, shrinking machines, nibblers, power riveters, turret punches, metal stitching machine, drop hammers, and rivet making machines that cut, punch, stamp, draw, shape, and roll cold metal sheets, strips, or wire into desired shapes or contours. The work includes removing and installing dies, punches, and other accessories; aligning the mating parts, allowing for clearances; replacing worn or damaged parts; feeding the sheet metal into the machines; and manipulating the controls to perform the operations required to form sheet metal parts such as for the skin and frame of aircraft, and proof and finished coins, through extrusion and/or other methods.

WORK NOT COVERED

This standard does not cover work that primarily involves:

- Fabricating and repairing various types of ferrous, ferrous-alloy, and nonferrous metal tools, parts and structural plates by maneuvering hot metal work pieces on the anvil and striking them repeatedly with hand or power hammers (i.e., forging) and other methods such as hardening, tempering, stress relieving, annealing. (See [Job Grading Standard for Metal Forger, 3802.](#));
- Visually examining finished coins and medals for finish, appearance, discoloration, missing letters, etc. (See [Coin/Currency, Checking Series, 3513.](#));
- Modifying, repairing, assembling, and installing sheet metal parts, items, and assemblies. (See [Job Grading Standard for Sheet Metal Mechanic, 3806](#), and [Notes to Users.](#));
- Operating machine and handtools such as lathes, annealing equipment, knuckle action or hydraulic presses, crank type and drill presses, sandblasting machines, buffing and polishing lathes, and spray guns to produce official gold, silver, and bronze medals, badges, decorations, and insignia. (See [Medal Making Series, 3832.](#)); and
- Making bench, floor, or sweep molds for producing foundry castings. (See [Molding Series, 4373.](#)).

TITLES

Jobs covered by this standard are to be titled *Metal Forming Machine Operator*.

GRADE LEVELS

This standard describes three levels of nonsupervisory metal forming machine operating and die setting work (grades 6, 8, and 10). Depending on the nature of the work performed, grade 6, grade 8, or grade 10 may represent the highest nonsupervisory level or full performance level of metal forming machine operating and die setting work found at a particular work facility.

This standard does not describe all possible grades at which jobs may be established in this occupation, or in any way limit the authority of agencies to assign work or particular duties to positions. If jobs differ substantially from the levels of skill, knowledge, and other work requirements of the grades described in this standard, they may warrant grading either above or below these grades, based on the application of sound job grading principles.

NOTES TO USERS

Die Setting

Die setting, which is primarily the installation and alignment of dies in appropriate presses, is usually performed as a specialized function only in setting up metal forming machines for operators performing work below the grade 8 level. At grade 8 level and above, operators themselves normally perform this function as an integral part of the operator job.

Relationship to Other Occupations

Metal forming equipment may be operated by employees in a number of different occupations. For example, sheet metal mechanics and workers often use such equipment to manufacture parts for use in accomplishing their primary assignment of modification, repair, assembly, and installation of sheet metal parts and assemblies. The positions of such workers are excluded from coverage under this standard. However, when the primary purpose and assignment of the position is the manufacture of sheet metal items, rather than their use in accomplishing other work, the position is covered by this standard for metal forming machine operator.

Incidental Work

In addition to the work described in this standard, metal forming machine operators may perform incidental work in operating other machines such as weighing machines, counting and bagging machines, and riddlers for sorting out defective coins and separating blanks according to the denominations. They may also perform other incidental work operations such as operating overhead cranes and molding castings of punch dies. For a discussion of the mixed job policy, see [Explanation of Job Grading System, Part 1, Section II-C-3 of the Job Grading System for Trades and Labor Occupations](#).

3869-6 METAL FORMING MACHINE OPERATOR, GRADE 6 3869-6

General: Grade 6 metal forming machine operators adjust and operate several different types of high speed automatic and semiautomatic machines to manufacture one or a few similar kinds of items from sheet metal. For example, operators at this level operate several different kinds of equipment including blanking presses, coin presses, and upsetting mills to stamp out parts from sheet metal and to produce proof and finished commercial coins of all denominations, both foreign and domestic. The presses are equipped with single, dual, and quad die sets which are installed by higher graded workers.

Skill and Knowledge: Grade 6 metal forming machine operators require knowledge of the operating procedures and functions of the different kinds of equipment used in the manufacture of coins; skill in the operation of these machines; and ability to determine the causes of defects during the different phases of coin manufacture, based on knowledge of the entire coinage manufacturing process and the general characteristics of the metals involved. In accomplishing work at this level, operators must be skilled in manipulating and coordinating the use of hand and foot levers controlling the operation of the equipment used. They must be able to operate one machine while at the same time monitoring the operation of a bank of from two to six additional automatic presses.

The operators must have a working knowledge of the general characteristics (e.g., hard, soft, brittle, nonbrittle) of such metals as copper, bronze, silver, aluminum, nickel, and clad to identify and select the proper stock to be used, and to adjust the pressure settings of the machines for the correct operation. Operators have a thorough knowledge of the operation of the machines and the machines' treatment of materials, enabling them to discern deviations from the normal rhythm and sound of the machines. They are able to identify the causes of various irregularities such as jamming, overheating, low air or oil pressure, cracked dies or collars, improper strike, loose fingers or inserts, broken or bent pins or springs, and power failure. As appropriate, they make corrections or notify the supervisor. They have the ability to disassemble and assemble the feeder mechanism and make minor repairs and adjustments to the feed bowls, webbing, cam stroke, tubes, vibratory trays, and other parts of the different kinds of machines operated.

Grade 6 operators clean and lubricate the machines and are skilled in the use of such tools as micrometers, shears, band cutters, vernier calipers, and magnifying glasses. Machine malfunctions such as those involving the replacement of cracked dies are referred to higher graded personnel.

In the production of proof coins, operators at this level, additionally, have the ability to produce high quality coins with a mirror or gemlike finish that must be essentially perfect in color and physical appearance and meet exacting coin specifications. They have knowledge of the relationship between the temperature and humidity of the work areas, and the metallic content of the blanks in determining the proper conditioning process including the correct amount of oil to apply before and after washing and the buffing required while drying the coins. They must apply great care in keeping the dies clean and the machine free of lint and shavings, as these are critical

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elements in the production of proof coins. The ability to make judgments on the acceptability of coins after close visual inspection also is required.

Responsibility: Grade 6 metal forming machine operators receive assignments from their immediate supervisors, either orally or in writing. They independently operate machines to which assigned, make judgments on the acceptability of parts produced, determine the cause of machine malfunction or other production problems and make corrections. However, major problems such as those requiring the installation and alignment of dies are reported to the supervisor. They are responsible for following standardized methods, techniques, and procedures. Assignments may be spot checked during progress. The supervisor or a higher graded employee is available to provide advice or discuss problems and to check completed work for quality control purposes.

Physical Effort: Grade 6 metal forming machine operators frequently handle objects weighing up to 23 kilograms (50 pounds) and occasionally lift objects in excess of 23 kilograms (50 pounds). Heavy physical effort is sometimes required to maneuver coils of sheet metal weighing up to 4500 kilograms (5 tons) onto presses using a chain lift or other mechanical devices. They are required to push, pull, bend, reach, walk, and stand for prolonged periods of time.

Working Conditions: Grade 6 metal forming machine operators usually perform work in areas that are adequately lighted and ventilated, frequently noisy, and sometimes dusty, dirty, greasy, humid, and wet. They are exposed to fumes and the possibility of skin and eye irritation when working with chemical compounds; to varying degrees of heat due to seasonal temperature changes; to the possibility of sprains, cuts, bruises, burns, and broken bones from moving parts of machines, abrasive particles, and hot metals; and to the possibility of falls from ladders when positioning boxes of blank coins to empty into overhead hoppers. Various protective devices such as gloves, ear plugs, and safety shoes, glasses, and shields are used.

3869-8 METAL FORMING MACHINE OPERATOR, GRADE 8 3869-8

General: In comparison with the work of grade 6 metal forming machine operators who operate several different kinds of machines to stamp out and manufacture one or a few similar kinds of sheet metal items such as coinage, grade 8 metal forming machine operators must use a greater number of different kinds of machines to accomplish a wider variety of different work operations. For example, grade 8 operators accomplish work such as cutting, punching, stamping, drawing, shaping, and rolling parts of sheet metal laminated plastics, and other materials; operate different kinds of equipment such as stakes, nibblers, shears, punch presses, band saws, sheet metal rolls, and 18 metric ton (20 ton) brakes; and manufacture items of different types, shapes, and dimensions. The machines may be hand or foot powered, mechanical crank type, hydraulically or hydrostatically operated, and may include attachments such as mechanical shell-trimming equipment on brakes. At this level, operators set up their own machines, including the installation and alignment of predetermined dies and punches to accomplish frequently recurring work assignments. In some work situations, grade 8 employees specialize in setting up and adjusting single, dual, or quad dies in appropriate presses operated by workers in lower grades to produce coins and planchets. The work includes replacing and aligning dies, troubleshooting to determine the cause of malfunctions, and performing minor repairs to or the replacement of various parts in automatic and semiautomatic coin presses, blanking presses, and upsetting machines.

Minor repairs include the removal and replacement of worn, bent, or cracked feeders, collars, friction posts, springs, die holders, fibers, studs, and other coin press parts; adjusting stake assembly, speed and stroke of the presses, grip of feeder fingers, stroke carriage, and other parts of the press feeder system. Repairs requiring greater mechanical skill such as refitting stake knees, straightening and replacing bent feeder posts, eliminating excessive play in ram and slackness in carriage are reported to the supervisor and referred to other personnel, e.g., machinery mechanics.

Skill and Knowledge: Grade 8 metal forming machine operators set up and operate various types of manual and automatic metal forming machines, including those listed above, that form and draw parts such as straps, metal furniture, wing patches and flaps, pans, brackets, and other objects which have predominantly straight edges and regular curves. By comparison, grade 6 Metal Forming Machine operators operate, a smaller variety of machines such as those used to stamp out various denominations of coins.

On routine jobs, operators at this level have the ability to set up the machine to be used, including the installation and alignment of predetermined dies and punches. They also make minor changes in machine set up such as realigning for different sizes or changes in the shape, cut, and opening of the work piece. However, on new or unusual jobs, the machine is set up by higher graded personnel.

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Grade 8 operators are skilled in the use of measuring instruments such as scales and various standard gauges to check the accuracy of dimensions and to maintain the position of preset machine stops and fixtures. They are also skilled in the use of protractors, calipers, snips, punches, drill presses, band saws, and other power and handtools in maneuvering and shaping metals (such as aluminum, stainless steel, and steel alloys) in machines and with hammers. Grade 8 operators are skilled in the set up of metal forming machines for producing various items from sheet metal and other materials. They use a magnifying glass to detect cracks or other imperfections in the dies and remove and replace the dies including the alignment of all parts.

Operators at this level have a thorough knowledge of the press operations enabling them to recognize defective tooling, the need for changing speeds and feeds, and to detect deviations from the normal rhythm and sound of the machine. They recognize unacceptable defects in the product, make adjustments to eliminate them, and accomplish troubleshooting and test phases required to isolate and correct equipment malfunctions. They use disc grinders, micrometers, feeler gauges, drill presses, and handtools such as hammers, screwdrivers, and wrenches in making adjustments and minor repairs to the equipment. They are skilled in stoning dies to remove scratches, tool marks, clash marks, and other imperfections from the surface of dies.

The work at this level requires the ability to interpret single view blueprints, sketches, diagrams, and other drawings, and the use of arithmetic and standard handbook formulas in performing dimensional measurements and maintaining required tolerances. Work at the grade 6 level does not require this ability.

Responsibility: Grade 8 metal forming machine operators receive assignments from their immediate supervisors. They work from simple plans and diagrams, detailed orders and specifications to determine the material and tools to be used, and the dimensions and shapes of the items to be produced. They use standard methods and techniques. Assignments are subject to review in progress and upon completion. The supervisor or a higher graded employee is available for advice on new or unusual assignments. Equipment malfunctions requiring major repairs are reported to the supervisor.

Physical Effort: Grade 8 metal forming machine operators frequently handle objects weighing up to 9 kilograms (20 pounds) and occasionally objects weighing up to 23 kilograms (50 pounds); however, hoists, lifts, and workers are available to assist in moving heavier items. They are required to lift, reach, push, pull, bend, walk, and stand for prolonged periods of time. Employees sometimes work in cramped positions over and under machinery when setting dies.

Working Conditions: Grade 8 metal forming machine operators usually perform work inside areas that are adequately lighted, ventilated, and heated. They are frequently exposed to noise caused by the pounding of metal and the movement of machinery, to the possibility of burns, cuts, bruises, and broken bones from hot metal chips and moving parts of machinery, and to unpleasant conditions from dirt, dust, smoke fumes, and gases. Floor surfaces are sometimes composed of

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concrete and may be cold, oily, and slippery. Various protective devices such as hardhats, gloves, ear plugs, safety shoes, and safety glasses are used.

3869-10 METAL FORMING MACHINE OPERATOR, GRADE 10 3869-10

General: Grade 10 metal forming machine operators use a variety of different kinds of machines such as 89 metric ton (80 ton) power brakes, 556 metric ton (500 ton) drop hammers, 89 metric ton (80 ton) hydraulic punch presses, and other machines to manufacture parts such as compartment boxes, I-beams, ducts, and various skin and frame parts of aircraft. By comparison with the operation of several different kinds of automatic and semiautomatic metal forming machines at the grade 8 level, grade 10 metal forming machine operators must apply more skill and knowledge to operate a variety of different kinds of machines that are larger, more complex, and more difficult to operate because of the greater range of their pressure capabilities and their responsiveness to the manner in which control levers and pedals are applied. By comparison with the manufacture of items having predominantly straight edges and regular curves at grade 8, grade 10 operators must be able to manufacture different kinds of parts which are heavier, more difficult to manipulate, and involve more complicated contours, sharp angles, and compound curves.

Skill and Knowledge: By comparison with grade 8 metal forming machine operators who set up the machines on routine jobs, grade 10 metal forming machine operators perform the complete set up of machines for new or unusual assignments. They select, install, and align proper dies to produce the correct bend angle and radius in accomplishing work. The machines are larger and have greater pressure capability than those operated at the lower grade levels. They vary in tonnage to 556 metric tons (500 tons) or more pressure and include arbor presses, planishing hammers, shrinkers, routers, and metal stretchers. Thus, greater skill is required of operators at this grade level in manipulating the control pedals and levers of the machines; in maneuvering larger and more complex work pieces on the anvil or other working surface; and in striking them repeatedly with hand or power hammer, or press between dies until the parts are formed.

Operators at this level have a thorough knowledge of the procedures and work sequences for typical jobs performed on each of the heavy forming machines and of how to utilize these machines in conjunction with one another. In order to select and work the proper stock, they must be able to recognize various metals and alloys visually, e.g., duralumin, monel, aluminum, magnesium, stainless steel, steel, and other metals, and have knowledge of their properties and working characteristics such as malleability, bending tolerance and spring back, and susceptibility to distortion. They skillfully form, shape, or reproduce metal items such as fuel tanks for aircraft, compartment boxes, I-beams, ducts, nose cones, wings, ribs, and any other skin or frame part of an aircraft.

Grade 10 metal forming machine operators plan, lay out, and perform their work from multiview blueprints, shop directives, technical manuals, and other documents. They are skilled in the use and application of trade practices and shop mathematics in determining the amount of material necessary including allowance for bend radius, hardness, and stretch of metal; in determining blank sizes and shapes of the finished part prior to forming operations; and in solving metal forming and drawing problems. Using the original metal part as a model, they must be able to develop diagrams, prints, and other drawings from which to duplicate the part. They are also skilled in casting punch dies from molten lead. Operators at this level improvise templates and

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special purpose aids such as form blocks, dies, drill and assembly jigs, and fixtures to hold parts in alignment and to close tolerance. They are skilled in applying rubber pressure pads to equalize pressure when forming severe angles and complicated contours; in removing compression wrinkles from formed parts by means of power planishing hammers or hand mallets and portable anvils; and in the use of various tools and equipment such as micrometers, radial gauges, shears, pneumatic drills, flanging machines, power sanders, and gasket cutters.

Responsibility: Grade 10 metal forming machine operators work under the general guidance of the immediate supervisor, who makes assignments orally or in writing. They independently plan and lay out the work sequence using blueprints, work orders, and specifications; make sketches and templates where necessary; and select and use methods, materials, and machines most appropriate to complete the assignment. The supervisor spot checks completed work for quality and accuracy. By comparison, grade 8 operators, are restricted to predetermined methods, tools, and materials, and are subject to closer supervision.

Physical Effort: Physical effort at this level is the same as that described at the [grade 8 level](#).

Working Conditions: Working conditions at this level are the same as those described at the [grade 8 level](#).