

Mechanical Drawing

Unit 3 Study Guide for Chapters 11-17

Chapter 11 Fasteners

Section 11.1 Types of Fasteners

- A. Threaded Fasteners: Why is thread specification important to drafters and manufacturers?
 - 1. Screw-Thread Standards
 - 2. Screw-Thread Terminology
 - 3. Pitch of a Screw Thread
 - 4. Single and Multiple Threads
 - 5. Right- and Left-Hand Threads
 - 6. Classification of Screw Threads
 - a. Thread Series
 - b. Classes of Fits
 - c. Thread Specifications
 - d. Metric Threads
 - 7. Bolts and Nuts
 - 8. Other Threaded Fasteners
 - a. Lock Nuts and Lock Washers
 - b. Cap Screws
 - c. Machine Screws
 - d. Setscrews
 - e. Wood Screws
 - 9. Miscellaneous Threaded Fasteners
- B. Nonthreaded Fasteners: In what specific cases are nonthreaded fasteners used?
 - 1. Keys
 - 2. Rivets

Section 11.2 Drawing Screw Threads and Fasteners

- A. Representing Screw Threads: What are the various ways of showing screw threads in drawings?
 - 1. Simplified Representation
 - a. Drawing a Simplified Representation
 - 2. Schematic Representation
 - a. Drawing a Schematic Representation
 - 3. Detailed Representation
 - a. Drawing a Detailed Representation
 - 4. Drawing Other Thread Types
 - a. Square Screw Threads
 - b. Acme Screw Threads
 - 5. Representing Boltheads and Nuts
 - a. Square Boltheads Across Flats
 - b. Square Boltheads Across Corners
 - c. Hexagon Boltheads
 - d. Thick Boltheads and Nuts
- B. CAD Symbol Libraries: What is the best way to represent fasteners in different types of CAD drawings?
 - 1. Creating a Custom Symbol Library
 - a. Drawing Fasteners
 - b. Creating the Blocks
 - c. Adding Attributes
 - d. Creating Attributes
 - e. Adding Attributes to Blocks

- f. Finishing the Symbol Library
2. Using a Custom or Standard Symbol Library
3. Third-Party Symbol Libraries
4. Getting Information

Chapter 12 Pictorial Drawing

Section 12.1 Types of Pictorial Drawing

- A. Pictorial Drawings: What are three main types of pictorial drawings?
- B. Isometric Drawing
 1. Axonometric Projection
- C. Oblique Drawing: What is an advantage of oblique drawings over isometric drawings?
 1. Oblique Projection
 2. Types of Oblique Drawings
- D. Perspective Drawing: When creating pictorial drawings, what factors that affect appearance do you need to consider?
 1. Definition of Terms
 2. Types of Perspective Drawings
 3. Factors that Affect Appearance
 - a. The Effect of Distance
 - b. The Effect of Position
- E. Technical Illustration: What techniques are used to manipulate the appearance of technical drawings for aesthetic or other reasons?
 1. Uses of Technical Illustration
 2. Choice of Drawing Type
 3. Exploded Views
 4. Identification Illustrations
 5. Rendering
 - a. Outline Shading
 - b. Surface Shading
 - c. Wash Rendering
 6. Photo Retouching

Section 12.2 Creating Pictorial Drawings

- A. Isometric Drawing Techniques: How do you draw circles, nonisometric lines, and reversed axes in isometric construction?
 1. Isometric Constructions
 - a. Drawing Isometric Circles
 - b. Drawing Irregular Curves
 - c. Using Isometric Templates
 2. Isometric Drawing Creation
 - a. Nonisometric Lines
 - b. Angles
 - c. Reversed Axes
 - d. Long Axis Horizontal
 - e. Dimensions of Isometric Drawings
 3. Isometric Sections
- B. Oblique Drawing Techniques: How is perspective drawing more complex than isometric and oblique drawing?
 1. Oblique Constructions
 - a. Obliques
 2. Oblique Drawing Creation
 - a. Angles and Inclined Surfaces
 - b. Oblique Sections
- C. Perspective Drawing Techniques: That techniques for drawing inclined surfaces, circles, and arcs used?

1. Perspective Constructions
 - a. Inclined Surfaces
 - b. Circles and Arcs
2. One-Point Perspective Creation
3. Two-Point Perspective Creation
4. Perspective Grids
- D. CAD Techniques: Why would you choose to create a CAD drawing in 2D rather than in 3D?
 1. 2D Isometric Drawing Techniques
 2. 3D Isometric Drawings
- E. Oblique Drawing Techniques- CAD: What is the advantage of using 3D Orbit in creating oblique drawings?
 1. 2D Oblique Drawings
 2. 3D Oblique Drawings
- F. Perspective Drawing Techniques- CAD: How are the commands 3DORBIT, PLINE, and EXTRUDE used in perspective drawing?

Chapter 13 Working Drawings

Section 13.1 Understanding Working Drawings

- A. Types of Working Drawings: What types of drawings are needed to manufacture a product?
 1. Detail Drawings
 2. Assembly Drawings
- B. Layout of Working Drawings: What are the parts that make up a working drawing?
 1. Choosing Views
 2. Choosing a Scale
 3. Grouping and Placing Parts
 4. Title Blocks
 5. Change or Revision Block
 6. Bill of Materials
 7. Notes and Specifications

Section 13.2 Preparing a Working Drawing

- A. Board-Drafting Techniques: Why is it important to carefully plan the drawings layout before beginning a working drawing?
- B. CAD Techniques: How important is layout planning when working in CAD?
 1. Using Layers
 2. Creating Multiple Layouts
 3. Creating a Working Drawing
 4. Generating the Bill of Materials
 - a. Attribute Extraction
 5. Checking the Drawing

Chapter 14 Pattern Development

Section 14.1 Principles of Pattern Development

- A. Understanding Pattern Development: How are patterns used in designing products for industry?
- B. The Packaging Industry: What are some materials used for pattern developments?
- C. Sheet-Metal Pattern Drafting: What processes are used to form metal objects made from patterns?
 1. Surface Geometry
 2. Finishing a Pattern
- D. Types of Developments: What specific shapes can be formed using pattern development?
 1. Parallel-Line Development

2. Radial-Line Development
3. Triangulation
 - a. Transition Pieces

Section 14.2 Drawing Pattern Developments

- A. Parallel-Line Developments: Why is accuracy so important when drawing pattern developments?
 1. Prisms
 2. Cylinders
 3. Elbows
 - a. Square Elbows
- B. Radial Line Developments: When might a pattern for a cone-shaped object be needed?
 1. Right Circular Cone
 2. Truncated Circular Cone
 3. Pyramids
 - a. Right Rectangular Pyramids
 - b. Oblique Pyramids
- C. Triangulation: What is another word for "Triangulation"?
- D. CAD Pattern Developments: Why is it important to learn to draw pattern developments in CAD?
 1. CAD Parallel-Line Development
 2. CAD Radial-Line Development
- E. Intersections: What is the first step in developing a pattern for interesting objects?
 1. Drawing Intersections
 - a. Intersecting Prisms
 - b. Intersecting Cylinders
 - c. Intersection of Cylinders and Cones
 - d. Intersection of Planes and Curved Surfaces
 2. CAD Intersections

Chapter 15 Welding Drafting

Section 15.1 Types of Joints, Welds, and Symbols

- A. Types of Joint and Welds: What specific facts must you know about the welding process when you draw parts to be welded?
 1. Joints
 2. Welds
- B. Fusion Welding: Why do you need two elements for fusion welding?
 1. Symbols for Fusion Welding
 - a. Standard Symbols
 - b. Supplementary Symbols
 2. Dimensioning Welds

Section 15.2 Producing a Welding Drawing

- A. Board-Drafting Techniques: What should you consider when preparing a welding drawing, to save a manufacturer "tooling up" time?
- B. CAD Techniques: How can you use a symbol library in creating a welding drawing?

Chapter 16 Pipe Drafting

Section 16.1 Pipe Systems

- A. Pipe Components: What kinds of components are represented in pipe system drawings?
 1. Types of Pipe
 - a. Steel and Wrought-Iron Pipe
 - b. Cast-Iron Pipe

- c. Seamless Brass and Copper Pipe
- d. Copper Tubing
- e. Plastic Pipe
- 2. Pipe fittings and Connections
 - a. Screw Fittings
 - b. Pipe Connections
 - c. Weld Connections
- 3. Valves
 - a. Gate Valves
 - b. Check Valves
 - c. Globe Valves

Section 16.2 Creating Pipe Drawings

A. Pipe Drawings: Why do pipe drawings not need to be as detailed as other technical drawings?

- 1. Single-Line Drawings
- 2. Drawing Projection
 - a. Crossings
 - b. Connections
 - c. Fittings
 - d. Adjoining Apparatus
- 3. Dimensioning
- 4. Orthographic Pipe Symbols
- 5. Isometric Pipe Drawings

B. Board-Drafting Techniques: What two types of drawings are used to represent pipe systems?

- 1. Orthographic Drawing
- 2. Isometric Drawing
- 3. Orthographic CAD Drawing
- 4. 2D Isometric CAD Drawing
- 5. 3D Solid Models and Wireframes
 - a. Drawing the Basic Wireframe
 - b. Adding the Symbols
- 6. Dimensioning the Drawing

Chapter 17 Cams and Gears

Section 17.1 Cams and Cam Drawings

A. Cams: How is a cam's shape relevant to the motion it produces?

- 1. Cams and Followers
- 2. Displacement Diagrams
- 3. Cam Motion
 - a. Uniform Motion
 - b. Harmonic Motion
 - c. Uniformly Accelerated and Decelerated Motion

B. Creation of Cam Profiles: What does a cam profile include?

- 1. Draw a Cam Profile Using Boars-Drafting Techniques
- 2. Draw a Cam Profile Using CAD

Section 17.2 Gears and Gear Drawings

A. Gears: What is the basic principle of the gear?

- 1. Spur Gears
 - a. Gear Teeth
 - b. Spur-Gear Formulas

- 2. Involute Rack and Pinion

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3. Worm and Wheel

4. Bevel Gears

B. Gear Drawings: How are gears usually indicated in drawings?

1. Drawing Gear Teeth

2. Drawing Gear Teeth Using CAD

3. Creating 3D Gears and Wheels