# Multi-State Advanced Manufacturing Consortium

*US DOL SPONSORED TAACCCT GRANT: TC23767*

## MSAMC Master Performance Based Objectives (PBO) Review Template

### Instructions

The following tab lists PBOs for the topic area ***Machine Tool*** . Please review each of the PBOs, and rate each PBO with one of the following ratings:

**1 = Skill or understanding is required for employees.**
**2 = Skill is useful, but is not crucial for employees.**
**3 = Skill is not useful for employees, or isn't relevant for typical work assignments.**
**0 = PBO is unclear.**

Additionally, for each PBO, note any comments or recommendations that you may have about how to improve the PBO. If any PBOs or skill sets seem to be missing from the list, please add them in the space at the bottom of the list.

| Please enter your information below | |
|---|---|
| Name: | |
| Company/Plant: | |
| Department/Division: | |
| Industry/Segment: | |
| Email: | |
| Phone: | |

# Machine Tool

*M-S AMC Industry Partner PBO Review*

**Please review the following PBOs to identify the appropriate skill set for a given job title / category / classification (see row 10 below).**

* In the "**Importance**" column, identify how important each PBO is for someone in the relevant position. For each PBO, type 1 if the PBO must be covered in the coursework, enter 2 if the PBO is helpful but not necessary and would not impair the performance of the employee in the workplace if missed, and enter 3 if the PBO would not benefit the student or doesn't apply to the typical work assignments. If you don't understand the PBO, enter 0.

* Note any comments or feedback for improving each PBO (in the "Comments" column).

**Note: It is the intention of competency based instruction to have each student individually demonstrate their proficiency of the skills indicated.**

Reviewing PBOs fc ***TYPE JOB TITLE HERE*** (from whose perspective are you rating PBO importance?)

| Sub-Topic | Level | Topic | PBO ID | Performance Based Objective (PBO) | Importance<br>1 = Need<br>2 = nice to have<br>3 = N/A<br>0= Don't understand | Comments<br>*Notes to improve the PBO, PBO is unclear, etc.* |
|---|---|---|---|---|---|---|
| **Safety** | **1** | **MT** | **1** | Identify, explain, and demonstrate safe working practices while in any machining environment, including the following:<br>- Metal cutting safety<br>- Lathe safety<br>- Milling machine safety<br>- Drill press safety<br>- Sawing safety<br>- Manual and power tool safety<br>- Measurement and layout safety | | |
| **Measurement Systems** | **1** | **MT** | **2** | Explain dimensional measurement and its importance. | | |
| | **1** | **MT** | **3** | Review two systems of dimensional measurements: Define and explain the difference between U.S. Customary and Scientific International. | | |
| | **1** | **MT** | **4** | Define and explain the purpose and function of a machinist's rule. | | |
| | **1** | **MT** | **5** | Recognize and explain the difference between measurement accuracy and measurement precision. | | |
| | **1** | **MT** | **6** | Perform basic and precision measurement using<br>- A decimal-inch machinist's rule.<br>- A common fraction-inch rule<br>- A zero to one inch micrometer.<br>- A zero to 25 milimeter micrometer.<br>- A six inch dial caliper.<br>- A 150 mm dial caliper. | | |
| | **1** | **MT** | **7** | Demonstrate common conversions between U.S. customary system and the S.I. Metric system. | | |
| **Manual and Power Machine Tool** | **1** | **MT** | **8** | Demonstrate knowledge of standard machine tool movements. | | |
| | **1** | **MT** | **9** | Describe metal cutting processes and the production of shapes. | | |
| | **1** | **MT** | **10** | Describe the operation of a horizontal lathe. | | |
| | **1** | **MT** | **11** | Set up and operate an engine lathe. | | |
| | **1** | **MT** | **12** | Describe the operation of a vertical milling machine. | | |
| | **1** | **MT** | **13** | Set up and operate vertical milling machine. | | |
| | **1** | **MT** | **14** | Describe the operation of a drill press. | | |
| | **1** | **MT** | **15** | Set up and operate drill press. | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Machine Tool Use** | **1** | **MT** | **16** | Describe the operation of metal cutting saws. | | |
| | **1** | **MT** | **17** | Set up and operate horizontal and vertical band saws. | | |
| | **1** | **MT** | **18** | Use hand and bench tools properly. | | |
| | **1** | **MT** | **19** | Use power tools properly. | | |
| | **1** | **MT** | **20** | Explain the function and operation of a bench vise. | | |
| | **1** | **MT** | **21** | Describe the function and operation of a hacksaw. | | |
| | **1** | **MT** | **22** | Describe the function and operation of a file. | | |
| **Precision Layout** | **1** | **MT** | **23** | Define the purpose and use of a surface plate. | | |
| | **1** | **MT** | **24** | Perform basic and precision layout. | | |
| | **1** | **MT** | **25** | Identify and explain safe use and care of a surface plate. | | |
| | **1** | **MT** | **26** | Explain the purpose of gauge blocks. | | |
| | **1** | **MT** | **27** | Explain how to build a gauge block stack, and the process of wringing gague blocks. | | |
| | **1** | **MT** | **28** | Recognize bore gauges and explain their purpose. | | |
| | **1** | **MT** | **29** | Explain how to use a bore gauge. | | |
| | **1** | **MT** | **30** | Discuss an adjustable size bore gauge. | | |
| | **1** | **MT** | **31** | Measure lengths, widths, diameters, of various gauge block builds, gauge pins, and also convert inch measurement to metric. | | |
| | **1** | **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. | | |
| | **1** | **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** | **1** | **MT** | **34** | Describe the operation of a horizontal band saw. | | |
| | **1** | **MT** | **35** | Describe the operation of a vertical band saw. | | |
| | **1** | **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** | **1** | **MT** | **37** | Explain the operation of a floor drill press. | | |
| | **1** | **MT** | **38** | Describe the form and cutting action of twist drills. | | |
| | **1** | **MT** | **39** | Identify and explain the purpose of various of cutting fluids. | | |
| | **1** | **MT** | **40** | Describe the process of reaming, countersinking, counter boring, tapping, and chamfering. | | |
| | **1** | **MT** | **41** | Set up and operate drill press safely and proficiently, layout, drill, ream, chamfer, and assemble completed details per blue print specifications. | | |
| **Lathe** | **1** | **MT** | **42** | Explain the operation of a manual lathe. | | |
| | **1** | **MT** | **43** | Identify six safety rules to follow before starting a lathe. | | |
| | **1** | **MT** | **44** | Identify ten safety rules to follow during operation of the lathe. | | |
| | **1** | **MT** | **45** | Describe the function and operation of a universal three-jaw and independent four-jaw laithe chucks. | | |
| | **1** | **MT** | **46** | Describe the function of three hand wheels used to feed the cutting tool. | | |
| | **1** | **MT** | **47** | Explain the operation of the two types of micrometer collars on the cross feed. | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Lathe Operations** | **1** | **MT** | **48** | Recognize the function of two types of cuts performed on the lathe. | | |
| | **1** | **MT** | **49** | Explain the operation of automatic feed and describe the advantage. | | |
| | **1** | **MT** | **50** | Identify the two types of chamfer that can be created on the lathe. | | |
| | **1** | **MT** | **51** | Describe groove tools, threading tools, combination drill and countersink bit. | | |
| | **1** | **MT** | **52** | Tell how to drill a hole on a lathe. | | |
| | **1** | **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** | **1** | **MT** | **54** | Describe the operation of a vertical mill. | | |
| | **1** | **MT** | **55** | Discuss six safety rules to be followed before starting a milling operation. | | |
| | **1** | **MT** | **56** | Describe the function and operation of the micrometer collars for the two movements of the knee. | | |
| | **1** | **MT** | **57** | Explain how backlash affects the accuracy of a mill, and describe the difference between climb and down milling. | | |
| | **1** | **MT** | **58** | Identify a step and explain the two methods used to locate the tool position when milling a step. | | |
| | **1** | **MT** | **59** | Explain the difference between a slot and a pocket. | | |
| | **1** | **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. | | |

| **Additions: Please add any additional objectives that we may have overlooked.** |
|---|
| |

**SAFETY DISCLAIMER:**

M-SAMC educational resources are in no way meant to be a substitute for occupational safety and health standards. No guarantee is made to resource thoroughness, statutory or regulatory compliance, and related media may depict situations that are not in compliance with OSHA and other safety requirements. It is the responsibility of educators/employers and their students/employees, or anybody using our resources, to comply fully with all pertinent OSHA, and any other, rules and regulations in any jurisdiction in which they learn/work. M-SAMC will not be liable for any damages or other claims and demands arising out of the use of these educational resources. By using these resources, the user releases the Multi-State Advanced Manufacturing Consortium and participating educational institutions and their respective Boards, individual trustees, employees, contractors, and sub-contractors from any liability for injuries resulting from the use of the educational resources.

**DOL DISCLAIMER:**

This product was funded by a grant awarded by the U.S. Department of Labor's Employment and Training Administration. The product was created by the grantee and does not necessarily reflect the official position of the U.S. Department of Labor. The Department of Labor makes no guarantees, warranties, or assurances of any kind, express or implied, with respect to such information, including any information on linked sites and including, but not limited to, accuracy of the information or its completeness, timeliness, usefulness, adequacy, continued availability, or ownership.

**RELEVANCY REMINDER:**

M-SAMC resources reflect a shared understanding of grant partners at the time of development. In keeping with our industry and college partner requirements, our products are continuously improved. Updated versions of our work can be found here: http://www.msamc.org/resources.html.