Use Drafting Media

Unit: Media, Equipment, and Reproduction Methods

Problem Area: Manual Drafting

Lesson: Use Drafting Media

Student Learning Objectives.

Instruction in this lesson should result in students achieving the following objectives:

1. **Discuss factors influencing the use of drafting media.**
2. **Identify the types of paper and film used in manual drafting.**
3. **Describe sheet sizes, title blocks, and borders.**

List of Resources.

The following resources may be useful in teaching this lesson:

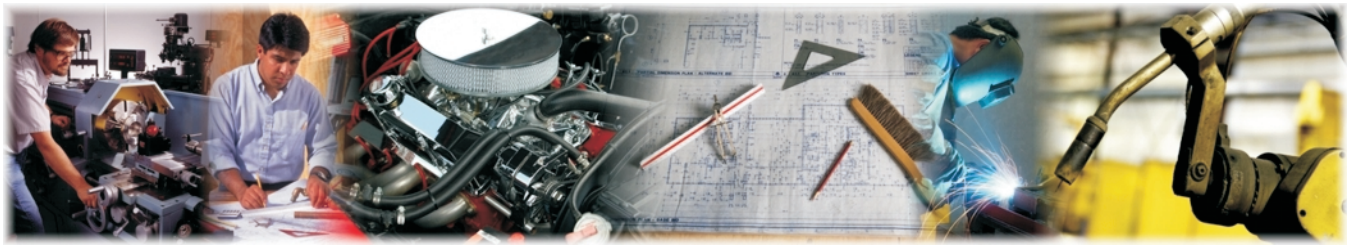
American Society of Mechanical Engineers. Home page. Accessed Nov. 19, 2007. <http://www.asme.org>.

Decimal Inch Drawing Sheet Size and Format. American Society of Mechanical Engineers, 2005.

Giesecke, Frederick E., et al. *Technical Drawing,* 12th ed. Pearson Prentice Hall, 2003.

Madsen, David A., David P. Madsen, and J. Lee Turpin. *Engineering Drawing & Design,* 4th ed. Thomson Delmar Learning, 2007.

Metric Drawing Sheet Size and Format. American Society of Mechanical Engineers, 2005.



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List of Equipment, Tools, Supplies, and Facilities

- ✓ Overhead or PowerPoint projector
- ✓ Visual(s) from accompanying master(s)
- ✓ Copies of sample test, lab sheet(s), and/or other items designed for duplication
- ✓ Materials listed on duplicated items
- ✓ Computers with printers and Internet access
- ✓ Classroom resource and reference materials

Terms.

The following terms are presented in this lesson (shown in bold italics):

- detail paper
- dimensional stability
- durability
- erasability
- ghosting
- matte
- polyester film
- smoothness
- tracing cloth
- tracing paper
- transparency
- vellum
- zoning

Interest Approach.

Use an interest approach that will prepare the students for the lesson. Teachers often develop approaches for their unique class and student situation. A possible approach is included here.

> *Many drawing and printing media are used in manual drafting. Each media type has specific advantages. Ask students what (if any) drafting media they are familiar with. Ask them to discuss the advantages of the media with which they are familiar. What are some disadvantages of these materials?*

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SUMMARY OF CONTENT AND TEACHING STRATEGIES

Objective 1: Discuss factors influencing the use of drafting media.

Anticipated Problem: What factors influence the use of drafting media?

I. Many factors, apart from cost, influence the purchase and use of drafting media. These considerations are dimensional stability, durability, erasability, smoothness, and transparency.

A. ***Dimensional stability*** refers to a material's ability to retain its size regardless of atmospheric conditions, such as heat, cold, and humidity. Some media are more dimensionally stable than others.

B. ***Durability*** refers to a material's ability to withstand a great deal of use. Original drawings may tear or wrinkle and the images become hard to see if the materials on which they are drawn are not durable.

C. ***Erasability*** refers to a material's ability to handle frequent erasing with a minimum of ghosting.

1. ***Ghosting*** is the residue left behind after lines that are hard to erase have been removed. Unsightly ghost images are often reproduced in a print.
2. Materials with good erasability are easy to clean.

D. ***Smoothness*** refers to how a material accepts lettering and line work. The material should be easy to draw on so the image is sharp and dark, with a minimum of effort on the drafter's part.

E. ***Transparency*** refers to a material's ability to allow light to pass through.

1. The goal of any drawing is good reproduction, so the more transparent the material the better the reproduction.
2. However, transparency is not important when drawings are photocopied.

Many techniques can be used to help students master this objective. Lead a discussion on the factors to consider when purchasing and using drafting media. Use VM–A as a visual aid during the discussion.

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Objective 2: Identify the types of paper and film used in manual drafting.

Anticipated Problem: What types of paper and film are used in manual drafting?

II. The types of paper and film used in manual drafting are detail paper, tracing paper, tracing cloth, and polyester film.

A. ***Detail paper*** is used when a drawing is to be made in pencil but not for reproduction. The preferred paper is light cream or buff in color.

1. The best detail papers contain up to 100 percent pure rag stock with strong fibers that provide durability, erasability, and folding strength. These papers will not discolor or grow brittle with age.
2. For ink drawings, such as book illustrations, white papers are commonly used.

B. ***Tracing paper*** is a thin, transparent paper used when a drawing is to be made for the purpose of reproducing by blueprinting or some other process. Most tracing papers take pencil or ink, but some are especially suited for one or the other.

1. ***Vellum*** is a type of tracing paper that has been treated with wax, oil, or a similar substance to make it more transparent.
2. Lead on vellum is the most common combination used in manual drafting. However, vellum can also accept ink.
3. Vellum has good smoothness and transparency, but it is not as durable or erasable as other materials. Since it is affected by humidity, vellum is also not as dimensionally stable as other media.

C. ***Tracing cloth*** is a thin, transparent muslin fabric with plastic or a starch compound that provides a good working surface for pencil or ink.

1. Tracing cloth is considerably more expensive than tracing paper.
2. Special pencil tracing cloths are available. These cloths have surfaces that produce dense black lines when hard pencils are used. Therefore, drawings made on these cloths do not smudge easily and are very durable.

D. ***Polyester film*** is a plastic drafting material with excellent dimensional stability, durability, erasability, and transparency. It is commonly known by its brand name, Mylar®.

1. Ink and special polyester leads do better on polyester film than graphite leads, which tend to smear easily.
2. Polyester film is available with a single or double matte surface. ***Matte*** is a textured, nonglossy surface.
   a. Single matte film is used most often; its non-drawing side has a slick surface.
   b. Double matte film is textured on both sides so drawing can be done on either side.

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Many techniques can be used to help students master this objective. Lead a discussion on the types of paper and film used in manual drafting. Use VM–B as a visual aid during the discussion.

Objective 3: Describe sheet sizes, title blocks, and borders.

Anticipated Problem: What are the standard sheet sizes, title blocks, and borders?

III. The American National Standards Institute (ANSI) has set standards for sheet sizes and for the information included in the title block and on the surrounding sheet next to the border.

A. Standard sheet sizes

1. ANSI specifies six standard sheet sizes in inches.
   a. 8½ × 11 (or 11 × 8½)
   b. 11 × 17
   c. 17 × 22
   d. 22 × 34
   e. 34 × 44
   f. 28 × 40
2. ANSI specifies five standard sheet sizes in millimeters.
   a. 210 × 297
   b. 297 × 420
   c. 420 × 594
   d. 594 × 841
   e. 841 × 1189
3. Longer lengths, referred to as elongated and extra-elongated drawing sizes, are available in multiples of the short side of the sheet size.

B. Title blocks and borders

1. The title block is located in the lower right corner of most engineering drawings and contains the following basic information:
   a. Company name
   b. Confidential statement
   c. Unspecified dimensions and tolerances
   d. Sheet size
   e. Drawing number
   f. Part name
   g. Material
   h. Scale
   i. Drafter's name or initials
   j. Checker's name or initials

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k. Engineer's name or initials
l. Revision level

2. All standard drawing sheets have border lines, with or without zoning.
   a. ***Zoning*** is a system of numbers along the top and bottom margins and letters along the left and right margins.
   b. Zoning allows the drawing to be read like a road map. For example, an item located at C5 means that the item can be found at or near the intersection of C across and 5 up or down.

Many techniques can be used to help students master this objective. Lead a discussion on standard sheet sizes, title blocks, and borders. Use VM–C and VM–D as visual aids during the discussion. Refer to Figures 2.45a and 2.45b in Engineering Drawing & Design, 4th ed., to illustrate standard sheet sizes. Refer to Figure 2.46 to illustrate a title block. Assign LS–A.

Review/Summary. Use the student learning objectives to summarize the lesson. Have students explain the content associated with each objective. Student responses can be used in determining which objectives need to be reviewed or taught from a different angle. Questions at the ends of chapters in the textbook may also be used in the review/summary.

Application. Use the included visual masters and lab sheet to apply the information presented in the lesson.

Evaluation. Evaluation should focus on student achievement of the objectives for the lesson. Various techniques can be used, such as student performance on the application activities. A sample written test is provided.

Answers to Sample Test:

Part One: Matching

1. h
2. i
3. a
4. b
5. e
6. g
7. d
8. j
9. c
10. f

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Part Two: Completion

1. Mylar®
2. Tracing cloth
3. Erasability
4. Tracing paper
5. road map
6. lower right corner

Part Three: Short Answer

1. a. 8½ × 11 (or 11 × 8½)
   b. 11 × 17
   c. 17 × 22
   d. 22 × 34
   e. 34 × 44
   f. 28 × 40
2. a. 210 × 297
   b. 297 × 420
   c. 420 × 594
   d. 594 × 841
   e. 841 × 1189

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Sample Test

Name _____

Use Drafting Media

Part One: Matching

Instructions: **Match the term with the correct definition.**

a. durability
b. smoothness
c. detail paper
d. polyester film
e. transparency
f. ghosting
g. zoning
h. matte
i. vellum
j. dimensional stability

_____1. A textured, nonglossy surface

_____2. A type of tracing paper that has been treated with wax, oil, or a similar substance

_____3. Refers to a material's ability to withstand a great deal of use

_____4. Refers to how a material accepts lettering and line work

_____5. Refers to a material's ability to allow light to pass through

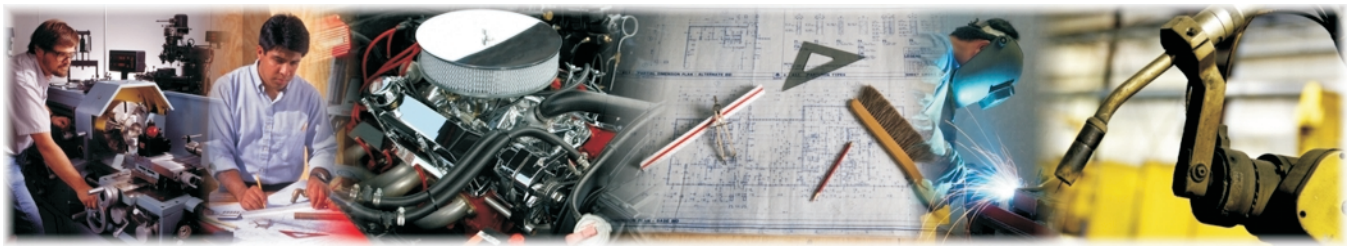
_____6. A system of numbers along the top and bottom margins and letters along the left and right margins

_____7. A plastic drafting material with excellent dimensional stability, durability, erasability, and transparency

_____8. Refers to a material's ability to retain its size regardless of atmospheric conditions

_____9. Used when a drawing is to be made in pencil but not for reproduction

____10. The residue left behind after lines that are hard to erase have been removed



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Part Two: Completion

Instructions: **Provide the word or words to complete the following statements.**

1. Polyester film is commonly known by its brand name, _____.
2. _____ is a thin, transparent muslin fabric with plastic or a starch compound that provides a good working surface.
3. _____ refers to a material's ability to handle frequent erasing with a minimum of ghosting.
4. _____ is a thin, transparent paper used when a drawing is to be made for the purpose of reproducing.
5. Zoning allows the drawing to be read like a _____.
6. The title block is located in the _____ of most engineering drawings.

Part Three: Short Answer

Instructions: **Complete the following.**

1. List the standard sheet sizes in inches.

2. List the standard sheet sizes in millimeters.

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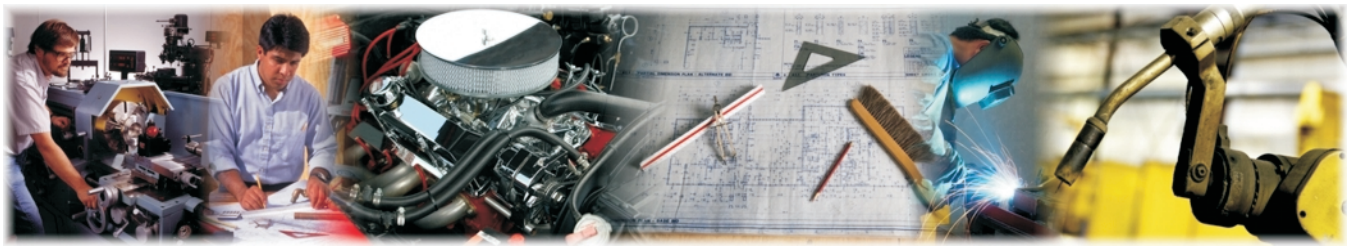
IMPORTANT CHARACTERISTICS OF DRAFTING MEDIA

- Dimensional stability
- Durability
- Erasability
- Smoothness
- Transparency



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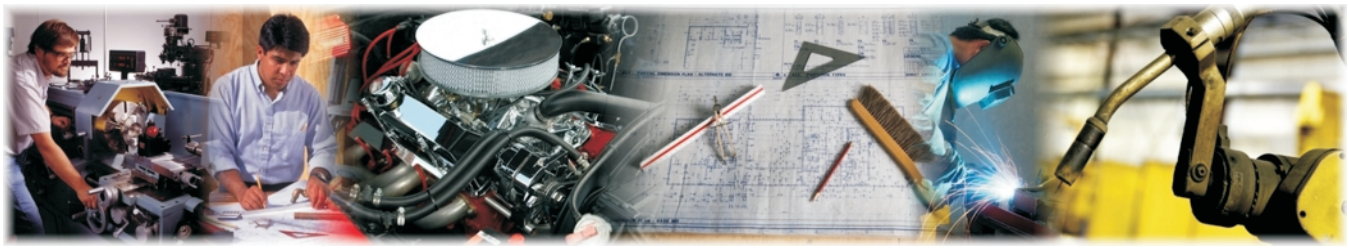
TYPES OF PAPER AND FILM

- Detail paper
- Tracing paper
  - Vellum
- Tracing cloth
- Polyester film
  - Mylar®



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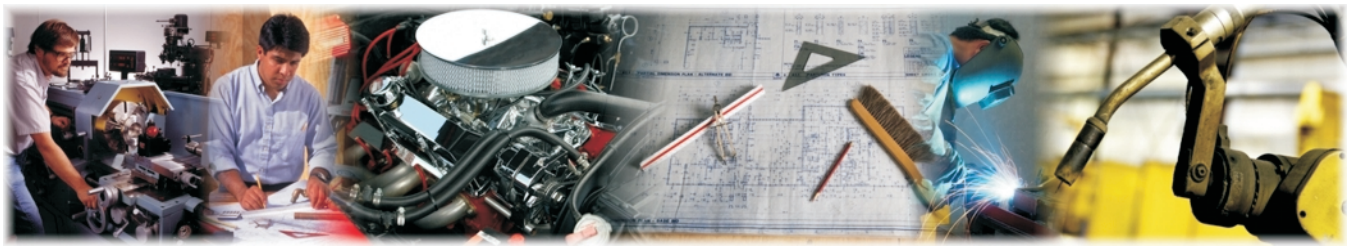
STANDARD SHEET SIZES IN INCHES

Size Designation	Size (in inches)
A	8½ × 11 (horizontal format) 11 × 8½ (vertical format)
B	11 × 17
C	17 × 22
D	22 × 34
E	34 × 44
F	28 × 40



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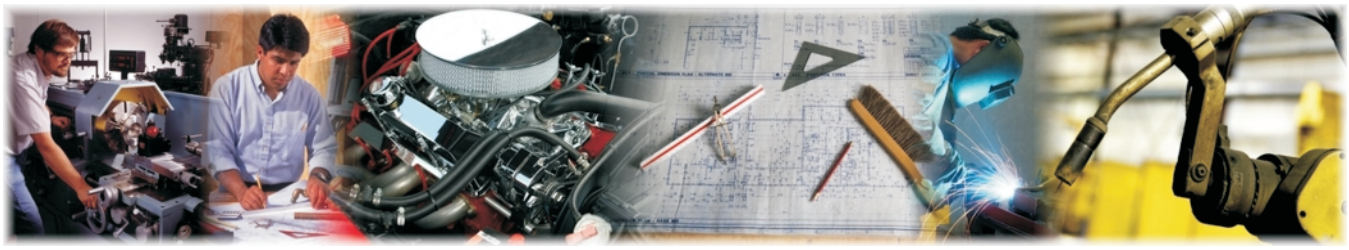
STANDARD SHEET SIZES IN MILLIMETERS

Size Designation	Size (in millimeters)
A4	210 × 297
A3	297 × 420
A2	420 × 594
A1	594 × 841
A0	841 × 1189



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LS–A

Name _____

Creating a Title Block

Purpose

The purpose of this activity is to reinforce your understanding of what information is to be included in a title block.

Objective

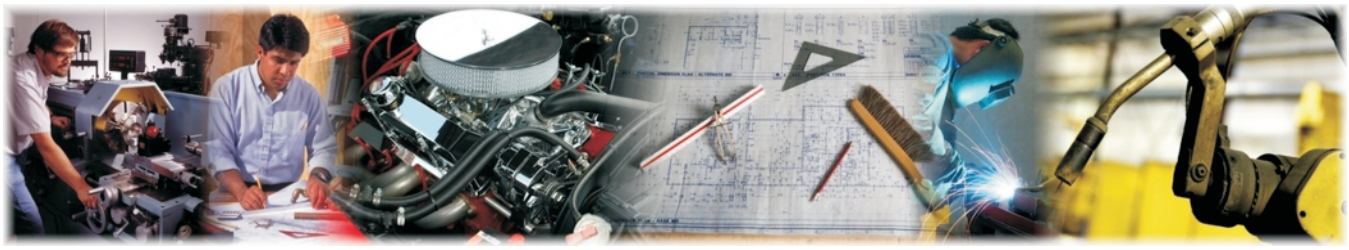
Create a sample title block.

Materials

- lab sheet
- 4 × 6 note card
- writing utensil

Procedure

1. As a drafter, you've been hired by the Johnson Aeronautical Company to make a drawing of a certain part to be used in the company's new aircraft.
2. Fill in the following information for the title block.
   a. Company name: Johnson Aeronautical Company
   b. Confidential statement:
   c. Unspecified dimensions & tolerances:
   d. Sheet size:
   e. Drawing number:
   f. Part name:
   g. Material:
   h. Scale:
   i. Drafter's name: (Your name)
   j. Checker's name: (Your instructor's name)
   k. Engineer's name:
   l. Revision level:
3. On a 4 × 6 note card, make a sample title block containing the information from step 2.



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