

CADD Skill Standards

Fundamental Drafting Skills

Drafting Skills

Number 1(a)

Skill Use drawing media and related drafting materials.

Objectives Identify the characteristics and types of vellum, mylar, plotting pens, plotting pencils, ink and toner cartridges.

Standard Select drawing media from among the following choices: mylar, vellum, paper. Considering the following criteria; cost, use, compatibility, accuracy, and reproduction equipment (e.g. what type of drawing media is needed for working copy for evaluation and mark up).

Number 1(b)

Skill Use drawing media and related drafting materials.

Objectives Identify the characteristics and types of vellum, mylar, plotting pens, plotting pencils, ink, and toner cartridges.

Standard Select related drafting materials from among the following choices: plotting pens, plotting pencils, ink, toner cartridges. Considering the following criteria: costs, equipment, use, compatibility, and accuracy (e.g. what type of drafting media is needed for working copy for evaluation and mark up)

Number 2(a)

Skill Use basic measurement systems.

Objectives List the elements of the English/Imperial system and the metric system.

Standard Identify basic measurement systems using: fractions, decimals, metric, English, millimeters, centimeters, meters, degrees, and radians. Evaluate each measuring system using the criteria of: length, mass (weight), area, perimeter, circumference, and volume.

Number 2(b)

Skill Use basic measurement systems

Objectives Apply the elements of the English/Imperial system and the metric system.

Standard Apply basic measurement systems' measurements to the mathematical operations of length, mass (weight), area, perimeter, circumference, and volume.

CADD Skill Standards

Fundamental Drafting Skills

Drafting Skills

Number 3(a)

Skill Add correct annotation(s) to drawing.

Objectives Identify notes, symbols, and the placement of notes and symbols.

Standard Identify annotation notes, symbols, and placement. Correct notes and proportionately sized symbols for features requiring description (e.g. electrical symbols on electrical drawings, GD&T symbols on machine drawings).

Number 3(b)

Skill Add correct annotation to drawing.

Objectives Identify notes, symbols, and the placement of notes and symbols.

Standard Apply annotation notes, symbols, and placement to correct the feature being described (e.g. electrical symbols on electrical drawings, GD&T symbols on machine drawings).

Number 4(a)

Skill Identify line styles and weights.

Objectives Identify center, hidden, phantom, object, section, cut plane, dimension, break, chain, symmetry, visible, extension, and stitch lines.

Standard Identify line styles including: center line, hidden line, phantom line, object line, section line, cut plane line, dimension line, symmetry line, visible line, extension line, and stitch line. Evaluate line styles and correct line style in order to represent/define features.

Number 4(b)

Skill Identify line styles and weights.

Objectives Identify center, hidden, phantom, object, section, cut plane, dimension, break, chain symmetry, visible, extension, and stitch lines.

Standard Apply various line styles including: center line, hidden line, phantom line, object line, section line, cut plane line, dimension line, chain line, symmetry line, visible line, extension line, and stitch line, in accordance with industry accepted standards.

CADD Skill Standards

Fundamental Drafting Skills

Drafting Skills

Number 5(a)

Skill Prepare separate title blocks and other drafting formats.

Objectives Given a title block, identify the following components: company name, scale, sheet number, revision number, drawing number, and approval block.

Standard Identify the following title block components: company name, address, title, drawing size, CAGE, code, scale, sheet, number, revision, approval block, and continuation sheet. Evaluate the title block using the criteria: location on the drawing, content, and appropriate letter height and justification.

Number 5(b)

Skill Prepare separate title blocks and other drafting formats.

Objectives Given a title block, identify the following components: company name, drawing title, scale, sheet number, revision number, drawing number, and approval block.

Standard Prepare a title block including: company name, address, title, drawing size, CAGE, code, scale, sheet number, revision, approval block, and continuation sheet. Consider the criteria: location on the drawing, content, and appropriate letter height and justification during preparation.

Number 5(c)

Skill Prepare separate title blocks and other drafting formats.

Objectives Identify the components of a bill of materials, parts list, and schedules.

Standard Identify/prepare a parts list including a bill of materials, stock list, list of materials, and schedules. Evaluate the parts list using the criteria: location on the drawing, content, and appropriate letter height and justification.

Number 5(d)

Skill Prepare separate title blocks and other drafting formats.

Objectives Given a revision block, identify the latest revision number, description of change, date, and approval.

Standard Identify/prepare a revision history block including a description of change, revision, date, and approval. Evaluate the revision history block using the criteria: location on the drawing, content, and appropriate letter height and justification.

CADD Skill Standards

Fundamental Drafting Skills

Drafting Skills

Number 5(e)

Skill Prepare separate title blocks and other drafting formats.

Objectives Given a tolerance block, identify angular tolerance, linear tolerance, metric/English tolerancing systems and dual tolerancing systems.

Standard Identify/prepare a tolerance block incorporating angle, dimensioning, decimal/ metric systems, and places of tolerance. Evaluate the tolerance block using the criteria: location on the drawing, content, and appropriate letter height and justification.

Number 5(f)

Skill Prepare separate title blocks and other drafting formats.

Objectives Given a reference/information chart, identify the size, quantity, symbol, and location of each feature.

Standard Identify reference information charts incorporating size, quantity, and type of reference. Evaluate the reference/information charts using the criteria: location on the drawing, content, and appropriate letter height and justification.

Number 5(g)

Skill Prepare separate title blocks and other drafting formats.

Objectives Identify the components/elements of a proprietary information/copyright block.

Standard Identify a copyright/proprietary information block, including company name, year, and "all rights reserved." Evaluate the copyright/ proprietary information block using the criteria: location on the drawing, content, and appropriate letter height and justification.

Number 5(h)

Skill Prepare separate title blocks and other drafting formats.

Objectives Given a revision status of sheets block, identify sheet numbers and the revision number.

Standard Identify/prepare a revision status of sheets block, including sheet numbers and revision symbols. Evaluate the revision status of sheets block using the criteria: location on the drawing, content, and appropriate letter height and justification.

CADD Skill Standards

Fundamental Drafting Skills

Drafting Skills

Number 5(i)

Skill Prepare separate title blocks and other drafting formats.

Objectives Given a border, identify fold lines, microfilm, arrows, and zone identifiers.

Standard Identify/prepare a border, incorporating fold lines, microfilm, arrows and zones. Evaluate the border using the criteria: location on the drawing, content, and appropriate letter height and justification.

Number 5(j)

Skill Prepare separate title blocks and other drafting formats.

Objectives Given the nominal sheet sizes, identify the general sheet size.

Standard Identify/prepare a drawing size (e.g., ANSI Y14.1). Evaluate the drawing size using the criteria: location on the drawing, content, and appropriate letter height and justification.

Number 6(a)

Skill Identify and use appropriate standard symbols

Objectives Given the industry standard symbols, identify the finish mark, electrical/electronic, welding, GD&T, machine tool, and architectural symbols.

Standard Identify the industry standard symbols: finish, electrical/electronic, welding, GD&T, machine tool, and architectural. Evaluate these symbols (e.g. ANSI or ISO specs) as required on a drawing.

Number 6(b)

Skill Identify and use appropriate standard symbols

Objectives Given the industry standard symbols, identify the finish mark, electrical/electronic, welding, GD&T, machine tool, and architectural symbols.

Standard Apply industry standard symbols: finish, electrical/electronic, welding, GD&T, machine tool, and architectural (e.g. ANSI or ISO specs) as required on a drawing.

Number 7(a)

Skill Reproduction of originals using different methods.

Objectives Identify methods for reproduction of originals.

Standard Identify photocopies, diazos, and original output devices. Evaluate the appropriate copying method with cost and purpose of the drawing (e.g. for an instruction manual for shop work or fabrication).

CADD Skill Standards

Fundamental Drafting Skills *Drafting Skills*

Number 7(b)

Skill Reproduction of originals using different methods.

Objectives Identify methods for reproduction of originals.

Standard Create a first generation plot by developing a plotted drawing.

Number 8(a)

Skill Create freehand technical sketches.

Objectives Identify the purpose of a freehand sketch.

Standard Identify the basic rules of technical freehand, orthographic, pictorial, schematic, and diagram sketches (e.g., appropriate views properly matched to purpose of the sketch).

Number 8(b)

Skill Create freehand technical sketches.

Objectives Identify the purpose of a freehand sketch.

Standard Create proportionate and legible technical freehand, orthographic, pictorial, schematic, and diagram sketches.

CADD Skill Standards

Fundamental Drafting Skills

Orthographic Projections

Number 1(a)

Skill Identify, create, and place appropriate orthographic views.

Objectives Given an orthographic multiview drawing, identify the appropriate views required to completely describe an object. Include top, bottom, front, right, left, and rear views.

Standard Identify the proper size and location of necessary orthographic views, including when applicable, top, bottom, front, right, left, and rear views.

Number 1(b)

Skill Identify, create, and place appropriate orthographic views.

Objectives Given an orthographic multiview drawing, identify the appropriate views required to completely describe an object. Include top, bottom, front, right, left, and rear views.

Standard Create orthographic views utilizing the criteria: necessary views, surface and edge relationships, and hidden lines/surfaces. Incorporate all views- top, bottom, front, right, left and rear, where applicable.

Number 2(a)

Skill Identify, create, and place appropriate auxiliary views.

Objectives Identify the purposes of primary and secondary auxiliary views.

Standard Identify primary and secondary auxiliary views. Evaluate the necessary views and purposes for use.

Number 2(b)

Skill Identify, create, and place appropriate section views.

Objectives Identify the purposes of primary and secondary auxiliary views.

Standard Create primary and secondary auxiliary views with proper size and location of necessary views.

CADD Skill Standards

Fundamental Drafting Skills

Orthographic Projections

Number 3(a)

Skill Identify, create, and place appropriate section views.

Objectives

- 1) Identify the purpose of section views.
- 2) Identify full, rib, half, and broken sections.
- 3) Identify the unique symbols to depict foreshortened sections (e.g. bar, round, tubes, and wood).

Standard Identify full section, rib section, half section, foreshortened parts; rods, tubes, bars, wood, freaks, and broken sections. Exaluate sectioning rules, cutting plane line, necessary views and proper placement for each section view.

Number 3(b)

Skill Identify, create, and place appropriate section views.

Objectives

- 1) Identify the purpose of section views.
- 2) Identify full, rib, half, and broken sections.
- 3) Identify the unique symbols to depict foreshortened sections. (e.g. bar, round, tubes, and wood)

Standard Create full section, rib section, half section, foreshortened parts; rods, tubes, bars, wood, freaks, and broken sections. Utilize sectioning rules, cutting plane line, necessary views and proper placement for each section view.

CADD Skill Standards

Fundamental Drafting Skills

Pictorial Drawings

Number 1(a)

Skill Identify and create axonometric drawings.

Objectives Given axonometric drawings, identify isometric, dimetric, trimetric, and exploded drawings.

Standard Identify axonometric views; isometric, dimetric, trimetric, and exploded drawings. Evaluate the drawings by the criteria: size and angle.

Number 1(b)

Skill Identify and create axonometric drawings.

Objectives Given axonometric drawings, identify isometric, dimetric, trimetric, and exploded drawings.

Standard Create in detail axonometric; isometric, dimetric, trimetric, and exploded drawings. Evaluate the drawings by the criteria: size and angle.

Number 2(a)

Skill Identify and create oblique drawings

Objectives Identify cabinet and cavalier oblique drawings.

Standard Identify cabinet and cavalier oblique drawings, using proper size and angle.

Number 2(b)

Skill Identify and create oblique drawings

Objectives Identify cabinet and cavalier oblique drawings.

Standard Create cabinet and cavalier oblique drawings, using proper size and angle.

Number 3

Skill Identify perspective drawings.

Objectives Given perspective drawings, identify 1, 2, and 3-point views.

Standard Identify 1, 2, and 3-point views, evaluating different types of perspective drawings.

CADD Skill Standards

Fundamental Drafting Skills Dimensioning

Number 1(a)

Skill Apply dimensioning rules correctly.

Objectives 1) Given a drawing, identify extension, dimension and leader lines.
2) Identify and describe generally accepted dimensioning practices (e.g. spacing, crossing lines, redundant dimensions).

Standard Identify dimensioning rules in regards to extension, dimension, and leader lines. Use the correct rules as they apply to the appropriate discipline.

Number 1(b)

Skill Apply dimensioning rules correctly.

Objectives 1) Given a drawing, identify extension, dimension and leader lines.
2) Identify and describe generally accepted dimensioning practices (e.g. spacing, crossing lines, redundant dimensions).

Standard Apply dimensioning rules to extension, dimension, and leader lines. Use the correct rules as they apply to the appropriate discipline.

Number 2(a)

Skill Use correct dimension line terminators.

Objectives Identify and outline the use of generally accepted dimension line terminators.

Standard Identify the proper size and locations of dimension line terminators (e.g. arrowheads, ticks, slashes).

Number 2(b)

Skill Use correct dimension line terminators.

Objectives Identify and outline the use of generally accepted dimension line terminators.

Standard Apply the proper size and locations of dimension line terminators (e.g. arrowheads, ticks, slashes).

Number 3(a)

Skill Dimension objects.

Objectives Identify the generally accepted practices of dimensioning a line, an arc, an angle, radii, and diameters.

Standard Identify the proper size and location of: dimensions of lines, arcs, angles, radii, and diameters.

CADD Skill Standards

Fundamental Drafting Skills

Dimensioning

Number 3(b)

Skill Dimension objects.

Objectives Identify the generally accepted practices of dimensioning a line, an arc, an angle, radii, and diameters.

Standard Apply the proper size and location to: dimensions of lines, arcs, angles, radii, and diameters.

Number 4(a)

Skill Dimension complex shapes.

Objectives Identify the generally accepted practices of dimensioning spheres, cylinders, tapers, pyramids, irregular objects, and pictorial drawings.

Standard Identify the proper size and location of spheres, cylinders, tapers, pyramids, irregular objects, and pictorial drawings.

Number 4(b)

Skill Dimension complex shapes.

Objectives Identify the generally accepted practices of dimensioning spheres, cylinders, tapers, pyramids, irregular objects, and pictorial drawings.

Standard Apply the proper size and location to spheres, cylinders, tapers, pyramids, irregular objects, and pictorial drawings.

Number 5(a)

Skill Dimension features from a center line.

Objectives Identify the purpose of using a center line for dimensioning symmetrical features.

Standard Identify the proper size and location of the center line.

Number 5(b)

Skill Dimension features from a center line.

Objectives Identify the purpose of using a center line for dimensioning symmetrical features.

Standard Apply the symmetrical features of a center line to its proper size and location.

CADD Skill Standards

Fundamental Drafting Skills *Dimensioning*

Number 6(a)

Skill Dimension a theoretical point of intersection.

Objectives Identify the purpose of dimensioning to a theoretical point of intersection.

Standard Identify the proper size and location of a theoretical point of intersection.

Number 6(b)

Skill Dimension a theoretical point of intersection.

Objectives Identify the purpose of dimensioning to a theoretical point of intersection.

Standard Apply the proper size and location to a theoretical point of intersection.

Number 7(a)

Skill Use appropriate dual dimensioning standards.

Objectives 1) Identify the components of dual dimensioning.
2) Identify the primary and secondary measures.

Standard Identify the proper size and location of dual dimensioning using metric & inches.

Number 7(b)

Skill Use appropriate dual dimensioning standards.

Objectives 1) Identify the components of dual dimensioning.
2) Identify the primary and secondary measures.

Standard Apply the proper size and location in metric & inches to dual dimensioning.

Number 8(a)

Skill Use size and location dimension practices.

Objectives Identify generally the accepted size and location of dimensioning practices. Given examples, identify a feature that is properly and completely dimensioned for size and location.

Standard Identify the proper size and location of extension lines, dimension lines, and leaders dimensions.

CADD Skill Standards

Fundamental Drafting Skills Dimensioning

Number 8(b)

Skill Use size and location dimension practices.

Objectives Identify generally the accepted size and location of dimensioning practices. Given examples, identify a feature that is properly and completely dimensioned for size and location.

Standard Apply the proper size and location of extension lines, dimension lines, and leaders dimensions.

Number 9(a)

Skill Use various dimensioning styles.

Objectives 1) Identify and provide a use for different types of dimensioning style.
2) Define coordinate systems of various dimensioning styles (e.g. Cartesian, polar, datum, coordinate).

Standard Identify the proper size and location of Cartesian, polar, datum, and coordinate dimensioning methods.

Number 9(b)

Skill Use various dimensioning styles.

Objectives 1) Identify and provide a use for different types of dimensioning style.
2) Define coordinate systems of various dimensioning styles (e.g. Cartesian, polar, datum, coordinate).

Standard Apply the proper size and location to Cartesian, polar, datum, and coordinate dimensioning methods.

Number 10(a)

Skill Place tolerance dimensioning and Geometric Dimensioning and Tolerance (GD&T) on drawings where appropriate.

Objectives Identify a GD&T symbol and a toleranced dimension.

Standard Identify the proper size and location of GD&T (tolerancing & datum) symbols.

Number 10(b)

Skill Place tolerance dimensioning and Geometric Dimensioning and Tolerance (GD&T) on drawings where appropriate.

Objectives Identify a GD&T symbol and a toleranced dimension.

Standard Apply the proper size and location to GD&T (tolerancing & datum) symbols.

CADD Skill Standards

Fundamental Computer Skills *Hardware*

Number 1

Skill Demonstrate proper care of equipment.

Objectives Identify the generally accepted practices for care of computer components.

Standard Explain the standard procedures regarding care of equipment; keyboard, monitor, CPU, etc., based on the survey of operators' manuals.

Number 2(a)

Skill Operate and adjust input devices.

Objectives Identify the generally accepted practices for the use of input devices in a graphic workstation.

Standard Identify/explain standard procedure for input devices (mouse, keyboard, tablet/digitizer) based on the survey of operators' manuals.

Number 2(b)

Skill Operate and adjust input devices.

Objectives Identify the generally accepted practices for the use of input devices in a graphic workstation.

Standard Operate and interface with computers and software through the use of input devices (e.g., mouse, keyboard, tablet/digitizer).

Number 3(a)

Skill Operate and adjust output devices.

Objectives Identify the generally accepted practices for the use of output devices in a graphic workstation.

Standard Explain output devices (printers/plotters) based on the standard procedures found in the survey of operators' manuals.

Number 3(b)

Skill Operate and adjust output devices.

Objectives Identify the generally accepted practices for the use of input devices in a graphic workstation.

Standard Explain the operation of output devices (printers/plotters) based on the standard procedures found in the survey of operators' manuals (e.g., raster, vector).

CADD Skill Standards

Fundamental Computer Skills *Hardware*

Number 4

Skill Correct handling and operation of storage media.

Objectives Identify different types of storage media and the proper operating methods/protection capabilities for each type.

Standard Explain the standard techniques and procedures for the care and usage of storage media (e.g., diskettes, tapes, CDs) based on the manufacturers' recommendations.

Number 5

Skill Start and shut down work station

Objectives Demonstrate power up with system function intact and initialization/ exit procedures.

Standard Demonstrate power up with system function intact and initialization/ exit procedures.

Number 6

Skill Adjust monitor controls for maximum comfort and usability.

Objectives Demonstrate the ability to adjust monitor controls. (e.g., brightness, contrast, etc.)

Standard Demonstrate the ability to adjust monitor controls. (e.g., brightness, contrast, etc.)

Number 7

Skill Recognize availability of information services.

Objectives Describe the purpose of e-mail, bulletin boards, internal/external computer networks, and on-line information services.

Standard Identify various information sources and list each source's services by function.

CADD Skill Standards

Fundamental Computer Skills *Physical and Safety Needs*

Number 1

Skill Demonstrate an understanding of ergonomic considerations

Objectives Define ergonomic. List and explain the importance of each feature of an ergonomic environment for a computer operator.

Standard Explain/identify ergonomic applications (e.g., lighting, posture, keyboard position, seating, monitor adjustments). Evaluate the applications with the criteria: OSHA standards, personal comfort, and common sense.

Number 2

Skill Demonstrate personal safety.

Objectives List safety standards and describe potential safety hazards that may affect a computer operator.

Standard List and describe the OSHA and national Electrical Code safety standards, e.g., extension cords, daisy chaining, and watts usage for an outlet.

CADD Skill Standards

Fundamental Computer Skills *Operating Systems*

Number 1(a)

Skill Start and exit a software program as required.

Objectives Exit an application within a software program.

Standard Exit an application within a software program.

Number 1(b)

Skill Start and exit a software program as required.

Objectives Exit an application within a software program.

Standard Exit an application within a software program.

Number 2(a)

Skill Demonstrate proper file management techniques.

Objectives List and describe the function of file management commands.

Standard Explain definitions and procedures for file management techniques: copying, deleting, finding, saving, and renaming, based on operating/applications systems.

Number 2(b)

Skill Demonstrate proper file management techniques.

Objectives List and describe the function of file management commands.

Standard Demonstrate definitions and procedures for file management techniques: copying, deleting, finding, saving, and renaming, based on operating/applications systems.

Number 3(a)

Skill Format floppy disk.

Objectives Explain the procedure for formatting floppy disk.

Standard Explain the procedure for the preparation and use of a floppy disk based on operating systems.

Number 3(b)

Skill Format floppy disk

Objectives Explain the procedure for formatting floppy disk.

Standard Demonstrate the procedure for the preparation and use of a floppy disk based on operating systems.

CADD Skill Standards

Fundamental Computer Skills *Operating Systems*

Number 4(a)

Skill Identify, create, and use directory structure and change paths.

Objectives Identify the correct method to organize files on a particular workstation and recognize potential problems associated with using an improper directory structure.

Standard Identify the directory structure of directories, sub-directories, and files based on the operating system.

Number 4(b)

Skill Identify, create, and use directory structure and change paths.

Objectives Identify the correct method to organize files on a particular workstation and recognize potential problems associated with using an improper directory structure.

Standard Create an observed result or procedure checklist from a directory structure, incorporating directories, sub-directories, and files.

Number 4(c)

Skill Identify, create, and use directory structure and change paths.

Objectives Identify the correct method to organize files on a particular workstation, and recognize potential problems associated with using an improper directory structure.

Standard Apply a directory structure (e.g., directories, sub-directories, files) to organize files on a particular workstation.

Number 5(a)

Skill Demonstrate proper file maintenance and backup procedures.

Objectives Identify the correct method for backing up files on a particular workstation.

Standard Explain the file back-up procedure for files, directories, programs, etc., based on the operating/application system.

Number 5(b)

Skill Demonstrate proper file maintenance and backup procedures.

Objectives Identify the correct method for backing up files on a particular workstation.

Standard Demonstrate the file back-up procedure for files, directories, programs, etc., based on the operating/application system.

CADD Skill Standards

Fundamental Computer Skills *Operating Systems*

Number 6(a)

Skill Translate, import, and export data files between formats.

Objectives 1) Explain the procedure for translating, importing, and exporting files between format.
2) Explain the function of IGES and DXF

Standard Translate and evaluate an observed result or a procedure check list from data files and data types based on the application system.

Number 6(b)

Skill Translate, import, and export data files between formats.

Objectives 1) Explain the procedure for translating, importing, and exporting files between format.
2) Explain the function of IGES and DXF

Standard Explain the procedure and limitations for data files and data types based on the application system (i.e., justification, advantages and disadvantages).

Number 7(a)

Skill Use on-line help

Objectives Identify the location and purpose of on-line help.

Standard Explain an on-line help tutorial based on the application system.

Number 7(b)

Skill Use on-line help

Objectives Identify the location and purpose of on-line help.

Standard Use an on-line help tutorial based on the application system.

Number 8(a)

Skill Save drawings to storage devices.

Objectives List possible storage devices and explain the correct procedure for saving to each device.

Standard Explain the procedure to store drawings on hard drives, floppy disks, CDs, etc. based on the application system.

CADD Skill Standards

Fundamental Computer Skills *Operating Systems*

Number 8(b)

Skill Save drawings to storage devices.

Objectives List possible storage devices and explain the correct procedure for saving to each device.

Standard Save drawings on hard drives, floppy disks, CDs, etc. based on the application system.
Evaluate the excursive with either an observed result or a procedure checklist.

CADD Skill Standards

Basic CADD Skills

Create

Number 1

Skill Create new drawing

Objectives Demonstrate the ability to open a drawing data file and create a drawing.

Standard Demonstrate the ability to open a drawing data file and create a drawing.

Number 2(a)

Skill Perform drawing set up.

Objectives 1) Identify drawing setup parameters
2) Define and know the purpose of drawing boundaries, units of measurement, and line types.

Standard Identify and pick the descriptors of necessary drawing setup components (e.g., sheet size, border, title block).

Number 2(b)

Skill Perform drawing set up.

Objectives 1) Identify drawing setup parameters
2) Define and know the purpose of drawing boundaries, units of measurement, and line types.

Standard Demonstrate the ability to perform a drawing setup (e.g., sheet size, border, title block).

Number 3

Skill Construct geometric figures.

Objectives Demonstrate multiple construction techniques (e.g., lines, conics, circles, splines, arcs, polygons) given size, orientation, and location specifications.

Standard Demonstrate multiple construction techniques (e.g., lines, conics, circles, splines, arcs, polygons) given size, orientation, and location specifications.

Number 4

Skill Create text using appropriate style and size to annotate drawings.

Objectives Create appropriate text annotation commands orientation, style, size, placement in CADD, or various means of construction for each item.

Standard Create appropriate text annotation commands orientation, style, size, placement in CADD, or various means of construction for each item.

CADD Skill Standards

Basic CADD Skills

Create

Number 5(a)

Skill Use and control accuracy enhancement tools.

Objectives 1) Define entity positioning tools.
2) Identify and define the purpose of: construction plane, snap, and grid.

Standard Define entity positioning tools (snap, grid, construction plane) accurately utilizing various locating specifications and system coordinates.

Number 5(b)

Skill Use and control accuracy enhancement tools.

Objectives 1) Define entity positioning tools.
2) Identify and define the purpose of: construction plane, snap, and grid.

Standard Apply entity positioning tools (snap, grid, construction plane) accurately placing and utilizing various locating specifications and system coordinates.

Number 6(a)

Skill Identify, create, store, and use appropriate symbols/libraries.

Objectives Identify the purpose of a symbol and a symbol library.

Standard Identify and differentiate between various symbol styles: ANSI standard, ISO standard, company standard, and discipline oriented symbols.

Number 6(b)

Skill Identify, create, store, and use appropriate symbols/libraries.

Objectives Identify the purpose of a symbol and a symbol library.

Standard Create and initiate appropriate commands in CADD or various means of construction for each item: ANSI standard, ISO standard, company standard, and discipline oriented symbols.

Number 6(c)

Skill Identify, create, store, and use appropriate symbols/libraries.

Objectives Identify the purpose of a symbol and a symbol library.

Standard Demonstrate the ability to store symbols (ANSI standard, ISO standard, company standard, discipline oriented) to a defined location.

CADD Skill Standards

Basic CADD Skills

Create

Number 6(d)

Skill Identify, create, store, and use appropriate symbols/libraries.

Objectives Identify the purpose of a symbol and a symbol library.

Standard Demonstrate the ability to retrieve symbols (ANSI standard, ISO standard, company standard, discipline oriented) from a defined location.

Number 6(e)

Skill Identify, create, store, and use appropriate symbols/ libraries.

Objectives Identify the purpose of a symbol and a symbol library.

Standard Demonstrate the ability to locate, size, and orient on documentation symbols (e.g., ANSI standard, ISO standard, company standard, discipline oriented).

Number 7

Skill Create wireframe/ solid models.

Objectives Create accurate and proper 3D wireframe/ solid representations for plane surfaces.

Standard Create accurate and proper 3D wireframe/ solid representations for plane surfaces.

Number 8

Skill Create objets using primitives.

Objectives Create accurate and properly represented 3D solid models composed of primitives.

Standard Create accurate and properly represented 3D solid models composed of primitives.

Number 9

Skill Create 2-d-geometry from 3-D models.

Objectives Extract and accurate 2-D profile from a 3-D wire frame model.

Standard Extract and accurate 2-D profile from a 3-D wire frame model.

Number 10(a)

Skill Revolve a profile to create a 3-D object.

Objectives Define radial symmetry and identify profile, rotational axis, and objects created by profile rotation.

Standard Select an appropriate 2-D profile and rotational axis.

CADD Skill Standards

Basic CADD Skills

Create

Number 10(b)

Skill Revolve a profile to create a 3-D object.

Objectives Define radial symmetry and identify profile, rotational axis, and objects created by profile rotation.

Standard Revolve a 2-D profile on a rotational axis to create a 3-D model.

Number 11(a)

Skill Create 3-D wireframe models from 2-D geometry

Objectives Demonstrate a 3-D wireframe model using 2-D geometry.

Standard Demonstrate a 3-D wireframe model using 2-D geometry.

Number 11(b)

Skill Create 3-D wireframe models from 2-D geometry

Objectives Extrude a 2-D profile onto a rotational axis to create a 3-D model

Standard Extrude a 2-D profile onto a rotational axis to create a 3-D model

CADD Skill Standards

Basic CADD Skills

Edit

Number 1(a)

Skill Utilize geometry editing commands.

Objectives 1) Identify and describe the purpose of: mirror, trim, extend, scale, rotate, break, fillet, move, stretch, copy, and chamfer.
2) Define symmetry.
3) Describe the techniques involved in mirroring, trimming, extending, etc.

Standard Identify and define the editing commands: mirror, trim, extend, scale, rotate, break, fillet, move, stretch, and copy, which are used as techniques for construction.

Number 1(b)

Skill Utilize geometry editing commands.

Objectives 1) Identify and describe the purpose of: mirror, trim, extend, scale, rotate, break, fillet, move, stretch, copy, and chamfer.
2) Define symmetry.
3) Describe the techniques involved in mirroring, trimming, extending, etc.

Standard Demonstrate an accurate and unambiguous representation of an object utilizing the editing commands: mirror, trim, extend, scale, rotate, break, fillet, move, stretch, and copy.

Number 2(a)

Skill Utilize non-geometric commands.

Objectives Identify non-geometric entities such as text, title blocks, fonts, attributes, annotations, color, and dimensions.

Standard Select and identify non-geometric editing commands (e.g., locations, correct size).

Number 2(b)

Skill Utilize non-geometric commands.

Objectives Identify non-geometric entities such as text, title blocks, fonts, attributes, annotations, color, and dimensions.

Standard Demonstrate editing and sizing skill utilizing non-geometric editing commands: text sizing, editing, font, and orientation.

CADD Skill Standards

Basic CADD Skills

Manipulate

Number 1(a)

Skill Control coordinates and display scale.

Objectives Identify origin and its location & axis orientation. Also identify display scale and manipulate it.

Standard Identify coordinate type; origin, scale, axis orientation, and origin locations.

Number 1(b)

Skill Control coordinates and display scale.

Objectives Identify origin and its location & axis orientation. Also identify display scale and manipulate it.

Standard Demonstrate the modification and selection of origin, scale, and axis orientation.

Number 2(a)

Skill Control entity properties.

Objectives Identify line style properties and types such as color, thickness, style, etc.

Standard Determine and identify appropriate entity properties and line criteria.

Number 2(b)

Skill Control entity properties

Objectives Identify line style properties and types such as color, thickness, style, etc.

Standard Demonstrate the modification of entity properties (e.g., color type, line type, thickness type).

Number 3

Skill Use viewing commands.

Objectives Demonstrate viewing commands (e.g., dynamic rotation, zooming, panning, change view, view names, multiview- view).

Standard Demonstrate viewing commands (e.g., dynamic rotation, zooming, panning, change view, view names, multiview- view).

CADD Skill Standards

Basic CADD Skills

Manipulate

Number 4(a)

Skill Use display commands.

Objectives Define entity visualization properties such as shading, hidden line removal, and meshing.

Standard Define the correct uses for display commands (e.g., hidden line, no hidden, shading, meshing, wire frame, etc).

Number 4(b)

Skill Use display commands.

Objectives Define entity visualization properties such as shading, hidden line removal, and meshing.

Standard Apply the correct uses for display commands (e.g., hidden line, no hidden, shading, meshing, wire frame, etc).

Number 5(a)

Skill Use standard parts and/ or symbol libraries.

Objectives Identify standard parts and their purposes.

Standard Define and identify standard parts and symbol libraries (e.g., scale, location, entity properties).

Number 5(b)

Skill Use standard parts and/or symbol libraries.

Objectives Identify standard parts and their purposes.

Standard Demonstrate the location, use, and creation of standard parts and symbol libraries (e.g., scale, location, entity properties).

Number 6

Skill Plot drawings on media using correct layout and scale.

Objectives Demonstrate plotting procedures (e.g., layout, scale, view, file).

Standard Demonstrate plotting procedures (e.g., layout, scale, view, file).

CADD Skill Standards

Basic CADD Skills

Manipulate

Number 7(a)

Skill Use layering techniques.

Objectives Define layering manipulation techniques.

Standard Define and understand the various purposes and usage of layering techniques (e.g., freeze, visibility).

Number 7(b)

Skill Use layering techniques.

Objectives Define layering manipulation techniques.

Standard Demonstrate and apply the various layering techniques (e.g., freeze, visibility).

Number 8(a)

Skill Use grouping techniques.

Objectives Define grouping manipulations techniques and the benefits of grouping.

Standard Define and understand the various purposes and uses of grouping techniques (e.g. un-group, delete, re-group, create).

Number 8(b)

Skill Use grouping techniques.

Objectives Define grouping manipulations techniques and the benefits of grouping.

Standard Demonstrate various grouping techniques (e.g. un-group, delete, re-group, create).

Number 9(a)

Skill Minimize file size.

Objectives Define techniques for minimizing files.

Standard Determine file size/extraneous entities and the need for file size reduction.

Number 9(b)

Skill Minimize file size.

Objectives Define techniques for minimizing files.

Standard Demonstrate reduction of file size/extraneous entities.

CADD Skill Standards

Basic CADD Skills

Analyze

Number 1

Skill Use query commands to interrogate database.

Objectives Apply the use of query commands (e.g., mass properties, geometric measure, system status, entity characteristics).

Standard Apply the use of query commands (e.g., mass properties, geometric measure, system status, entity characteristics).

CADD Skill Standards

Basic CADD Skills

Dimensioning

Number 1(a)

Skill Use associative dimensioning correctly.

Objectives Define associative dimensioning and identify different types of dimensioning.

Standard Correctly identify and define the various descriptors of associative dimensioning (e.g., horizontal, vertical, ordinate, angular, circular, diametrical, radial, polar).

Number 1(b)

Skill Use associative dimensioning correctly.

Objectives Define associative dimensioning and identify different types of dimensioning.

Standard Demonstrate the various descriptors of associative dimensioning (e.g., horizontal, vertical, ordinate, angular, circular, diametrical, radial, polar).

CADD Skill Standards

Advanced CADD Skills

Create

Number 1

Skill Create a wireframe and/ or solid models.

Objectives Create multiple radii fillets, sculpted surfaces, variable fillets, complex/compound wireframe or solid 3-D models.

Standard Create multiple radii fillets, sculpted surfaces, variable fillets, complex/compound wireframe or solid 3-D models.

Number 2(a)

Skill Create non-analytic surfaces using appropriate modeling.

Objectives State the difference between analytic and non-analytic surfaces; define NURBS, B-spline, Gordon, Coons patch, etc.

Standard Identify the size, shape, and location of various non-analytical surfaces (e.g., NURB, B-spline, Gordon, Bezier, Coons Patch).

Number 2(b)

Skill Create non-analytic surfaces using appropriate modeling.

Objectives State the difference between analytic and non-analytic surfaces; define NURBS, B-spline, Gordon, Coons patch, etc.

Standard Create a non-analytical accurate surface, according to size, shape, and location (e.g., NURB, B-spline, Gordon, Bezier, Coons patch).

Number 3(a)

Skill Create analytic surfaces using modeling with planes and analytic curves.

Objectives Define conics, cylinders, revolved ruled tabulated surfaces, etc.

Standard Identify the size, shape, and location of various analytic surface (e.g., conic, cylinders, revolved, ruled, tabulated surfaces).

Number 3(b)

Skill Create analytic surfaces using modeling with planes and analytic curves.

Objectives Define conics, cylinders, revolved ruled tabulated surfaces, etc.

Standard Create accurate analytic surfaces according to size, shape, and location (e.g., conic, cylinders, revolved, ruled, tabulated surfaces).

CADD Skill Standards

Advanced CADD Skills

Create

Number 4

Skill Create offset surfaces.

Objectives Create offset surfaces at a specified distance.

Standard Create offset surfaces at a specified distance.

Number 5

Skill Find an intersection of two surfaces.

Objectives Develop a show of lines or curves at the intersection of surfaces.

Standard Develop a show of lines or curves at the intersection of surfaces.

Number 6

Skill Create joined surfaces.

Objectives Create a single surface from multiple surfaces.

Standard Create a single surface from multiple surfaces.

Number 7

Skill Create a fillet or blend between two surfaces.

Objectives Develop filleted, rounded, chamfered and blended surfaces. Evaluate these surfaces by: size, location of trimmed/not trimmed surfaces.

Standard Develop filleted, rounded, chamfered and blended surfaces. Evaluate these surfaces by: size, location of trimmed/not trimmed surfaces.

Number 8(a)

Skill Create feature based geometry.

Objectives Identify different types of feature-based geometry.

Standard Identify various types of feature-based geometry (e.g. holes, slots, round, fillets, counterbores, countersink, spotfaces).

Number 8(b)

Skill Create feature based geometry.

Objectives Identify different types of feature-based geometry.

Standard Create various types of feature-based geometry based on size and location using features (e.g. holes, slots, round, fillets, counterbores, countersink, spotfaces).

CADD Skill Standards

Advanced CADD Skills

Create

Number 9

Skill Create cut sections.

Objectives Create and show sections of various types and styles of 3-D solid model sections (e.g. full, offset, rotates, half).

Standard Create and show sections of various types and styles of 3-D solid model sections (e.g. full, offset, rotates, half).

Number 10(a)

Skill Construct and label exploded assembly drawings.

Objectives Construct accurate drawing representations of a 3-D assembly model.

Standard Construct accurate drawing representations of a 3-D assembly model.

Number 10(b)

Skill Construct and label exploded assembly drawings.

Objectives Label accurate drawing representations of multiple models.

Standard Label accurate drawing representations of multiple models.

Number 11

Skill Perform Boolean operations.

Objectives Demonstrate mastery of advanced Boolean operations; keep model database small (e.g., multiple union, subtraction, intersection, instancing).

Standard Demonstrate mastery of advanced Boolean operations; keep model database small (e.g., multiple union, subtraction, intersection, instancing).

CADD Skill Standards

Advanced CADD Skills

Edit

Number 1

Skill Trim surface.

Objectives Demonstrate mastery of skill by correctly trimming surfaces, including multiple trimmed surfaces.

Standard Demonstrate mastery of skill by correctly trimming surfaces, including multiple trimmed surfaces.

Number 2

Skill Manipulate surface normals.

Objectives Demonstrate mastery of skill by manipulating surface normals, including reverse and reverse normal.

Standard Demonstrate mastery of skill by manipulating surface normals, including reverse and reverse normal.

Number 3

Skill Extend surface.

Objectives Demonstrate mastery of skill by extending surfaces.

Standard Demonstrate mastery of skill by extending surfaces.

Number 4(a)

Skill Edit control points.

Objectives Define control points.

Standard Identify control points of various non-analytic surfaces (e.g., Bezier, mesh, NURBS, Coons Patch).

Number 4(b)

Skill Edit control points.

Objectives Define control points.

Standard Demonstrate skill and modify surface by moving the control point (e.g., Bezier, mesh, NURBS, Coons Patch).

CADD Skill Standards

Advanced CADD Skills

Edit

Number 4(c)

Skill Edit control points.

Objectives Define control points.

Standard Demonstrate skill and modify surface by adding and/or removing the control point (e.g., Bezier, mesh, NURBS, Coons Patch).

Number 5

Skill Modify geometry via Boolean operations.

Objectives Demonstrate skill by deleting solid primitives.

Standard Demonstrate skill by deleting solid primitives.

Number 6

Skill Edit primitives (e.g., moving, copying, resizing).

Objectives Demonstrate skill by moving, copying, and resizing primitives.

Standard Demonstrate skill by moving, copying, and resizing primitives.

CADD Skill Standards

Advanced CADD Skills

Manipulate

Number 1

Skill Perform axis view clipping.

Objectives 100% demonstration of ability to perform an axis view clipping using a plane to display desired pre-determined view, including hidden line removal.

Standard 100% demonstration of ability to perform an axis view clipping using a plane to display desired pre-determined view, including hidden line removal.

Number 2

Skill Extract wireframe data from surface/solid geometry.

Objectives Demonstrate skill by using complete and accurate wireframe data to create a 3D wireframe from a 3D model.

Standard Demonstrate skill by using complete and accurate wireframe data to create a 3D wireframe from a 3D model.

Number 3(a)

Skill Shade/render object (e.g., reflectivity, opacity).

Objectives Define reflectivity, opacity, light source, type, and material finishes.

Standard Identify the purposes and uses of rendering a model's image as far as its reflectivity, opacity, light source, and material finishes.

Number 3(b)

Skill Shade/render object (e.g., reflectivity, opacity)

Objectives Define reflectivity, opacity, light source, type, material finishes.

Standard Shade a rendered image of a model or object using reflectivity, opacity, and lights cameras.

Number 3(c)

Skill Shade/render object (e.g., reflectivity, opacity)

Objectives Define reflectivity, opacity, light source, type, and material finishes.

Standard Render an image of the model or object using material properties and finishes.

CADD Skill Standards

Advanced CADD Skills

Analyze

Number 1(a)

Skill Extract geometric data.

Objectives Identify the purposes of extracting geometric data and the different kinds of geometric data (e.g. surfaces, wireframe).

Standard Identify the purposes and uses of extracting geometric data from surfaces and a wireframe.

Number 1(b)

Skill Extract geometric data.

Objectives Identify the purposes of extracting geometric data and the different kinds of geometric data (e.g. surfaces, wireframe).

Standard Extract valid and usable geometric data from surfaces and a wireframe.

Number 2(a)

Skill Extract attribute data.

Objectives Identify and define the purpose of attribute data, and list the different kinds of attribute data (e.g. parts list, bills of materials).

Standard Identify the purposes and uses of attribute data extracted from parts lists and bills of materials.

Number 2(b)

Skill Extract attribute data.

Objectives Identify and define the purpose of attribute data, and list the different kinds of attribute data (e.g. parts list, bills of materials).

Standard Demonstrate ability to completely extract lists, files, and valid and usable attribute data from parts lists and bills of materials.

Number 3(a)

Skill Identify gaps in non-intersecting surfaces.

Objectives Verify the existence of gaps, identify gaps in surfaces, and explain the causes of gaps or non-intersection between surfaces.

Standard Identify problems associated with surface to surface gaps in a database.

CADD Skill Standards

Advanced CADD Skills

Analyze

Number 3(b)

Skill Identify gaps in non-intersecting surfaces

Objectives Verify the existence of gaps, identify gaps in surfaces, and explain causes of gaps or non-intersection between surfaces

Standard Demonstrate mastery of skill by locating and querying surface to surface gaps

Number 4(a)

Skill Obtain surface properties.

Objectives Identify and define different kinds of surface properties (e.g. area, perimeter, normals).

Standard Identify the purposes and uses of data extracted from surface properties (e.g. area, perimeter, normals).

Number 4(b)

Skill Obtain surface properties.

Objectives Identify and define different kinds of surface properties (e.g. area, perimeter, normals).

Standard Demonstrate mastery of skill by extracting different surface properties (e.g. area, perimeter, normals).

Number 5(a)

Skill Obtain mass properties data (e.g., moments of inertia, centroids).

Objectives List and define the purposes of mass properties, such as moments of inertia, centroids, volume, and mass.

Standard Identify the purposes and uses of extracted data from mass properties (e.g., moments of inertia, centroids, volume, mass).

Number 5(b)

Skill Obtain mass properties data (e.g. moments of inertia, centroids).

Objectives List and define the purpose of mass properties, such as moments of inertia, centroids, volume, and mass.

Standard Demonstrate mastery of skill by extracting mass properties such as moments of inertia, centroids, volume, and mass.

CADD Skill Standards

Advanced CADD Skills

Productivity and Work Habits

Number 1(a)

Skill Perform customization to improve productivity (e.g., customize menus, function keys, script files, macros).

Objectives Identify the features that can be customized (e.g. menus, script files, macros, key assignments).

Standard Identify the purposes, uses, and needs for customization techniques in menus, key assignments, scripts, and macros.

Number 1(b)

Skill Perform customization to improve productivity (e.g., customize menus, function keys, script files, macros).

Objectives Identify the features that can be customized (e.g. menus, script files, macros, key assignments).

Standard Demonstrate results from applying customization techniques to menus, key assignments, scripts, and macros.

Number 2(a)

Skill Manipulate associated non-graphical data.

Objectives Identify non-graphical data, then define the purpose and describe the techniques for inputting or extracting non-graphical data.

Standard Identify the purpose and usage of non-graphical data (e.g., spreadsheets, text files, engineering output files).

Number 2(b)

Skill Manipulate associated non-graphical data.

Objectives Identify non-graphical data; then define the purpose and describe the techniques for inputting or extracting non-graphical data.

Standard Demonstrate skill by manipulating non-graphical data (e.g. spreadsheets, text files, engineering output files).

Number 3(a)

Skill Use template and library files to establish drawing standard presets.

Objectives Define standard drawing defaults and identify the purpose of changing system defaults.

Standard Identify the needs and purposes of drawing standard presets using template and library defaults.

CADD Skill Standards

Advanced CADD Skills

Productivity and Work Habits

Number 3(b)

Skill Use template and library files to establish drawing standard presents.

Objectives Define standard drawing defaults and identify the purpose of changing system defaults.

Standard Demonstrate skill by using template and library system defaults to create drawing standard presents.

Number 4(b)

Skill Develop geometry using parametric programs.

Objectives Define, list the benefits of, and identify when to use parametrically controlled geometry.

Standard Demonstrate skill by creating a graphic geometric image from a parametric output.

Number 4(a)

Skill Develop geometry using parametric programs.

Objectives Define, list the benefits of, and identify when to use parametrically controlled geometry.

Standard Identify the need to construct geometry graphics using parametrically controlled programs.
