

Working Drawing

During design process an engineer records his ideas by means of sketches and then developed these sketching in drawing of entire structure of machine and in drawing of each part alone, working drawing contains all the information needed to manufacture a product. It include all information needed to fabricate each part, specify all standard components, and assemble the parts and standard the components into the product. So working drawing may be divided into two types

- 1- Detail Drawing
- 2- Assembly Drawing

A typical working drawing also include

- 3- Standard parts sheet or parts list.

Detail Drawing

The first step in developing a new machine is the preparation of design assembly drawings. After the drawing is analyzed thoroughly, final assembly drawings are made from these drawings. To facilitate the manufacture of the unit, individual parts of the unit are to be produced first, which requires the preparation of part drawings. These are prepared from the final assembly drawings. The part drawing must contain all the information required such as size and shape

description, dimensions, notes, suitable material, etc., to enable the student to understand the functional aspects of the unit.

The steps to be followed to prepare part drawings from the assembly drawing are:

- 1- Understand the assembly drawing thoroughly, by referring to the parts list and the different orthographic views of the unit.
- 2- Study the functional aspect of the unit as a whole. This will enable to understand the arrangement of the parts.
- 3- Visualize the size and shape of the individual components.
- 4- As far as possible, choose full scale for the drawing. Small parts and complicated shapes may require the use of enlarged scales so that their presentation will have a balanced appearance.
- 5- Select the minimum number of views required for describing each part completely. The view from the front selected must provide maximum information of the part.
- 6- The under mentioned sequence may be followed for preparing different views of each part :

(i) Draw the main centre lines and make outline blocks, using the overall dimensions of the views.

(ii) Draw the main circles and arcs of the circles.

(iii) Draw the main outlines and add all the internal features.

(iv) Cross-hatch the sectional views.

(v) Draw the dimension lines and add dimensions and notes.

7- Check the dimensions of the mating parts.

8- Prepare the parts title and add number for each part.

Assembly Drawing

A machine is an assembly of various links or parts. It is necessary to understand the relation between the various parts of the unit for the purpose of design and production. An assembly drawing is one which represents various parts of a machine in their working Position.

An assembly drawing made at the design stage while developing a machine is known as design assembly drawing Working assembly drawings are normally made for simple machines, comprising small number of parts. Each part is completely dimensioned to facilitate easy fabrication.

A **sub-assembly drawing** is an assembly drawing of a group of related parts which form a part of a complicated machine. Thus, a number of such sub-assembly drawings are needed to make a complete unit. An installation assembly drawing reveals the relation between different units of a machine, giving location and dimensions of few important parts.

The following steps may be made use of to make an assembly drawing from component drawings:

- 1- Understand the purpose, principle of operation and field of application of the given machine. This will help in understanding the functional requirements of individual parts and their location.
- 2- Examine thoroughly, the external and internal features of the individual parts.
- 3- Choose a proper scale for the assembly drawing.
- 4- Estimate the overall dimensions of the views of the assembly drawing and make the outline blocks for each of the required view, leaving enough space between them, for indicating dimensions and adding required notes.
- 5- Draw the axes of symmetry for all the views of the assembly drawing.

- 6- Begin with the view from the front, by drawing first, the main parts of the machine and then adding the rest of the parts, in the sequence of assembly.
- 7- Project the other required views from the view from the front and complete the views.
- 8- Mark the location and overall dimensions and add the part numbers on the drawing.
- 9- Prepare the parts list.
- 10- Add the title block.

NOTE It is not advisable to complete one view before commencing the other. The better method is to develop all the required views simultaneously.

Section lines in Assemblies

- Section lines: section lines in adjacent parts are drawn in opposing direction
 - In the largest area, section line are drawn at 45°
 - Next largest (-45)
 - Additional area (30° – 60°)
 - In small area, space the section lines closer together
 - Different section line types different material.

Hidden lines and Dimensions

- **Hidden Lines**
 - The should be used whenever necessary for clearness

- They should be left off when they impair clearness.
- When a section view is used, hidden lines should not be used in that view.

• **Dimensions**

- As a rule, dimensions are not given on assembly drawing.
- If dimensions are given, they are limited to same function of the object as a whole where it given for the overall height and width.

Part list/ Bill of material

- The part list is an itemized list of the parts for assembly.
- Contains part number, part name, the number required and the material of the part.
- Part #'s are usually assigned based on size or importance.

-	-	-	-
3	Front Plate	1	3003 Aluminum
2	Rear Plate	2	Steel
1	Screw	4	Steel
Part #	Part name	REQ'D	MAT

Example:

The following an example of detailed and assembly drawing draw these as mentioned in each case.