GRAPHIC COMMUNICATION

What is Graphic Communication?

A universal language

- Standards organizations like ANSI (American National Standards Institute) and ISO (International Standards Organization) publish standards detailing how drawings should be created so they can be interpreted universally.

The primary medium for communicating and developing design concepts
GRAPHIC COMMUNICATION

- Effective mean of communicating technical ideas and problem solutions
- Plays an important role in the design process.
- Complete language that uses:
  1) Visualization:
     ability to mentally picture things that do or do not exist - to be communicated through sketches.
GRAPHIC COMMUNICATION

- Complete language that uses:
  2) Communication:
      Creation of geometric models from sketches generated during or after visualization.
  3) Documentation: Done after design solution is finalized.
      - Permanent and detail record of the design.
      - 2D: detailed drawing – blue print
      - 3D
      - Follow strict standard practice (archive and legal).
GRAPHIC COMMUNICATION

TRADITIONAL TOOLS:

- Although intensive use of computer in drawing traditional drawing tools are still important and useful for:
  - Sketching
  - Drawing

- They assist human hand in making clean and neat technical drawing

- They increase the speed with which drawing are made.
GRAPHIC COMMUNICATION

TRADITIONAL TOOLS:

Typical Tools consist of:

- Wood or mechanical pencils
  Different grades:
  Hard → 4H to H9, use for construction lines
  Medium → 3H, 2H, H, F, HB, B
  Soft → 2B through 7B.
- Instrument Set (compass and dividers)
- 45 and 30/60 –degrees angles.
TRADITIONAL TOOLS:

Typical Tools consist of:

- Scales
- Irregular curves
- Protractors
- Drawing papers
- Erasers and erasing sheel
- Isometric and regular Templates (Circles, ellipses, polygons)
STANDARD AND CONVENTIONS

- Graphic language must follow a set of standards and conventions in order to make communication using technical graphic effective.

- **Conventions**: Commonly accepted practices, rules and methods.

- **Standards**: Sets of rules that govern how technical drawings are presented. Must be followed.
STANDARD AND CONVENTIONS

- ISO: International Standard Organization
- JIS: Japanese Standard
- DOD Department of Defense
- MIL US Military.

ANSI Y14.*-year (revision year) or ASME Y14.* - year
ASME Y14.2M-1992
Figure 1.17  Dimensioned mechanical drawing using ASME Y14.5M–1994 standards

The dimension type, placement, size, and other factors are examples of standard drawing conventions. For example, one ANSI standard dimensioning rule states that all diametral dimensions should be preceded by a phi (Ø) symbol.

(Reprinted from ASME Y14.5M–1994, Dimensioning and Tolerancing, by permission of The American Society of Mechanical Engineers.)
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Drawing Paper /media

- Media are surface upon which an engineer communicate graphical information.
- Different types or grades
  - Tracing – detail drawing
  - Vellum – tracing with improved translucency.
  - Polyester – transparent, waterproof – leave no trace of erasers.
  - Special paper for Cad plotters.
Figure 2.10  Square (A) and isometric (B) grids used for sketching
The grid lines are used as an aid in proportioning the drawing and sketching straight lines freehand.
Paper size
- Each drawing paper size is designed by a letter.
- ANSI has established sheet size and letter blocks for media used for technical drawing.

<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&quot; × 11&quot;</td>
<td>9&quot; × 12&quot;</td>
</tr>
<tr>
<td>A3 297 × 420</td>
<td>B-Size 11&quot; × 17&quot;</td>
<td>12&quot; × 18&quot;</td>
</tr>
<tr>
<td>A2 420 × 594</td>
<td>C-Size 17&quot; × 22&quot;</td>
<td>18&quot; × 24&quot;</td>
</tr>
<tr>
<td>A1 594 × 841</td>
<td>D-Size 22&quot; × 34&quot;</td>
<td>24&quot; × 36&quot;</td>
</tr>
<tr>
<td>A0 841 × 1189</td>
<td>E-Size 34&quot; × 44&quot;</td>
<td>36&quot; × 48&quot;</td>
</tr>
</tbody>
</table>
Preprinted title blocks

Preprinted standard borders and title blocks on drafting paper are commonly used in industry.

(Courtesy of Alvin & Company.)
LETTERING

☐ Neat legible lettering is used to add dimensions and notes to sketches.

☐ Poor lettering can ruin an otherwise good sketch.

☐ Engineering lettering is usually drawn with HB or other relatively soft lead.

☐ Use 1/8” uppercase single-stroke letters
□ Letter Shapes

- **STRAIGHT-LINE LETTERS**
- **CURVED-LINE LETTERS**
- **CURVED-LINE LETTERS AND NUMERALS**

- "W" is only letter over 6 units wide. Letters in "TOM Q VAXY" are 6 units wide. All others are 5, except "T" and "W".
- The letters Q, G, C, and D are based on a true circle. The lower portion of the J and U is elliptical.
- The 8 is composed of two ellipses. The 3, 5, and 2 are based on the 8.
- The 0, 6, and 9 are elliptical.
SCALES

- Use to measure distance on technical drawing.
- Usually 6 or 12 Inches long
GRAPHIC COMMUNICATION

ALPHABET OF LINES
ALPHABET OF LINES

Figure 1.18  The alphabet of lines
The alphabet of lines is a set of ASME standard linetypes used on technical drawings. The approximate dimensions shown on some linetypes are used as guides for drawing them with traditional tools. The technical drawing at the top shows how different linetypes are used in a drawing.
Sketched Lines

- Line patterns communicate what the line represents in the drawing.
- Line patterns tell you information such as whether the line is hidden, visible, or a centerline.
Points

- A point represents a location in space or on a drawing. It has no width, height or depth.
- Sketch points by a short crossbar on a line, or by a small cross.
Lines

- A straight line is the shortest distance between two points.
- Parallel lines
- Intersecting lines
- Perpendicular lines
A polygon is any plane figure bounded by straight lines.
Regular Polygons

- Regular polygons have equal angles and equal sides.
- They are often created and described by inscribing them in a circle, or circumscribing them about a circle.
- Hex head bolts are a typical example.
Circles

- A circle is a closed curve, all points of which are equally distant from the center.
- Circumference equals pi times the diameter \( C = \pi d \)
Solids

The 5 Regular Solids:
1. Tetrahedron (4 Triangles)
2. Hexahedron (Cube)
3. Octahedron (8 Triangles)
4. Dodecahedron (12 Pentagons)
5. Icosahedron (20 Triangles)

Prisms (Polyhedra):
6. Right Square
7. Right Rectangular
8. Oblique Rectangular

Trisms:
9. Right Triangular
10. Right Pentagonal
11. Oblique Hexagonal

Cylinders:
12. Right Circular
13. Oblique Circular

Pyramids:
14. Right Triangular
15. Right Square
16. Oblique Pentagonal

Cones:
17. Right Circular (Frustum)
18. Oblique Circular (Truncated)
19. Sphere
20. Torus
21. Oblate Ellipsoid
22. Prolate Ellipsoid