Precision Machining Evaluation Tool

2020 Curricular Materials Review

Idaho CTE Trades and Industry (T&I) Precision Machining Program Standards[[1]](#footnote-1)

**Publisher information**

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* Title:
* Grade Level:
* ISBN #:
* Author:
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# Instructions:

Complete the Publisher Standards Alignment Report below. Please provide written justification as to how the material meets the standard along with location references. If a justification requires additional space, please submit response on an additional document.

# Publisher STANDARDS ALIGNMENT Report:

## Standard MACH.1.0: Fundamental Machining Skills

### Performance Standard MACH.1.1 Comply with Safe and Efficient Work Practices

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.1.1.1 Describe general shop safety rules and procedures (i.e., safety test). |  |
| CTE MACH.1.1.2 Describe OSHA in workplace safety. |  |
| CTE MACH.1.1.3 Comply with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities (i.e., personal protection equipment – PPE). |  |
| CTE MACH.1.1.4 Operate lab equipment according to safety guidelines. |  |
| CTE MACH.1.1.5 Identify and use proper lifting procedures and proper use of support equipment (i.e. rigging, chains, straps, cables). |  |
| CTE MACH.1.1. 6 Utilize proper ventilation procedures for working within the lab/shop area. |  |
| CTE MACH.1.1.7 Identify marked safety areas. |  |
| CTE MACH.1.1.8 Identify the location and the types of fire extinguishers and other fire safety equipment; demonstrate knowledge of the procedures for using fire extinguishers and other fire safety equipment. |  |
| CTE MACH.1.1.9 Identify the location and use of eye wash stations. |  |
| CTE MACH.1.1.10 Identify the location of the posted evacuation routes. |  |
| CTE MACH.1.1.11 Identify and wear appropriate clothing for lab/shop activities. |  |
| CTE MACH.1.1.12 Secure hair and jewelry for lab/shop activities. |  |
| CTE MACH.1.1.13 Demonstrate knowledge of the safety aspects of high voltage circuits. |  |
| CTE MACH.1.1.14 Locate and interpret safety data sheets (SDS). |  |
| CTE MACH.1.1.15 Perform housekeeping duties. |  |
| CTE MACH.1.1.16 Follow verbal instructions to complete work assignments. |  |
| CTE MACH.1.1.17 Follow written instructions to complete work assignments. |  |
| CTE MACH.1.1.18 Demonstrate knowledge of safety by completing a written safety test. |  |

### Performance Standard MACH.1.2 Maintain Immediate Work Area

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.1.2.1 Demonstrate proper shop safety rules and practices. |  |
| CTE MACH.1.2.2 Properly dispose of scrap metal chips, shavings, oil, and coolant. |  |
| CTE MACH.1.2.3 List shop operating rules and practices. |  |
| CTE MACH.1.2.4 Demonstrate procedures to clean and maintain work areas affected by operations of work and shop areas. |  |
| CTE MACH.1.2.5 Demonstrate safe working practices. |  |

### Performance Standard MACH.1.3 Perform Job-Related Mathematical Calculations

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.1.3.1 Accurately perform job related decimal and fraction calculations. |  |
| CTE MACH.1.3.2 Solve job-related problems using basic geometry. |  |
| CTE MACH.1.3.3 Accurately measure a work piece and compare measurements with blueprint specifications. |  |
| CTE MACH.1.3.4 Calculate the amount of material to be removed to obtain correct limits for secondary operations. |  |
| CTE MACH.1.3.5 Solve job-related problems using mathematical handbooks, charts, and tables. |  |
| CTE MACH.1.3.6 Convert measurements from English to metric and from metric to English units. |  |
| CTE MACH.1.3.7 Calculate machine speeds and feeds using appropriate formulas. |  |

### Performance Standard MACH.1.4 Read, Interpret, and Sketch Blueprints

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.1.4.1 Interpret line types. |  |
| CTE MACH.1.4.2 Read and interpret title blocks. |  |
| CTE MACH.1.4.3 Read and interpret change orders on working and assembly prints. |  |
| CTE MACH.1.4.4 Read and interpret nomenclature. |  |
| CTE MACH.1.4.5 Make shop sketches. |  |
| CTE MACH.1.4.6 Read and interpret blueprints, including geometric dimensioning and tolerancing. |  |
| CTE MACH.1.4.7 Determine and interpret reference information used in performing machining work. |  |

### Performance Standard MACH.1.5 Demonstrate Proficiency in Machine Planning

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.1.5.1 Identify proper order of operations. |  |
| CTE MACH.1.5.2 Identify proper machines. |  |
| CTE MACH.1.5.3 Select proper work holding/fixturing. |  |
| CTE MACH.1.5.4 Select proper tooling. |  |

### Performance Standard MACH.1.6 Perform Measuring Operations

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.1.6.1 Read and measure with steel rules and calipers. |  |
| CTE MACH.1.6.2 Read and measure with micrometers. |  |
| CTE MACH.1.6.3 Read and measure with Vernier tools. |  |
| CTE MACH.1.6.4 Read and measure with dial indicators. |  |
| CTE MACH.1.6.5 Measure using a surface plate. |  |
| CTE MACH.1.6.6 Read and interpret surface finish. |  |

### Performance Standard MACH.1.7 Perform Maintenance on Machines and Tools

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.1.7.1 Inspect work areas to assure a safe working environment. |  |
| CTE MACH.1.7.2 Lubricate equipment parts. |  |
| CTE MACH.1.7.3 Clean and store hand tools, cutters, fixtures, jigs, and attachments. |  |
| CTE MACH.1.7.4 Inspect and repair hand tools. |  |
| CTE MACH.1.7.5 Inspect drive pulleys or belts. |  |
| CTE MACH.1.7.6 Select lubricants for machining operations. |  |
| CTE MACH.1.7.7 Inspect equipment for safe operational conditions. |  |
| CTE MACH.1.7.8 Store grinding wheels and precision tools. |  |

## Standard MACH.2.0: Perform Bench Work Skills

### Performance Standard MACH.2.1 Identify Proper Hand Tools, Usage, and Applications

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.2.1.1 Use proper hammer types. |  |
| CTE MACH.2.1.2 Use proper punches, stamps, chisels. |  |
| CTE MACH.2.1.3 Use proper assembly tools. |  |

### Performance Standard MACH.2.2 Cut Materials by Using Hand Hacksaws

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.2.2.1 Explain the safety precautions/procedures for use of a hand hacksaw. |  |
| CTE MACH.2.2.2 Determine teeth per inch on various hacksaw blades. |  |
| CTE MACH.2.2.3 Describe the applications for saw blades with different ratios of tooth pitch. |  |
| CTE MACH.2.2.4 Demonstrate the correct method of sawing materials with a hand hacksaw. |  |

### Performance Standard MACH.2.3 Cut Threads Using Hand Taps and Dies

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.2.3.1 Explain safety precautions/procedures for threading with taps and dies. |  |
| CTE MACH.2.3.2 Identify and explain the use of the three taps used for threading a blind hole. |  |
| CTE MACH.2.3.3 Select cutting fluids. |  |
| CTE MACH.2.3.4 Describe the procedure for cutting internal and external threads with a tap or die. |  |
| CTE MACH.2.3.5 Explain the correct procedure to align a tap with the hole. |  |

### Performance Standard MACH.2.4 Ream Holes Using Hand Reamers

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.2.4.1 Demonstrate the proper method of hand reaming holes using both adjustable and non-adjustable reamers. |  |
| CTE MACH.2.4.2 Explain the types of lubricants and their applications to reaming. |  |
| CTE MACH.2.4.3 Explain the correct drill sizes as they relate to the various sizes of reamers. |  |

### Performance Standard MACH. 2.5 Remove Damaged Screw and Other Hardware

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.2.5.1 Explain the safety precautions/procedures for using easy outs and tap extractors. |  |
| CTE MACH.2.5.2 Explain the purpose of easy outs and tap extractors. |  |
| CTE MACH.2.5.3 Determine the correct drill sizes used with various easy outs. |  |
| CTE MACH.2.5.4 Determine the correct tap extractor for various taps. |  |
| CTE MACH.2.5.5 Remove damaged screws. |  |

### Performance Standard MACH. 2.6 Set Up and Use Arbor Press Broaches

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.2.6.1 Determine proper broach size. |  |
| CTE MACH.2.6.2 Explain why broaches have to shimmed. |  |
| CTE MACH.2.6.3 Explain why lubricant is required. |  |
| CTE MACH.2.6.4 Cut splines and keyways utilizing broaches, bushings, shims and arbor presses. |  |

### Performance Standard MACH. 2.7 Deburr Work Pieces

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.2.7.1 Select proper deburring tool. |  |
| CTE MACH.2.7.2 Demonstrate how to properly hold deburring tool and machinist scrapers. |  |
| CTE MACH.2.7.3 Demonstrate how to sharpen machinist scrapers. |  |
| CTE MACH.2.7.4 Deburr work pieces to required tolerances. |  |

## Standard MACH.3.0: Set Up and Operate Power Saws

### Performance Standard MACH. 3.1 Comply with Safe and Efficient Work Practices

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.3.1.1 Explain what could be the possible injuries resulting from improper safety precautions. |  |
| CTE MACH.3.1.2 Identify hazardous components of saws. |  |
| CTE MACH.3.1.3 Demonstrate knowledge of safety by completing a written safety test. |  |

### Performance Standard MACH. 3.2 Remove and Replace Saw Blades

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.3.2.1 Explain why the teeth of the blade must point in the correct direction for each type of machine. |  |
| CTE MACH.3.2.2 Explain why the blades of reciprocating saws must be elevated a certain distance above the work piece before starting the machine. |  |
| CTE MACH.3.2.3 Describe the procedures for replacing saw blades. |  |
| CTE MACH.3.2.4 Replace blades in hand and reciprocating saws. |  |

### Performance Standard MACH. 3.3 Select Appropriate Blades to Perform Given Sawing Operations

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.3.3.1 Explain how the width of the blade and radius desired in contour cutting have a direct effect on each other. |  |
| CTE MACH.3.3.2 Explain how the number of teeth per inch and the thickness of the work piece affect each other. |  |
| CTE MACH.3.3.3 Describe a bi-metal saw blade for a reciprocating type machine. |  |

### Performance Standard MACH. 3.4 Select and Set Speeds For Sawing Operations

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.3.4.1 Select the correct cutting speed for specific material. |  |
| CTE MACH.3.4.2 Explain how coolant can affect speeds and feeds. |  |

### Performance Standard MACH. 3.5 Measure and Cut Off Materials Using Power Saws

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.3.5.1 Explain the safety precautions/procedures before operating power saws. |  |
| CTE MACH.3.5.2 Determine the proper amount of material that must be left on a work piece for machining. |  |
| CTE MACH.3.5.3 Describe procedure and cut material to layout or scribed line. |  |

### Performance Standard MACH. 3.6 Cut and Weld Band Saw Blades

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.3.6.1 Perform proper saw blade welding operation. |  |
| CTE MACH.3.6.2 Describe the procedures for measuring and cutting saw blades to length. |  |
| CTE MACH.3.6.3 Explain the reasons for annealing the saw blade after the welding operation. |  |
| CTE MACH.3.6.4 Describe the procedures for grinding a saw blade before installation. |  |
| CTE MACH.3.6.5 Describe the procedure for selecting the proper guides. |  |

### Performance Standard MACH. 3.7 Set Up and Operate Saws for Angular Cutting

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.3.7.1 Explain the reasons for cutting as close to the layout lines as possible. |  |
| CTE MACH.3.7.2 Explain the reason for cutting angles on a band saw as opposed to using other machines. |  |
| CTE MACH.3.7.3 Set up a saw for angular cutting. |  |
| CTE MACH.3.7.4 Perform an angular cut on a work piece. |  |

## Standard MACH.4.0: Set Up and Operate Pedestal Grinders

### Performance Standard MACH.4.1 Comply with Safe and Efficient Work Practices

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.4.1.1 Demonstrate the operation of pedestal grinders’ safety devices. |  |
| CTE MACH.4.1.2 Demonstrate knowledge of safety by completing a written safety test. |  |

### Performance Standard MACH.4.2 Identify Parts of the Pedestal Grinder and Know Their Function

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.4.2.1 Identify types of pedestal grinders. |  |
| CTE MACH.4.2.2 Identify major parts and their functions. |  |

### Performance Standard MACH.4.3 Select Appropriate Grinding Types

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.4.3.1 Understanding and selecting proper wheel type. |  |

### Performance Standard MACH.4.4 Mount Grinding Wheels

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.4.4.1 Explain how to determine if a wheel is cracked before mounting. |  |
| CTE MACH.4.4.2 Explain the importance of cleanliness when mounting wheel. |  |
| CTE MACH.4.4.3 Explain the importance of the blotters on the wheel. |  |
| CTE MACH.4.4.4 Explain the reasons for the manufacturer printing the operating speed on grinding wheels. |  |
| CTE MACH.4.4.5 Explain the safety precautions in regard to the diameter of the flanges in relationship to the diameter of the wheel. |  |
| CTE MACH.4.4.6 Explain procedure to determine how tight the wheel flanges should be. |  |
| CTE MACH.4.4.7 Dress wheel and adjust wheel guard and tool rest. |  |

### Performance Standard MACH.4.5 Set Up Tool Rests

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.4.5.1 Explain the purpose of the tool rest. |  |
| CTE MACH.4.5.2 Demonstrate the proper procedure required for adjusting tool rest. |  |

### Performance Standard MACH.4.6 Dress Grinding Wheel

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.4.6.1 Identity the different types of wheel dressers. |  |
| CTE MACH.4.6.2 Demonstrate the procedure for dressing and truing a grinding wheel. |  |

## Standard MACH.5.0: Hand-Sharpen Cutting Tools

### Performance Standard MACH.5.1 Comply with Safe and Efficient Work Practices

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.5.1.1 Demonstrate knowledge of safety by completing a written safety test. |  |

### Performance Standard MACH.5.2 Grind High Speed Tool Bits

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.5.2.1 Understand selection of the proper grinding wheel. |  |
| CTE MACH.5.2.2 Identify and properly grind the appropriate clearances, i.e. rake, relief and radius. |  |

### Performance Standard MACH.5.3 Grind Brazed Carbide Tool Bits

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.5.3.1 Understand selection of the proper grinding wheel. |  |
| CTE MACH.5.3.2 Identify and properly grind the appropriate clearances, i.e. rake, relief, and radius. |  |

### Performance Standard MACH.5.4 Grind Drill Bits

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.5.4.1 Identify the parts of the drill bit. |  |
| CTE MACH.5.4.2 Describe the amount of lip clearance a drill must have to perform correctly. |  |
| CTE MACH.5.4.3 Explain why a drill bit must have the same lip angle and length. |  |
| CTE MACH.5.4.4 Discuss why different drill point angles are ground for different materials. |  |
| CTE MACH.5.4.5 Describe and demonstrate the procedures for hand sharpening a drill bit. |  |
| CTE MACH.5.4.6 Describe the procedure for correcting a thick web on a drill bit. |  |

## Standard MACH.6.0: Set Up and Operate Lathes

### Performance Standard MACH.6.1 Comply with Safe and Efficient Work Practices

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.6.1.1 Explain the need for safety glasses. |  |
| CTE MACH.6.1.2 Explain the hazards of chip handling. |  |
| CTE MACH.6.1.3 Explain the set up hazards. |  |
| CTE MACH.6.1.4 Explain the chuck removal and installation hazards. |  |
| CTE MACH.6.1.5 Explain the hazards of work piece burrs. |  |
| CTE MACH.6.1.6 Explain the proper housekeeping and tool hazards. |  |
| CTE MACH.6.1.7 Demonstrate the knowledge of safety by completing a written safety test. |  |

### Performance Standard MACH.6.2 Identify the Parts of the Lathe

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.6.2.1 Explain the major parts of the lathe and their functions. |  |

### Performance Standard MACH.6.3 Set Up an Engine Lathe

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.6.3.1 Explain the relevant safety precautions/procedures for mounting/removing chucks on lathes. |  |
| CTE MACH.6.3.2 Explain how to operate a lathe. |  |
| CTE MACH.6.3.3 Demonstrate the correct selection, installation, and use of work holding devices. |  |

### Performance Standard MACH.6.4 Secure Tools, Tool Holders, and Fixtures or Attachments

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.6.4.1 Describe the proper selection of tool holding devices. |  |
| CTE MACH.6.4.2 Describe the use of tool holders, fixtures and attachments. |  |
| CTE MACH.6.4.3 Describe the mounting of tool bits. |  |

### Performance Standard MACH.6.5 Select and Set Feeds and Speeds

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.6.5.1 Locate, speed and feed chart on each machine. |  |
| CTE MACH.6.5.2 List spindle speed formula and calculate appropriate RMACH. |  |
| CTE MACH.6.5.3 Demonstrate correct speed and feed application. |  |

### Performance Standard MACH.6.6 Set Up Lathes and Face Work Pieces Held In Chunks

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.6.6.1 Describe the uses of carbide, high speed, and cutting tools as applied to facing operations. |  |
| CTE MACH.6.6.2 Calculate cutting speeds and feeds for facing operations. |  |
| CTE MACH.6.6.3 Describe the procedure for facing. |  |
| CTE MACH.6.6.4 Select the correct cutting fluids for facing. |  |
| CTE MACH.6.6.5 Face a work piece to specifications. |  |

### Performance Standard MACH.6.7 Rough-Cut and Finish-Cut with Lathes

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.6.7.1 Calculate the correct speeds and feeds for the appropriate operation. |  |
| CTE MACH.6.7.2 Explain tool position and tool geometry (angles). |  |
| CTE MACH.6.7.3 Define and make trial cuts. |  |
| CTE MACH.6.7.4 Using appropriate measuring tools, measure work piece. |  |
| CTE MACH.6.7.5 Perform required rough and finish cuts to specifications. |  |

### Performance Standard MACH.6.8 Perform Lathe Deburring Operations

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.6.8.1 Identify and demonstrate proper selection and use of deburring tools. |  |
| CTE MACH.6.8.2 Calculate the correct speeds for deburring operation. |  |
| CTE MACH.6.8.3 Explain grit size of abrasive clothes. |  |
| CTE MACH.6.8.4 File, polish and deburr a work piece. |  |
| CTE MACH.6.8.5 Explain the use of appropriate inspection gages. |  |

### Performance Standard MACH.6.9 Align Lathe Centers Using Accurate Methods

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.6.9.1 Calculate the correct speeds for deburring operation. |  |
| CTE MACH.6.9.2 Align centers using the point to point method. |  |
| CTE MACH.6.9.3 Align centers using a precision ground centered shaft. |  |
| CTE MACH.6.9.4 Align centers using the cut and measuring method. |  |

### Performance Standard MACH.6.10 Drill with Lathes

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.6.10.1 Describe the procedures for drilling on a lathe. |  |
| CTE MACH.6.10.2 Calculate speeds for drilling operations. |  |
| CTE MACH.6.10.3 Select the correct cutting fluids for drilling operations. |  |
| CTE MACH.6.10.4 Drill a hole in a work piece. |  |

### Performance Standard MACH.6.11 Countersink Holes with Lathes

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.6.11.1 Describe the procedures for countersinking holes on a lathe. |  |
| CTE MACH.6.11.2 Calculate speeds for countersinking operations. |  |
| CTE MACH.6.11.3 Select the correct cutting fluid for countersinking operations. |  |
| CTE MACH.6.11.4 Countersink a hold in a work piece. |  |
| CTE MACH.6.11.5 Explain the use of appropriate inspection gages. |  |

### Performance Standard MACH.6.12 Ream Holes with Lathes

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.6.12.1 Describe the procedures for reaming a hole on a lathe. |  |
| CTE MACH.6.12.2 Calculate speeds for reaming a hole. |  |
| CTE MACH.6.12.3 Select the correct cutting fluid for reaming operations. |  |
| CTE MACH.6.12.4 Ream a hole in a work piece. |  |

### Performance Standard MACH.6.13 Tap Threads with Lathes

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.6.13.1 Select the proper tap for the operation. |  |
| CTE MACH.6.13.2 Determine tap drill size using the charts and formulas. |  |
| CTE MACH.6.13.3 Describe the procedures for tapping threads with a lathe. |  |
| CTE MACH.6.13.4 Calculate speeds for tapping operations. |  |
| CTE MACH.6.13.5 Select the correct cutting fluid for tapping operations. |  |
| CTE MACH.6.13.6 Tap a hole in a work piece. |  |
| CTE MACH.6.13.7 Explain the use of appropriate inspection gages. |  |

### Performance Standard MACH.6.14 Counter Bore Holes with Lathes

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.6.14.1 Describe the procedures for counter boring on a lathe. |  |
| CTE MACH.6.14.2 Calculate speeds for counter boring operations. |  |
| CTE MACH.6.14.3 Select the correct cutting fluid for counter boring operations. |  |
| CTE MACH.6.14.4 Counter bore a hole in a work piece. |  |
| CTE MACH.6.14.5 Explain the use of appropriate inspection gages. |  |

### Performance Standard MACH.6.15 Bore Holes with Lathes

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.6.15.1 Describe the procedures for boring holes. |  |
| CTE MACH.6.15.2 Select the correct tool and tool holder for boring holes. |  |
| CTE MACH.6.15.3 Calculate speeds and feeds for boring operations on lathes. |  |
| CTE MACH.6.15.4 Select the correct cutting fluids for boring. |  |
| CTE MACH.6.15.5 Bore a hole in a work piece. |  |

### Performance Standard MACH.6.16 Knurl Parts with Lathes

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.6.16.1 Describe the procedures for knurling. |  |
| CTE MACH.6.16.2 Select the correct tool and tool holder for knurling. |  |
| CTE MACH.6.16.3 Calculate speeds and feeds for knurling. |  |
| CTE MACH.6.16.4 Select the correct cutting fluids for knurling. |  |
| CTE MACH.6.16.5 Knurl a work piece. |  |
| CTE MACH.6.16.6 Explain the use of inspection gages. |  |

### Performance Standard MACH.6.17 Cut External Threads with Lathes

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.6.17.1 Describe the procedures for cutting external threads. |  |
| CTE MACH.6.17.2 Explain the formulas used in the three wire system for measuring external threads. |  |
| CTE MACH.6.17.3 Select appropriate speeds for cutting external threads. |  |
| CTE MACH.6.17.4 Select the correct cutting fluid for threading operations. |  |
| CTE MACH.6.17.5 Calculate thread depth. |  |
| CTE MACH.6.17.6 Calculate total in feed of compound. |  |
| CTE MACH.6.17.7 Determine depth per pass. |  |
| CTE MACH.6.17.8 Determine compound off-set angle (right or left hand threads). |  |
| CTE MACH.6.17.9 Cut external threads on a work piece. |  |
| CTE MACH.6.17.10 Explain the use of inspection gages. |  |

### Performance Standard MACH.6.18 Cut Threads with Lathes

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.6.18.1 Describe the procedures for chasing threads. |  |
| CTE MACH.6.18.2 Select appropriate speeds for chasing external threads. |  |
| CTE MACH.6.18.3 Select the correct cutting fluid for threading operations. |  |
| CTE MACH.6.18.4 Determine depth per pass. |  |
| CTE MACH.6.18.5 Determine compound off-set angle (right or left hand threads). |  |
| CTE MACH.6.18.6 Chase threads on a work piece. |  |

### Performance Standard MACH.6.19 Cut Internal Threads with Lathes

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.6.19.1 Describe the procedures for cutting internal threads |  |
| CTE MACH.6.19.2 Explain the use of appropriate inspection gages. |  |
| CTE MACH.6.19.3 Select the appropriate speeds for cutting internal threads. |  |
| CTE MACH.6.19.4 Select the correct cutting fluid for threading operations. |  |
| CTE MACH.6.19.5 Calculate thread depth. |  |
| CTE MACH.6.19.6 Calculate total in feed of compound. |  |
| CTE MACH.6.19.7 Determine depth per pass. |  |
| CTE MACH.6.19.8 Determine compound off-set angle (right or left hand threads). |  |
| CTE MACH.6.19.9 Cut external threads on a work piece. |  |

### Performance Standard MACH.6.20 Set Up and Perform Taper Turning with Taper Attachments

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.6.20.1 Explain the use of taper attachments. |  |
| CTE MACH.6.20.2 Describe the procedures for cutting external tapers. |  |
| CTE MACH.6.20.3 Calculate speeds and feeds for external tapering operations. |  |
| CTE MACH.6.20.4 Explain how to inspect a taper. |  |
| CTE MACH.6.20.5 Select the correct cutting fluids for external tapering operations. |  |
| CTE MACH.6.20.6 Turn an external taper on a work piece. |  |
| CTE MACH.6.20.7 Explain the use of appropriate inspection gages. |  |

### Performance Standard MACH.6.21 Set Up and Perform Taper Turning with Compound Rest

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.6.21.1 Explain the procedure for cutting a taper utilizing the compound rest. |  |
| CTE MACH.6.21.2 Calculate speed for taper turning. |  |
| CTE MACH.6.21.3 Explain how to inspect a taper. |  |
| CTE MACH.6.21.4 Select the correct cutting fluids for taper turning operations. |  |
| CTE MACH.6.21.5 Turn a taper on a work piece. |  |
| CTE MACH.6.21.6 Explain the use of appropriate inspection gages. |  |

### Performance Standard MACH.6.22 Perform Contour, Angular, or Radius Cuts with Lathes

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.6.22.1 Describe the procedures for angular concave or contour cuts with lathes. |  |
| CTE MACH.6.22.2 Explain the proper use of radius gages. |  |
| CTE MACH.6.22.3 Calculate speeds for free hand forming operations. |  |
| CTE MACH.6.22.4 Describe the procedures for free hand forming concave and convex radii. |  |
| CTE MACH.6.22.5 Select the correct cutting fluids. |  |
| CTE MACH.6.22.6 Cut contour, concave, and angular surfaces on a work piece. |  |
| CTE MACH.6.22.7 Explain the use of appropriate inspection gages. |  |

### Performance Standard MACH.6.23 Set Up and Use Follower and Steady-Rests

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.6.23.1 Describe the use of follower rests and steady-rests. |  |
| CTE MACH.6.23.2 Install steady rest or follower rest and adjust to part. |  |
| CTE MACH.6.23.3 Turn work to size with proper follow and steady rest setup. |  |
| CTE MACH.6.23.4 Face and center drill part using steady-rest. |  |
| CTE MACH.6.23.5 Explain the use of appropriate inspection gages. |  |

### Performance Standard MACH.6.24 Set Up Face Plates and Lathe Dogs

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.6.24.1 Describe the procedure to install work using a face plate and lathe dog. |  |
| CTE MACH.6.24.2 Describe the use of the face plate and the importance of counter-balancing the work piece. |  |
| CTE MACH.6.24.3 Describe the procedure for clamping and aligning part to face plate. |  |

## Standard MACH.7.0: Set Up and Operate Milling Machines

### Performance Standard MACH.7.1 Comply with Safe and Efficient Work Practices

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.7.1.1 Describe general shop safety rules and procedures (i.e. safety test). |  |
| CTE MACH.7.1.2 Describe OSHA in workplace safety. |  |
| CTE MACH.7.1.3 Comply with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities (i.e., personal protection equipment (PPE). |  |
| CTE MACH.7.1.4 Operate lab equipment according to safety guidelines. |  |
| CTE MACH.7.1.5 Identify and use proper lifting procedures and proper use of support equipment (i.e. rigging, chains, straps, cables). |  |
| CTE MACH.7.1.6 Utilize proper ventilation procedures for working within the lab/shop area. |  |
| CTE MACH.7.1.7 Identify marked safety areas. |  |
| CTE MACH.7.1.8 Identify the location and the types of fire extinguishers and other fire safety equipment; demonstrate knowledge of the procedures for using fire extinguishers and other fire safety equipment. |  |
| CTE MACH.7.1.9 Identify the location and use of eye wash stations. |  |
| CTE MACH.7.1.10 Identify the location of the posted evacuation routes. |  |
| CTE MACH.7.1.11 Identify and wear appropriate clothing for lab/shop activities. |  |
| CTE MACH.7.1.12 Secure hair and jewelry for lab/shop activities. |  |
| CTE MACH.7.1.13 Demonstrate knowledge of the safety aspects of high voltage circuits. |  |
| CTE MACH.7.1.14 Locate and interpret safety data sheets (SDS). |  |
| CTE MACH.7.1.15 Perform housekeeping duties. |  |
| CTE MACH.7.1.16 Follow verbal instructions to complete work assignments. |  |
| CTE MACH.7.1.17 Follow written instructions to complete work assignments. |  |
| CTE MACH.7.1.18 Demonstrate knowledge of safety by completing a written safety test. |  |

### Performance Standard MACH.7.2 Identify the Parts of the Horizontal and Vertical Milling Machines and Know Their Functions

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.7.2.1 Describe the function of major parts. |  |

### Performance Standard MACH.7.3 Lubricate Milling Machines

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.7.3.1 Explain the safety precautions procedures for cleaning, lubricating and inspecting the milling machine. |  |
| CTE MACH.7.3.2 Explain the reasons for performing routine cleaning, inspection, and lubrication of milling machines. |  |
| CTE MACH.7.3.3 Determine the proper lubricants to be used for milling machines. |  |
| CTE MACH.7.3.4 Explain the meaning of the terms (a) climb; (b) conventional milling. |  |
| CTE MACH.7.3.5 Describe the procedures for cleaning, lubricating and inspecting the milling machine. |  |
| CTE MACH.7.3.6 Lubricate a milling machine. |  |

### Performance Standard MACH.7.4 True Up the Head and Align Milling Machine Fixtures

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.7.4.1 Explain the safety precautions procedures in alignment of heads. |  |
| CTE MACH.7.4.2 Explain the operation of a swivel head on a mill. |  |
| CTE MACH.7.4.3 Explain the use of dial indicator for aligning swivel heads. |  |
| CTE MACH.7.4.4 Align a vise on a milling table. |  |
| CTE MACH.7.4.5 Align a head of a milling machine. |  |

### Performance Standard MACH.7.5 Select and Set Feeds and Speeds for Milling Work

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.7.5.1 List the correct cutting speed and feed for various materials. |  |
| CTE MACH.7.5.2 Set correct feeds and speeds on a milling machine for various materials. |  |

### Performance Standard MACH.7.6 Square up Work Pieces with a Table Vise

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.7.6.1 Calculate the correct speeds and feed for various cutters. |  |
| CTE MACH.7.6.2 Describe the procedures for setting-up and machining a work piece parallel and square. |  |
| CTE MACH.7.6.3 Identify the correct cutting fluids for milling. |  |

### Performance Standard MACH.7.7 Perform End Milling

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.7.7.1 Calculate proper speeds, feeds and depth of cut with end milling. |  |
| CTE MACH.7.7.2 Describe the procedures for setting up and end milling a flat surface. |  |
| CTE MACH.7.7.3 Identify the correct cutting fluids for milling. |  |
| CTE MACH.7.7.4 End mill a flat surface. |  |

### Performance Standard MACH.7.8 Perform Fly-Cutting Operations

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.7.8.1 Define surface roughness, waviness, lay and identify their symbols. |  |
| CTE MACH.7.8.2 Explain the purpose of fly-cutters. |  |
| CTE MACH.7.8.3 Calculate speeds, feeds, and determine depth of cut for fly-cutting surfaces. |  |
| CTE MACH.7.8.4 Describe the procedures for fly-cutting surfaces. |  |
| CTE MACH.7.8.5 Fly-cut a work piece surface to required tolerances. |  |

### Performance Standard MACH.7.9 Drill Holes With a Milling Machine

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.7.9.1 Describe the procedures for using milling machine dials for accurate table positioning. |  |
| CTE MACH.7.9.2 Calculate the amount of table movement for each position. |  |
| CTE MACH.7.9.3 Describe the procedures for compensating for backlash out the lead screws. |  |
| CTE MACH.7.9.4 Calculate the correct speed and feed. |  |
| CTE MACH.7.9.5 Drill holes in a work piece to specified tolerances using a milling machine. |  |

### Performance Standard MACH.7.10 Perform Reaming Operations

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.7.10.1 Explain the uses of centerdrills, drills, and reamers. |  |
| CTE MACH.7.10.2 Calculate proper speeds and feeds for centerdrilling, drilling, and reaming operations. |  |
| CTE MACH.7.10.3 Describe the procedures for centerdrilling, drilling, and reaming on a milling machine. |  |
| CTE MACH.7.10.4 Identify the correct cutting fluids for centerdrilling, drilling and reaming. |  |
| CTE MACH.7.10.5 Determine the proper drill size for reaming. |  |
| CTE MACH.7.10.6 Ream a hole in a work piece holding required tolerances. |  |

### Performance Standard MACH.7.11 Cut External Keyways

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.7.11.1 Calculating proper speeds, feeds, and depth of cut when milling keyseats. |  |
| CTE MACH.7.11.2 Describe the procedures for setting up and milling keyseats. |  |
| CTE MACH.7.11.3 Identify the correct cutting fluids for milling keyseats. |  |
| CTE MACH.7.11.4 Determine keyway depth. |  |
| CTE MACH.7.11.5 End mill a keyseat in a work piece holding required tolerances. |  |

### Performance Standard MACH.7.12 Bore Holes with Milling Machines

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.7.12.1 Explain the procedures for accurately adjusting a boring head. |  |
| CTE MACH.7.12.2 Calculate speeds and feeds for boring operations. |  |
| CTE MACH.7.12.3 Describe the procedures for setting up and completing boring operations. |  |
| CTE MACH.7.12.4 Identify the correct cutting fluids for boring and counterboring. |  |
| CTE MACH.7.12.5 Bore a hole in a work piece using a boring head on a milling machine to required tolerances. |  |

### Performance Standard MACH.7.13 Perform Form Milling

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.7.13.1 Define the terms concave and convex as they pertain to milling cutters. |  |
| CTE MACH.7.13.2 Calculate speeds, feeds, and depth of cut for milling cutter. |  |
| CTE MACH.7.13.3 Describe the procedures for form milling. |  |
| CTE MACH.7.13.4 Identify the correct cutting fluids. |  |
| CTE MACH.7.13.5 Form mill a work piece to required tolerances. |  |

### Performance Standard MACH.7.14 Perform Indexing Operations Using a Dividing Head

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.7.14.1 Explain the calculations for the indexing head when performing differential indexing. |  |
| CTE MACH.7.14.2 Explain the proper technique for assembling gears in gear train. |  |
| CTE MACH.7.14.3 Define simple gearing and compound gearing. |  |

### Performance Standard MACH.7.15 Set Up and Operate Rotary Tables

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.7.15.1 Describe set up and clamping procedures for a rotary table. |  |
| CTE MACH.7.15.2 List the applications for a rotary table. |  |
| CTE MACH.7.15.3 Explain the procedures for avoiding backlash of rotary table and milling machine screws. |  |
| CTE MACH.7.15.4 Calculate the correct speeds for machining outside radius. |  |
| CTE MACH.7.15.5 Describe the procedure for milling outside radius using a rotary table. |  |
| CTE MACH.7.15.6 Identify the correct cutting fluids. |  |
| CTE MACH.7.15.7 Describe the procedures for centering spindle with rotary table. |  |

### Performance Standard MACH.7.16 Perform Cutting-Off Operation

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.7.16.1 Explain how to calculate depths, speeds and feeds for slitting saws. |  |
| CTE MACH.7.16.2 Explain how to set up work pieces with kickers to cut precision lengths. |  |
| CTE MACH.7.16.3 Cut work pieces to precision lengths. |  |
| CTE MACH.7.16.4 Slot various shapes of work pieces. |  |

### Performance Standard MACH.7.17 Set Up and Perform Slab Mill Operations

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.7.17.1 Explain the importance of maintaining a clean milling machine. |  |
| CTE MACH.7.17.2 Describe procedures for mounting cutter and arbor in the milling machine. |  |
| CTE MACH.7.17.3 Explain why the cutter should always be mounted on the arbor as close to the column of the milling machine as possible. |  |
| CTE MACH.7.17.4 Describe the procedures for slab milling operations. |  |
| CTE MACH.7.17.5 Identify correct cutting fluid. |  |
| CTE MACH.7.17.6 Explain the purpose of the applications for using climb milling and conventional milling. |  |

### Performance Standard MACH.7.18 Use an Edge Finder and Wiggler

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.7.18.1 Explain the correct care and use of an edge finder or wiggler. |  |
| CTE MACH.7.18.2 Describe the procedures for touching off with an edge finder and a wiggler. |  |
| CTE MACH.7.18.3 Locate the center of a work piece after locating it with a wiggler or edge finder. |  |

### Performance Standard MACH.7.19 Position a Table

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.7.19.1 Describe the procedures for accurate table positioning. |  |
| CTE MACH.7.19.2 Calculate the amount of table movement for each position. |  |
| CTE MACH.7.19.3 Describe the procedures for keeping backlash out of lead screws. |  |
| CTE MACH.7.19.4 Calculate the correct cutting speed and feed. |  |
| CTE MACH.7.19.5 Describe the procedures for drilling equally spaced holes. |  |
| CTE MACH.7.19.6 Drill equally spaced holes in a work piece. |  |

### Performance Standard MACH.7.20 Set Up and Use a Sine Bar

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.7.20.1 Describe the care and use of parallels. |  |
| CTE MACH.7.20.2 Describe the procedures for seating a part in a milling vise. |  |
| CTE MACH.7.20.3 Set up and seat a work piece in a vise. |  |

## Standard MACH.8.0: Set Up and Operate Drill Presses

### Performance Standard MACH.8.1 Comply with Safe and Efficient Work Practices

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.8.1.1 Demonstrate knowledge of safety by completing a written safety test. |  |

### Performance Standard MACH.8.2 Explain the Different Types of Drill Presses

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.8.2.1 Identify the parts of the drill press. |  |
| CTE MACH.8.2.2 Demonstrate the procedure for adjusting the table height. |  |
| CTE MACH.8.2.3 Calculate the RPM and feed for various size drills and materials. |  |
| CTE MACH.8.2.4 Demonstrate the selection of the correct RPM settings and feed settings. |  |
| CTE MACH.8.2.5 Explain the use of the drill chuck and Morse tapered spindle. |  |
| CTE MACH.8.2.6 Explain the use of drill press work holding devices. |  |

### Performance Standard MACH.8.3 Center Drill, Drill, and Ream a Hold in a Work Piece

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.8.3.1 Describe the procedures for center drilling and drilling holes. |  |
| CTE MACH.8.3.2 Describe the procedures for reaming holes. |  |
| CTE MACH.8.3.3 Select the proper cutting fluids for drill press. |  |
| CTE MACH.8.3.4 Center drill, drill, and ream a hole in a work piece to required tolerance. |  |

### Performance Standard MACH.8.4 Counter Bore, Spot Face, and Countersink a Hole in a Work Piece

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.8.4.1 Explain the purpose of counter boring, spot facing, and countersinking a hole. |  |
| CTE MACH.8.4.2 Describe the procedures for counter boring, counter sinking and spot facing holes. |  |
| CTE MACH.8.4.3 Select the correct cutting fluids for counter boring, counter sinking, and spot facing. |  |
| CTE MACH.8.4.4 Counter bore, spot face, and counter sink a hole in a work piece to required tolerance. |  |

### Performance Standard MACH.8.5 Hand Tap a Hole in Work Piece

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.8.5.1 Describe the procedures for hand tapping a hole with a drill press to assure perpendicularity. |  |

### Performance Standard MACH.8.6 Power Tap a Hole in Work Piece

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.8.6.1 Distinguish between power and hand taps. |  |
| CTE MACH.8.6.2 Describe the procedures for machine tapping holes. |  |
| CTE MACH.8.6.3 Select the proper accessory to perform a power tapping procedure. |  |
| CTE MACH.8.6.4 Select the correct cutting fluids for power tapping. |  |
| CTE MACH.8.6.5 Power tap a hole in a work piece to required tolerance. |  |

### Performance Standard MACH.8.7 Use Appropriate Inspection Gages

| Student Competencies by Performance Standard | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| CTE MACH.8.7.1 Explain the use of appropriate inspection gages. |  |

# Indicators of quality Rubric:

Standards-aligned and Integrated Curriculum:

| Standards | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| 1. The curriculum is based on industry-validated technical standards and competencies. |  |
| 1. The curriculum is aligned with relevant content and standards for core subjects, such as reading, math and science, including federal, state and/or local standards, as appropriate. |  |
| 1. The curriculum incorporates employability skill standards that help students succeed in the workplace, such as problem solving, critical thinking, teamwork, communications and workplace etiquette. |  |
| 1. The curriculum allows for student application of integrated knowledge and skills in authentic scenarios. |  |
| 1. Materials used reflect current workplace, industry and/or occupational practices and requirements. |  |

Access and Equity:

| Standards | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| 1. Materials are provided in a way that ensures all students have the opportunity to achieve success in the program of study, including by meeting Title IX, Americans with Disabilities Act and other accessibility requirements. |  |
| 1. Materials and assessments are free from bias, inclusive and non-discriminatory, and offered in a way that ensures all students have the opportunity to achieve success in the program of study. |  |
| 1. Contains guidance to support differentiated and culturally responsive (i.e., purposefully represents diverse cultures, linguistic backgrounds, learning styles and interests) instruction in the classroom so that every student’s need are addressed by including:    1. Suggestions for how to promote equitable instruction by making connections to culture, home, neighborhood, and community as appropriate.    2. Appropriate scaffolding, interventions, and supports, including integrated and appropriate reading, writing, listening, and speaking alternatives (e.g., translations, picture support, graphic organizers) that neither sacrifice content nor avoid language development for English language learners, special needs, or below grade level readers.    3. Digital and print resources that provide various levels of readability.    4. Modifications and extensions for all students, including those performing above their grade level, to deepen understanding of the content.    5. Materials in multiple language formats. |  |

Student Focus:

| Standards | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| 1. The material supports the sequential and cumulative development of foundational skills and progresses in specificity to build students’ depth of knowledge and skills. Those skills are necessary for a student’s independent comprehension of grade-level complex texts and mastery of tasks called for by the standards. |  |
| 1. Content and standards within the program of study are non-duplicative and vertically aligned to prepare students to transition seamlessly to the next level of education. |  |
| 1. The material provides many and varied opportunities for students to work with each standard within the grade level. |  |
| 1. The material cross-refers and integrates other content areas. |  |
| 1. The material has a balance of text types and lengths that encourage close, in-depth reading and rereading, analysis, comparison, and synthesis of texts. |  |
| 1. The material includes sufficient supplementary activities or assignments that are appropriately integrated into the text. |  |
| 1. The material has activities and assignments that develop problem-solving skills and foster synthesis and inquiry at both an individual and group level. |  |
| 1. The material has activities and assignments that reflect varied learning styles of students. |  |
| 1. The material includes appropriate instructional strategies. |  |
| 1. Project-based learning and related instructional approaches, such as problem-based, inquiry-based and challenge-based learning, are fully integrated into the material. |  |

Pedagogical Approach:

| Standards | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| 1. Provides guidance for teachers throughout for how learning experiences build on each other to support students in developing a deep understanding of the content. |  |
| 1. Provides scaffolded supports for teachers to facilitate learning of the content so that students are increasingly responsible for making sense of the content. |  |
| 1. The material provides opportunities for supporting English language learners to regularly and actively participate with grade-level text. |  |
| 1. The material gives clear and concise instruction to teachers and students. It is easy to navigate and understand. |  |
| 1. Includes appropriate academic and content-specific vocabulary in the context of the learning experience that is accessible, introduced, reinforced, reviewed, and augmented with visual representations when appropriate. |  |
| 1. Allows teachers to access, revise, and print form digital resources (e.g., readings, labs, assessments, rubrics). |  |
| 1. Uses varied modes (selected, constructed, project-based, extended response, and performance tasks) of instruction-embedded pre-, formative, summative, peer, and, self-assessment measures of learning. |  |
| 1. Includes editable and aligned rubrics, scoring guidelines, and exemplars that provide guidance for assessing student performance and to support teachers in planning instruction and providing ongoing feedback to students. |  |
| 1. Provides multiple opportunities for students to demonstrate and receive feedback on performance of practices connected with their understanding of concepts. |  |

Presentation and Design:

| Standards | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| 1. The material has an aesthetically appealing appearance. |  |
| 1. Digital and print materials are consistently formatted, visually focused, and uncluttered for efficient use. |  |
| 1. The material has a reasonable and appropriate balance between text and illustration. The material has grade-appropriate font size. |  |
| 1. The illustrations clearly cross-reference the text, are directly relevant to the content (not simply decorative), and promote thinking, discussion, and problem solving. |  |
| 1. Non-text content (performance clips, images, maps, globes, graphs, pictures, charts, databases, and models) are accurate and well integrated into the text. |  |

Technology:

| Standards | Justification: Provide examples from materials as evidence to support each response for this section. Provide descriptions, not just page numbers. |
| --- | --- |
| 1. Technology and digital media support, extend, and enhance learning experiences. |  |
| 1. The material has “platform neutral” technology (i.e., cloud based) and availability for networking. |  |
| 1. The material has a user-friendly and interactive interface allowing the user to control (shift among activities). |  |

For Questions Contact

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1. [Idaho T&I Precision Machining Program Standards](https://cte.idaho.gov/wp-content/uploads/2018/07/Precision-Machining-Standards1.pdf) [↑](#footnote-ref-1)