Dimensioning Hand Drawings

ENGR 1182
Graphics 04
Today’s Objectives

- Formal Drawing Components:
  - Dimensioning Hand Drawings
- GP04 Activity
- GP04 Application
Basic Dimensioning

Dimensioning is used to define an object so that it could be manufactured and must:

- Define the overall size of the part in all 3 dimensions.
- Define the size and location of the features of the part in all 3 dimensions.
Dimensioning Definitions

- Extension Lines
- Dimension Lines
  - If space available, place Dimension between Extension lines
  - If no space available, place Dimension outside of Extension lines
- Radial Diameter Dimension
- Radial Radius Dimension

Dimensions:
- Ø 1.0
- R 1.0
- 2.0
- 0.10

Note GAP
Basic Dimensioning

Overall Size

Features Size and Location

2

2

2

.75

.25

1

2
Basic Dimensioning: Arcs and Circles

Overall Size

Features Size and Location

OBJECT IS SYMMETRICAL TOP TO BOTTOM

WITHOUT THE SYMMETRY NOTE PRESENT, THIS DIMENSION WOULD BE REQUIRED

OBJECT IS SYMMETRICAL TOP TO BOTTOM

Ø1
When dimensioning objects with Center Marks it is usually advantageous to establish the Center Marks location early in the dimensioning process.

Note that by dimensioning the Center Mark offset early, it becomes readily apparent that by using it, in combination with the radius (R1), the width of the object is fully specified.
There are many ways to use dimensions to locate features.

- Chain
- Baseline

(Both techniques are acceptable, however baseline dimensions are preferred.)
Dimensioning Guidelines

10 BASIC DIMENSIONING GUIDELINES *

1. Do not over-dimension or under-dimension an object. Every object must be completely and uniquely described, so that any distance or angle related to the object can be found, but only in one way.

2. Each dimension should be placed in a descriptive or characteristic view where the corresponding component may be seen clearly.

3. Dimensions should be located outside the boundaries of the object and placed between views whenever possible.

4. Dimension lines should be aligned and grouped where possible to promote clarity and uniform appearance.

5. Do not cross dimension lines with extension lines or other dimension lines (note that extension lines may cross other extension lines).

6. When symmetry is used to reduce dimensioning complexity, a note must be added describing precisely the location of the axis of symmetry.

7. Avoid dimensioning to a hidden line.

8. Hole and Arc Details:
   A. Diameters (for circular features of 360 degrees) are dimensioned with a numerical value preceded by the diameter symbol (Ø) e.g. Ø5.0.
   B. Radii (for circular features of less than 360 degrees) are dimensioned with a numerical value preceded by the radius symbol (R) e.g. R5.0.
   C. A small cross is always used to locate the center of a circle. It is also used when the center of curvature for an arc needs to be located.

9. Dimensioning Cylinders:
   A. Dimension a positive cylinder (e.g. a rod) in the view perpendicular to where it appears as a circle, i.e. where the side of the cylinder appears as a rectangle. The symbol Ø is still required.
   B. Dimension a negative cylinder (e.g. a hole) in the view where it appears as a circle.

10. There should be a visible gap between the extension line and the feature being dimensioned. (Note that if the feature is interior to the object, there is no break in the extension line where it crosses the object boundary.)

* OVERALL CLARITY is the ultimate goal. However, if you break any of the above guidelines, the results should be distinctly clearer than what you could achieve without breaking the guidelines.
Dimension this Object Using the Guidelines
Dimension this Object Using the Guidelines

- First define the overall size of the part in all 3 dimensions.
- Then define the size and location of the features of the part in all 3 dimensions.
- Carefully follow the Dimensioning Guidelines.

C. A small cross is always used to locate the center of a circle. It is also used when the center of curvature for an arc needs to be located.
Establish Height, Width and Depth
Define the overall size of the part in all 3 dimensions

2. Each dimension should be placed in a descriptive or characteristic view where the corresponding component may be seen clearly.

3. Dimensions should be located outside the boundaries of the object whenever possible.

4. Dimension lines should be aligned and grouped where possible to promote clarity and uniform appearance.

6. When symmetry is used to reduce dimensioning complexity, a note must be added describing precisely the location of the axis of symmetry.

The SYMMETRY note greatly simplifies dimensioning in this example since it locates all the cylindrical features front to back and left to right.
Define the size and location of the features of the part in all 3 dimensions

8. Hole and Arc Details:
   A. Diameters (for circular features of 360 degrees) are dimensioned with a numerical value preceded by the diameter symbol \( \varnothing \) e.g. \( \varnothing 5.0 \).

   B. Dimension a negative cylinder (e.g. a hole) in the view where it appears as a circle.

8. Hole and Arc Details:
   A. Diameters (for circular features of 360 degrees) are dimensioned with a numerical value preceded by the diameter symbol \( \varnothing \) e.g. \( \varnothing 5.0 \).

   A. Dimension a positive cylinder (e.g. a rod) in a view perpendicular to where it appears as a circle, i.e. where the side of the cylinder appears as a rectangle. The symbol \( \varnothing \) is still required.
Define the size and location of the features of the part in all 3 dimensions

1. **Do not over-dimension or under-dimension an object.** Every object must be completely and uniquely described, so that any distance or angle related to the object can be found, but only in one way.

2. Each dimension should be placed in a **descriptive or characteristic view** where the corresponding component may be seen clearly.

3. Dimensions should be located outside the boundaries of the object and placed between views whenever possible.

*OVERALL CLARITY* is the ultimate goal. However, if you break any of the above guidelines, the results should be distinctly clearer than what you could achieve without breaking the guidelines.
Any Dimensions Missing??

Final Result

Using a NOTE here greatly reduces dimensioning effort!!
Dimensioning Wrap Up

Basic Rules of Dimensioning

1. Overall size in all 3 dimensions
2. Size and location of all features in all 3 dimensions
3. Follow Dimensioning Guidelines
Activity (GP04-DIM): Adding Dimensions
Application (GP04-DIM): Adding Dimensions
(On Paper- All dimensions are even numbers)
What’s Next?

- Due Next Class: GP04 - Dimensioning Application
- Take Graphics 5 Quiz on readings