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| A close up of a sign  Description automatically generatedMECHANICAL DRAFTING 15.1300.40  TECHNICAL STANDARDS  An Industry Technical Standards Validation Committee developed and validated these standards on November 5 and 17, 2020. The Arizona Career and Technical Education Quality Commission, the validating authority for the Arizona Skills Standards Assessment System, endorsed these standards on January 27, 2021.  Note: Arizona’s Professional Skills are taught as an integral part of the Mechanical Drafting program. | |
| **The Technical Skills Assessment for Mechanical Drafting is available SY2022-2023** | |
| **Note: In this document i.e. explains or clarifies the content and e.g. provides examples of the content that must be taught.** | |
| STANDARD 1.0 APPLY MEASUREMENT AND SCALE CONCEPTS IN DESIGN DRAFTING | |
| 1.1 | Identify types of unit systems used in design drafting (i.e., SI units, Imperial, ANSI, IEC standards, etc.) |
| 1.2 | Demonstrate the use of different measurement systems (i.e., SI units, Imperial, etc.) |
| 1.3 | Explain the use of measurement tools (i.e., ruler, protractor, measuring tape, calipers, etc.) |
| 1.4 | Use types of geometric measurements (i.e., linear, angular, etc.) |
| 1.5 | Determine and apply appropriate scale |
| STANDARD 2.0 INTERPRET MECHANICAL DESIGN DOCUMENTS | |
| 2.1 | Differentiate among mechanical, civil, and architectural drawings |
| 2.2 | Interpret dimensions, symbols, legends, and scales (i.e., diameter, depth, tolerance, parallelism, angularity, etc.) |
| 2.3 | Describe mechanical features in technical drawings (i.e., hole diameter, dimension, location, etc.) |
| 2.4 | Analyze technical drawings for clarity, completeness, and accuracy (i.e., ASME GD&T Standard, etc.) |
| STANDARD 3.0 APPLY BEST PRACTICES TO CREATE TECHNICAL DRAWINGS | |
| 3.1 | Use basic drafting techniques for drawings (i.e., isometric, oblique, projection drawing views, etc.) |
| 3.2 | Develop manual sketches that accurately reflect real objects |
| 3.3 | Communicate concepts with manual sketches |
| 3.4 | Create computer draft of sketches |
| 3.5 | Classify line type and line weight |
| 3.6 | Create and identify elements of title blocks and borders |
| 3.7 | Apply notes and dimensions |
| 3.8 | Determine correct drawing scale and layout based on output requirements (e.g., hard copy and electronic delivery) |
| 3.9 | Organize and maintain drawings and supporting documents |
| 3.10 | Prepare detail and assembly drawings |
| STANDARD 4.0 UTILIZE HARDWARE AND SOFTWARE TOOLS | |
| 4.1 | Describe the role of new technologies in the use of drafting drawings (i.e., simulations, AI, robotics, etc.) |
| 4.2 | Use computer hardware and input/output devices for design drafting problems (i.e., 3D printers, CNC Machines, etc.) |
| 4.3 | Apply file and disk management techniques (i.e., network, revision control, document management, nomenclature for file naming, etc.) |
| 4.4 | Import and export data files using different formats (i.e., DWG, DXF, PDF, STEP, etc.) |

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| STANDARD 5.0 APPLY CADD SYSTEM AND PROCEDURES | |
| 5.1 | Explore and determine applicability of CADD |
| 5.2 | Use CADD software to set up drawing (e.g., scale, format, and dimensioning) |
| 5.3 | Determine and apply CADD commands and techniques (e.g., layers, colors, line types, editing commands, and properties) |
| 5.4 | Employ available libraries and templates |
| 5.5 | Draw geometric constructions using snap functions (i.e., parallel lines, polygons, tangents, perpendicular, landscape, etc.) |
| 5.6 | Determine views for projection (e.g., plan, top, and front) |
| 5.7 | Identify, create, and place views for orthographic features |
| 5.8 | Identify, create, and place auxiliary views to determine true size, shape, and location of non-orthogonal features |
| 5.9 | Identify, create, and place appropriate section views |
| 5.10 | Construct full, half, offset, aligned, revolved, and removed section views |
| 5.11 | Utilize various material hatch patterns in section views |
| 5.12 | Draft assemblies, intersections, developments, and patterns (i.e., including radial and parallel line patterns) |
| STANDARD 6.0 COMPARE BASIC MANUFACTURING PROCESSES | |
| 6.1 | Identify types of parts to be detailed (i.e., cast, machined, forged, sheet metal, welded, etc.) |
| 6.2 | Incorporate manufacturing process symbols in mechanical drawings (e.g., welding, machining, casting, and sheet metal) |
| 6.3 | Identify fasteners used in manufacturing processes (i.e., screw heads, rivets, studs, etc.) |
| 6.4 | Read a material specification sheet (i.e., mechanical material, yield strength, etc.) |
| 6.5 | Generate a bill of materials |
| 6.6 | Identify differences in material types and conditions (i.e., stainless steels, carbon steels, aluminum, plastics, etc.) |
| 6.7 | Explain dimensional tolerances of various manufacturing materials and processes (i.e., sheet metal, fabrication welding, etc.) |
| 6.8 | Identify part finishes (i.e., painted, powder coated, galvanized, anodized, etc.) |
| 6.9 | Analyze dimensional tolerance stack-up in assemblies per material/design feature |
| 6.10 | Determine the tolerance usage per material/design feature |
| STANDARD 7.0 APPLY DIMENSIONING BEST PRACTICES | |
| 7.1 | Use dimensioning rules in compliance with ASME Y14 standards |
| 7.2 | Draw/select appropriate dimensioning practices (i.e., conventional, tabular, datum, ordinate, aligned, coordinate systems, fit, unilateral/bilateral tolerance, etc.) |
| 7.3 | Identify potential machining datums (i.e., holes, planes, circular, etc.) |
| 7.4 | Check drawings for accuracy, completeness, and clarity |