



## Performance Based Objectives – Machine Tool\*

Sub-Topic	PBO No.	Performance Based Objective
Safety	MT-1	Identify, explain, and demonstrate safe working practices while in any machining environment, including the following: <ul style="list-style-type: none"> <li>- Metal cutting safety</li> <li>- Lathe safety</li> <li>- Milling machine safety</li> <li>- Drill press safety</li> <li>- Sawing safety</li> <li>- Manual and power tool safety</li> <li>- Measurement and layout safety</li> </ul>
Measurement Systems	MT-2	Explain dimensional measurement and its importance.
	MT-3	Review two systems of dimensional measurements: Define and explain the difference between U.S. Customary and Scientific International.
	MT-4	Define and explain the purpose and function of a machinist's rule.
	MT-5	Recognize and explain the difference between measurement accuracy and measurement precision.
	MT-6	Perform basic and precision measurement using: <ul style="list-style-type: none"> <li>- A decimal-inch machinist's rule.</li> <li>- A common fraction-inch rule</li> <li>- A zero to one inch micrometer.</li> <li>- A zero to 25 millimeter micrometer.</li> <li>- A six inch dial caliper.</li> <li>- A 150 mm dial caliper.</li> </ul>
	MT-7	Demonstrate common conversions between U.S. customary system and the S.I. Metric system.
	Manual and Power Machine Tool Use	MT-8
MT-9		Describe metal cutting processes and the production of shapes.
MT-10		Describe the operation of a horizontal lathe.
MT-11		Set up and operate an engine lathe.
MT-12		Describe the operation of a vertical milling machine.
MT-13		Set up and operate vertical milling machine.
MT-14		Describe the operation of a drill press.
MT-15		Set up and operate drill press.
MT-16		Describe the operation of metal cutting saws.
MT-17		Set up and operate horizontal and vertical band saws.
MT-18		Use hand and bench tools properly.
MT-19		Use power tools properly.
MT-20		Explain the function and operation of a bench vise.
MT-21		Describe the function and operation of a hacksaw.
MT-22	Describe the function and operation of a file.	





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Precision Layout	MT-23	Define the purpose and use of a surface plate.
	MT-24	Perform basic and precision layout.
	MT-25	Identify and explain safe use and care of a surface plate.
	MT-26	Explain the purpose of gauge blocks.
	MT-27	Explain how to build a gauge block stack, and the process of wringing gauge blocks.
	MT-28	Recognize bore gauges and explain their purpose.
	MT-29	Explain how to use a bore gauge.
	MT-30	Discuss an adjustable size bore gauge.
	MT-31	Measure lengths, widths, diameters, of various gauge block builds, gauge pins, and also convert inch measurement to metric.
	MT-32	Layout and install per blue print specifications, power drill and hand tap holes then install chamfers using the belt sander and pencil grinder.
	MT-33	Given a component drawing, describe the process from rough cut to finished part (machine tools used, order of use, etc.).
Band Saw Operations	MT-34	Describe the operation of a horizontal band saw.
	MT-35	Describe the operation of a vertical band saw.
	MT-36	Set up and operate horizontal band saw, deburr safely and proficiently sawing various size mild steel to blue print specifications.
Drill Press Operations	MT-37	Explain the operation of a floor drill press.
	MT-38	Describe the form and cutting action of twist drills.
	MT-39	Identify and explain the purpose of various of cutting fluids.
	MT-40	Describe the process of reaming, countersinking, counter boring, tapping, and chamfering.
	MT-41	Set up and operate drill press safely and proficiently, layout, drill, ream, chamfer, and assemble completed details per blue print specifications.
Lathe Operations	MT-42	Explain the operation of a manual lathe.
	MT-43	Identify six safety rules to follow before starting a lathe.
	MT-44	Identify ten safety rules to follow during operation of the lathe.
	MT-45	Describe the function and operation of a universal three-jaw and independent four-jaw lathe chucks.
	MT-46	Describe the function of three hand wheels used to feed the cutting tool.
	MT-47	Explain the operation of the two types of micrometer collars on the cross feed.
	MT-48	Recognize the function of two types of cuts performed on the lathe.
	MT-49	Explain the operation of automatic feed and describe the advantage.
	MT-50	Identify the two types of chamfer that can be created on the lathe.
	MT-51	Describe groove tools, threading tools, combination drill and countersink bit.
	MT-52	Tell how to drill a hole on a lathe.





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	MT-53	Set up and operate the lathe safely and proficiently, layout, face ends of journals to size, turn journals and chamfers to blue print specifications, drill, tap, and ream using the tailstock.
Mill Operations	MT-54	Describe the operation of a vertical mill.
	MT-55	Discuss six safety rules to be followed before starting a milling operation.
	MT-56	Describe the function and operation of the micrometer collars for the two movements of the knee.
	MT-57	Explain how backlash affects the accuracy of a mill, and describe the difference between climb and down milling.
	MT-58	Identify a step and explain the two methods used to locate the tool position when milling a step.
	MT-59	Explain the difference between a slot and a pocket.
	MT-60	Set up and operate milling machine safely and proficiently, layout using variety of measuring and layout tools, mill all sides parallel and perpendicular, mill keyways, slots, and pockets, drill, ream, tap, and counter sink per blueprint specifications.

\* A rework of the Machine Tool PBOs is underway and will be included in revision 3 of the list; CNC PBOs will be included on revision 3 of the list.

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