

End of Chapter Problems
Solutions

Engineering Drawing & Design
Sixth Edition

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Contents

Chapter 1	Introduction to Engineering Drawing and Design	1
Chapter 2	Drafting Equipment, Media, and Reproduction Methods	2
Chapter 3	Computer-aided Design and Drafting (CADD)	10
Chapter 4	Manufacturing Materials and Processes	12
Chapter 5	Sketching Applications	19
Chapter 6	Lines and Lettering	23
Chapter 7	Drafting Geometry	28
Chapter 8	Multiviews	43
Chapter 9	Auxiliary Views	80
Chapter 10	Dimensioning and Tolerancing	102
Chapter 11	Fasteners and Springs	122
Chapter 12	Sections, Revolutions, and Conventional Breaks	133
Chapter 13	Geometric Dimensioning and Tolerancing	174
Chapter 14	Pictorial Drawings and Technical Illustrations	190
Chapter 15	Working Drawings	200
Chapter 16	Mechanisms: Linkages, Cams, Gears, and Bearings	289
Chapter 17	Belt and Chain Drives	312
Chapter 18	Welding Processes and Representations	325
Chapter 19	Precision Sheet Metal Drafting	340
Chapter 20	Electrical and Electronic Drafting	350
Chapter 21	Industrial Process Piping	388
Chapter 22	Structural Drafting	410
Chapter 23	Heating, Ventilating, and Air-Conditioning (HVAC), and Pattern Development	434
Chapter 24	Civil Drafting	466
Chapter 25	The Engineering Design Process	476

Chapter 1

Introduction to Engineering Drawing and Design

Solutions to End-of-Chapter Problems

Problems 1.1 Through 1.20

Students select one or more of the given problem topic areas as determined by the instructor or course guidelines and write a 300to 500-word report on the selected topic or topics. Prepare each report using a word processor. Use double-spacing, proper grammar and spelling, and illustrative examples where appropriate. Use, but do not copy, the information found in this chapter and additional research information.

Student solutions vary. Check for the following possibilities:

- Complete content
- Accuracy
- Neatness
- Spelling and grammar
- Plagiarism
- Research
- Originality

Chapter 2

Drafting Equipment, Media, and Reproduction Methods

Solutions to End-of-Chapter Problems

Reading Scales and Drafting Machine Verniers

Part 1: Problems 2.1 Through 2.9

PROBLEM 2.1

- A. .5
- B. 1.1
- C. 2.25
- D. 3.6
- E. 4.4

PROBLEM 2.2

- A. .5
- B. 1.1
- C. 2.2
- D. 4.8

PROBLEM 2.3

- A. $1/8$
- B. $5/8$
- C. $1 \frac{5}{16}$
- D. $1 \frac{3}{4}$
- E. $2 \frac{1}{4}$
- F. $2 \frac{15}{16}$

PROBLEM 2.4 Full Scale

- A. 5
- B. 20
- C. 37.5
- D. 62.5
- E. 108

PROBLEM 2.5 Half Scale

- A. 10
- B. 40
- C. 76
- D. 120
- E. 166

PROBLEM 2.6

- A. 2' – 0"
- B. 3' – 2'
- C. 4' – 6"
- D. 5' – 10"

PROBLEM 2.7

- A. .20
- B. 1.00
- C. 1.30
- D. 2.16

PROBLEM 2.8

- A. .9
- B. 1.8
- C. 2.4
- D. R.3
- E. \emptyset .2
- F. \emptyset .6
- G. \emptyset 1.0

PROBLEM 2.9

- A. 4' – 5"
- B. 8' – 0"
- C. 6' – 8"
- D. 9' – 8"
- E. 2' – 8"

F. 4' – 6"

G. 2' – 1"

Reading Sheet Blocks

Part 2: Problems 2.10 Through 2.26

PROBLEM 2.10 (A)

Title Block

A title block provides a variety of information about a drawing. ASME standards recommend placing the title block in the lower-right corner of sheet borderlines. ASME standards provide specific dimensions and content requirements for title blocks. However, some companies prefer to use a slightly different title block design.

PROBLEM 2.11 (B)

Angle of Projection Block

The angle of projection block specifies how to interpret a drawing according to the method of view projection. The THIRD ANGLE PROJECTION notation and related symbol means that the views on the drawing are created using the third-angle projection system. The other option is FIRST ANGLE PROJECTION.

PROBLEM 2.12 (C)

Dimensioning and Tolerancing Block

The dimensioning and tolerancing block is used to specify the general dimensioning and tolerancing specifications found on the drawing. The problem example shows inch and metric dimensioning and tolerancing blocks.

PROBLEM 2.13 (D)

Company or Design Activity

Normally displays the name, address, and contact information of the company, or it can provide original design activity content.

PROBLEM 2.14 (E)**Title**

Displays the title of the drawing, which is typically the product assembly name or the specific part or subassembly name.

PROBLEM 2.15 (F)**Sheet Size**

Identifies the sheet size designation such as A, B, A4, or A3.

PROBLEM 2.16 (G)**CAGE Code**

The CAGE code is a five-number code assigned by the U.S. Defense Logistic Service Center (DLSC) to all Department of Defense contractors. CAGE stands for *commercial and government entity*. The CAGE code must appear on all drawings of products designed for the U.S. government. CAGE was previously known as FSCM, which stands for Federal Supply Code for Manufacturers.

PROBLEM 2.17 (H)**Drawing Number**

Some companies specify the part or related number as the drawing number. Most companies have their own drawing or part numbering system. Although numbering systems differ, they often key to categories such as the nature of the drawing, for example, casting, machining, or assembly; materials used; related department within the company; the project; or a numerical classification of the product.

PROBLEM 2.18 (I)**Revision**

Specifies the current revision of the part or drawing. A new or original drawing is— (dash) or 0 (zero). The first time a drawing is revised, the— or 0 changes to an A; for the second drawing change a B is placed here, and so on. The letters I, O, Q, S, X, and Z are not used because they might be confused with numbers. When all of the available letters A through Y have been used, use double letters such as AA and AB, or BA and BB. Some companies use revision numbers rather than letters.

Some companies do not use this compartment when the revision history block is on the same sheet.

PROBLEM 2.19 (J)

Scale

Specifies the principal drawing scale, such as FULL or 1:1, HALF or 1:2, DBL or 2:1, and QTR or 1:4. Enter NONE when there is no scale.

PROBLEM 2.20 (K)

Weight

Indicates the actual or estimated weight of the part or assembly. Some companies may use this block for other purposes, such as to identify material.

PROBLEM 2.21 (L)

Sheet

Identifies the sheet relative to a group of sheets or set of sheets. When multiple sheets are required to display a single drawing, the sheet block organizes the multiple-sheet drawing. For example, if two sheets are needed to show a drawing, the first sheet is 1/1 or 1 OF 1 and the second sheet is 2/2 or 2 OF 2. The first sheet has the complete title block and other sheet blocks, such as the angle of projection block and dimensioning and tolerance block. Additional sheets can have the same set of blocks, or they can have a continuation sheet title block. The continuation sheet title block uses a minimum of the drawing number, scale, sheet size, CAGE code, and sheet number. When the sheet is a member of a set of different drawings, the sheet block organizes the set.

PROBLEM 2.22 (M)

Approvals 1

The entire area above items N and O in the problem example typically allows for approval names or signatures and dates by people directly involved with preparing and approving the drawing, such as the drafter, checker, and engineer. For example, if you are the drafter, identify yourself in the DRAFTER block by using all your initials such as DAM, DPM, or JLT. Fill in the date block in order by day,

month, and year such as 18 NOV 10 or numerically with month, day, and year such as 11/18/10. Confirm the preferred name and date format with your school or company standards. When a drawing is complete, it usually goes to a **checker** for inspection. A checker is a person with the responsibility of checking drawings for content and accuracy. Each company or project follows specific approval guidelines. Figure 2.35 shows an example of using APPROVALS and DATES columns to divide approval blocks. Drawings that do not require extensive approvals often use a portion of this area for other information such as material and finish specifications.

PROBLEM 2.23 (N)

Approval 2

Allows for approval by an individual, design activity, or organization not directly related with preparing or approving the drawing, such as a subcontractor hired to manufacture the product. This block may be required when producing drawings for the United States government. If no outside approvals are necessary, this block is used for inside approvals, other information, or is left blank.

PROBLEM 2.24 (O)

Approval 3

Allows for approval by an individual, design activity, or organization not specified in the other approval blocks. This block may be required when producing drawings for the United States government. If no outside approvals are necessary, this block is used for inside approvals, other information, or is left blank.

PROBLEM 2.25 (P)

The upper portion of the dimensioning and tolerancing block provides a note indicating that all dimensions are in millimeters (mm) or inches (IN), unless otherwise specified such as UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES (IN).

PROBLEM 2.26 (Q)

The dimensioning and tolerancing block compartment continues with information about unspecified tolerances. Unspecified tolerances refer to any dimension on the

drawing that does not have a tolerance specified. This is when the dimensional tolerance required is the same as the general tolerance shown in the dimensioning and tolerancing block.

Reading a Revision History Block

Part 3: Problems 2.27 Through 2.31

PROBLEM 2.27

Zone

This compartment is only used if the drawing includes zoning and specifies the location of the revision. For example, enter D4 in the ZONE column if the location of the change is at or near the intersection of D up or down and 4 across.

PROBLEM 2.28 (2)

Revision

Enter the revision letter or number, such as A, B, C, or D. Succeeding letters are to be used for each engineering change. You must change the value in REV block of the title block, previously described, to agree with the last REV letter in the revision block. **Revisions** happen when parts are redesigned or revised for any reason and the drawing changes. All drawing changes are commonly documented and filed for future reference. When this happens, the documentation should be referenced on the drawing so users can identify that a change has been made. Before any revision can be made, the drawing must be released for manufacturing.

PROBLEM 2.29 (3)

Description

Gives a short description of the change.

PROBLEM 2.30 (4)

Date

Fill in the day, month, and year on which the engineering change is ready for release to production, such as 6 APR11, or use month, day, and year numbers such as 4/6/11. Confirm the proper format with your school or company standards.

PROBLEM 2.31 (5)**Approval**

Add the initials of the person approving the change and the optional date.

Math Problem Solutions**Part 4: Problems 2.32 Through 2.41**

PROBLEM 2.32 $.25^\circ$

PROBLEM 2.33 7.5°

PROBLEM 2.34 18.08°

PROBLEM 2.35 200.3°

PROBLEM 2.36 -13.7°

PROBLEM 2.37 $60^\circ 24'$

PROBLEM 2.38 $9^\circ 30'$

PROBLEM 2.39 $16.2'$

PROBLEM 2.40 $177^\circ 48'$

PROBLEM 2.41 $-45^\circ 6'$