



# ET-115

# Engineering Drawing

Lecture # 1

Drafting Instruments, Basic Drafting Skills

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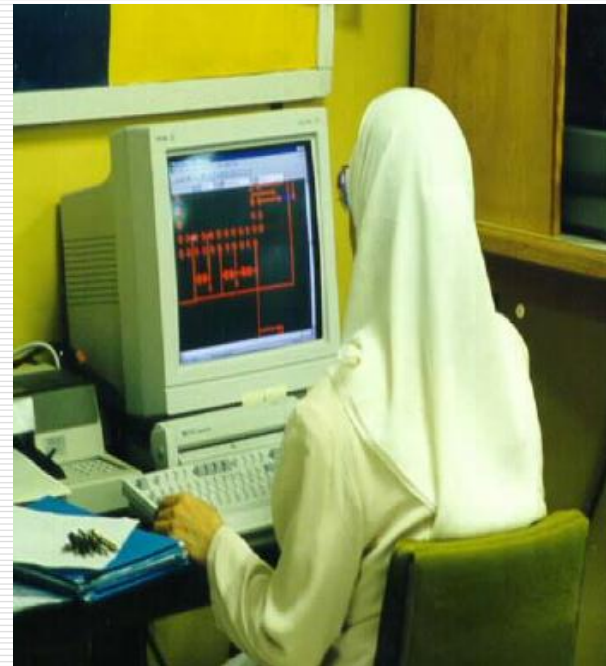


# “A design is as good as it’s instruments.”

- A engineering drawing is a highly stylized graphic representation of an idea. The idea might be of something that we can see such a real or virtual object, space or environment.
  - In some cases, such as an electronic schematic diagram for example, the drawing will bear no visual resemblance to the physical object that will be built from the information it provides.
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# Conventional & C.A.D.





# Conventional Drafting Tools

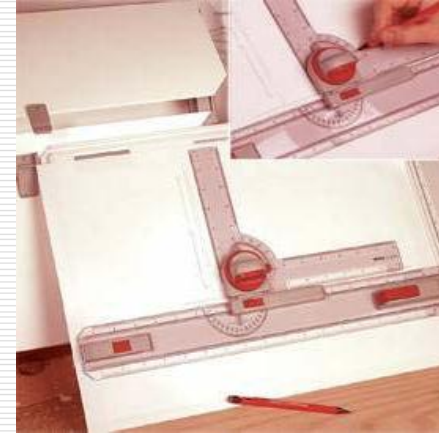




# Drawing Surfaces



Drawing Table



Drawing Board

# Drafting Equipment

- Drawing board/table





# Drawing Surface

- Available in a variety of styles and sizes. Most are adjustable up and down, and can tilt to almost any angle from vertical 90° to horizontal
- The drawing surface must be clean, flat, smooth, and large enough to accommodate the drawing and some drafting equipment.
- If a T-square is to be used, at least one edge on the board must be absolutely true.
- Most quality boards have a metal edge to ensure against warping and to hold the T-square securely



- Drawing Table with Drafting Machine
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# Drafting Equipment

## Drawing Horizontal lines

- T-square



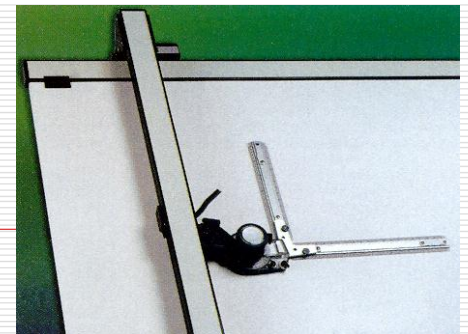
- Parallel edge



- Drafting Machine

- Arm/elbow type

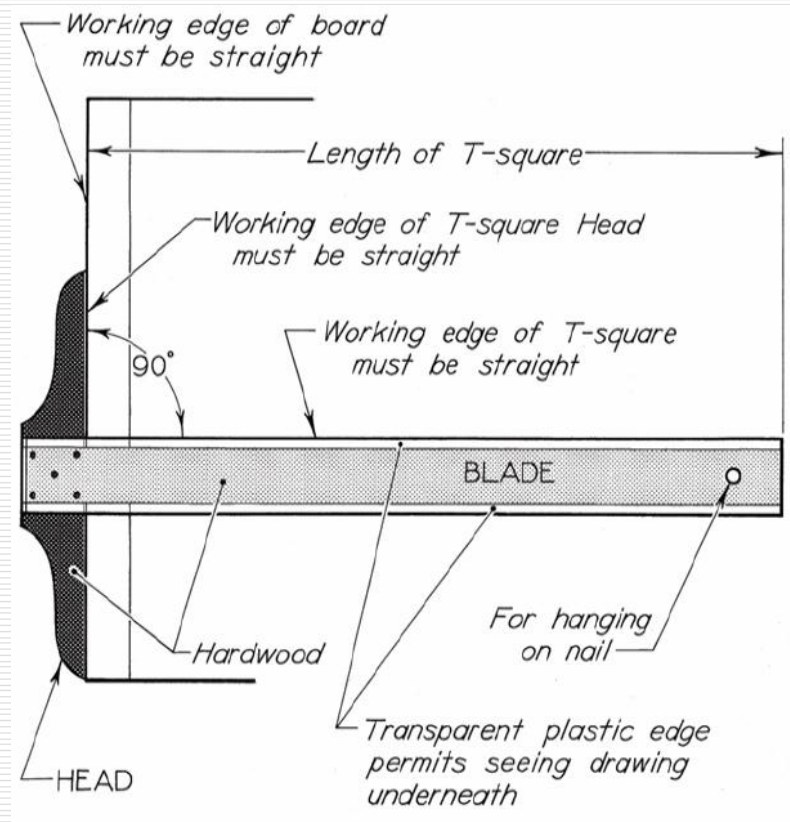
- Track type





# T-Square

- ❑ It provides a parallel straight edge for the beginning drawing drafter.
- ❑ It is composed of two parts: the head and the blade. The two parts are fastened together at an exact right angle.
- ❑ The blade must be straight and free of any necks and imperfections.



# T-Square (cont'd)

- ❑ Used to draw horizontal lines on the drawing sheet.
- ❑ Used to draw vertical lines and slanted lines with the help of additional equipment basically 45o and 60o triangles.
- ❑ Draw lines only against the upper edge of the blade. Make sure the head is held against the left edge of the drawing board to guarantee parallel lines.
- ❑ Use a T-square to align the drawing paper to the drawing board, and to draw parallel horizontal lines on the paper.

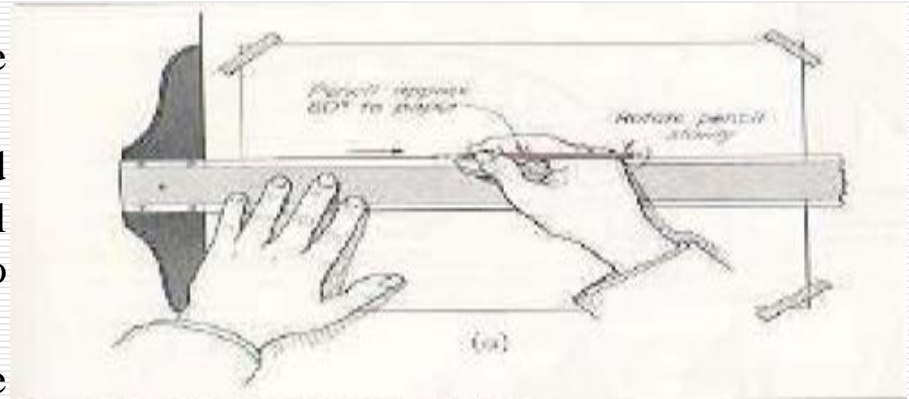


Fig. 2.20 Drawing a Horizontal Line.

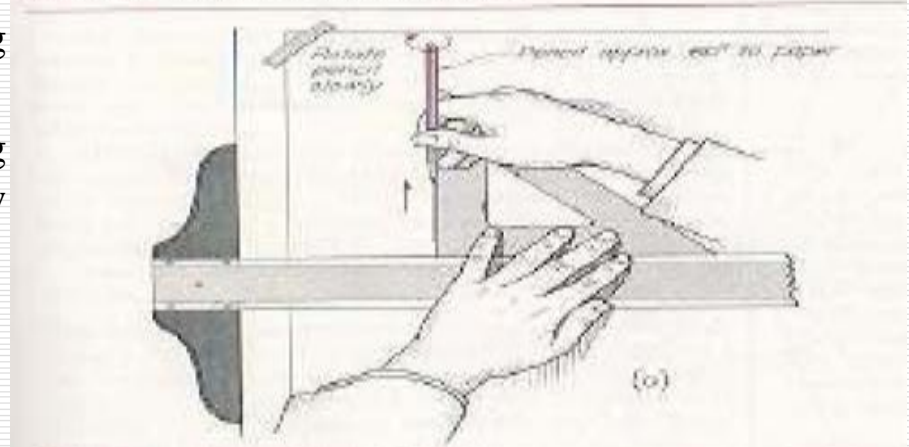
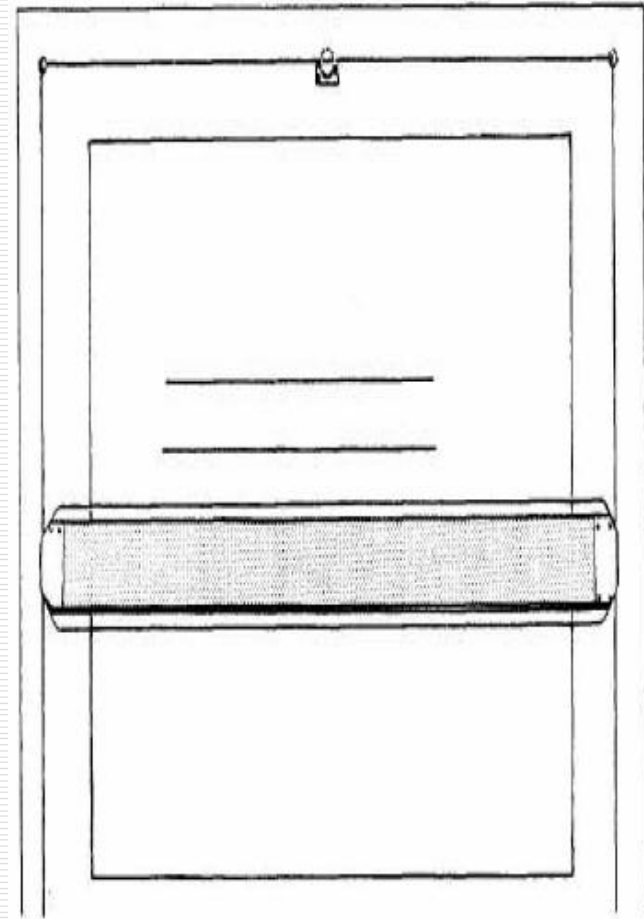


Fig. 2.21 Drawing a Vertical Line.

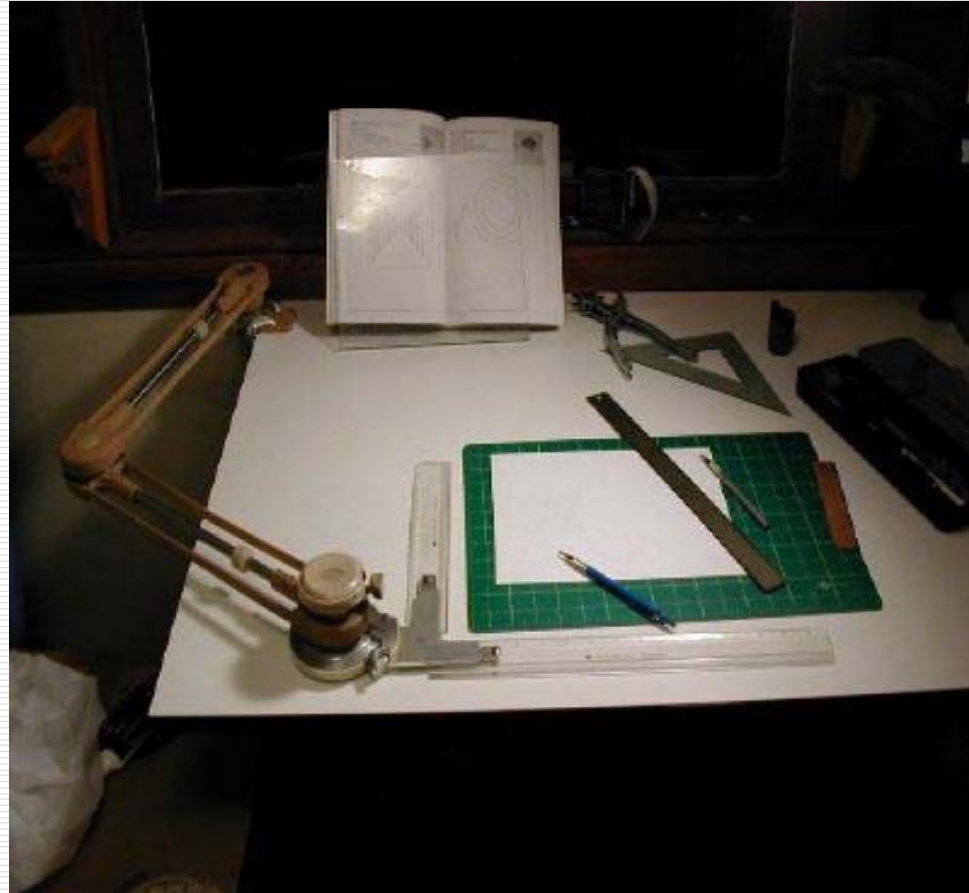
# Parallel Straightedge

- A parallel straightedge is a laminated maple blade with transparent plastic edges similar to those on the T-square. Its primary purpose is the same as the T-square.
- The parallel straightedge uses a system of cords and pulleys so that it is supported at both ends by a cord tacked to the drawing board.
- You can move the straightedge up or down the board with pressure at any point along its length and maintain parallel motion automatically.





# Drafting Machine





# Drafting Equipment - Triangles

## □ 45° Triangle

- Draw vertical lines and lines @ 45°



## □ 30° x 60° Triangle

- Draw vertical lines and lines @ 30° and 60°



## □ Adjustable Triangle

- Draw lines @ 0° to 90°





# Drafting Equipment

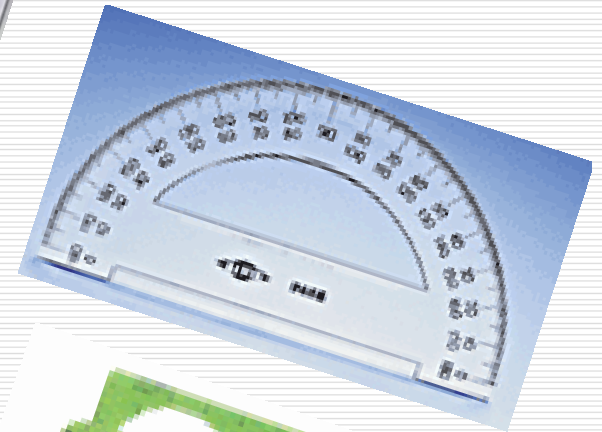
## Compass

- Draw circles and arcs



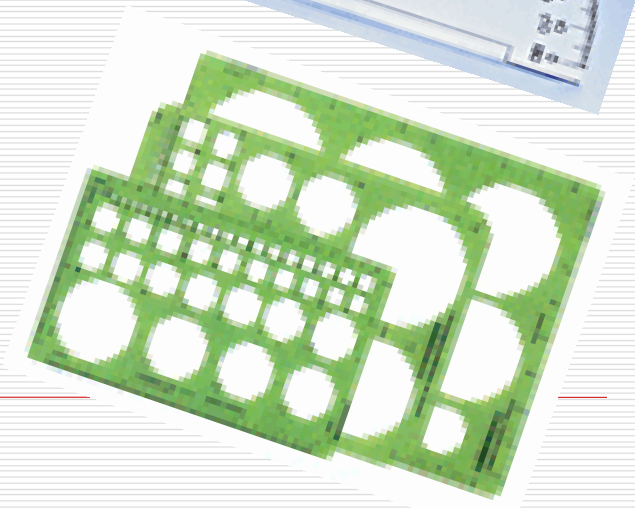
## Protractor

- Measure and layout angles



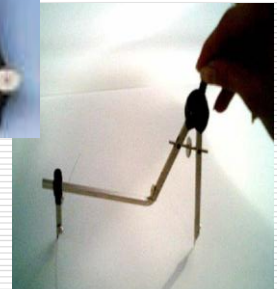
## Templates

- Drawing repetitive features



# Drafting Equipment

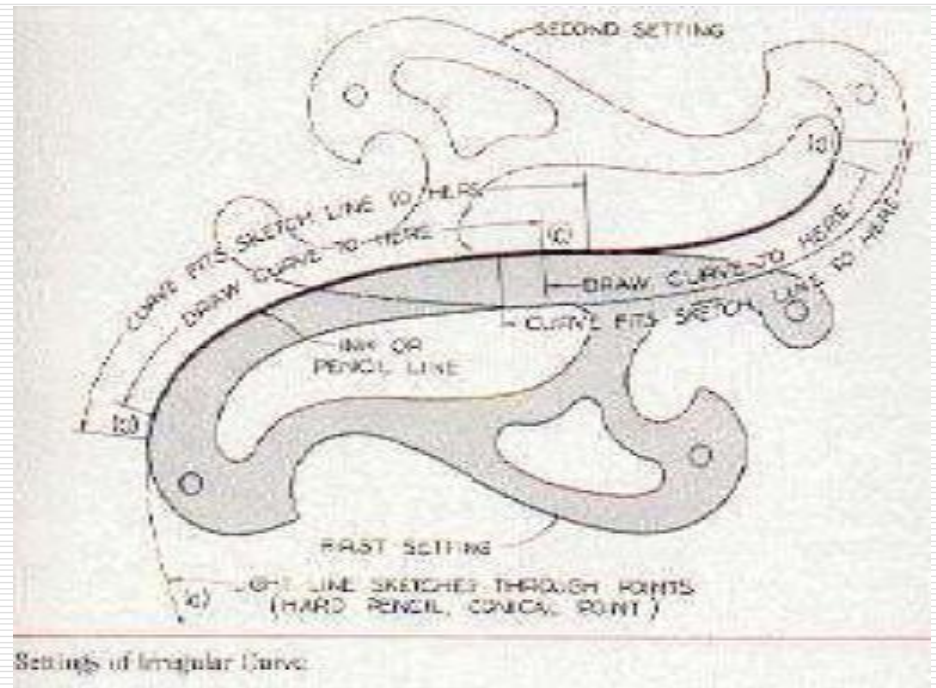
- Pivot Compass
  - used mainly to draw circles and circular curves of relative short radius .
- Bow Compass
  - The conical is the needlepoint can allow it to be used as a divider
- Extension Bars
  - Draws large circles
- Divider
  - used to transfer measurements. To step off a series of equal distances, and to divide lines into a number of equal parts





# Drafting Equipment

## □ French Curves







# Drafting Equipment - Pencils

Mechanical



Lead Holders

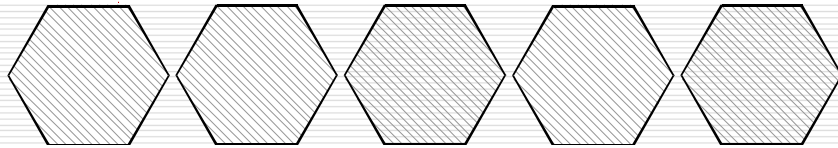


Wooden





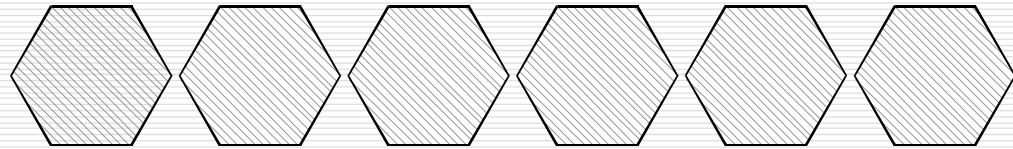
# Drafting Equipment - Leads



**6B**   **5B**   **4B**   **3B**   **2B**

## **SOFT**

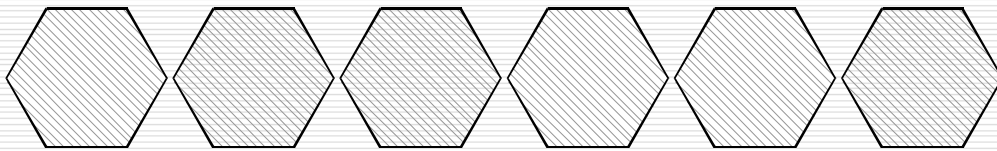
Very soft leads, smudge easily. Used for art work of various kinds and full-size details in architectural drawing.



**B**   **HB**   **F**   **H**   **2H**   **3H**

## **MEDIUM**

General purpose work. Softer grades (right) used for technical sketching, lettering, freehand work. Harder grades (left) used for line work on machine & architectural drawings.



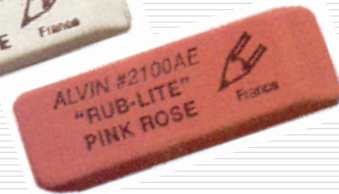
**9H**   **8H**   **7H**   **6H**   **5H**   **4H**

## **HARD**

Used where extreme accuracy is required. Softer grades (right) used for line work on engineering drawings. Draw very light lines.

# Drafting Equipment

## □ Erasers



## □ Brush

- Clean drawings w/out smudging



## □ Erasing Shield

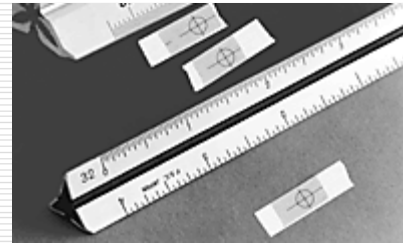
- Erase near lines that should not be erased





# Drafting Equipment - Scales

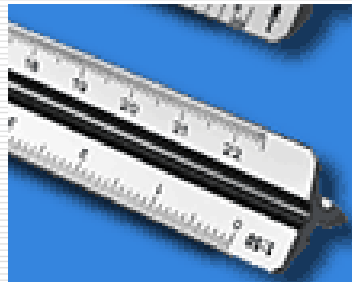
Engineer (Civil)



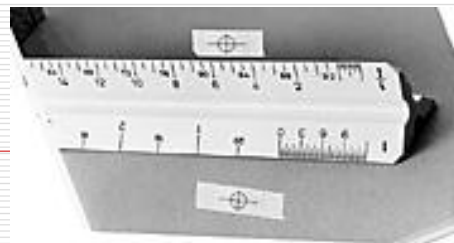
Mechanical drafter



Metric



Architecture





# Drafting Media Types

## Vellum

- Tracing paper treated to make it more transparent
- Most commonly used drafting media

## Polyester drafting films (mylar)

- Very transparent, strong, and lasting
- Strongest drafting media

## Bond

- Standard printing and copy paper
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# Drafting Media Sizes

**E – 44 X 34  
48 X 36**

**D – 34 X 22  
36 X 24**

**C – 22 X 17  
18 X 24**

**B – 17 X 11  
12 X 18**

**A – 11 X 8.5  
9 X 12**

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# Reproduction Techniques

## □ Plotters

- Pen Plotters hold special technical pens of several different thicknesses and colors



## □ Printers

- Inkjet printers are now available in a variety of sizes to fit most drafting needs
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