

Beginning Engineering Graphics

1st Week Lecture Notes

Instructor: Edward N. Locke

Topic: Sketching and Mechanical Drafting ABC

1st Subject: Tools, Lettering and Measurements

1. Use of tools:

(1) Use **HB or F drawing pencil or a #2 writing pencil, light-blue lined quadrillo pad (1/4")**, and a **soft pencil eraser for all sketching assignments in these courses.**

(2) **Traditional drafting uses the following tools:** drawing board/table, drawing sheet, T-square, tape, erasing shield, dusting brush, pencil sharpener/pointer/sand paper, triangles (30°-60°-90°, and 45°-45°-90° combos), compass/dividers, protractor, French curves, templates (come with circles, ellipse, symbols, letters, etc), drafting machine (combo of T-square, scales, triangles and protractor).

(3) **Types of pencils used in drafting:** 4B, 3B, 2B, B (soft, for perspective drawings and shading); HB, F (for freehand sketching); 3H, 4H, 5H, 6H (hard, for construction lines); and mechanical pencils with leads of different diameters.

(4) **Types of Scales: Architect's scale:** comes with 3/32, 3/16, 1/8, 1/4, 3/8, 3/4, 1/2, 1 scales, 1 1/2, 3. Scales read either from left to right or from right to left. Commonly used scale for building is 1/4" = 1'. Marks on the other side of 0 mark designate smaller units. Used for architectural as well as general purposes.

Mechanical engineer's scale (comes with 1/8, 1/4, 1/2", and full size scale),

Civil engineer's scale (comes with inches divided into decimal parts: 10, 20, 30, 40, 50, and 60).

Metric scale: usually 150-300mm long. Scales: 1:2, 1:5, 1:10, 2:1, 5:1.

2. Lettering Tips:

Single-stroke Gothic is the most common form used on drawings. Use the same style on the same drawings, NOT different styles (such as vertical and inclined) on the same drawing.

For right-handed people, form letters from left to right and from top to bottom. **For left-handed people**, form letters from right to left and from bottom to top (See "Blue Book p7-8).

3. **Metric and customary paper sizes:** each smaller size is obtained by dividing the longer sides of the preceding size by two

Size	US	Metric	Customary	USA Architectural
A0	E	841 x 1189 mm	34 x 44"	36 x 48"
A1	D	594 x 841 mm	22 x 34"	24 x 36"
A2	C	420 x 594 mm	17 x 22"	18 x 24"
A3	B	297 x 420 mm	11 x 17"	12 x 18"
A4	A	210 x 297 mm	8 1/2 x 11"	9 x 12"

4. Examples of layout for drawing sheet:

(1) **Customary:** border line 1/2" from edge of drawing; title block 3/8" vertical space per line (See "Blue Book" p94).

- (2) **Metric:** border line 15mm from top, right and bottom edges of drawing sheet, 25mm from left edge of drawing sheet; Title block 10mm vertical space per line (See “Blue Book” p95). Title block can be placed on upper or lower right-hand corner.

2nd Subject: Types and Usage of Lines

Visible line. Thick, solid. Used to draw the outline of an object.

Hidden line. Thin, dashed. Used to show surfaces not normally seen.

Dimension line. Thin. Used to show extent of dimension with the dimension size written within or above the line.

Extension line. Thin. Extend out from the object; and used with dimension lines.

Leader. Thin. Points out the part to which a dimension or note refers.

Center line. Thin, long dashes separated by a short dash. Used to show center of an object.

Cutting-plane line. Thick. May be either long dashes or long dashes separated by two short dashes. Used to show an imaginary cut section through an object.

Section line. Thin, solid and drawn at an angle (normally 45 degree). Used to show cut surfaces in section view.

Break line. Thick for short breaks; thin for long breaks, solid. Used to show that part of an object has been removed.

Phantom line. Thin, long dashes separated by two short dashes. Used to show alternate position of a part.

3rd Subject: Three Types of Drafting jobs

1. Three types of drafting jobs:

Traditionally, engineer, designer, and architect make rough sketches, descriptions, and calculations of the first drawing of the product. Then the drafters prepares finished, detailed drawings, and figure the strength, quality amount and cost of materials. They are specialized in mechanical, electrical, or architectural fields, most work for private firms, and about one third work for engineering and architectural firms. Classification according to types of work: (1) **Tracer:** copies drawings made by others; (2) **Detailer:** makes detail and assembly drawings; (3) **Checker:** examines final drawings for errors.

Classification according to experience and level of responsibility: **Drafter, Senior drafter, Supervisor. Training needed to become a drafter:** technical institute, junior and community colleges, technical and vocational high schools, universities. Santa Ana College offers many courses tightly-related to market demands (refer to the College Catalog for details). Information on potential employment can be find through the internet, school Job Placement office, local Employment Development Department office, and non-profit civil groups and organizations. Santa Ana College also offers courses that teach how to find a job (talk with a councilor for course information).

Study Questions

1. What type of pencils are used for perspective drawings and shading?

2. What type of pencils are used for freehand sketching?
3. What type of pencils are used for construction lines?
4. How to read the Architect's scale? What scales does it come with?
5. What do marks on the other side of 0 mark on the Architect's scale designate?
6. What scale does a mechanical engineer's scale come with?
7. What does a civil engineer's scale divided an inch into?
8. Usually, how long is a metric scale? And what scale does it come with?
9. What are the most common font and style used on drawings?
10. What is the normal way of forming letters for right-handed people, and for left-handed people?

11. **What is an easy way to remember the following metric and customary paper sizes?**

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