Graphics Introduction

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MAE 205
Drawing Tools

Figure 1.6 Traditional Tools
CAD Tools

Figure 1.5 CAD Workstations
This is a 3-Part Course

- **AutoCAD 2-D** for Engineering Drawings and Designs, Visualization (2D and 3D).
- **PTC Creo Solid Modeling** for Engineering Design, Documentation, and Drawings.
Typical Engineering Documentation
## Paper Sizes

<table>
<thead>
<tr>
<th>Metric (mm)</th>
<th>U.S. Standard</th>
<th>Architectural</th>
</tr>
</thead>
<tbody>
<tr>
<td>A4 210 × 297</td>
<td>A-Size 8.5” × 11”</td>
<td>9” × 12”</td>
</tr>
<tr>
<td>A3 297 × 420</td>
<td>B-Size 11” × 17”</td>
<td>12” × 18”</td>
</tr>
<tr>
<td>A2 420 × 594</td>
<td>C-Size 17” × 22”</td>
<td>18” × 24”</td>
</tr>
<tr>
<td>A1 594 × 841</td>
<td>D-Size 22” × 34”</td>
<td>24” × 36”</td>
</tr>
<tr>
<td>A0 841 × 1189</td>
<td>E-Size 34” × 44”</td>
<td>36” × 48”</td>
</tr>
</tbody>
</table>

Table 1.1 ANSI Standard Sheet Sizes
Line types will be used to represent Specific Features

- Center - Thin
- Short Break Line - Thick
- Long Break Line - Thin
- Dimension & Extension Line - Thin
- Section Line - Thin
- Phantom Line - Thin
- Stitch Line - Thin
- Stitch Line - Thin
- Visible Line - Thick
- Hidden Line - Thin
- Cutting Plane Line - Thick
- Cutting Plane Line - Thick
- Chain Line - Thick
- Symmetry Line

Dimensions:
- Center: 1/16, 1/8, 1, .3 mm
- Visible Line: .6 mm
- Hidden Line: .3 mm
- Cutting Plane Line: .6 mm
- Chain Line: .6 mm
- Symmetry Line: Thin .3 mm, Thick .6 mm
Use of different line types
Interpretation of sketches
Sketching: Outline and Modify

Begin with outer shape

Figure 2.11 Contour Sketch
A contour sketch is created by carefully observing the outline of an object while sketching. This technique is used to improve your sketching ability. In this example, the contour sketch was created without looking at the paper.

Add detail

Figure 2.12 Modified Contour Sketch
This contour sketch was created by looking at the object, then looking at the paper as the sketch was produced.
Sketching goal: Smooth, straight lines

Figure 2.16 Examples of Good and Bad Straight Line Technique
Sketched lines should be straight and dark and should have a consistent thickness.
Sketching a Circle

(A) 
(B) 
(C) 
(D) 

Sketching a Circle
Use ruler and construction lines
Sketching approaches

(A) Multiview

(B) Axonometric

(C) Oblique

(D) Perspective
OBLIQUE VIEW SKETCH FOR 3D Representation

FLAT FRONT
PARALLEL BACK
SIDES ON ANGLE (~30-45 DEG)
More Common in Engineering

Isometric View 3-D on 2-D Paper

EACH SIDE DRAWN TO SCALE
EACH SIDE AT 30-DEG
VERTICAL LINES
Orthographic Projections

2-D PROJECTIONS

TOP

FRONT . . SIDE

(A) Multiview
Engineers use

• Design Documentations
• Isometric sketches
• Orthographic Projections views

For simple hand sketches
• Oblique sketches