



Certified Precision Sheet Metal Operator – Level I

13 Sections

Total of 136 tasks/skills/knowledge areas

Section B. Metals, Metallurgy, and Metal Working Processes

Section C. Paperwork and Documentation

Section D. Math Calculations for Sheet Metal Fabrication

Section E. Blueprint Reading and Part Layout

Section F. Computer/Part Program

Section G. Machine Set Up, Functioning, and Operation

Section H. Hand Tools

Section I. Inspection/Quality Control

Section J. Inspection Tools

Section K. Tooling/Dies/Jigs/Fixtures

Section L. Material and Product Handling

Section M. Safety Checks, Equipment, and Procedures

Section N. Preventive Maintenance on Equipment and Tools



Section B. Metals, Metallurgy, and Metal Working Processes

- 1.B. Identify raw material used to produce parts
- 2.B. Tell apart the reactions of fabrication to unlike metals
- 3.B. Contrast blank weight to finish weight of part
- 4.B. Compare costs of different material grades
- 5.B. Determine area, volume, weight, and price of the sheet metal parts
- 6.B. Identify production scrap that can be used to make other parts
- 7.B. Utilize part blank nesting to improve material utilization
- 8.B. Look at material grain direction for parts requiring special orientation
- 9.B. Suggest principle location points (PLP) or tooling hole location in the part to assist in the assembly process
- 10.B. Suggest foolproof or repeatable methods to keep parts from being assembled incorrectly
- 11.B. Compare various manufacturing methods to help produce the lowest costing part
- 12.B. Evaluate different manufacturing processes to help control tool costs

Section C. Paperwork and Documentation

- 1.C. Track material from its tag information
- 2.C. Report production and scrap in writing or through computer system
- 3.C. Verify information on Inspection/Move tags is complete and correct
- 4.C. Keep document information up to date and control its access
- 5.C. Fill out paperwork from first piece inspection, production run, inventory, and shipping
- 6.C. Read and interpret operator set up sheet, then apply information to the machine
- 7.C. Complete document change form whenever process or part order needs to be changed
- 8.C. Read, interpret, and extract product and quality information from written documents
- 9.C. Label finished parts
- 10.C. Interpret and follow process plan and material/paper routing
- 11.C. Document corrective actions electronically or on paper

Section D. Math Calculations for Sheet Metal Fabrication

- 1.D. Calculate maximum number of parts per sheet and drop
- 2.D. Convert fractions to decimals and vice versa
- 3.D. Read and convert standard to/from metric linear dimensions
- 4.D. Apply principles of geometric tolerancing and dimensioning to develop parts
- 5.D. Determine the values of chords, radii, arcs, and areas of circular segments
- 6.D. Apply trigonometric principles to develop parts with holes, notches, or bends

Section E. Blueprint Reading and Part Layout

- 1.E. Read, interpret, and identify tolerances and key elements of a part on a blueprint
- 2.E. Identify the required material for a part from the blueprint
- 3.E. Compare and contrast a manufactured part against drawing specifications
- 4.E. Figure out missing dimensions on a blueprint based on information given
- 5.E. Calculate part dimensions and create new parts from blueprint drawings
- 6.E. Utilize CAD/CAM software to develop part and machine program
- 7.E. Develop flat layouts or patterns for a variety of simple and complex geometric shapes
- 8.E. Sketch a part in different views
- 9.E. Unfold a developed part into a flat pattern, and determine proper allowances and correct cutting size
- 10.E. Orient part to blueprint so part is not formed backwards
- 11.E. Determine the sequence of fabrication and assembly from a drawing
- 12.E. Calculate developed sizes based on inside and outside dimensions
- 13.E. Discuss drawings with customers to understand their requirements
- 14.E. Talk about drawings with coworkers to determine the most effective fabrication method

Section F. Computer/Part Program

- 1.F. Create programs for a variety of part shapes from blueprint data
- 2.F. Determine feed, speeds, tooling, and operation sequence for parts
- 3.F. Enter or load part program via keyboard, tape, diskette, or network
- 4.F. Identify, choose, and enter G-codes into part program
- 5.F. Identify, choose, and enter M-codes into part program
- 6.F. Edit programs to produce the desired part shape in the shortest time with the highest level of safety
- 7.F. Comprehend machine alarm codes and correct problem for each code
- 8.F. Save or delete master and working part programs to/from tape, diskette, and/or network

Section G. Machine Set Up, Functioning, and Operation

- 1.G. Verify the selected equipment has the capability to run the job
- 2.G. Stage material and build tolls correctly to ensure a 24 hour/ 7 day production schedule
- 3.G. Change tolling/dies within the machine
- 4.G. Move work piece onto table or fixture with a hoist, jib, or crane
- 5.G. Fabricate/form/cut parts within close tolerances as called out on process sheets, samples, and drawings
- 6.G. Operate machine axes in manual mode
- 7.G. Use the key features and functions of the controller
- 8.G. Adjust settings for optimum machine performance and part quality
- 9.G. Modify machine mechanical and/or hydraulic setup to correct quality issues of part
- 10.G. Repair broken or cracked parts and prepare orders for missing or worn parts
- 11.G. Package (box and/or skid) parts; deliver to shipping, and close work order
- 12.G. Identify part problems and their causes, and then take corrective action
- 13.G. Troubleshoot machine problems by utilizing the control
- 14.G. Schedule production run according to due dates, material availability, customer needs, and machine availability

Section H. Hand Tools

- 1.H. Name and select metal fabrication hand tools for specific tasks
- 2.H. Maintain an inventory of tools
- 3.H. Keep tools clean and protect them against damage
- 4.H. Make machine adjustments with hand tools to achieve desired part

Section I. Inspection/Quality Control

- 1.I. Audit the shop floor for inspection process compliance
- 2.I. Confirm material type, size and thickness, and place it at the machine for production
- 3.I. Check the condition of the material edge and remove any burrs
- 4.I. Certify form shapes for correct direction, size, diameter, depth, and/or orientation
- 5.I. Compare overall dimensions to print
- 6.I. Inspect characteristics of the first part to the customer's criteria and then document
- 7.I. Evaluate raw material, work in progress (WIP), and fabricated parts with inspection tools
- 8.I. Place nonconforming material or parts on quality hold
- 9.I. Create/write inspection procedures and/or develop measuring methods
- 10.I. Troubleshoot quality issues to their root causes
- 11.I. Measure the length of obtuse or acute flanges
- 12.I. Confirm that blank development is within tolerance
- 13.I. Measure inside to inside, inside to outside, and/or outside to outside dimensions
- 14.I. Inspect hole to edge and hole-to-hole dimensions for small tolerances
- 15.I. Look for excessive die marks
- 16.I. Monitor condition of the cut
- 17.I. Identify bad cuts and tooling that needs reworking
- 18.I. Calibrate or "home" the machine

Section J. Inspection Tools

- 1.J. Measure and read linear dimensions with a tape measure
- 2.J. Employ a caliper(dial or vernier) to measure linear dimensions, thickness, or diameters
- 3.J. Measure angles with a protractor
- 4.J. Verify hole/slot dimensions and locations with plug or pin gauges
- 5.J. Measure the thickness of metal with a micrometer
- 6.J. Use go, no-go gauges to determine if a part is acceptable
- 7.J. Check gaps between opposing surfaces with feeler gauges
- 8.J. Confirm inspection equipment has been calibrated before using
- 9.J. Verify part squareness with a square
- 10.J. Inspect and compare work piece to specification for conformance
- 11.J. Employ depth gauges for part to print comparison
- 12.J. Compare part to required dimensions with height gauge
- 13.J. Utilize precision gauge blocks and feeler gauges to evaluate part dimensions

Section K. Tooling/Dies/Jigs/Fixtures

- 1.K. Select dies/tooling based on condition, materials, part shape, and/or equipment capabilities
- 2.K. Inspect dies/tooling for accuracy, sharpness, and/or wear, before and after a part run
- 3.K. Sharpen, lubricate, adjust/shim, and assemble tooling prior to a production run
- 4.K. Repair or replace tooling and/or its holder as needed
- 5.K. Install and align dies/tooling into holders
- 6.K. Design and construct templates and fixtures
- 7.K. Determine die clearance per material type and thickness

Section L. Material and Product Handling

- 1.L. Lift, carry, and transport heavy material and part orders with power equipment like a forklift or hoist
- 2.L. Safeguard product from environmental hazards such as rain or smog
- 3.L. Package and store material and parts using documented procedures

Section M. Safety Checks, Equipment, and Procedures

- 1.M. Read and understand Material Safety Data Sheets (MSDS)
- 2.M. Apply Lockout/Tagout procedures when appropriate
- 3.M. Maintain a clean and orderly work environment
- 4.M. Wear personal protective equipment such as safety shoes, glasses, gloves, and hearing protection
- 5.M. Arrange work area for safe and efficient material processing
- 6.M. Hold and load material properly when producing a part
- 7.M. Follow all safety guidelines on equipment
- 8.M. Verify all safety devices on and around machines are operating properly at the beginning of each shift
- 9.M. Complete reports describing safety issues and how they were resolved
- 10.M. Observe OSHA regulation for machine operation
- 11.M. Recognize and tell apart electrical, pneumatic, hydraulic, and mechanical types of energy
- 12.M. Manually lift parts or materials weighing up to 50 pounds
- 13.M. Apply first aid for minor injuries such as cuts, abrasions, sprains, bruises, etc.
- 14.M. Determine machine and part movement zone, and establish safe working distances

Section N. Preventive Maintenance on Equipment and Tools

- 1.N. Look for worn belts or machine parts before each setup
- 2.N. Examine machine for breakage before each setup
- 3.N. Check hydraulic oil level and replace filter(s) according to established schedule
- 4.N. Clean the machine according to established methods and schedule
- 5.N. Lubricate equipment at key points in accordance with standard procedure
- 6.N. Check water traps and drain when necessary
- 7.N. Empty dust collector and scrap pans daily
- 8.N. Document preventive maintenance tasks following their completion
- 9.N. Assist maintenance personnel or service technicians in diagnosing equipment problems
- 10.N. Troubleshoot equipment problems and correct minor faults
- 11.N. Repair or replace machine parts to keep machine running properly
- 12.N. Observe machine operation and listen for abnormal noises, so major equipment breakdowns are averted