IDAHO AUTOMATED MANUFACTURING PROGRAM STANDARDS

2017
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August 2018

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.

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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).
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.

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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 Set up and operate power saws.
6.1.5 Set up and operate grinders.
6.1.6 Set up and operate lathes including tool and parts setups.
6.1.7 Set up 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 Set up 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.

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CONTENT STANDARD 1.0: IDENTIFY AND UTILIZE SAFETY PROCEDURES AND PROPER TOOLS

Performance Standard 1.1: General Lab Safety Rules and Procedures

1.1.1 Describe general shop safety rules and procedures (~~i.~~e.g., safety test).
1.1.2 Utilize safe procedures for handling of tools and equipment.
1.1.3 Identify and use proper placement of floor jacks and jack stands.
1.1.4 Identify and use proper procedures for safe vehicle lift operation.
1.1.5 Utilize proper ventilation procedures for working within the lab/shop area.
1.1.6 Identify marked safety areas.
1.1.7 Identify the location and the types of fire extinguishers and other fire safety equipment.
1.1.8 Demonstrate knowledge of the procedures for using fire extinguishers and other fire safety equipment.
1.1.9 Identify the location and use of ~~eye wash~~eyewash stations.
1.1.10 Identify the location of the posted evacuation routes.
1.1.11 Comply with the required use of PPE during lab/shop activities.
1.1.12 Identify and wear appropriate clothing for lab/shop activities.
1.1.13 Secure hair and jewelry for lab/shop activities.
1.1.14 Research safety aspects of supplemental restraint systems (SRS), electronic brake control systems, and hybrid vehicle high voltage circuits.
1.1.15 Research safety aspects of high voltage circuits (~~such as~~e.g., high intensity discharge (HID) lamps, ignition systems, and injection systems~~, etc.~~).
1.1.16 Locate and interpret safety data sheets (SDS).

Performance Standard 1.2: Identify and Utilize Proper Tools

1.2.1 Identify tools and their usage in automotive applications.
1.2.2 Identify standard and metric designation.
1.2.3 Demonstrate safe handling and use of appropriate tools.
1.2.4 Demonstrate proper cleaning, storage, and maintenance of tools and equipment.
1.2.5 Demonstrate proper use of precision measuring tools (~~i.~~e.g., tram gauges, mil thickness gauge).

CONTENT STANDARD 2.0: INVESTIGATE INDUSTRY CAREERS

Performance Standard 2.1: Explore Careers

2.1.1 Research the different career opportunities in the transportation career path.
2.1.2 Investigate new and emerging vehicle technologies and trends.

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CONTENT STANDARD 3.0: DEMOSTRATE DAMAGE ANALYSIS, ESTIMATING, AND CUSTOMER SERVICE SKILLS

Performance Standard 3.1: Identify Vehicle Construction and Parts

3.1.1 Identify type of vehicle construction (e.g., space frame, auto body, body-over-frame).
3.1.2 Recognize the different damage characteristics of space frame, uni-body, and body-over-frame vehicles.
3.1.3 Identify impact energy absorbing components.
3.1.4 Identify steel types; determine reparability.
3.1.5 Identify aluminum/magnesium components; determine reparability.
3.1.6 Identify plastic/composite components; determine reparability.
3.1.7 Identify vehicle glass components and repair/replacement procedures.
3.1.8 Identify add-on accessories.

Performance Standard 3.2: Perform Damage Analysis

3.2.1 Position the vehicle for inspection.
3.2.2 Prepare vehicle for inspection by providing access to damaged areas.
3.2.3 Analyze damage to determine appropriate methods for overall repairs.
3.2.4 Determine the direction, point(s) of impact, and extent of direct, indirect, and inertia damage.
3.2.5 Gather details of the incident/accident necessary to determine the full extent of vehicle damage.
3.2.6 Identify and record pre-existing damage.
3.2.7 Identify and record prior repairs.
3.2.8 Perform visual inspection of structural components and members.
3.2.9 Identify structural damage using measuring tools and equipment.
3.2.10 Perform visual inspection of non-structural components and members.
3.2.11 Determine parts, components, material type(s), and procedures necessary for a proper repair.
3.2.12 Identify type and condition of finish; determine if refinishing is required.
3.2.13 Identify suspension, electrical, and mechanical component physical damage.
3.2.14 Identify safety systems physical damage.
3.2.15 Identify interior component damage.
3.2.16 Identify damage to add-on accessories and modifications.
3.2.17 Identify single (one-time) use components.

Performance Standard 3.3: Demonstrate Estimating Procedures

3.3.1 Determine and record customer/vehicle owner information.

3.3.2 Identify and record vehicle identification number (VIN) information, including nation of origin, make, model, restraint system, body type, production date, engine type, and assembly plant.
3.3.3 Identify and record vehicle options, including trim level, paint code, transmission, accessories, and modifications.
3.3.4 Identify safety systems; determine replacement items.
3.3.5 Apply appropriate estimating and parts nomenclature (terminology).
3.3.6 Determine and apply appropriate estimating sequence.
3.3.7 Utilize estimating guide procedure pages.
3.3.8 Apply estimating guide footnotes and headnotes as needed.
3.3.9 Estimate labor value for operations requiring judgment.
3.3.10 Select appropriate labor value for each operation (structural, non-structural, mechanical, and refinish).
3.3.11 Select and price OEM parts; verify availability, compatibility, and condition.
3.3.12 Select and price alternative/optional OEM parts; verify availability, compatibility and condition.
3.3.13 Select and price aftermarket parts; verify availability, compatibility, and condition.
3.3.14 Select and price recyclable/used parts; verify availability, compatibility and condition.
3.3.15 Select and price remanufactured, rebuilt, and reconditioned parts; verify availability, compatibility and condition.
3.3.16 Determine price and source of necessary sublet operations.
3.3.17 Determine labor value, prices, charges, allowances, or fees for non-included operations and miscellaneous items.
3.3.18 Recognize and apply overlap deductions, included operations, and additions.
3.3.19 Determine additional material and charges.
3.3.20 Determine refinishing material and charges.
3.3.21 Apply math skills to establish charges and totals.
3.3.22 Interpret computer-assisted and manually written estimates; verify the information is current.
3.3.23 Identify procedural differences between computer-assisted systems and manually written estimates.
3.3.24 Identify procedures to restore corrosion protection; establish labor values, and material charges.
3.3.25 Determine the cost effectiveness of the repair and determine the approximate vehicle retail, and repair value.
3.3.26 Recognize the differences in estimation procedures when using different information provider systems.

3.3.27 Verify accuracy of estimate compared to the actual repair and replacement operations.
3.3.28 Demonstrate ability to access OEM repair information.

Performance Standard 3.4: Demonstrate Customer Relations and Sales Skills

3.4.1 Acknowledge and/or greet customer/client.
3.4.2 Listen to customer/client; collect information and identify customers/client's concerns, needs, and expectations.
3.4.3 Establish cooperative attitude with customer/client.
3.4.4 Identify yourself to customer/client; offer assistance.
3.4.5 Resolve customer/client conflicts.
3.4.6 Identify customer/client preferred communication method; follow up to keep customer/client informed about parts and the repair process.
3.4.7 Recognize basic claims handling procedures; explain to customer/client.
3.4.8 Project positive attitude and professional appearance.
3.4.9 Provide and review warranty information.
3.4.10 Estimate and explain duration of out-of-service time.
3.4.11 Apply negotiation skills to obtain a mutual agreement.
3.4.12 Interpret and explain manual or computer-assisted estimate to customer/client.

CONTENT STANDARD 4.0: PERFORM NON-STRUCTURAL ANALYSIS AND DAMAGE REPAIR (BODY COMPONENTS)

Performance Standard 4.1: Demonstrate Inspection and Preparation Techniques

4.1.1 Review damage report and analyze damage to determine appropriate methods for overall repair; develop and document a repair plan.
4.1.2 Inspect, remove, label, store, and reinstall exterior trim and moldings.
4.1.3 Inspect, remove, label, store, and reinstall interior trim and components.
4.1.4 Inspect, remove, label, store, and reinstall body panels and components that may interfere with or be damaged during repair.
4.1.5 Inspect, remove, label, store, and reinstall vehicle mechanical and electrical components that may interfere with or be damaged during repair.
4.1.6 Protect panels, glass, interior parts, and other vehicles adjacent to the repair area.
4.1.7 Soap and water wash entire vehicle; complete pre-repair inspection checklist.
4.1.8 Prepare damaged area using water-based and solvent-based cleaners.
4.1.9 Remove corrosion protection, undercoatings, sealers, and other protective coatings as necessary to perform repairs.
4.1.10 Inspect, remove, and reinstall repairable plastics and other components for off-vehicle repair.
4.1.11 Inspect, remove, and replace seatbelt and shoulder harness assembly and components.

4.1.12 Inspect restraint system mounting areas for damage; repair as needed.
4.1.13 Verify proper operation of seatbelt.

Performance Standard 4.2: Perform Outer Body Panel Repair, Replacement, and Adjustments

4.2.1 Review damage report and analyze damage to determine appropriate methods for overall repair; develop and document a repair plan.
4.2.2 Inspect, remove, label, store, and reinstall exterior trim and moldings.
4.2.3 Inspect, remove, label, store, and reinstall interior trim and components.
4.2.4 Inspect, remove, label, store, and reinstall body panels and components that may interfere with or be damaged during repair.
4.2.5 Inspect, remove, label, store, and reinstall vehicle mechanical and electrical components that may interfere with or be damaged during repair.
4.2.6 Protect panels, glass, interior parts, and other vehicles adjacent to the repair area.
4.2.7 Soap and water wash entire vehicle; complete pre-repair inspection checklist.
4.2.8 Prepare damaged area using water-based and solvent-based cleaners.
4.2.9 Remove corrosion protection, undercoatings, sealers, and other protective coatings as necessary to perform repairs.
4.2.10 Inspect, remove, and reinstall repairable plastics and other components for off-vehicle repair.
4.2.11 Inspect, remove, and replace seatbelt and shoulder harness assembly and components.
4.2.12 Inspect restraint system mounting areas for damage; repair as needed.
4.2.13 Verify proper operation of seatbelt.
4.2.14 Identify one-time use fasteners.
4.2.15 Clean, inspect, and prepare reusable fasteners.

Performance Standard 4.3: Apply Metal Finishing and Body Filling Techniques

4.3.1 Remove paint from the damaged area of a body panel.
4.3.2 Locate and repair surface irregularities on a damaged body panel.
4.3.3 Demonstrate hammer and dolly techniques.
4.3.4 Heat shrink stretched panel areas to proper contour.
4.3.5 Cold shrink stretched panel areas to proper contour.
4.3.6 Prepare and apply body filler.
4.3.7 Identify different types of body fillers.
4.3.8 Rough sand body filler to contour; finish sand.

Performance Standard 4.4: Inspect Moveable Glass and Hardware Components

4.4.1 Inspect, adjust, repair or replace window regulators, run channels, glass, power mechanisms, and related controls.

4.4.2 Inspect, adjust, repair, remove, reinstall, or replace weather-stripping.

4.4.3 Cycle electrical components as needed.

Performance Standard 4.5: Perform Metal Welding and Cutting Techniques

4.5.1 Identify weldable and non-weldable substrates used in vehicle construction.

4.5.2 Weld and cut high-strength steel and other steels (plasma, oxy fuel).

4.5.3 Determine the correct GMAW (MIG) welder type, electrode/wire type, diameter, and gas to be used in a specific welding situation.

4.5.4 Set up and adjust the GMAW (MIG) welder to "tune" for proper electrode stickout, voltage, polarity, flow rate, and wire-feed speed required for the substrate being welded.

4.5.5 Store, handle, and install high-pressure gas cylinders.

4.5.6 Determine work clamp (ground) location and attach.

4.5.7 Use the proper angle of the gun to the joint and direction of gun travel for the type of weld being made in the flat, horizontal, vertical, and overhead positions.

4.5.8 Protect adjacent panels, glass, vehicle interior, etc. from welding and cutting operations.

4.5.9 Protect computers and other electronic control modules during welding procedures.

4.5.10 Clean and prepare the metal to be welded, assure good metal fit-up, apply weld-through primer if recommended, clamp or tack as required.

4.5.11 Determine the joint type (e.g., butt weld with backing, lap~~, etc.~~) for weld being made.

4.5.12 Determine the type of weld (e.g., continuous, stitch weld, plug~~, etc.~~) for each specific welding operation.

4.5.13 Perform the following welds: continuous, plug, butt weld with and without backing, fillet, etc.

4.5.14 Perform visual and destructive tests on each weld type.

4.5.15 Identify the causes of various welding defects; make necessary adjustments.

4.5.16 Identify cause of contact tip burn-back and failure of wire to feed; make necessary adjustments.

4.5.17 Identify different methods of attaching non-structural components squeeze type resistant spot welds (STRSW), riveting, non-structural adhesive, silicon bronze, etc.

Performance Standards 4.6: Utilize Plastic and Adhesives

4.6.1 Identify the types of plastics; determine reparability.

4.6.2 Clean and prepare the surface of plastic parts; identify the types of plastic repair procedures.

4.6.3 Demonstrate one-sided, two-sided, and tab repair.

4.6.4 Repair rigid, semi-rigid, or flexible plastic panels.

4.6.5 Remove or repair damaged areas from rigid exterior composite panels.

4.6.6 Replace bonded rigid exterior composite body panels; straighten or align panel supports.
4.6.7 Demonstrate the proper cleanup procedures for specific adhesives.

CONTENT PERFORMACE 5.0: PERFORM STRUCTURAL ANALYSIS AND DAMAGE REPAIR

Performance Standards 5.1: Demonstrate Inspection and Repair Techniques

5.1.1 Measure and diagnose structural damage using a tram gauge.
5.1.2 Attach vehicle to anchoring devices.
5.1.3 Determine the extent of the direct and indirect damage and the direction of impact; document the methods and sequence of repair.
5.1.4 Analyze and identify crush/collapse zones.
5.1.5 Restore mounting and anchoring locations.
5.1.6 Check for water leaks, dust leaks, and wind noise.
5.1.7 Perform visual inspection and measuring checks to identify steering and suspension collision damage.
5.1.8 Reinstall wheels and torque lug nuts.

CONTENT STANDARDS 6.0: DEMOSTRATE PAINTING AND REFINISHING TECHNIQUES

Performance Standards 6.1: Apply Safety Precautions

6.1.1 Identify and take necessary precautions with hazardous operations and materials according to federal, state, and local regulations.
6.1.2 Identify safety and personal health hazards according to OSHA guidelines and the “Right to Know Law”.
6.1.3 Inspect spray environment and equipment to ensure compliance with federal, state and local regulations, and for safety and cleanliness hazards.
6.1.4 Select and use a NIOSH approved air purifying respirator. Inspect condition and ensure fit and operation. Perform proper maintenance in accordance with OSHA Regulation 1910.134 and applicable state and local regulation.
6.1.5 Select and use a NIOSH approved supplied air (Fresh Air Make-up) respirator system. Perform proper maintenance in accordance with OSHA Regulation 1910.134 and applicable state and local regulation.
6.1.6 Select and use appropriate PPE.

Performance standards 6.2: Utilize Surface Preparation Techniques

6.2.1 Inspect, remove, store, and replace exterior trim and components necessary for proper surface preparation.
6.2.2 Soap and water wash entire vehicle; use appropriate cleaner to remove contaminants.
6.2.3 Inspect and identify type of finish, surface condition, and film thickness; develop and document a plan for refinishing using a total product system.
6.2.4 Strip paint to bare substrate (paint removal).

6.2.5 Dry or wet sand areas to be refinished.
6.2.6 Featheredge areas to be refinished.
6.2.7 Apply suitable metal treatment or primer in accordance with total product systems.
6.2.8 Mask and protect other areas that will not be refinished.
6.2.9 Mix primer, primer-surface, or primer-sealer.
6.2.10 Identify a complimentary color or shade of undercoat to improve coverage.
6.2.11 Apply primer onto surface of repaired area.
6.2.12 Apply two-component finishing filler to minor surface imperfections.
6.2.13 Block sand area to which primer-surface has been applied.
6.2.14 Dry sand area to which finishing filler has been applied.
6.2.15 Remove dust from area to be refinished, including cracks or moldings of adjacent areas.
6.2.16 Clean area to be refinished using a final cleaning solution.
6.2.17 Remove, with a tack rag, any dust or lint particles from the area to be refinished.
6.2.18 Apply suitable sealer to the area being refinished.
6.2.19 Scuff sand to remove nibs or imperfections from a sealer.
6.2.20 Apply stone chip resistant coating.
6.2.21 Restore caulking and seam sealers to repaired areas.
6.2.22 Prepare adjacent panels for blending.
6.2.23 Identify the types of rigid, semi-rigid, or flexible plastic parts to be refinished; determine the materials needed, preparation, and refinishing procedures.
6.2.24 Identify metal parts to be refinished; determine the materials needed, preparation, and refinishing procedures.

Performance Standards 6.3: Perform Spray Gun and Related Equipment Operations

6.3.1 Inspect, clean, and determine condition of spray guns and related equipment (air hoses, regulators, air lines, air source, and spray environment).
6.3.2 Select spray gun and setup (fluid needle, nozzle, and cap) for product being applied.
6.3.3 Test and adjust spray gun using fluid, air, and pattern control valves.
6.3.4 Demonstrate an understanding of the operation of spray equipment.

Performance Standards 6.4: Utilize Paint Mixing, Matching, and Application

6.4.1 Identify color code by manufacturer's vehicle information label.
6.4.2 Shake, stir, reduce, catalyze/activate, and strain refinish materials.
6.4.3 Apply finish using appropriate spray techniques (gun arc, angle, distance, travel speed, and spray pattern overlap) for the finish being applied.
6.4.4 Demonstrate a let-down panel; check for color match.
6.4.5 Apply single stage topcoat.
6.4.6 Apply basecoat/clear coat for panel blending and panel refinishing.
6.4.7 Apply basecoat/clear coat for overall refinishing.

6.4.8 Remove nibs or imperfections from basecoat.
6.4.9 Refinish rigid or semi-rigid plastic parts.
6.4.10 Refinish flexible plastic parts.
6.4.11 Demonstrate knowledge of multi-stage coats for panel blending and overall refinishing.
6.4.12 Identify and mix paint using a formula.
6.4.13 Identify poor hiding colors; determine necessary action.
6.4.14 Tint color using formula to achieve a bendable match.
6.4.15 Identify alternative color formula to achieve a bendable match.
6.4.16 Identify the materials equipment, and preparation differences between solvent and waterborne technologies.

Performance Standards 6.5: Identify Paint Defects—Causes and Cures

6.5.1 Identify blistering (raising of the paint surface, air entrapment); determine the cause(s) and correct the condition.
6.5.2 Identify a dry spray appearance in the paint surface; determine the cause(s) and correct the condition.
6.5.3 Identify the presence of fish-eyes (crater-like openings) in the finish; determine the cause(s) and correct the condition.
6.5.4 Identify lifting; determine the cause(s) and correct the condition.
6.5.5 Identify clouding (mottling and streaking in metallic finishes); determine the cause(s) and correct the condition.
6.5.6 Identify orange peel; determine the cause(s) and correct the condition.
6.5.7 Identify overspray; determine the cause(s) and correct the condition.
6.5.8 Identify solvent popping in freshly painted surface; determine the cause(s) and correct the condition.
6.5.9 Identify sags and runs in paint surface; determine the cause(s) and correct the condition.
6.5.10 Identify sanding marks or sand scratch swelling; determine the cause(s) and correct the condition.
6.5.11 Identify contour mapping/edge mapping while finish is drying; determine the cause(s) and correct the condition.
6.5.12 Identify color difference (off-shade); determine the cause(s) and correct the condition.
6.5.13 Identify tape tracking; determine the cause(s) and correct the condition.
6.5.14 Identify low gloss condition; determine the cause(s) and correct the condition.
6.5.15 Identify poor adhesion; determine the cause(s) and correct the condition.
6.5.16 Identify paint cracking (e.g., shrinking, splitting, crow's feet or line-checking, micro-checking~~, etc.~~); determine the cause(s) and correct the condition.
6.5.17 Identify corrosion; determine the cause(s) and correct the condition.
6.5.18 Identify dirt or dust in the paint surface; determine the cause(s) and correct the condition.

6.5.19 Identify water spotting; determine the cause(s) and correct the condition.
6.5.20 Identify finish damage caused by bird droppings, tree sap, and other natural causes; correct the condition.
6.5.21 Identify finish damage caused by airborne contaminants (acids, soot, rail dust, and other industrial-related causes); correct the condition.
6.5.22 Identify die-back conditions (dulling of the paint film showing haziness); determine the cause(s) and correct the condition.
6.5.23 Identify chalking (oxidation); determine the cause(s) and correct the condition.
6.5.24 Identify bleed-through (staining); determine the cause(s) and correct the condition.
6.5.25 Identify pin-holing; determine the cause(s) and correct the condition.
6.5.26 Identify buffing-related imperfections (swirl marks, wheel burns); correct the condition.
6.5.27 Identify pigment flotation (color change through film build); determine the cause(s) and correct the condition.

Performance Standards 6.6: Perform Detail Procedures

6.6.1 Apply decals, transfers, tapes, pinstripes (painted and taped), etc.
6.6.2 Sand, buff and polish fresh or existing finish to remove defects as required.
6.6.3 Clean interior, exterior, and glass.
6.6.4 Clean body openings (e.g., door jambs and edges~~, etc.~~).
6.6.5 Remove overspray.
6.6.6 Perform vehicle clean-up; complete quality control using a checklist.

IDAHO COSMETOLOGY PROGRAM STANDARDS

2017
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CONTENT STANDARD 1.0: IDENTIFY AND UTILIZE SAFETY PROCEDURES AND PROPER TOOLS

Performance Standard 1.1: Demonstrate Safety Rules and Sanitation Procedures

1.1.1 Describe general safety rules and sanitation procedures (i.e., safety test).
1.1.2 Utilize personal/professional hygiene practices.
1.1.3 Classify infectious and contagious diseases.
1.1.4 Demonstrate workplace sanitation and safety practices (i.e., work area, implements, equipment, and blood spills).

Performance Standard 1.2: Identify and Utilize Proper Tools, Implements, and Equipment

1.2.1 Identify tools, implements, and equipment and their appropriate usage.
1.2.2 Identify the proper techniques when using tools, implements, and equipment.
1.2.3 Identify proper sanitation, storage, and maintenance of tools, implements, and equipment.

CONTENT STANDARD 2.0: DEMONSTRATE PROFESSIONAL BEHAVIORS

Performance Standard 2.1: Demonstrate Professional Communication Skills

2.1.1 Demonstrate a client consultation/needs assessment.
2.1.2 Demonstrate customer service skills by addressing the customer using professional etiquette.
2.1.3 Demonstrate effective listening skills.
2.1.4 Prepare and maintain client records for the various cosmetology services.
2.1.5 Demonstrate resolution strategies when dealing with a dissatisfied client or peer issues.

Performance Standard 2.2: Apply and Utilize Professional Image

2.2.1 Identify professional attire versus personal dress.
2.2.2 Discuss the importance of personal hygiene in the workplace.
2.2.3 Understand cultural diversity and its effect in the workplace.

Performance Standard 2.3: Practice Life Skills

2.3.1 Demonstrate effective reading, writing, and math skills.
2.3.2 Explain the importance of time management.
2.3.3 Research the career paths and employability options in the cosmetology profession.
2.3.4 Understand the importance of workplace habits.

CONTENT STANDARD 3.0: ASSESS HAIR AND SCALP CARE

Performance Standard 3.1: Analyze Hair and Scalp

3.1.1 Illustrate and explain the structure of hair.
3.1.2 List and describe the structures of the hair root and scalp.
3.1.3 Identify and describe hair growth and hair loss.
3.1.4 Identify disorders of the hair and scalp using visual media.

3.1.5 Explain the chemical composition of hair.
3.1.6 Demonstrate knowledge of texture, density, porosity, and elasticity.

Performance Standard 3.2: Explain Shampooing and Conditioning

3.2.1 Apply the proper client draping for a shampoo and conditioning treatment.
3.2.2 Distinguish the correct shampoo and conditioner for different hair and scalp types.
3.2.3 Explain the proper technique of shampooing and conditioning.

CONTENT STANDARD 4.0: IDENTIFY PRINCIPLES OF HAIR DESIGN

Performance Standard 4.1: Demonstrating Styling Techniques

4.1.1 Explain the principals of hair design and their importance in creating hairstyles (i.e., proportion, balance, rhythm, emphasis, and harmony).
4.1.2 Describe the principle parts of a pin curl and roller placement.
4.1.3 Create pin curls and roller sets by using proper bases.
4.1.4 Demonstrate various blow dry styling techniques on a variety of hair types and textures.
4.1.5 Demonstrate the safe and proper use of thermal curling irons.
4.1.6 Explain the various types of styling products and describe the results obtained from their use.
4.1.7 Demonstrate various braiding techniques using all safety precautions.
4.1.8 Explain the difference between wet, thermal, or dry natural hair styling.

CONTENT STANDARD 5.0: UNDERSTAND THE BASICS OF HAIRCUTTING

Performance Standard 5.1: Demonstrate a Haircut

5.1.1 Create a solid form haircut.
5.1.2 Distinguish angles, elevations, and guidelines when performing a haircut.

CONTENT STANDARD 6.0: IDENTIFY BASIC CHEMISTRY AND ELECTRICITY USES

Performance Standard 6.1: Apply Basic Principles of Chemistry and Electricity

6.1.1 Illustrate the pH scale.
6.1.2 Identify electrical equipment, appropriate usage, and safety precautions.

CONTENT STANDARD 7.0: IDENTIFY AND UTILIZE CHEMICAL SERVICES

Performance Standard 7.1: Demonstrate Hair Coloring Techniques

7.1.1 List the reasons why clients color their hair.
7.1.2 Analyze the color wheel and its relationship to color formulation.
7.1.3 Identify the levels of color and color tones.
7.1.4 List and describe the different categories of hair color and their uses.
7.1.5 Define a patch test.
7.1.6 Demonstrate a virgin single process color.
7.1.7 Demonstrate a retouch color application.
7.1.8 Demonstrate basic foil techniques.

IDAHO COSMETOLOGY PROGRAM STANDARDS

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CONTENT STANDARD 8.0: IDENTIFY CHEMICAL TEXTURE SERVICES

Performance Standard 8.1: Demonstrate Chemical Texture Services

8.1.1 Utilize the appropriate types of materials and tools needed for chemical texture services.
8.1.2 Describe the chemical actions that occur during permanent waving.
8.1.3 Identify the different types of permanent waving solutions and their uses.
8.1.4 Duplicate sectioning and rod placement patterns.
8.1.5 Select, formulate, and demonstrate a permanent wave with water solution.

CONTENT STANDARD 9.0: DEMONSTRATE A BASIC MANICURE

Performance Standard 9.1: Practice Manicuring

9.1.1 Describe the structure and composition of the nail and how the nail grows.
9.1.2 Identify the appropriate products and tools used in a basic manicure.
9.1.3 Demonstrate the setup of a manicure table following all safety and sanitation requirements.
9.1.4 Analyze the hands and nails for a manicure procedure.

CONTENT STANDARD 10.0: ANALYZE MAKEUP TECHNIQUES

Performance Standard 10.1: Demonstrate Makeup Application

10.1.1 Assess skin color and apply cosmetics based on color theory.
10.1.2 Demonstrate cosmetic applications for daytime, evening, and special occasions.
10.1.3 Describe sanitation precautions for makeup tools.

CONTENT STANDARD 11.0: EXPLORE SALON SKILLS

Performance Standard 11.1: Workplace Readiness

11.1.1 Create a resume.
11.1.2 Create and organize a portfolio.
11.1.3 Observe a licensed cosmetologist, investigate professional practices, and report data.
11.1.4 Critique information found in various resources regarding trends, products, and technology used in the cosmetology profession.

Performance Standard 11.2: Analyze Business Management/Operations

11.2.1 Create a business plan for opening a cosmetology establishment.
11.2.2 Demonstrate the importance of being engaged in the community.
11.2.3 Analyze the importance of building and maintaining a clientele.
11.2.4 Critique the importance of retail sales to the financial stability of a salon.
11.2.5 Develop short and long term goals for professional and personal success.

Performance Standard 11.3: Research Rules, Laws, and State Board Testing Requirements

11.3.1 Research the components on the National Interstate Council of State Boards of Cosmetology practical exam rubric.

11.3.2 Research the requirements of the Idaho State Board of Cosmetology written licensure exam and practical exam.

IDAHO FIREFIGHTING PROGRAM STANDARDS

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CONTENT STANDARD 1.0: RELATE ACADEMIC FOUNDATIONS TO ACHIEVE SKILL REQUIREMENT

Performance Standard 1.1: Apply Concepts of Language Arts Knowledge

1.1.1 Model behaviors that demonstrate active listening.
1.1.2 Organize oral and written information.
1.1.3 Adapt language for audience, purpose, and situation.
1.1.4 Evaluate oral and written information for accuracy, expression, adequacy, clarity, and validity.
1.1.5 Articulate potential outcomes and/or solutions.
1.1.6 Present formal and informal speeches, as related to the hiring process and public relations.

Performance Standard 1.2: Apply Concepts of Mathematics Knowledge

1.2.1 Demonstrate use of whole numbers, decimals, and fractions.
1.2.2 Demonstrate knowledge of arithmetic operations.
1.2.3 Formulate data and measurements to solve a problem.
1.2.4 Analyze mathematical problem statements.
1.2.5 Construct charts/tables/graphs from functions and data.
1.2.6 Critique data when interpreting operational documents.

Performance Standard 1.3: Apply Concepts of Science Knowledge

1.3.1 Evaluate scientific constructs including conclusions, conflicting data, controls, sources of error and variables.
1.3.2 Apply scientific method in qualitative and quantitative analysis.
1.3.3 Recognize elements and their various states of matter.
1.3.4 Describe the fire tetrahedron.
1.3.5 Describe transmission of heat.
1.3.6 Explain various states of “fuel.”
1.3.7 Outline the classification of fire – A,B,C,D,K.
1.3.8 Explain the phases of fire growth.
1.3.9 Describe factors that affect fire development.
1.3.10 Describe fire control theory.

CONTENT STANDARD 2.0: DEMONSTRATE THE USE OF COMMUNICATION

Performance Standard 2.1: Select and Employ Appropriate Reading and Communication Strategies

2.1.1 Identify the use of content, technical concepts and vocabulary for analyzing information.
2.1.2 Demonstrate the ability to read and fully comprehend a written document.
2.1.3 Interpret information, data and observations for application.
2.1.4 Transcribe information, data and apply information.
2.1.5 Communicate information to actual practice.

Performance Standard 2.2: Enhance Diversity to Enhance Skills

2.2.1 Apply factors and strategies for communicating with people in a diverse and cultural background.

2.2.2 Demonstrate ability to communicate and resolve conflicts through various communication methods.

Performance Standard 2.3: Create Verbal and Nonverbal Behaviors

2.3.1 Interpret and utilize verbal behaviors when communicating with clients and coworkers.

2.3.2 Interpret and utilize nonverbal behaviors when communicating with the public.

2.3.3 Respond with restatement and clarification techniques.

2.3.4 Exhibit public relations skill.

CONTENT STANDARD 3.0: DEMONSTRATE PROBLEM SOLVING AND CRITICAL THINKING

Performance Standard 3.1: Utilize Thinking Skills Independently and As a Team

3.1.1 Identify common tasks that require problem solving.

3.1.2 Analyze elements of a problem to develop solutions.

3.1.3 Identify alternatives using problem solving and critical thinking skills.

Performance Standard 3.2: Employ Interpersonal Skills to Resolve Conflicts

3.2.1 Analyze situations and behaviors that affect conflict management.

3.2.2 Determine outcomes and options.

3.2.3 Identify and implement the various stress management techniques.

Performance Standard 3.3: Monitor Workplace Performance Goals

3.3.1 Develop realistic performance goals, objectives and action plans.

3.3.2 Synthesize goals and adjust as necessary.

3.3.3 Recognize achievement and use appropriate rewards in the workplace.

Performance Standard 3.4: Conduct Technical Research

3.4.1 Demonstrate various methods of gathering information for the audience.

3.4.2 Gather technical information using a variety of resources to solve a problem.

3.4.3 Evaluate information and data to prove the value of research through documentation.

CONTENT STANDARD 4.0: USE OF INFORMATION TECHNOLOGY TOOLS

Performance Standard 4.1: Differentiate Between Various Electronic Tasks

4.1.1 Use personal information applications to increase workplace efficiency.

4.1.2 Apply technological tools to expedite workflow.

4.1.3 Operate electronic mail application to communicate.

4.1.4 Critique internet applications to perform workplace tasks.

4.1.5 Differentiate writing and publishing applications to prepare departmental communications.

Performance Standard 4.2: Organize and Manipulate Tasks

4.2.1 Create computer based applications.

4.2.2 Access support as needed to maintain operations.
4.2.3 Manage and compress files for efficiency.
4.2.4 Facilitate group work through delegation and management.
4.2.5 Manage interrelated data elements.
4.2.6 Perform calculations and analyses using spreadsheets.

CONTENT STANDARD 5.0: IDENTIFY KEY ORGANIZATIONAL SYSTEMS

Performance Standard 5.1: Describe the Scope of Departmental Organizations

5.1.1 Differentiate the types and functions of the different organizations in the fire service industry.
5.1.2 Explain the interactions between the different organizations in the fire service industry.
5.1.3 Explain the history of the fire service industry.
5.1.4 Describe the fire service industries mission, organizational structure including chain of command, apparatus, crews, and duties.
5.1.5 Identify career tracks within the fire service industry.
5.1.6 Complete Incident Command System (ICS) and the National Incident Management System (NIMS) 100, 200, 700 and 800.

Performance Standard 5.2: Implement Quality Control Systems and Practices

5.2.1 Implement quality control standards and practices.
5.2.2 Use national and statewide standards for quality control.

CONTENT STANDARD 6.0: UNDERSTAND THE IMPORTANCE OF HEALTH, SAFETY AND THE ENVIRONMENT

Performance Standard 6.1: Implement Personal and Departmental Safety Regulations

6.1.1 Assess workplace conditions with regard to safety and health.
6.1.2 Identify safety hazards.
6.1.3 Select appropriate personal protective equipment.
6.1.4 Employ safety hierarchy and communication systems.
6.1.5 Implement safety precautions to maintain safe workplace.
6.1.6 Meet industry health and fitness qualifications and standards.
6.1.7 Demonstrate the care of personal protective equipment (PPE).
6.1.8 Demonstrate donning and doffing of personal protective equipment within one minute.
6.1.9 Identify the components of a self-contained breathing apparatus (SCBA).
6.1.10 Describe respiratory hazards as well as when SCBA shall be “used” in an immediately dangerous to life or health atmosphere (IDLH).
6.1.11 Practice donning and doffing SCBA within one minute.
6.1.12 Explain principles of air management consistent with NFPA 1404.
6.1.13 Demonstrate replacement of SCBA air cylinders.

Performance Standard 6.2: Employee Rights and Responsibilities

6.2.1 Identify rules, laws and governing bodies designed to promote safety and health.
6.2.2 Understand rationale for laws, regulations and rules as it applies to the fire service industry.

Performance Standard 6.3: Employ Emergency Procedures and Disaster Response Plans

6.3.1 Complete an EMR (Emergency Medical Responder) program of First Aid and CPR training that meets the requirements of the American Heart Association (AHA).
6.3.2 Create a safety equipment training plan.
6.3.3 Assess emergency and/or disaster situations.
6.3.4 Design an emergency or disaster plan.
6.3.5 Describe fire extinguisher rating systems.
6.3.6 Use a portable fire extinguisher safely; pull, aim, squeeze and sweep (PASS) method of application.
6.3.7 Explain how to inspect a portable fire extinguisher.
6.3.8 Complete and understand a hazardous material operations course.

CONTENT STANDARD 7.0: UNDERSTAND THE IMPORTANCE OF ETHICS AND LEGAL RESPONSIBILITIES

Performance Standard 7.1: Apply Ethical Reasoning to Workplace Situations

7.1.1 Understand legal responsibilities and employer policies.
7.1.2 Identify personal and long-term workplace consequences for unethical behaviors.
7.1.3 Create a plan to deal with legal and ethical considerations.

Performance Standard 7.2: Interpret Written Agency Policies and Procedures

7.2.1 Demonstrate understanding of departmental policies and procedures.
7.2.2 Discuss the effect of policies and procedures on a specific work situation.
7.2.3 Demonstrate understanding of standard operating procedures for a department or agency.
7.2.4 Compare annual firefighter injuries and fatalities data for potential policy and procedural changes.
7.2.5 Identify safety standards related to fire services, such as National Fire Protection Association (NFPA) 1500 and Occupational Safety and Health Administration (OSHA).

CONTENT STANDARD 8.0: DEMONSTRATE FIRE SUPPRESSION TACTICS AND EQUIPMENT

Performance Standard 8.1: Employ Water Supply Theory

8.1.1 Describe and perform sources of water supplies and water theory.
8.1.2 Explain different means of moving water, including friction loss, appliances and fire service hose.
8.1.3 Describe fire hose damage and perform general care.
8.1.4 Describe suppressing class A, B, C, D, and K fires.

Performance Standard 8.2: Understand Concepts of Company Operations

8.2.1 Describe in order tactical priorities.
8.2.2 Describe and demonstrate engine, ladder and rescue company functions on fires.
8.2.3 Describe and demonstrate the reasons for fire ground ventilation.
8.2.4 Define and perform the proper procedures and care for fire service ground ladders.
8.2.5 Describe the reasons and types of forcible entry.
8.2.6 Describe the reasons and types of salvage operations.

Performance Standard 8.3: Apply Concepts of Additional Tactics and Techniques

8.3.1 Complete National Wildfire Coordination Group (NWCG), S130, S190, L180 or equivalent (wildland firefighting).
8.3.2 Describe reasons and procedures for vehicle extrication.
8.3.3 Apply to concepts of live fire training (when possible).
8.3.4 Understand the context of Technical Rescue Awareness class per Idaho State Fire Marshall.
8.3.5 Meet requirements to sign off as completed from the Firefighter Manipulative Skills Manual.

Performance Standard 8.4: Applied Concepts and Methods of Fire Prevention

8.4.1 Understand and demonstrate best practices in the inspection process.
8.4.2 Understand and demonstrate best practices in public fire instruction.
8.4.3 Understand how scientific methods apply to fire investigation through NFPA 3.1.
8.4.4 Apply methods and concepts of fire prevention.

IDAHO PRECISION MACHINING PROGRAM STANDARDS

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CONTENT STANDARD 1.0: FUNDAMENTAL MACHINING SKILLS

Performance Standard 1.1: Comply with Safe and Efficient Work Practices

1.1.1 Describe general shop safety rules and procedures (i.e., safety test).
1.1.2 Describe OSHA 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 (i.e. rigging, chains, straps, cables).
1.1.6 Utilize proper ventilation procedures for working within the lab/shop area.
1.1.7 Identify marked safety areas.
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.
1.1.9 Identify the location and use of eye wash stations.
1.1.10 Identify the location of the posted evacuation routes.
1.1.11 Identify and wear appropriate clothing for lab/shop activities.
1.1.12 Secure hair and jewelry for lab/shop activities.
1.1.13 Demonstrate knowledge of the safety aspects of high voltage circuits.
1.1.14 Locate and interpret safety data sheets (SDS).
1.1.15 Perform housekeeping duties.
1.1.16 Follow verbal instructions to complete work assignments.
1.1.17 Follow written instructions to complete work assignments.
1.1.18 Demonstrate knowledge of safety by completing a written safety test.

Performance Standard 1.2: Maintain Immediate Work Area

1.2.1 Demonstrate proper shop safety rules and practices.
1.2.2 Properly dispose of scrap metal chips, shavings, oil, and coolant.
1.2.3 List shop operating rules and practices.
1.2.4 Demonstrate procedures to clean and maintain work areas affected by operations of work and shop areas.
1.2.5 Demonstrate safe working practices.

Performance Standard 1.3: Perform Job-Related Mathematical Calculations

1.3.1 Accurately perform job related decimal and fraction calculations.
1.3.2 Solve job-related problems using basic geometry.
1.3.3 Accurately measure a work piece and compare measurements with blueprint specifications.
1.3.4 Calculate the amount of material to be removed to obtain correct limits for secondary operations.
1.3.5 Solve job-related problems using mathematical handbooks, charts, and tables.

1.3.6 Convert measurements from English to metric and from metric to English units.
1.3.7 Calculate machine speeds and feeds using appropriate formulas.

Performance Standard 1.4: Read, Interpret and Sketch Blueprints

1.4.1 Interpret line types.
1.4.2 Read and interpret title blocks.
1.4.3 Read and interpret change orders on working and assembly prints.
1.4.4 Read and interpret nomenclature.
1.4.5 Make shop sketches.
1.4.6 Read and interpret blueprints, including geometric dimensioning and tolerancing.
1.4.7 Determine and interpret reference information used in performing machining work.

Performance Standard 1.5: Demonstrate Proficiency in Machine Planning

1.5.1 Identify proper order of operations.
1.5.2 Identify proper machines.
1.5.3 Select proper work holding/fixturing.
1.5.4 Select proper tooling.

Performance Standard 1.6: Perform Measuring Operations

1.6.1 Read and measure with steel rules and calipers.
1.6.2 Read and measure with micrometers.
1.6.3 Read and measure with Vernier tools.
1.6.4 Read and measure with dial indicators.
1.6.5 Measure using a surface plate.
1.6.6 Read and interpret surface finish.

Performance Standard 1.7: Perform Maintenance on Machines and Tools

1.7.1 Inspect work areas to assure a safe working environment.
1.7.2 Lubricate equipment parts.
1.7.3 Clean and store hand tools, cutters, fixtures, jigs, and attachments.
1.7.4 Inspect and repair hand tools.
1.7.5 Inspect drive pulleys or belts.
1.7.6 Select lubricants for machining operations.
1.7.7 Inspect equipment for safe operational conditions.
1.7.8 Store grinding wheels and precision tools.

CONTENT STANDARD 2.0: PERFORM BENCH WORK SKILLS

Performance Standard 2.1: Identify proper hand tools, usage, and applications

2.1.1 Use proper hammer types.
2.1.2 Use proper punches, stamps, chisels.
2.1.3 Use proper assembly tools.

Performance Standard 2.2: Cut materials by using hand hacksaws

2.2.1 Explain the safety precautions/procedures for use of a hand hacksaw.

2.2.2 Determine teeth per inch on various hacksaw blades.
2.2.3 Describe the applications for saw blades with different ratios of tooth pitch.
2.2.4 Demonstrate the correct method of sawing materials with a hand hacksaw.

Performance Standard 2.3: Cut threads using hand taps and dies

2.3.1 Explain safety precautions/procedures for threading with taps and dies.
2.3.2 Identify and explain the use of the three taps used for threading a blind hole.
2.3.3 Select cutting fluids.
2.3.4 Describe the procedure for cutting internal and external threads with a tap or die.
2.3.5 Explain the correct procedure to align a tap with the hole.

Performance Standard 2.4: Ream holes using hand reamers

2.4.1 Demonstrate the proper method of hand reaming holes using both adjustable and non-adjustable reamers.
2.4.2 Explain the types of lubricants and their applications to reaming.
2.4.3 Explain the correct drill sizes as they relate to the various sizes of reamers.

Performance Standard 2.5: Remove damaged screw and other hardware

2.5.1 Explain the safety precautions/procedures for using easy outs and tap extractors.
2.5.2 Explain the purpose of easy outs and tap extractors.
2.5.3 Determine the correct drill sizes used with various easy outs.
2.5.4 Determine the correct tap extractor for various taps.
2.5.5 Remove damaged screws.

Performance Standard 2.6: Setup and use Arbor Press Broaches

2.6.1 Determine proper broach size.
2.6.2 Explain why broaches have to shimmed.
2.6.3 Explain why lubricant is required.
2.6.4 Cut splines and keyways utilizing broaches, bushings, shims and arbor presses.

Performance Standard 2.7: Deburr Workpieces

2.7.1 Select proper deburring tool.
2.7.2 Demonstrate how to properly hold deburring tool and machinist scrapers.
2.7.3 Demonstrate how to sharpen machinist scrapers.
2.7.4 Deburr work pieces to required tolerances.

CONTENT STANDARD 3.0: SETUP AND OPERATE POWER SAWS

Performance Standard 3.1: Comply with Safe and Efficient Work Practices

3.1.1 Explain what could be the possible injuries resulting from improper safety precautions.
3.1.2 Identify hazardous components of saws.
3.1.3 Demonstrate knowledge of safety by completing a written safety test.

Performance Standard 3.2: Remove and Replace Saw Blades

3.2.1 Explain why the teeth of the blade must point in the correct direction for each type of machine.

3.2.2 Explain why the blades of reciprocating saws must be elevated a certain distance above the work piece before starting the machine.
3.2.3 Describe the procedures for replacing saw blades.
3.2.4 Replace blades in hand and reciprocating saws.

Performance Standard 3.3: Select Appropriate Blades to Perform given Sawing Operations

3.3.1 Explain how the width of the blade and radius desired in contour cutting have a direct effect on each other.
3.3.2 Explain how the number of teeth per inch and the thickness of the work piece affect each other.
3.3.3 Describe a bi-metal saw blade for a reciprocating type machine.

Performance Standard 3.4: Select and Set Speeds for Sawing Operations

3.4.1 Select the correct cutting speed for specific material.
3.4.2 Explain how coolant can affect speeds and feeds.

Performance Standard 3.5: Measure and Cut off Materials using Power Saws

3.5.1 Explain the safety precautions/procedures before operating power saws.
3.5.2 Determine the proper amount of material that must be left on a work piece for machining.
3.5.3 Describe procedure and cut material to layout or scribed line.

Performance Standard 3.6: Cut and Weld Band Saw Blades

3.6.1 Perform proper saw blade welding operation.
3.6.2 Describe the procedures for measuring and cutting saw blades to length.
3.6.3 Explain the reasons for annealing the saw blade after the welding operation.
3.6.4 Describe the procedures for grinding a saw blade before installation.
3.6.5 Describe the procedure for selecting the proper guides.

Performance Standard 3.7: Setup and Operate Saws for Angular Cutting

3.7.1 Explain the reasons for cutting as close to the layout lines as possible.
3.7.2 Explain the reason for cutting angles on a band saw as opposed to using other machines.
3.7.3 Set up a saw for angular cutting.
3.7.4 Perform an angular cut on a work piece.

CONTENT STANDARD 4.0: SETUP AND OPERATE PEDESTAL GRINDERS

Performance Standard 4.1: Comply with Safe and Efficient Work Practices

4.1.1 Demonstrate the operation of pedestal grinders' safety devices.
4.1.2 Demonstrate knowledge of safety by completing a written safety test.

Performance Standard 4.2: Identify Parts of the Pedestal Grinder and Know Their Function

4.2.1 Identify types of pedestal grinders.

4.2.2 Identify major parts and their functions.

Performance Standard 4.3: Select Appropriate Grinding Types

4.3.1 Understanding and selecting proper wheel type.

Performance Standard 4.4: Mount Grinding Wheels

4.4.1 Explain how to determine if a wheel is cracked before mounting.
4.4.2 Explain the importance of cleanliness when mounting wheel.
4.4.3 Explain the importance of the blotters on the wheel.
4.4.4 Explain the reasons for the manufacturer printing the operating speed on grinding wheels.
4.4.5 Explain the safety precautions in regard to the diameter of the flanges in relationship to the diameter of the wheel.
4.4.6 Explain procedure to determine how tight the wheel flanges should be.
4.4.7 Dress wheel and adjust wheel guard and tool rest.

Performance Standard 4.5: Setup Tool Rests

4.5.1 Explain the purpose of the tool rest.
4.5.2 Demonstrate the proper procedure required for adjusting tool rest.

Performance Standard 4.6: Dress Grinding Wheel

4.6.1 Identify the different types of wheel dressers.
4.6.2 Demonstrate the procedure for dressing and truing a grinding wheel.

CONTENT STANDARD 5.0: Hand-Sharpen Cutting Tools

Performance Standard 5.1: Comply with Safe and Efficient Work Practice

5.1.1 Demonstrate knowledge of safety by completing a written safety test.

Performance Standard 5.2: Grind High Speed Tool Bits

5.2.1 Understand selection of the proper grinding wheel.
5.2.2 Identify and properly grind the appropriate clearances, i.e. rake, relief and radius.

Performance Standard 5.3: Grind Brazed Carbide Tool Bits

5.3.1 Understand selection of the proper grinding wheel.
5.3.2 Identify and properly grind the appropriate clearances, i.e. rake, relief and radius.

Performance Standard 5.4: Grind Drill Bits

5.4.1 Identify the parts of the drill bit.
5.4.2 Describe the amount of lip clearance a drill must have to perform correctly.
5.4.3 Explain why a drill bit must have the same lip angle and length.
5.4.4 Discuss why different drill point angles are ground for different materials.
5.4.5 Describe and demonstrate the procedures for hand sharpening a drill bit.
5.4.6 Describe the procedure for correcting a thick web on a drill bit.

CONTENT STANDARD 6.0: SETUP AND OPERATE LATHES

Performance Standard 6.1: Comply with Safe and Efficient Work Practices

6.1.1 Explain the need for safety glasses.

6.1.2 Explain the hazards of chip handling.
6.1.3 Explain the set up hazards.
6.1.4 Explain the chuck removal and installation hazards.
6.1.5 Explain the hazards of work piece burrs.
6.1.6 Explain the proper housekeeping and tool hazards.
6.1.7 Demonstrate the knowledge of safety by completing a written safety test.

Performance Standard 6.2: Identify the Parts of the Lathe

6.2.1 Explain the major parts of the lathe and their functions.

Performance Standard 6.3: Set up an Engine Lathe

6.3.1 Explain the relevant safety precautions/procedures for mounting/removing chucks on lathes.
6.3.2 Explain how to operate a lathe.
6.3.3 Demonstrate the correct selection, installation, and use of work holding devices.

Performance Standard 6.4: Secure Tools, Tool Holders, and Fixture or Attachments

6.4.1 Describe the proper selection of tool holding devices.
6.4.2 Describe the use of tool holders, fixtures and attachments.
6.4.3 Describe the mounting of tool bits.

Performance Standard 6.5: Select and Set Feeds and Speeds

6.5.1 Locate, speed and feed chart on each machine.
6.5.2 List spindle speed formula and calculate appropriate RPM.
6.5.3 Demonstrate correct speed and feed application.

Performance Standard 6.6: Setup Lathes and Face Work Pieces Held in Chucks

6.6.1 Describe the uses of carbide, high speed, and cutting tools as applied to facing operations.
6.6.2 Calculate cutting speeds and feeds for facing operations.
6.6.3 Describe the procedures for facing.
6.6.4 Select the correct cutting fluids for facing.
6.6.5 Face a work piece to specifications.

Performance Standard 6.7: Rough-Cut and Finish-Cut with Lathes

6.7.1 Calculate the correct speeds and feeds for the appropriate operation.
6.7.2 Explain tool position and tool geometry (angles).
6.7.3 Define and make trial cuts.
6.7.4 Using appropriate measuring tools, measure work piece.
6.7.5 Perform required rough and finish cuts to specifications.

Performance Standard 6.8: Perform Lathe Deburring Operations

6.8.1 Identify and demonstrate proper selection and use of deburring tools.
6.8.2 Calculate the correct speeds for deburring operation.

6.8.3 Explain grit size of abrasive clothes.
6.8.4 File, polish and deburr a work piece.
6.8.5 Explain the use of appropriate inspection gages.

Performance Standard 6.9: Align Lathe Centers using Accurate Methods

6.9.1 Describe the geometry of alignment of centers.
6.9.2 Align centers using the point to point method.
6.9.3 Align centers using a precision ground centered shaft.
6.9.4 Align centers using the cut and measuring method.

Performance Standard 6.10: Drill with Lathes

6.10.1 Describe the procedures for drilling on a lathe.
6.10.2 Calculate speeds for drilling operations.
6.10.3 Select the correct cutting fluids for drilling operations.
6.10.4 Drill a hole in a work piece.

Performance Standard 6.11: Countersink Holes with Lathes

6.11.1 Describe the procedures for countersinking holes on a lathe.
6.11.2 Calculate speeds for countersinking operations.
6.11.3 Select the correct cutting fluid for countersinking operations.
6.11.4 Countersink a hole in a work piece.
6.11.5 Explain the use of appropriate inspection gages.

Performance Standard 6.12: Ream Holes with Lathes

6.12.1 Describe the procedures for reaming a hole on a lathe.
6.12.2 Calculate speeds for reaming a hole.
6.12.3 Select the correct cutting fluid for reaming operations.
6.12.4 Ream a hole in a work piece.

Performance Standard 6.13: Tap Threads with Lathes

6.13.1 Select the proper tap for the operation.
6.13.2 Determine tap drill size using the charts and formulas.
6.13.3 Describe the procedures for tapping threads with a lathe.
6.13.4 Calculate speeds for tapping operations.
6.13.5 Select the correct cutting fluid for tapping operations.
6.13.6 Tap a hole in a work piece.
6.13.7 Explain the use of appropriate inspection gages.

Performance Standard 6.14: Counter Bore Holes with Lathes

6.14.1 Describe the procedures for counter boring on a lathe.
6.14.2 Calculate speeds for counter boring operations.
6.14.3 Select the correct cutting fluid for counter boring operations.
6.14.4 Counter bore a hole in a work piece.
6.14.5 Explain the use of appropriate inspection gages.

IDAHO PRECISION MACHINING PROGRAM STANDARDS

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Performance Standard 6.15: Bore Holes with Lathes

6.15.1 Describe the procedures for boring holes.
6.15.2 Select the correct tool and tool holder for boring holes.
6.15.3 Calculate speeds and feeds for boring operations on lathes.
6.15.4 Select the correct cutting fluids for boring.
6.15.5 Bore a hole in a work piece.

Performance Standard 6.16: Knurl Parts with Lathes

6.16.1 Describe the procedures for knurling.
6.16.2 Select the correct tool and tool holder for knurling.
6.16.3 Calculate speeds and feeds for knurling.
6.16.4 Select the correct cutting fluids for knurling.
6.16.5 Knurl a work piece.
6.16.6 Explain the use of inspection gages.

Performance Standard 6.17: Cut External Threads with Lathes

6.17.1 Describe the procedures for cutting external threads.
6.17.2 Explain the formulas used in the three wire system for measuring external threads.
6.17.3 Select appropriate speeds for cutting external threads.
6.17.4 Select the correct cutting fluid for threading operations.
6.17.5 Calculate thread depth.
6.17.6 Calculate total in feed of compound.
6.17.7 Determine depth per pass.
6.17.8 Determine compound off-set angle (right or left hand threads).
6.17.9 Cut external threads on a work piece.
6.17.10 Explain the use of inspection gages.

Performance Standard 6.18: Chase Threads with Lathes

6.18.1 Describe the procedures for chasing threads.
6.18.2 Select appropriate speeds for chasing external threads.
6.18.3 Select the correct cutting fluid for threading operations.
6.18.4 Determine depth per pass.
6.18.5 Determine compound off-set angle (right or left hand threads).
6.18.6 Chase threads on a work piece.

Performance Standard 6.19: Cut Internal Threads with Lathes

6.19.1 Describe the procedures for cutting internal threads.
6.19.2 Explain the use of appropriate inspection gages.
6.19.3 Select the appropriate speeds for cutting internal threads.
6.19.4 Select the correct cutting fluid for threading operations.
6.19.5 Calculate thread depth.
6.19.6 Calculate total in feed of compound.

6.19.7 Determine depth per pass.
6.19.8 Determine compound off-set angle (right or left hand threads).
6.19.9 Cut external threads on a work piece.

Performance Standard 6.20: SetUp and Perform Taper Turning with Taper Attachments

6.20.1 Explain the use of taper attachments.
6.20.2 Describe the procedures for cutting external tapers.
6.20.3 Calculate speeds and feeds for external tapering operations.
6.20.4 Explain how to inspect a taper.
6.20.5 Select the correct cutting fluids for external tapering operations.
6.20.6 Turn an external taper on a work piece.
6.20.7 Explain the use of appropriate inspection gages.

Performance Standard 6.21: Setup and Perform Taper Turning with Compound Rest

6.21.1 Explain the procedure for cutting a taper utilizing the compound rest.
6.21.2 Calculate speed for taper turning.
6.21.3 Explain how to inspect a taper.
6.21.4 Select the correct cutting fluids for taper turning operations.
6.21.5 Turn a taper on a work piece.
6.21.6 Explain the use of appropriate inspection gages.

Performance Standard 6.22: Perform Contour, Angular, or Radius Cuts with Lathes

6.22.1 Describe the procedures for angular concave or contour cuts with lathes.
6.22.2 Explain the proper use of radius gages.
6.22.3 Calculate speeds for free hand forming operations.
6.22.4 Describe the procedures for free hand forming concave and convex radii.
6.22.5 Select the correct cutting fluids.
6.22.6 Cut contour, concave and angular surfaces on a work piece.
6.22.7 Explain the use of appropriate inspection gages.

Performance Standard 6.23: Setup and use Follower and Steady-Rests

6.23.1 Describe the use of follower rests and steady-rests.
6.23.2 Install steady rest or follower rest and adjust to part.
6.23.3 Turn work to size with proper follow and steady rest setup.
6.23.4 Face and center drill part using steady-rest.
6.23.5 Explain the use of appropriate inspection gages.

Performance Standard 6.24: Set up Face Plates and Lathe Dogs

6.24.1 Describe the procedure to install work using a face plate and lathe dog.
6.24.2 Describe the use of the face plate and the importance of counter-balancing the work piece.

6.24.3 Describe the procedure for clamping and aligning part to face plate.

CONTENT STANDARD 7.0: SETUP AND OPERATE MILLING MACHINES

Performance Standard 7.1: Comply with Safe and Efficient Work Practices

7.1.1 Describe general shop safety rules and procedures (i.e. safety test).
7.1.2 Describe OSHA in workplace safety.
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)
7.1.4 Operate lab equipment according to safety guidelines.
7.1.5 Identify and use proper lifting procedures and proper use of support equipment (.e.e rigging, chains, straps, cables).
7.1.6 Utilize proper ventilation procedures for working within the lab/shop area.
7.1.7 Identify marked safety areas.
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.
7.1.9 Identify the location and use of eye wash stations.
7.1.10 Identify the location of the posted evacuation routes.
7.1.11 Identify and wear appropriate clothing for lab/shop activities.
7.1.12 Secure hair and jewelry for lab/shop activities.
7.1.13 Demonstrate knowledge of the safety aspects of high voltage circuits.
7.1.14 Locate and interpret safety data sheets (SDS).
7.1.15 Perform housekeeping duties.
7.1.16 Follow verbal instructions to complete work assignments.
7.1.17 Follow written instructions to complete work assignments.
7.1.18 Demonstrate knowledge of safety by completing a written safety test.

Performance Standard 7.2: Identify the Parts of the Horizontal and Vertical Milling Machines and Know their Functions

7.2.1 Describe the function of major parts.

Performance Standard 7.3: Lubricate Milling Machines

7.3.1 Explain the safety precautions/procedures for cleaning, lubricating and inspecting the milling machine.
7.3.2 Explain the reasons for performing routine cleaning, inspection, and lubrication of milling machines.
7.3.3 Determine the proper lubricants to be used for milling machines.
7.3.4 Explain the meaning of the terms (a) climb; (b) conventional milling.
7.3.5 Describe the procedures for cleaning, lubricating and inspecting the milling machine.
7.3.6 Lubricate a milling machine.

Performance Standard 7.4: True Up the Head and Align Milling Machine Fixtures

7.4.1 Explain the safety precautions/procedures in alignment of heads.

7.4.2 Explain the operation of a swivel head on a mill.
7.4.3 Explain the use of dial indicator for aligning swivel heads.
7.4.4 Align a vise on a milling table.
7.4.5 Align a head of a milling machine.

Performance Standard 7.5: Select and set Feeds and Speeds for Milling Work

7.5.1 List the correct cutting speed and feed for various materials.
7.5.2 Set correct feeds and speeds on a milling machine for various materials.

Performance Standard 7.6: Square Up Work Pieces with a Table Vise

7.6.1 Calculate the correct speeds and feed for various cutters.
7.6.2 Describe the procedures for setting-up and machining a work piece parallel and square.
7.6.3 Identify the correct cutting fluids for milling.

Performance Standard 7.7: Perform End Milling

7.7.1 Calculate proper speeds, feeds and depth of cut with end milling.
7.7.2 Describe the procedures for setting up and end milling a flat surface.
7.7.3 Identify the correct cutting fluids for milling.
7.7.4 End mill a flat surface.

Performance Standard 7.8: Perform Fly-Cutting Operations

7.8.1 Define surface roughness, waviness, lay and identify their symbols.
7.8.2 Explain the purpose of fly-cutters.
7.8.3 Calculate speeds, feeds, and determine depth of cut for fly-cutting surfaces.
7.8.4 Describe the procedures for fly-cutting surfaces.
7.8.5 Fly-cut a work piece surface to required tolerances.

Performance Standard 7.9: Drill Holes with a Milling Machine

7.9.1 Describe the procedures for using milling machine dials for accurate table positioning.
7.9.2 Calculate the amount of table movement for each position.
7.9.3 Describe the procedures for compensating for backlash out the lead screws.
7.9.4 Calculate the correct speed and feed.
7.9.5 Drill holes in a work piece to specified tolerances using a milling machine.

Performance Standard 7.10: Perform Reaming Operations

7.10.1 Explain the uses of centerdrills, drills, and reamers.
7.10.2 Calculate proper speeds and feeds for centerdrilling, drilling, and reaming operations.
7.10.3 Describe the procedures for centerdrilling, drilling, and reaming on a milling machine.
7.10.4 Identify the correct cutting fluids for centerdrilling, drilling and reaming.
7.10.5 Determine the proper drill size for reaming.
7.10.6 Ream a hole in a work piece holding required tolerances.

Performance Standard 7.11: Cut External Keyways

7.11.1 Calculating proper speeds, feeds, and depth of cut when milling keyseats.

7.11.2 Describe the procedures for setting up and milling keyseats.
7.11.3 Identify the correct cutting fluids for milling keyseats.
7.11.4 Determine keyway depth.
7.11.5 End mill a keyseat in a work piece holding required tolerances.

Performance Standard 7.12: Bore Holes with Milling Machines

7.12.1 Explain the procedures for accurately adjusting a boring head.
7.12.2 Calculate speeds and feeds for boring operations.
7.12.3 Describe the procedures for setting up and completing boring operations.
7.12.4 Identify the correct cutting fluids for boring and counterboring.
7.12.5 Bore a hole in a work piece using a boring head on a milling machine to required tolerances.

Performance Standard 7.13: Perform Form Milling

7.13.1 Define the terms concave and convex as they pertain to milling cutters.
7.13.2 Calculate speeds, feeds, and depth of cut for milling cutter.
7.13.3 Describe the procedures for form milling.
7.13.4 Identify the correct cutting fluids.
7.13.5 Form mill a work piece to required tolerances.

Performance Standard 7.14: Perform Indexing Operations using a Dividing Head

7.14.1 Explain the calculations for the indexing head when performing differential indexing.
7.14.2 Explain the proper technique for assembling gears in gear train.
7.14.3 Define simple gearing and compound gearing.

Performance Standard 7.15: Setup and Operate Rotary Tables

7.15.1 Describe set up and clamping procedures for a rotary table.
7.15.2 List the applications for a rotary table.
7.15.3 Explain the procedures for avoiding backlash of rotary table and milling machine screws.
7.15.4 Calculate the correct speeds for machining outside radius.
7.15.5 Describe the procedure for milling outside radius using a rotary table.
7.15.6 Identify the correct cutting fluids.
7.15.7 Describe the procedures for centering spindle with rotary table.

Performance Standard 7.16: Perform Cutting-Off Operation

7.16.1 Explain how to calculate depths, speeds and feeds for slitting saws.
7.16.2 Explain how to set up work pieces with kickers to cut precision lengths.
7.16.3 Cut work pieces to precision lengths.
7.16.4 Slot various shapes of work pieces.

Performance Standard 7.17: Setup and Perform Slab Mill Operations

7.17.1 Explain the importance of maintaining a clean milling machine.
7.17.2 Describe procedures for mounting cutter and arbor in the milling machine.

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.
7.17.4 Describe the procedures for slab milling operations.
7.17.5 Identify the correct cutting fluid.
7.17.6 Explain the purpose of the applications for using climb milling and conventional milling.

Performance Standard 7.18: Use an Edge Finder and Wiggler

7.18.1 Explain the correct care and use of an edge finder or wiggler.
7.18.2 Describe the procedures for touching off with an edge finder and a wiggler.
7.18.3 Locate the center of a work piece after locating it with a wiggler or edge finder.

Performance Standard 7.19: Position a Table

7.19.1 Describe the procedures for accurate table positioning.
7.19.2 Calculate the amount of table movement for each position.
7.19.3 Describe the procedures for keeping backlash out of lead screws.
7.19.4 Calculate the correct cutting speed and feed.
7.19.5 Describe the procedures for drilling equally spaced holes.
7.19.6 Drill equally spaced holes in a work piece.

Performance Standard 7.20: Setup and use a Sine Bar

7.20.1 Describe the care and use of parallels.
7.20.2 Describe the procedures for seating a part in a milling vise.
7.20.3 Set up and seat a work piece in a vise.

CONTENT STANDARD 8.0: SETUP AND OPERATE DRILL PRESSES

Performance Standard 8.1: Comply with Safe and Efficient Work Practices

8.1.1 Demonstrate knowledge of safety by completing a written safety test.

Performance Standard 8.2: Explain the Different Types of Drill Presses

8.2.1 Identify the parts of the drill press.
8.2.2 Demonstrate the procedure for adjusting the table height.
8.2.3 Calculate the RPM and feed for various size drills and materials.
8.2.4 Demonstrate the selection of the correct RPM settings and feed settings.
8.2.5 Explain the use of the drill chuck and Morse tapered spindle.
8.2.6 Explain the use of drill press work holding devices.

Performance Standard 8.3: Center Drill, Drill and Ream a Hole in a Work Piece

8.3.1 Describe the procedures for center drilling and drilling holes.
8.3.2 Describe the procedures for reaming holes.
8.3.3 Select the proper cutting fluids for drill press.
8.3.4 Center drill, drill, and ream a hole in a work piece to required tolerance.

Performance Standard 8.4: Counter Bore, Spot Face, and Countersink a Hole in a Workpiece

8.4.1 Explain the purpose of counter boring, spot facing, and countersinking a hole.
8.4.2 Describe the procedures for counter boring, counter sinking and spot facing holes.
8.4.3 Select the correct cutting fluids for counter boring, counter sinking, and spot facing.
8.4.4 Counter bore, spot face, and counter sink a hole in a work piece to required tolerance.

Performance Standard 8.5: Hand Tap a Hole in Work Piece

8.5.1 Describe the procedures for hand tapping a hole with a drill press to assure perpendicularity.

Performance Standard 8.6: Power Tap a Hole in Work Piece

8.6.1 Distinguish between power and hand taps.
8.6.2 Describe the procedures for machine tapping holes.
8.6.3 Select the proper accessory to perform a power tapping procedure
8.6.4 Select the correct cutting fluids for power tapping
8.6.5 Power tap a hole in a work piece to required tolerance.

Performance Standard 8.7: Use Appropriate Inspection Gages

8.7.1 Explain the use of appropriate inspection gages.