



## The Manufacturers Association

### JOB QUALIFICATION STANDARD (JQS)

**Occupation:** MACHINIST (CNC)

**Work Process:** CNC Setup

**Practical Hours:** 2000 hrs.

**DOL Standard:** CNC Setup: Apply a working knowledge in the setup of Computer Numerical Controls (CNC) machines that execute milling, turning or grinding operations to meet required specifications.

**Performance Objective:** Demonstrate the ability to setup Computerized Numerically Controlled (CNC) machines using information from the job specifications to ensure that machining process selected is the correct one to make the parts or components.

Performance Indicator	Qualification Date/Initial
Demonstrate the ability to read and interpret blueprints for CNC Machining Operations.	
Demonstrate the ability to locate machining points from a datum point using the Cartesian Coordinate System, Absolute Dimensioning System, Incremental Dimensioning System and Polar Coordinate System.	
Demonstrate the ability to prepare a CNC set-up sheet to identify and describe all pertinent information needed for the setting up of machine tools in accordance with job specifications.	
Demonstrate the ability to input and process program data to the machine memory using information from machine-tool manual and programming data so that the data is input correctly to machine the part in accordance with the job process sheet.	
Demonstrate the ability to determine the tool path and calculate the proper coordinates to establish cutter start-point, cutter finish-point, and geometry of path in accordance with the set-up sheet and job specifications.	
Demonstrate the ability to identify, select, and set up CNC cutting tools and tooling (tool holders, end and face mills, carbide insert tools, center-drill, drill, taps, reamers, counter bores, and boring head) to pre-determined reference points outlined from the prepared sequence sheets and tool lists, to ensure that the tools and tooling selected are the correct ones to machine the workpiece efficiently and safely.	
Demonstrate the ability to identify, select, and set machine parameters (spindle feeds, table feeds, and power settings) using speed and feed charts and according to the type, size, grade, and hardness of the material to be cut so that the workpiece is machined efficiently and safely without damage to the tooling, machine, or workpiece and ensure personal safety in accordance with job specifications.	
Demonstrate the ability to position and align workpiece in CNC machine to specified datums and required alignments, using chucks, face plates, collets, vises, clamps, stops, and fixtures to locate and position the workpiece, avoid collisions, and, ensure maximum stability during machining in accordance with job specifications.	



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Demonstrate the ability to input and verify the part program at CNC machine controls by: performing a dry run; taking a test cut; interrupting machining; measuring and checking dimensions; making adjustments to machine feeds, speeds, and offsets; editing the program; taking a final cut; and, performing an inspection prior to the production run; to ensure that the dimensions, shape, and tolerances of the machined part conforms to job specifications.	
Demonstrate the ability to store and record a verified program on storage media (disks, drives, hard copy, or tapes) for future use so that programs can be retrieved and available for repeat machining jobs in accordance with job specifications.	
Demonstrate the ability to verify tool sequence, tool path, and collision avoidance program by performing a dry run and editing program as required to ensure that the workpiece is machined in accordance with job specifications.	
Demonstrate the ability to monitor the CNC machining process by interrupting machining, measuring or checking dimensions, and making adjustments to machine feeds, speeds, and offsets, so that the dimensions, shape, and tolerances of the machined workpiece are maintained during machining in conformance 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.	
Demonstrate the ability to perform daily, weekly and monthly Preventative Maintenance responsibilities.	

**Performance Objective:** Demonstrate the ability to safely set up and operate a CNC Lathe in accordance with the CNC Operational Plan.

Performance Indicator	Qualification Date/Initial
Demonstrate the ability to interpret setup sheets, part process sheets, blueprints, etc.	
Demonstrate the ability to install and true soft jaws into a CNC Lathe.	
Demonstrate the ability to assemble and load tools into a CNC Lathe.	
Demonstrate the ability to establish a machine reference point on a CNC Lathe.	
Demonstrate the ability to set initial tool offsets on a CNC Lathe.	
Demonstrate the ability to monitor and adjust offsets for accurate part production on a CNC Lathe.	



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Demonstrate the ability to load programs into a CNC Lathe.	
Demonstrate the ability to work all controls on the main control unit of a CNC Lathe.	
Demonstrate the ability to properly operate a CNC Lathe for test runs and production runs.	
Demonstrate the ability to replenish stock in the bar feeder, as necessary.	

**Performance Objective:** Demonstrate the ability to safely set up and operate a CNC Mill in accordance with the CNC Operational Plan.

Performance Indicator	Qualification Date/Initial
Demonstrate the ability to interpret setup sheets, part process sheets, blueprints, etc.	
Demonstrate the ability to install and align workholding devices on a CNC Mill.	
Demonstrate the ability to load and align materials into a CNC Mill.	
Demonstrate the ability to load tools into the CNC Mill.	
Demonstrate the ability to establish and set the machine reference on the CNC Mill.	
Demonstrate the ability to load programs into a CNC Mill.	
Demonstrate the ability to work all controls on the main control unit of a CNC Mill.	
Demonstrate the ability to properly operate a CNC Mill for test runs and production runs.	

**Performance Objective:** Demonstrate the ability to perform surface grinding operations in accordance with an Operational Plan.

Performance Indicator	Qualification Date/Initial
Demonstrate the ability to interpret setup sheets, part process sheets, blueprints, etc.	
Demonstrate the ability to select a grinding wheel for surface grinding.	
Demonstrate the ability to check the condition of the wheel for surface grinding.	
Demonstrate the ability to true, balance and dress a grinding wheel for surface grinding.	
Demonstrate the ability to locate and position the workpiece in a surface grinder.	
Demonstrate the ability to grind horizontal, vertical and angular flat surfaces during surface grinding.	
Demonstrate the ability to parallel grind workpieces on a surface grinder.	



**The Manufacturers Association**

**JOB QUALIFICATION STANDARD (JQS)**

**Performance Objective:** Demonstrate the ability to perform cylindrical grinding operations in accordance with an Operational Plan.

<b>Performance Indicator</b>	<b>Qualification Date/Initial</b>
Demonstrate the ability to interpret setup sheets, part process sheets, blueprints, etc.	
Demonstrate the ability to select a grinding wheel for cylindrical grinding.	
Demonstrate the ability to check the condition of the wheel for cylindrical grinding.	
Demonstrate the ability to true, balance and dress a grinding wheel for cylindrical grinding.	
Demonstrate the ability to locate and position the workpiece in a cylindrical grinder.	
Demonstrate the ability to grind horizontal, vertical and angular flat surfaces during cylindrical grinding.	

**Performance Objective:** Demonstrate the ability to perform pedestal/tool & cutter machine grinding operations in accordance with an Operational Plan.

<b>Performance Indicator</b>	<b>Qualification Date/Initial</b>
Demonstrate the ability to select the grinding wheel for pedestal/tool & cutter machine grinding.	
Demonstrate the ability to check grinding wheel condition for pedestal/tool & cutter machine grinding.	
Demonstrate the ability to select machine feeds and speeds for pedestal/tool & cutter machine grinding.	
Demonstrate the ability to sharpen a clamp tool in a pedestal grinder by setting up workholding devices including angle plate, magnetic holders, vises, chucks, centers, jigs, V-block, and mandrels, so that workpiece is aligned, secured, and stable during grinding operations.	
Demonstrate the ability to sharpen tools or cutters in a pedestal grinder by holding against grinding wheel, so that the ground cutting edge of tools and cutters conforms to tool geometry standards, to ensure optimum metal removal and finish.	
Demonstrate the ability to quench and cool cutters by following required procedures, so that cutters can be sharpened in accordance with engineering drawings, job specifications, and OSHA.	
Demonstrate the ability to check ground surfaces using surface gauges, fixed gauges, optical comparators, micrometers, and calipers, to ensure surface is finished in micro-inches or microns, as specified in engineering drawings and customer specifications.	
Demonstrate the ability to final finish tool or cutters using a finer abrasive wheel or whetstone so that the ground cutting edge of tools and cutters are ground in accordance with tool geometry standards, engineering drawings, and job specifications.	



**The Manufacturers Association**

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Demonstrate the ability to perform final inspection using precision measuring instruments and checking devices, fixed gauges, micrometers, optical comparators, calipers, and surfaces gauges, to ensure that the tolerances and dimensions of the sharpened workpiece conform to the engineering drawings and customer specifications.	
Demonstrate the ability to communicate with co-workers to identify previous job operations, availability of tools, parts, and machinery, scheduling requirements, and any other information needed to complete the grinding job, ensuring that the information communicated is clear, concise, and accurate.	
Demonstrate the ability to complete work documentation including tracking sheets, required sign-offs, inspection reports, and procedure sheets, to ensure the finalization of the workpiece, and to facilitate traceability of work in accordance with engineering drawings, customer specifications, and company procedures.	
Demonstrate the ability to practice good housekeeping in the workplace by cleaning up spills and leaks, keeping work area clean and clear of obstructions, and storing tools or equipment, so that the potential for accident or injury is minimized and tools or equipment are in place and available, in compliance with company procedures.	

<b>Apprentice Signature:</b>	<b>Completed:</b> MM/DD/YY
<b>Mentor Signature:</b>	<b>Completed:</b> MM/DD/YY
<b>Supervisor Signature:</b>	<b>Completed:</b> MM/DD/YY
<b>Comments:</b>	