

Beginning Engineering Graphics
2nd Week 2nd Meeting Lecture Notes
Instructor: Edward N. Locke

Topic: Mechanical Drafting ABC: Units and Measurement

1st Subject: Systems of Measurement and Units Used in Drafting

1. **Systems of measurement:** There are currently two systems of measurement units widely used in the world:
 - (1) **Metric system** first adopted by France and based on the meter with other decimalized units (kilometer, millimeter, etc); The metric system is also called SI or International System, and is gradually coming into use in the United States, especially by many multinational corporations in the chemical, electronic and mechanical industries;
Metric measurement is decimalized, or based on division by multiples of tens):
 1 km = 1,000m, 1m = 10 decimeter, 1 decimeter = 10cm, 1cm = 10mm
Basic SI Metric Measurement System: Kilogram (mass or weight), Kelvin (temperature), meter (length), mole (amount of substance), ampere (electrical current), candela (brightness of light), second (time). To help memorize these units, I use their abbreviation to come up with an acronym: **“KKMMacs”** (pronounced like Kaykay-am-max).
 - (2) **The US Customary or British Imperial system** developed by England which includes inches, yards, feet, etc.
2. **Basic conversion of units to remember for this class:**

Length:	Area:
1 in = 25.4 mm	1 sq.in = 645.16 sq.mm
1 foot = 304.8mm	1 sq.feet = 0.09 sq.m
1 yard = 0.91m	1 sq. yard = 0.84 sq.m
1 mile = 1.6km	1 cm ² = 0.16 sq.in
1 mm = 0.04 in	1 m ² = 1.2 sq.yard
1m = 1.09 yard	1 km ² = 0.39 sq.mile
1km = 0.62 mile	

2nd Subject: Paper Sizes and Layouts

1. **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	8½ x 11”	9 x 12”

2. **Examples of layout for drawing sheet:**
 - (1) **Customary:** border line ½” 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.
 Title block can be placed on upper or lower right-hand corner.

Study Questions:

1. What are the two systems of units used in drafting, in what countries are they originally created? How do they work?
2. How to remember the basic units in the SI Metric Measurement System in an easy way?
3. Try to remember the basic conversion of units if you can:

Length:	Area:
1 in = 25.4 mm	1 sq.in = 645.16 sq.mm
1 foot = 304.8mm	1 sq.feet = 0.09 sq.m
1 yard = 0.91m	1 sq. yard = 0.84 sq.m
1 mile = 1.6km	1 cm ² = 0.16 sq.in
1 mm = 0.04 in	1 m ² = 1.2 sq.yard
1m = 1.09 yard	1 km ² = 0.39 sq.mile
1km = 0.62 mile	

1 km = 1,000m, 1m = 10 decimeter, 1 decimeter = 100cm, 1cm = 10mm

Try to remember these units by doing the following exercises:

1 yard = feet, 1 feet = inches, 1 in = mm, 1 yard = m, 1 mile = km; and

1 km = m, 1 m = cm, 1 cm = mm

6 feet = yard, 2.5 feet = inches, 10 in = mm, 2 yard = m, 3 mile = km; and

1.5 km = m, 10 cm = m, 100 cm = cm