STATE OF WYOMING

MANUFACTURING CLUSTER AND
PRECISION MACHINING PATHWAY COMPETENCIES

Manufacturing Cluster

Cluster Level Core Competencies & Objectives

COMPETENCY

MFG1 The student will understand and apply safe practices and professional machine shop procedures

OBJECTIVES

MFG1-1 Understand and apply appropriate clothing protection appropriate to the task
MFG1-2 Locate and properly use protective equipment
MFG1-3 Identify hazardous and non-hazardous materials
MFG1-4 Understand and apply appropriate handling, lifting and transport of materials (hazardous and non-hazardous)
MFG1-5 Understand and apply proper storage, stacking and securing of materials (hazardous and non-hazardous)
MFG1-6 Apply appropriate disposal of hazardous and non-hazardous materials
MFG1-7 Demonstrate understanding of legal issues relating to disposal of materials
MFG1-8 Identify the purposes and use of MSDS sheets

COMPETENCY

MFG2 The student will demonstrate proper equipment safety practices

OBJECTIVES

MFG2-1 Maintain and use appropriate protective guards and equipment on machinery
MFG2-2 Select appropriate tool for the task
MFG2-3 Conduct pre-use inspection and set-up of tools
MFG2-4 Apply proper use of the tool (hand placement, minimum and max material sizes, feed rates)
MFG2-5 Demonstrate awareness of proper functioning during use of the tool
MFG2-6 Demonstrate maintenance of the tool (cleaning, lubrication, sharpening)

COMPETENCY

MFG 3 The student will demonstrate proper use of emergency equipment and procedures

MFG3-1 Demonstrate proper use of fire extinguisher
MFG3-2 Understand purpose and meaning of fire triangle (covers all areas)
MFG3-3 Understand and apply evacuation procedures
MFG3-4 Understand basic first aid to cuts and burns, eye wash, and blood-born pathogens

COMPETENCY

MFG 4 The student will use basic math and measuring skills

OBJECTIVES

MFG4-1 Demonstrate proper use of measuring devices
- Example: tape measure, rule and square

MFG4-2 Identify and apply appropriate unit of measurement
MFG4-3 Able to measure to a specified tolerance
MFG4-4 Convert fractions/decimals/metric
MFG4-5 Apply appropriate calculation to the task (add, subtract, multiply, divide)
MFG4-6 Perform basic layout techniques

COMPETENCY

MFG 5 The student will demonstrate knowledge and skills specific to the pathway

OBJECTIVES

MFG5-1 Student demonstrates an understanding of the different career paths and opportunities within a pathway
- Example (Welding Pathway): Student will demonstrate knowledge of welding opportunities in the oil and natural gas, heavy equipment manufacturing and mining industries within Wyoming.
- Example (Precision Machining Pathway): Student will demonstrate knowledge of precision machining in the industries within Wyoming

MFG5-2 The student will be able to interpret drawings, plans and control documents specific to the pathway
MFG5-3 The student will be able to identify generally used materials specific to the pathway
MFG5-4 The student will demonstrate ability to complete core processes within the pathway
MFG5-5 The student will demonstrate proper use of the tool in completing a specific process

Manufacturing Cluster

PRECISION MACHINING PATHWAY

Pathway Core Competencies & Objectives

COMPETENCY

PM1 The student will use basic math and measuring skills specific to Precision Machining.

OBJECTIVES

PM1-1 Perform basic trigonometric functions
PM1-2 Solve for unknown angles
PM1-3 Solve for unknown sides
PM1-4 Calculate bolt hole patterns
PM1-5 Apply proper measuring techniques
PM1-6 Demonstrate how to check calibration of various precision instruments.

COMPETENCY

PM2 The student will be able to interpret engineering drawings, plans and control documents.

OBJECTIVES

PM2-1 Review blueprint notes and dimensions
PM2-2 Explain basic blueprint terminology
PM2-3 Identify the types of dimensions
PM2-4 Identify general note symbols
PM2-5 Locate notes on a print
PM2-6 Interpret commonly used abbreviations and terminology
PM2-7 Determine tolerances associated with dimensions on a drawing
PM2-8 Identify and list the essential components found in the general drawing notes

COMPETENCY

PM3 The student will identify the basic layout of drawings.

OBJECTIVES

PM3-1 Identify types of lines within a drawing
PM3-2 Identify item number symbols

PM3-3 Identify general note symbols
PM3-4 List the essential components found in the title block
PM3-5 Locate bill of materials on a drawing
PM3-6 List the components found in the revision block

COMPETENCY

PM4 The student will identify basic types of drawings.

OBJECTIVES

PM4-1 Identify orthographic views
PM4-2 Identify positions of views (top, front, side, and auxiliary)
PM4-3 Visualize one or more views from a given view
PM4-4 Identify isometric views
PM4-5 Identify exploded isometric drawings
PM4-6 Identify assembly drawings

COMPETENCY

PM5 The student will be able to recognize different precision machining materials.

OBJECTIVES

PM5-1 Identify common materials and explain their desired properties
PM5-2 Describe general characteristics for carbon steels, tool steels, stainless steels, structural steels, cast irons, aluminum, and other commonly used metals

COMPETENCY

PM6 The student will apply and select proper measurement techniques and tools as they best relate to part characteristics and specified accuracy.

OBJECTIVES

PM6-1 Identify basic semi-precision measuring tools and describe their major applications
PM6-2 Identify precision measuring tools and describing their major applications
PM6-3 Demonstrate proper reading of tools to their finest precision
PM6-4 Demonstrate proper reading of tools to their finest graduation
PM6-5 Demonstrate proper manipulation and care of precision measuring tools

COMPETENCY

PM7 The student will be able to understand, plan and complete core processes in Precision Machining.

OBJECTIVES

PM7-1 Perform basic semi-precision and precision layout as necessary

PM7-2 Plan machining operations and write a plan of procedures

PM7-3 Use the machinery handbook as a reference

PM7-4 Calculate proper speeds, feeds, depth of roughing, and finish cuts for specific applications

PM7-5 Describe machine-ability and chip formation and make adjustments to calculate speeds, feeds, and depths of roughing and finish cuts for common machining applications (performance application)

PM7-6 Demonstrate order of operations to complete a specified task using milling, drilling, turning, and shaping machines

COMPETENCY

PM8 The student will demonstrate proper use of the hand tools in completing a specific process.

OBJECTIVES

PM8-1 Identify common hand tools and describe their basic applications.

PM8-2 Demonstrate the proper care and use of arbor and shop presses

PM8-3 Select necessary work holding devises and hand tools as dictated by the size and shape of the part plus the machining to be done

PM8-4 Select the most appropriate hand file and properly demonstrate its use

PM8-5 Correctly identify and use: hand taps; thread cutting dies; and thread gauges

PM8-6 Demonstrate the proper use and care of bench and pedestal grinders.

COMPETENCY

PM9 The student will demonstrate the proper use of machines in completing a specific process.

OBJECTIVES

PM9-1 For each machine, including Drilling, Vertical Milling, Metal Lathes, and Abrasive Machines, the student will demonstrate:

PM9-2 Proper setup and operation

PM9-3 Proper cleaning and care

PM9-4 Inspection of designated machines

PM9-5 Carry out a specific, appropriate operation within a specified time frame

Note: We would like to acknowledge that some schools within the state currently or will in the future offer the following. However, these topics are NOT OFFERED STATEWIDE due to size or time limitations and as such, competencies have not been identified at this time.

- Computer Numerical Controlled (CNC)
- Foundry work
- Plastics
- Principles of Technology
- Robotics
- Mechatronics
- Ornamental ironworking