Industrial Mechanics Evaluation Tool

2020 Curricular Materials Review

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

**Publisher information**

* Publisher Name:
* Title:
* Grade Level:
* ISBN #:
* Author:
* Copyright:

# 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 MECH.1.0: Safety

### Performance Standard MECH.1.1 Shop Safety

| 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 MECH.1.1.1 Explain the idea of a safety culture and its importance to industrial maintenance. |  |
| CTE MECH.1.1.2 Identify causes of accidents and the impact of accident costs. |  |
| CTE MECH.1.1.3 Review worker’s rights and responsibilities. |  |
| CTE MECH.1.1.4 Recognize hazard recognition and risk assessment techniques. |  |
| CTE MECH.1.1.5 Explain fall protection and ladder, stair, and scaffold procedures and requirements. |  |
| CTE MECH.1.1. 6 Identify equipment power sources. |  |
| CTE MECH.1.1.7 Knowledge of lock out and tag out procedures. |  |
| CTE MECH.1.1.8 Demonstrate safe work procedures to use around electrical hazards. |  |
| CTE MECH.1.1.9 Demonstrate the use and care of appropriate personal protective equipment (PPE). |  |
| CTE MECH.1.1.10 Explain the importance of hazard communications (HazCom) and Safety Data. |  |
| CTE MECH.1.1.11 Identify other construction hazards on your job site, including hazardous material exposures, environmental elements, welding and cutting hazards, confined spaces, and fires. |  |

## Standard MECH.2.0: Technical Drawings

### Performance Standard MECH.2.1 Blueprints and Schematics

| 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 MECH.2.1.1 Explain the purpose of blueprints. |  |
| CTE MECH.2.1.2 Explain and interpret machine parts and machine drawings. |  |
| CTE MECH.2.1.3 Develop sketches. |  |
| CTE MECH.2.1.4 Read and interpret schematics and symbols (i.e electrical, hydraulic, and welding). |  |

## Standard MECH.3.0: Shop Skills

### Performance Standard MECH. 3.1 Shop Skills

| 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 MECH.3.1.1 Apply basic mathematical principles. |  |
| CTE MECH.3.1.2 Explain techniques of measurement, e.g. motion, fluids, electricity, and temperature. |  |
| CTE MECH.3.1.3 Explain the mechanical and chemical properties of ferrous and non-ferrous metals. |  |
| CTE MECH.3.1.4 Understand lean and continuous improvement manufacturing processes. |  |
| CTE MECH.3.1.5 Determine sequence of work on a specified project. |  |
| CTE MECH.3.1.6 Determine tolerances and finishes. |  |
| CTE MECH.3.1.7 Explain the variables that affect job efficiency. |  |
| CTE MECH.3.1.8 Demonstrate knowledge of record keeping practices. |  |
| CTE MECH.3.1.9 Complete a work order. |  |
| CTE MECH.3.1.10 Complete a requisition. |  |
| CTE MECH.3.1.11 Recognize the differences in estimation procedures when using different information provider systems. |  |

## Standard MECH.4.0: Tools

### Performance Standard MECH.4.1 Shop Equipment

| 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 MECH.4.1.1 Demonstrate use and maintenance of basic hand and power tools properly. |  |
| CTE MECH.4.1.2 Convert English/standard to metric. |  |
| CTE MECH.4.1.3 Demonstrate the ability to perform layout work. |  |
| CTE MECH.4.1.4 Demonstrate the use and care of test and safety equipment. |  |

## Standard MECH.5.0: Welding

### Performance Standard MECH.5.1 Gas Welding/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 MECH.5.1.1 Set up gas welding and cutting equipment and accessories. |  |
| CTE MECH.5.1.2 Identify personal protective equipment required for welding and cutting. |  |
| CTE MECH.5.1.3 Demonstrate proper lighting, adjusting, and shutting down of a gas torch. |  |
| CTE MECH.5.1.4 Layout and cut mild steel. |  |
| CTE MECH.5.1.5 Braze/Solder miscellaneous materials. |  |

### Performance Standard MECH.5.2 Arc Welding/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 MECH.5.2.1 Set up and adjust a variety of arc welders. |  |
| CTE MECH.5.2.2 Identify and select electrodes. |  |
| CTE MECH.5.2.3 Weld build-up pads and/or shafts or round surfaces. |  |
| CTE MECH.5.2.4 Hard surface metals with S.M.A.W. |  |
| CTE MECH.5.2.5 Weld basic joints in flat, horizontal, and vertical positions. |  |

## Standard MECH.6.0: Electricity & Electronics

### Performance Standard MECH.6.1 Elements of Electricity & Electronics

| 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 MECH.6.1.1 Define common terms used in electricity and electronics. |  |
| CTE MECH.6.1.2 Discuss electrical safe work practices and the governing organizations. |  |
| CTE MECH.6.1.3 Describe theory and the industrial uses of magnets and electromagnets. |  |
| CTE MECH.6.1.4 Explain the purpose and use of transformers. |  |
| CTE MECH.6.1.5 Explain and apply Ohm’s Law. |  |
| CTE MECH.6.1.6 Use instruments which measure current, resistance, and potential difference. |  |
| CTE MECH.6.1.7 Explain the fundamentals and differences between AC/DC circuits. |  |
| CTE MECH.6.1.8 Demonstrate knowledge of the instruments used to measure electrical circuits. |  |
| CTE MECH.6.1.9 Know the difference between a single phase and a three phase circuit. |  |
| CTE MECH.6.1.10 Install, troubleshoot, and maintain electric motors. |  |
| CTE MECH.6.1.11 Demonstrate knowledge of troubleshooting procedures for electric circuits and control systems. |  |
| CTE MECH.6.1.12 Understand the differences and properties between series and parallel circuits. |  |

## Standard MECH.7.0: Preventive and Predictive Maintenance

### Performance Standard MECH.7.1 Maintenance Scheduling

| 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 MECH.7.1.1 Explain the function of lubricants. |  |
| CTE MECH.7.1.2 Explain the factors determining the selection of lubricants. |  |
| CTE MECH.7.1.3 Describe lubricating systems, including the charts and methods used. |  |
| CTE MECH.7.1.4 Demonstrate proper grease application. |  |
| CTE MECH.7.1.5 Practice lubrication on various equipment. |  |
| CTE MECH.7.1.6 Preventative maintenance scheduling and maintaining records. |  |
| CTE MECH.7.1.7 Know the preventive maintenance techniques of various equipment. |  |
| CTE MECH.7.1.8 Perform preventive maintenance on drive components. |  |
| CTE MECH.7.1.9 List rules for good bearing lubrication. |  |

## Standard MECH.8.0: Drive Components

### Performance Standard MECH.8.1 Drive Component Installation and Maintenance

| 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 MECH.8.1.1 Identify and understand various drive component couplings. |  |
| CTE MECH.8.1.2 Understand different type of power transfer methods. |  |
| CTE MECH.8.1.3 Understand use of shaft alignment techniques. |  |
| CTE MECH.8.1.4 Explain the function of gear boxes. |  |
| CTE MECH.8.1.5 Explain the function of drive sprockets and chains. |  |
| CTE MECH.8.1.6 Explain the function of sheaves and pulleys. |  |

## Standard MECH.9.0: Bearings

### Performance Standard MECH.9.1 Bearing Installation, Inspection, and Repair

| 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 MECH.9.1.1 Identify various bearing types and their applications. |  |
| CTE MECH.9.1.2 Identify and select bearing seals. |  |
| CTE MECH.9.1.3 Explain bearing load, wear patterns, and maintenance. |  |

## Standard MECH.10.0: Pumps

### Performance Standard MECH.9.1 Pump Maintenance and Repair

| 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 MECH.10.1.1 Determine pump capacity and system requirements. |  |
| CTE MECH.10.1.2 Identify packing and seal requirements. |  |
| CTE MECH.10.1.3 Explain the operating principles of various types of pumps, e.g. centrifugal, propeller and turbine rotary, reciprocating and metering pumps. |  |

## Standard MECH.11.0: Piping Systems

### Performance Standard MECH.11.1 Piping Systems and Accessory Maintenance

| 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 MECH.11.1.1 Identify the components of a piping system. |  |
| CTE MECH.11.1.2 Explain the maintenance features of piping systems. |  |
| CTE MECH.11.1.3 Explain valve operation and maintenance. |  |
| CTE MECH.11.1.4 Explain the use and maintenance of strainers, filters, and traps in piping systems. |  |

## Standard MECH.12.0: Hydraulic Systems

### Performance Standard MECH.12.1 Hydraulic Component Maintenance and Repair

| 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 MECH.12.1.1 Explain laws and principles of hydraulic systems. |  |
| CTE MECH.12.1.2 Explain the characteristics and components of a hydraulic system. |  |
| CTE MECH.12.1.3 Identify hydraulic system components. |  |
| CTE MECH.12.1.4 Troubleshoot hydraulic systems. |  |

## Standard MECH.13.0: Pneumatic Systems

### Performance Standard MECH.13.1 Pneumatic Component Maintenance and Repair

| 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 MECH.13.1.1 Identify schematic symbols and diagrams used in pneumatic systems. |  |
| CTE MECH.13.1.2 Diagram an air supply system. |  |
| CTE MECH.13.1.3 Identify pneumatic system components. |  |
| CTE MECH.13.1.4 Explain pneumatic system maintenance techniques. |  |
| CTE MECH.13.1.5 Demonstrate pneumatic system troubleshooting procedures. |  |

## Standard MECH.14.0: Rigging Systems

### Performance Standard MECH.14.1 Rigging

| 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 MECH.14.1.1 Estimate the weight of a load. |  |
| CTE MECH.14.1.2 Find the center of gravity. |  |
| CTE MECH.14.1.3 Identify the rigging and slings used in maintenance work. |  |
| CTE MECH.14.1.4 Explain safety inspection procedures for rigging, ropes, and slings. |  |

## Standard MECH.15.0: Programmable Logic Controllers

### Performance Standard MECH.15.1 Programmable Logic Controllers

| 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 MECH.15.1.1 Describe the function and purpose of a programmable logic controller (PLC). |  |
| CTE MECH.15.1.2 Analyze a binary logic network. |  |
| CTE MECH.15.1.3 Construct input/output (I/O) circuits. |  |
| CTE MECH.15.1.4 State the characteristics of the different types of memory. |  |
| CTE MECH.15.1.5 Identify and explain the features of relay ladder logic instruction categories. |  |
| CTE MECH.15.1.6 Explain the use and function of electrical and electronic control equipment. |  |
| CTE MECH.15.1.7 Explain the function of variable frequency drive (VFD). |  |

## Standard MECH.16.0: Machine Shop Operations

### Performance Standard MECH.16.1 Turning

| 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 MECH.16.1.1 Identify the principal parts of a lathe. |  |
| CTE MECH.16.1.2 Demonstrate the use of a lathe and attachments. |  |
| CTE MECH.16.1.3 Bore and drill holes with a lathe. |  |
| CTE MECH.16.1.4 Cut threads with a lathe. |  |

### Performance Standard MECH.16.2 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 MECH.16.2.1 Identify types of milling machines and tooling. |  |
| CTE MECH.16.2.2 Select and set feeds and speeds for milling work. |  |
| CTE MECH.16.2.3 Perform a variety of milling operations. |  |

# 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

Content & Curriculum

Idaho State Department of Education

650 W State Street, Boise, ID 83702

208 332 6800 | [www.sde.idaho.gov](http://www.sde.idaho.gov/)

1. [Idaho T&I Industrial Mechanics Program Standards](https://cte.idaho.gov/wp-content/uploads/2016/01/Industrial_Mechanics_Program_Standards.pdf) [↑](#footnote-ref-1)