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JOB QUALIFICATION STANDARD (JQS)

Occupation: Maintenance Mechanic

Work Process: Machine Shop

Practical Hours: 250 hrs.

DOL Standard: Manual Machining Fundamentals: Apply a working knowledge of metal removal theory, set up and operations, including the verification of components such as workholding devices, cutting tools and toolholders.

Performance Objective: Demonstrate the ability to identify common metal cutting process and major components used within those processes.

Performance Indicator	Qualification Date/Initial
Demonstrate the ability to identify a single-point and multi-point tooling process.	
Demonstrate the ability to identify a sawing process.	
Demonstrate the ability to identify a turning process.	
Demonstrate the ability to distinguish between inner and outer diameter cutting operations.	
Demonstrate the ability to identify a milling process.	
Demonstrate the ability to identify a holmaking process.	
Demonstrate the ability to identify a multiple cutting operation.	
Demonstrate the ability to identify a broaching process.	
Demonstrate the ability to identify a drilling process.	
Demonstrate the ability to contrast a vertical and horizontal machine process.	
Demonstrate the ability to identify a boaring process.	

Performance Objective: Demonstrate the ability to set up, operate and tend to conventional machines and tools that removal metal, within a defined tolerance, to be used in further machining or fabrication processes.

Performance Indicator	Qualification Date/Initial
Demonstrate the ability to verify workpiece material for correct size and type by checking color codes, lettering, or numerical stamps to ensure that the workpiece selected conforms to engineering drawings and job instruction sheets.	
Demonstrate the correct identification and selection of cutting fluids using manuals, charts, engineering drawings, and material safety data sheets to ensure that the cutting fluid is the correct one to maximize machining without damage to workpiece, cutting tool, or machine.	
Demonstrate the ability to identify and select machines (conventional and numerically controlled) saws, drills, lathes, grinders, and vertical or horizontal mills, using information from	



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engineering drawings and work process documentation, to ensure that the machine selected is the correct one for the application and available to perform the job.	
Demonstrate the ability to identify and check machine controls and systems including locating and identifying switches, buttons, levers, controls, and safety devices to ensure that all controls are operational and functioning in accordance with manufacturer’s specifications and company standards.	
Demonstrate the ability to identify and select tooling required to cut the workpiece by using information engineering drawings and job instructions, ensuring that the selected tooling is the correct size and type for the application and available to perform the job.	
Demonstrate the ability to identify and prepare cutting tools by sharpening or replacing tools so that the cutting shape and angle is prepared for optimum cutting and personal safety in accordance with manufacturer’s specifications, engineering drawings, and company standards.	
Demonstrate the ability to identify and select measuring instruments, ensuring that instruments selected are capable of measuring the dimensions and tolerances specified in the engineering drawings, job specifications, and process layout.	
Demonstrate the ability to select machine speeds and feeds using speed and feed charts and in accordance with size, type, and hardness of workpiece materials, so that the machines perform optimum cutting without damage to workpiece, cutting tools, or machines and ensures personal safety.	
Demonstrate the ability to identify and select workholding devices including (not limited to) vises, clamps, jigs, chucks, face plates, centers, catch plates, steady rest, tailstocks, and mandrels, ensuring that the workholding device selected is the correct one to safely and securely position and locate the workpiece in the machine in accordance with job specifications.	
Demonstrate the ability to communicate with co-workers concerning previous job operations, availability of tools, parts, and machinery, scheduling requirements, and any other information needed to plan and prepare for the machining job, ensuring that the information communicated is clear, concise, and accurate.	



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DOL Standard: In-Process Verification: Apply a working knowledge of foundational measurement skills when interpreting specifications for in-process dimensional or surface verification.

Performance Objective: Demonstrate the ability to interpret part drawing specifications (dimensions, layout, material, surface finish, countersinks, tolerances, threading, etc.) and then select and use the gauges to measure features or characteristics, the applicable tolerance and the accuracy, and the resolution and capability of the test instrument.

Performance Indicator	Qualification Date/Initial
Demonstrate the ability to check straight cuts by using precision measuring instruments including (not limited to) micrometer, verniers, calipers, squares, straight edge, dial indicator, and surface comparator, to ensure that the accurate size, finish, parallelism and squareness of straight cuts conform with engineering drawings and job specifications.	
Demonstrate the ability to check shapes by using precision measuring instruments and checking devices including radius gauges, surface comparator and verniers, to ensure that the profile and finish of the cut shape conform to engineering drawing and job specifications.	
Demonstrate the ability to check threads by using precision measuring instruments, checking devices, and various checking methods including 3-wire method, thread micrometer, thread gauge, and plug or ring gauges, to ensure that the accuracy of pitch, thread geometry and size of cut threads conform to engineering drawings and job specifications.	
Demonstrate the ability to check holes by using precision measuring instruments and checking devices including (not limited to) dial indicators, bore gauges, plug gauges, telescopic gauges, surface comparators, and verniers to ensure that the accuracy of the diameter, depth, concentricity, position, and finish of cut holes conform to engineering drawings and job specifications.	
Demonstrate the ability to check tapers using precision measuring instruments and checking devices including taper gauge, sine bar, micrometer, and vernier to ensure that the accuracy of the angle, taper/foot, and diameter of the cut tapers conform to engineering drawings and job specifications.	
Demonstrate the ability to check hardness using various types of hardness testers and comparison charts to ensure that the hardness level of the workpiece materials conform to engineering drawings and job specifications.	
Demonstrate the ability to maintain material identification by marking or stamping workpiece and completing shop documentation to facilitate traceability of the final product or work-in-process and to maintain inventory control in accordance with company standards.	
Demonstrate the ability to check surfaces using surface comparators to ensure that surface is finished as specified in the engineering drawings and job specifications.	



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Demonstrate the ability to perform final inspection using precision measuring instruments and checking devices including inside and outside micrometers, vernier height gauges or indicators, gauge blocks, and pin gauges to ensure that the tolerances and dimensions of the workpiece conform to the engineering drawings and job specifications.	
Demonstrate the ability to complete work documentation including tracking sheets, sign-off sheets, inspection reports, or procedure sheets, to record the finalization of jobs and to facilitate traceability of work-in-process, ensuring that all data is recorded accurately and clearly in accordance with engineering drawings and job specifications.	
Demonstrate the ability to show proper care of precision measuring tools.	

Performance Objective: Demonstrate the ability to use advanced metrology equipment, such as optical comparators and CMMs.

Performance Indicator	Qualification Date/Initial
Demonstrate the ability to use optical comparators, optical flats and microscopes.	
Demonstrate the ability to use vision systems for product inspection (digital cameras, in-line optical sensors and other digital systems).	
Demonstrate the ability to use a Coordinate Measuring Machine (CMM) to locate datums, target points and areas and hole positions.	

DOL Standard: Benchwork: Apply a working knowledge of the processes and tools required for to complete benchwork activities.

Performance Objective: Demonstrate the ability to safely and properly use hand and power tools.

Performance Indicator	Qualification Date/Initial
Demonstrate the safe and proper use of a bench vise.	
Demonstrate the safe and proper use of a ball-peened hammer.	
Demonstrate the safe and proper use of a soft faced hammer.	
Demonstrate the safe and proper use of a standard screw driver.	
Demonstrate the safe and proper use of a phillips screw driver.	
Demonstrate the safe and proper use of an offset screw driver.	
Demonstrate the safe and proper use of a hand hacksaw.	
Demonstrate the safe and proper use of a machinist's file.	



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Demonstrate the safe and proper use of precision files.	
Demonstrate the safe and proper use of rotary and bur files.	
Demonstrate how to safely hand tap through tapering, plugging or bottoming.	
Demonstrate the safe and proper use of a T-handle wrench.	
Demonstrate the safe and proper use of a double-ended tap wrench.	
Demonstrate the safe and proper use of a tap extractor.	
Demonstrate how to thread dies.	
Demonstrate the safe and proper use of a solid hand reamer.	
Demonstrate the safe and proper use of an expansion hand reamer.	
Demonstrate the safe and proper use of an adjustable hand reamer.	
Demonstrate the safe and proper use of a roughing taper reamer.	
Demonstrate the safe and proper use of a finish taper reamer.	
Demonstrate how to prepare the layout table surface for metalwork.	
Demonstrate the safe and proper use of a pocket or double ended scribe.	
Demonstrate the safe and proper use of a combination square set.	
Demonstrate the safe and proper use of a surface gauge.	
Demonstrate the safe and proper use of a vernier height gauge.	
Demonstrate the safe and proper use of angular layout tools (bevel protractor head, rule, and universal bevel protractor).	
Demonstrate the safe and proper use of circular layout tools (dividers, trammels, center head and rule).	
Demonstrate the safe and proper use of permanent layout tools (pocket scribe, rule or straight edge, prick punch, automatic center punch).	
Demonstrate the safe and proper use of an angle plate.	
Demonstrate the safe and proper use of a toolmaker's clamp.	
Demonstrate the safe and proper use of a parallels.	
Demonstrate the safe and proper use of V-blocks.	
Demonstrate the safe and proper use of keyseat rules.	



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Performance Objective: Demonstrate the ability to interpret part drawing specifications, select and use hand and power tools to meet part specifications and tolerances within a company's workflow.

Performance Indicator	Qualification Date/Initial
Demonstrate the ability to use a hand-file including (flat, needle, bastard, rat-tail, lathe, and half-round files) to remove excessive material so that workpiece is filed in accordance with engineering drawings and job specifications.	
Demonstrate the ability to use a hand-saw to cut the workpiece to specified lengths in accordance with engineering drawings and job specifications.	
Demonstrate the ability to hand-drill holes, using power drill and drill bits, so that the size of the drilled holes will conform to engineering drawings and job specifications.	
Demonstrate the ability to hand-tap threaded holes, using T-handle, and tapping block so that the depth and squareness of tapped threads will conform to engineering drawings and job specifications.	
Demonstrate the ability to hand-ream, using straight or spiral-fluted reamers, to remove excessive material so that the diameter and depth of reamed hole will conform to engineering drawings and job specifications.	
Demonstrate the ability to chase threads using hand taps and dies to repair or clean damaged threads, so that the threads will conform to engineering drawings and job specifications.	
Demonstrate the ability to hand-grind, using pneumatic or electric hand grinders, to remove excess material so that the workpiece is ground in accordance with engineering drawings and job specifications.	
Demonstrate the ability to practice good housekeeping in the workplace by cleaning up spills or leaks, keeping work area clean and clear of obstructions, and storing tools or equipment so that the potential for accident or injury is prevented and tools or equipment are in place and available in compliance with safety regulations.	
Demonstrate the ability to deburr workpiece using files, scrapers, emery cloth, sanders, and hand or pedestal grinders to remove excess material and to ensure safe handling in accordance with engineering drawings and job specifications.	



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DOL Standard: Sawing: Apply a working knowledge for setting up, operating, or tending to machines that saw, cut or shear materials during the removal of metal, within a defined tolerance, to be used in further machining or fabrication processes.

Performance Objective: Demonstrate the ability to safely setup and operate machine tools to perform routine sawing operations.

Performance Indicator	Qualification Date/Initial
Demonstrate the ability to check fused/welded blade to ensure that joined saw has a continuous cutting edge in accordance with manufacturer's manual or job specifications.	
Demonstrate the ability to locate and position the workpiece in the saw to the required operational clearance by setting up workholding devices, including nesting fixtures, vises, or roller supports, so that the workpiece is aligned, secured, and stable during sawing operations in accordance with job specifications.	
Demonstrate the ability to select speeds and feeds of saws using the speed and feed charts and in accordance with the size, type, and hardness of workpiece material, so that the saw performs optimum cutting without damage to workpiece, cutting tools, or machines, and ensures personal safety.	
Demonstrate the ability to install and test-run blade to check alignments and movements so that the blade makes the required cut, prevents machine or blade damage and ensures personal safety in accordance with company standards.	
Demonstrate the ability to check first cut-off by measuring and checking a cut-off piece to ensure that the angles, squareness, and length of the sawed piece will conform to the engineering drawings and job specifications.	
Demonstrate the ability to cut shapes (vertical bandsaw) using required sawing sequences, speeds, feeds, and cutting fluids, so that the profile, size, and dimensions of the cut shapes conform to the engineering drawings, job specifications.	
Demonstrate the ability to cut squared and angled surfaces (power cut-off saw) using required sawing sequences, speeds, feeds, and cutting fluids, so that the squareness, angles, and size of cut surfaces conform to engineering drawings, job specifications.	
Demonstrate the ability to maintain material identification by marking or stamping the workpiece and completing shop documentation to facilitate traceability of the final product or work-in-process and maintain inventory control in accordance with company standards.	
Demonstrate the ability to deburr the workpiece using files, scrapers, emery cloth, sanders and hand or pedestal grinders to remove excess material and ensure safe handling in accordance with engineering drawings, job specifications.	
Demonstrate the ability to perform final inspection using precision measuring instruments and checking devices including inside and outside micrometers, vernier height gauges or indicators, gauge blocks, and pin gauges to ensure that the tolerances and dimensions of the workpiece to conform to the engineering drawings and job specifications.	



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Demonstrate the ability to complete work documentation including tracking sheets, sign-off sheets, inspection reports, or procedure sheets to record the finalization of jobs and to facilitate traceability of work-in-process and ensure that data is recorded accurately and clearly in accordance with engineering drawings and job specifications.	
Demonstrate the ability to practice good housekeeping in the workplace by cleaning up spills or leaks, keeping work area clean and clear of obstructions, and storing tools or equipment so that the potential for accident or injury is prevented and tools or equipment are in place and available in compliance with safety regulations.	

Standard: Drilling: Apply a working knowledge for setting up, operating, or tending to machines that drill, bore, ream, or countersink work pieces to specifications.

Performance Objective: Demonstrate the ability to safely setup and operate machine tools to perform routine drilling operations.

Performance Indicator	Qualification Date/Initial
Demonstrate the ability to select drill tooling including drill bits, center-drill, reamers, taps, counter-bores, counter-sinks, and spot-faces by using information in engineering drawings and job specifications to ensure that tooling is the correct size, shape, type, and grade for the application.	
Demonstrate the ability to identify and prepare cutting tools for drills by sharpening or replacing tools so that the cutting shape and angle is prepared for optimum cutting and personal safety in accordance with job or manufacturer's specifications and company standards.	
Demonstrate the ability to locate and position the workpiece in the drill to the required operational clearances by setting up and securing workpiece with workholding devices, including drilling vises, clamps, jigs, angle plates, and chucks, so that the workpiece is aligned, secured, and stable during drilling in accordance with job specifications.	
Demonstrate the ability to set up tooling in the drills to the required operational alignments using holding devices, including drill chucks, taper sleeves, and tapping heads, to ensure that tooling is in position and held securely during drilling in accordance with job specifications.	
Demonstrate the ability to select speeds and feeds for the drill using speed and feed charts and in accordance with the size, type, and hardness of workpiece material so that the drill performs optimum cutting without damage to workpiece, cutting tools, or machines, and ensures personal safety.	
Demonstrate the ability to perform a center-drill a layout punch mark using a drill press/machine, chuck, center-drill, and cutting fluid, so that the punch mark is drilled in accordance with engineering drawings and job specifications.	



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Demonstrate the ability to drill a hole using a drilling machine, drill bits, and cutting fluids so that the size and depth of drilled hole conforms to engineering drawings and job specifications.	
Demonstrate the ability to chamfer a hole using a drilling machine, countersinks, and cutting fluids to break sharp edges, so that the chamfered hole conforms to engineering drawings and job specifications.	
Demonstrate the ability to ream a hole using a drilling machine, reamers, and cutting fluids so that the diameter of the reamed hole conforms to engineering drawing or job specifications.	
Demonstrate the ability to machine-thread a hole using a drilling machine, tapping heads, taps, and cutting fluids so that the depth, size, and pitch of the threaded depth of the hole to conform with engineering drawings and job specifications.	
Demonstrate the ability to spot-face a hole using a drilling machine, spot-facing tools, and cutting fluids so that the depth and diameter of the spot-faced hole conforms to engineering drawings or job specifications.	
Demonstrate the ability to counter-bore a hole using a drilling machine, counter-boring tools, and cutting fluids so that the depth and diameter of the counter-bored hole conforms to engineering drawings and job specifications.	
Demonstrate the ability to counter-sink a hole using a drilling machine, countersinks, and cutting fluids so that the depth and diameter of the counter-sunk hole conforms to engineering drawings and job specifications.	
Demonstrate the ability to maintain material identification by marking or stamping the workpiece and completing shop documentation to facilitate traceability of the final product or work-in-process and maintain inventory control in accordance with company standards.	
Demonstrate the ability to deburr the workpiece using files, scrapers, emery cloth, sanders and hand or pedestal grinders to remove excess material and ensure safe handling in accordance with engineering drawings, job specifications.	
Demonstrate the ability to perform final inspection using precision measuring instruments and checking devices including inside and outside micrometers, vernier height gauges or indicators, gauge blocks, and pin gauges to ensure that the tolerances and dimensions of the sawed workpiece to conform to the engineering drawings and job specifications.	
Demonstrate the ability to complete work documentation including tracking sheets, sign-off sheets, inspection reports, or procedure sheets to record the finalization of jobs and to facilitate traceability of work-in-process and ensure that data is recorded accurately and clearly in accordance with engineering drawings and job specifications.	
Demonstrate the ability to practice good housekeeping in the workplace by cleaning up spills or leaks, keeping work area clean and clear of obstructions, and storing tools or equipment so that the potential for accident or injury is prevented and tools or equipment are in place and available in compliance with safety regulations.	



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Standard: Grinding: Apply a working knowledge for setting up, operating, or tending to machines that finish, shape and size a workface to meet required hardness and finish specifications.

Performance Objective: Demonstrate the ability to safely setup and operate machine tools to perform routine grinding operations.

Performance Indicator	Qualification Date/Initial
Demonstrate the ability to select a grinding wheel using information in engineering drawings, charts, and job specifications to ensure that the wheel selected is the correct grade and size needed to finish, shape, and size workface in accordance with the hardness and finish of the workpiece and job specifications.	
Demonstrate the ability to check condition of the grinding wheel for defects, cracks, or chips, and by taking the corrective action or replacing if required, to ensure personal safety and to perform optimum cutting in accordance with job specifications.	
Demonstrate the ability to install the grinding wheel to specified radii and tangents and/or angles using diamond or star-wheel dresser, to ensure personal safety and to perform optimum grinding in accordance with job specifications.	
Demonstrate the ability to locate and position the workpiece in the grinder to the required operational clearances by setting up workholding devices, including angle plate, magnetic holders, vises, chucks, centers, jigs, V-block, or mandrels, so that the workpiece is aligned, secured, and stable during grinding operations in accordance with job specifications.	
Demonstrate the ability to surface grind the workpiece using surface grinders so that the finish, flatness, and size of ground surfaces conform to engineering drawings and job specifications.	
Demonstrate the ability to hone holes using a honing machine and required attachments, so that the dimension and tolerance of the honed hole conforms to engineering drawings and job specifications.	
Demonstrate the ability to lap the workpiece by hand grinding or using a power lapping machine so that the finish and flatness of the lapped surface conforms to engineering drawings and job specifications.	
Demonstrate the ability to grind inside and outside diameters (ID/OD) using machine grinders so that the dimensions and tolerances of ground ID/OD surfaces conform to engineering drawings and job specifications.	
Demonstrate the ability to grind tools and cutters using pedestal, surface, or tool and cutter grinders, so that the ground cutting edge of the tools or cutters conforms to tool geometry standards to ensure optimum metal removal and finish.	
Demonstrate the ability to check ground surfaces using surface comparators to ensure that the surface is finished in as specified in the engineering drawings and job specifications.	



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Demonstrate the ability to perform final inspection using precision measuring instruments and checking devices including inside and outside micrometers, vernier height gauges or indicators, gauge blocks, and pin gauges to ensure that the tolerances and dimensions of the sawed workpiece to conform to the engineering drawings and job specifications.	
Demonstrate the ability to complete work documentation including tracking sheets, sign-off sheets, inspection reports, or procedure sheets to record the finalization of jobs and to facilitate traceability of work-in-process and ensure that data is recorded accurately and clearly in accordance with engineering drawings and job specifications.	
Demonstrate the ability to practice good housekeeping in the workplace by cleaning up spills or leaks, keeping work area clean and clear of obstructions, and storing tools or equipment so that the potential for accident or injury is prevented and tools or equipment are in place and available in compliance with safety regulations.	

Standard: Turning: Apply a working knowledge for setting up, operating, or tending to machines that turn, bore, thread, form, or face metal materials, such as wire, rod, or bar stock to meet required specifications.

Performance Objective: Demonstrate the ability to safely setup and operate machine tools to perform routine turning operations.

Performance Indicator	Qualification Date/Initial
Demonstrate the ability to select lathe cutting tools, including drill bits, boring, parting, threading, facing, or turning tools, by using information from engineering drawings and job instructions to ensure that the tools selected are the correct ones needed to cut the workpiece material.	
Demonstrate the ability to identify and prepare lathe cutting tools by sharpening or replacing tools so that the cutting shape and angle is prepared for optimum cutting and personal safety, in accordance with manufacturer's specifications and company standards/procedures.	
Demonstrate the ability to locate and position workpiece in lathe to required operational clearances by setting up and securing workholding devices (chucks, face plates, centers, catch plates, steady rest, or tail stock) so that the workpiece is aligned, secured, and stable during machining in accordance with job specifications.	
Demonstrate the ability to set up lathe cutting tools to the required operational alignments using tool posts and tail stocks, to ensure that tools are in position and held securely during machining in accordance with job specifications.	
Demonstrate the ability to select speeds and feeds of lathe using speed and feed charts and in accordance with the size, type, and hardness of workpiece material, so that the lathe performs optimum cutting without damage to workpiece, cutting tools, or machine and ensures personal safety in accordance with job specifications.	



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Demonstrate the ability to take a sizing cut to determine a reference workface and to check speeds and feeds to ensure that lathe is set up in accordance with engineering drawings and job specifications.	
Demonstrate the ability to establish a reference or starting point (datum) by zeroing out machine and ensuring that the datum is correctly located in accordance with job specifications.	
Demonstrate the ability to face a surface using a lathe and single-point tool bit and by measuring or checking with vernier, straight edge, or micrometer, so that the surface flatness and finished edge conforms to engineering drawings and job specifications.	
Demonstrate the ability to turn an external diameter using a lathe and single-point tool and by measuring or checking with a vernier or micrometer, so that the turned diameter conforms to engineering drawings and job specifications.	
Demonstrate the ability to drill a hole using a lathe, center-drill, drills, and tailstock, so that the diameter and depth of the drilled hole conforms to engineering drawings and job specifications.	
Demonstrate the ability to bore an internal diameter using a lathe and boring bars mounted in a tool post, so that the close-toleranced internal diameters conform to engineering drawings and job specifications.	
Demonstrate the ability to ream a hole using a lathe, center-drill, drills, reamers, and tail-stock, and by measuring or checking with vernier, micrometer, and gauges so that the depth and diameter of the reamed hole conforms to job specifications.	
Demonstrate the ability to tap a hole using a lathe, taps, tapping head, and tailstock, so that the depth, diameter, and thread pitch of the tapped hole conforms to job specifications.	
Demonstrate the ability to turn an internal or external thread using a lathe and single-point tool bit and by measuring or checking with thread micrometers and thread plug gauge (go-no-go), so that the pitch, geometrical form, and dimensional tolerance of the turned thread conforms to job specifications and thread standards.	
Demonstrate the ability to produce a taper using a lathe, offset tail stock, taper-turning attachment, and compound rest, and by measuring or checking with protractors, micrometers, vernier height gauges, or templates, so that the size and angle of turned taper conforms to job specifications.	
Demonstrate the ability to knurl cylindrical surface patterns using a lathe and knurling tools, so that the diameter, form, depth, and finish of the knurled surface patterns conform to job specifications.	
Demonstrate the ability to groove and part-off using a lathe and grooving or parting tools, so that the width, length, depth, and square of cut-offs conform to job specifications.	
Demonstrate the ability to maintain material identification by marking or stamping the workpiece and completing shop documentation to facilitate traceability of the final product or work-in-process and maintain inventory control in accordance with company standards.	



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Demonstrate the ability to deburr the workpiece using files, scrapers, emery cloth, sanders and hand or pedestal grinders to remove excess material and ensure safe handling in accordance with job specifications.	
Demonstrate the ability to perform final inspection using precision measuring instruments and checking devices including inside and outside micrometers, vernier height gauges or indicators, gauge blocks, and pin gauges to ensure that the tolerances and dimensions of the sawed workpiece to conform to job specifications.	
Demonstrate the ability to complete work documentation including tracking sheets, sign-off sheets, inspection reports, or procedure sheets to record the finalization of jobs and to facilitate traceability of work-in-process and ensure that data is recorded accurately and clearly in accordance with job specifications.	
Demonstrate the ability to practice good housekeeping in the workplace by cleaning up spills or leaks, keeping work area clean and clear of obstructions, and storing tools or equipment so that the potential for accident or injury is prevented and tools or equipment are in place and available in compliance with safety regulations.	

Standard: Milling - Apply a working knowledge for setting up, operating, or tending to machines that mill, plane, shape, groove, or profile metal work pieces to meet required specifications.

Performance Objective: Demonstrate the ability to safely setup and operate machine tools to perform routine milling operations.

Performance Indicator	Qualification Date/Initial
Demonstrate the ability to select milling cutting tools (end mills, face mills, shell cutters, slot drills, boring bars, slitting saws, and boring head) by using information from engineering drawings and job instructions to ensure that the tools selected are the correct ones needed to mill the workpiece to specifications.	
Demonstrate the ability to identify and prepare milling cutting tools by sharpening or replacing tools so that the cutting shape and angle is prepared for optimum cutting and personal safety in accordance with manufacturer's specifications and company standards.	
Demonstrate the ability to set-up and maintain milling adjustable support tools (indexing heads, vises, angle plates, sine bars, and tables) ensuring that the support tool is the correct one for the application and the workpiece is located and secured during machining in accordance with job specifications.	
Demonstrate the ability to set-up milling cutting tools to required operational alignments using arbors, collets, and drill chucks to ensure the tools are in position and held securely during machining in accordance with job specifications.	



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Demonstrate the ability to select speeds and feeds of lathe using speed and feed charts and in accordance with the size, type, and hardness of workpiece material, so that the mill performs optimum cutting without damage to workpiece, cutting tools, or machine and ensures personal safety in accordance with job specifications.	
Demonstrate the ability to perform fly-cutting using a milling machine, single-point tool bit, and required cutting fluid so that the size, shape, squareness, and flatness of the fly-cut workpiece conforms to job specifications.	
Demonstrate the ability to face-mill using a milling machine, multi-point tool bit, face mill, and required cutting fluids so that the size, shape, squareness, and flatness of the faced workpiece conform to job specifications.	
Demonstrate the ability to machine steps, cut-outs, angles, and open slots using a milling machine, end mill, and required cutting fluid so that the size, shape, and angle of the end-milled workpiece conforms to job specifications.	
Demonstrate the ability to machine a pocket or slot using a milling machine, slot drill, center cutting end mill, and required cutting fluid so that the size, shape, and angle of milled pockets or slots conform to job specifications.	
Demonstrate the ability to machine a hole using a milling machine, drill bits, reamers, slot drills, and required cutting fluid so that the diameter, depth, and tolerance of the milled hole conforms to job specifications.	
Demonstrate the ability to bore holes using a milling machine, boring bar, boring head, and required cutting fluid so that the diameter, finish, depth and location of the bored hole conforms to job specifications.	
Demonstrate the ability to deburr the workpiece using files, scrapers, emery cloth, sanders and hand or pedestal grinders to remove excess material and ensure safe handling in accordance with engineering drawings, job specifications.	
Demonstrate the ability to perform final inspection using precision measuring instruments and checking devices including inside and outside micrometers, vernier height gauges or indicators, gauge blocks, and pin gauges to ensure that the tolerances and dimensions of the sawed workpiece to conform to the engineering drawings and job specifications.	
Demonstrate the ability to complete work documentation including tracking sheets, sign-off sheets, inspection reports, or procedure sheets to record the finalization of jobs and to facilitate traceability of work-in-process and ensure that data is recorded accurately and clearly in accordance with engineering drawings and job specifications.	
Demonstrate the ability to practice good housekeeping in the workplace by cleaning up spills or leaks, keeping work area clean and clear of obstructions, and storing tools or equipment so that the potential for accident or injury is prevented and tools or equipment are in place and available in compliance with safety regulations.	



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Apprentice Signature:	Completed: MM/DD/YY
Mentor Signature:	Completed: MM/DD/YY
Supervisor Signature:	Completed: MM/DD/YY
Comments:	