IDAHO AUTOMATED MANUFACTURING PROGRAM STANDARDS

2017

CONTENT STANDARD 1.0: LAB ORGANIZATION AND SAFETY PROCEDURES

Performance Standard 1.1: General Lab Safety Rules and Procedures

1.1.1 Describe general shop safety rules and procedures.
1.1.2 Demonstrate knowledge of OSHA and its role in workplace safety.
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).
1.1.4 Operate lab equipment according to safety guidelines.
1.1.5 Identify and use proper lifting procedures and proper use of support equipment.
1.1.6 Utilize proper ventilation procedures for working within the lab/shop area.
1.1.7 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.
1.1.8 Identify the location and use of eye wash stations.
1.1.9 Identify the location of the posted evacuation routes.
1.1.10 Identify and wear appropriate clothing for lab/shop activities.
1.1.11 Secure hair and jewelry for lab/shop activities.
1.1.12 Understand knowledge of the safety aspects of low and high voltage circuits.
1.1.13 Locate and interpret safety data sheets (SDS).
1.1.14 Perform housekeeping duties.
1.1.15 Follow verbal instructions to complete work assignments.
1.1.16 Follow written instructions to complete work assignments.

Performance Standard 1.2: Hand Tools

1.2.1 Identify hand tools and their appropriate usage.
1.2.2 Identify standards and metric designation.
1.2.3 Demonstrate the proper techniques when using hand tools.
1.2.4 Demonstrate safe handling and use of appropriate tools.
1.2.5 Identify proper cleaning, storage and maintenance of tools.

Performance Standard 1.3: Power Tools and Equipment

1.3.1 Identify power tools and their appropriate usage.
1.3.2 Identify equipment and their appropriate usage.
1.3.3 Demonstrate the proper techniques when using power tools and equipment.
1.3.4 Demonstrate safe handling and use of appropriate power tools and equipment.
1.3.5 Identify proper cleaning, storage and maintenance of power tools and equipment.

CONTENT STANDARD 2.0: APPLY FUNDAMENTAL PRINT READING, MEASURING, AND CADD

Performance Standard 2.1: Demonstrate Print Reading Practices

2.1.1 Interpret basic elements of a technical drawing (i.e., title block information, dimensions.
2.1.2 Identify industry standard symbols (i.e., hydraulic, pneumatic, electrical, welding, mechanical).
2.1.3 Prepare a materials list from a technical drawing.

2.1.4 Describe various types of drawings (i.e., part, assembly, pictorial, orthographic, isometric, and schematic).

2.1.5 Understand dimensioning and tolerance, sectional drawings, fasteners, tables, charts, and assembly drawings.

Performance Standard 2.2: Demonstrate Measuring and Scaling Techniques

2.2.1 Identify industry standard units of measure.

2.2.2 Convert between customary (i.e., SAE, Imperial) and metric systems.

2.2.3 Determine appropriate engineering and metric scales.

2.2.4 Measure and calculate speed, distance, object size, area, and volume.

2.2.5 Determine and apply the equivalence between fractions and decimals.

2.2.6 Demonstrate proper use of precision measuring tools (i.e., micrometer, dial-indicator, dial-caliper) and inspecting parts to print.

Performance Standard 2.3: CADD, CAM

2.3.1 Develop three-dimensional models (i.e., wireframe, surface, solid, or parametric).

2.3.2 Interpret and create design and working drawings.

2.3.3 Properly post-process data to create G-code program.

Performance Standard 2.4: Simulation

2.4.1 Demonstrate an understanding of simulation software.

CONTENT STANDARD 3.0: APPLY FUNDAMENTAL POWER SYSTEM PRINCIPLES

Performance Standard 3.1: Identify and Utilize Basic Mechanical Systems

3.1.1 Understand examples of the six simple machines, their attributes and components.

3.1.2 Identify the power source of various systems machinery and tools.

3.1.3 Explain concepts of mechanical advantage.

3.1.4 Understand basic machine maintenance.

Performance Standard 3.2: Identify and Utilize Basic Fluid Systems

3.2.1 Define fluid systems (e.g., hydraulic, pneumatic, vacuum).

3.2.2 Identify and define the components of fluid systems.

3.2.3 Compare and contrast hydraulic and pneumatic systems.

3.2.4 Identify the advantages and disadvantages of using fluid power systems.

3.2.5 Explain the difference between gauge pressure and absolute pressure.

3.2.6 Discuss the safety concerns of working with liquids and gases under pressure.

3.2.7 Discuss mechanical advantage using Pascal's law.

3.2.8 Discuss values in a pneumatic system, using the ideal gas laws.

3.2.9 Design, construct, and test various fluid systems.

Performance Standard 3.3: Identify and Utilize Basic Electrical Systems

3.3.1 Define AC and DC electrical systems and terminology.

3.3.2 Discuss the safety concerns of working with electricity.

3.3.3 Describe the principles of generation, transmission, distribution, and storage of electricity.

3.3.4 Identify the advantages and disadvantages of using electrical systems.

3.3.5 Compute values of current, resistance, and voltage using Ohm's Law.
3.3.6 Identify series, parallel and series-parallel (combination) circuits.
3.3.7 Introduce single-phase and three-phase AC power.
3.3.8 Describe the laws, principles, and types of electricity to utilize equipment used in an industrial environment.
3.3.9 Construct and test simple electrical circuits from a schematic.
3.3.10 Explain electrical motor systems and motor controls by application.

CONTENT STANDARD 4.0: IDENTIFY AND APPLY MANUFACTURING PROCESSES

Performance Standard 4.1: Identify Material Properties and Science

4.1.1 Identify the major material families used in manufacturing.
4.1.2 Differentiate between the various types of material properties and their application.
4.1.3 Discuss the impact of material usage on the environment.
4.1.4 Explain how production is affected by the availability, quality and quantity of resources.
4.1.5 Differentiate among raw material standard stock and finished products.

Performance Standard 4.2: Identify Manufacturing Processes

4.2.1 Identify and describe the five major manufacturing processes (i.e., forming, separating, joining, conditioning, and finishing).
4.2.2 Discuss the impact of manufacturing processes on the environment.
4.2.3 Describe LEAN manufacturing and explain its importance.

Performance Standard 4.3: Apply Manufacturing Processes

4.3.1 Demonstrate cutting methods of metals and plastics.
4.3.2 Demonstrate drilling methods of metals and plastics.
4.3.3 Demonstrate grinding methods of metals.
4.3.4 Demonstrate finishing methods of metals and plastics.

Performance Standard 4.4: Identify Fasteners

4.4.1 Identify various fastening methods (e.g., rivets, welds, adhesive, screws, seams, etc.).
4.4.2 Categorize fastening methods by appropriate applications.
4.4.3 Demonstrate fastening methods on various materials.

CONTENT STANDARD 5.0: APPLY FUNDAMENTAL ELECTRONIC AND INSTRUMENTATION PRINCIPLES

Performance Standard 5.1: Demonstrate Control Technology and Automation Principles

5.1.1 Research the history and fundamentals of automation and control systems.
5.1.2 Identify applications of control logic.
5.1.3 Distinguish programmable controllers and PLC components and their functions.
5.1.4 Interpret programming diagrams.
5.1.5 Program ladder logic statements to perform a specific task.

CONTENT STANDARD 6.0: MACHINING

Performance Standard 6.1: Manual Machining

6.1.1 Hand-sharpen cutting tools.
6.1.2 Perform maintenance on machines and tools.
6.1.3 Deburr workpieces.
6.1.4 Setup and operate power saws.
6.1.5 Setup and operate grinders.
6.1.6 Setup and operate lathes including tool and parts setups.
6.1.7 Setup and operate milling machines including tool and parts setups.
6.1.8 Use appropriate inspection gages.

Performance Standard 6.2: CNC Machining

6.2.1 Demonstrate an understanding of the control interface.
6.2.2 Demonstrate knowledge and the ability to properly mount stock.
6.2.3 Demonstrate a thorough understanding of tooling.
6.2.4 Demonstrate the ability to properly select an NC (numeric code) program.
6.2.5 Demonstrate the ability to verify and dry run the program.
6.2.6 Demonstrate the ability run the NC program.
6.2.7 Demonstrate an understanding of NC programming.
6.2.8 Demonstrate an understanding of coordinate systems.
6.2.9 Demonstrate the ability to develop an NC program.
6.2.10 Demonstrate the ability to edit an NC program.

CONTENT STANDARD 7.0: ADDITIVE (3D) PRINTING

Performance Standard 7.1: Operation

7.1.1 Setup and operate a 3D printer.
7.1.2 Recognize design considerations.

CONTENT STANDARD 8.0: ROBOTICS AND MATERIALS HANDLING SYSTEMS

Performance standard 8.1: Process Automation

8.1.1 Demonstrate the knowledge of robotics and material handling equipment.
8.1.2 Discuss conveyors, robotic arms, material handlers, pick-and-place technology.