

A Lexicon: Engineering Drawing

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ABSTRACT: Wheel and fire are regarded as the most important invention for the humankind, though these were very important inventions but there is still an invention which is not often included in the list of inventions but still is used the most and that is the Language. Language is that medium which helps to convey the ideas, information, etc. For literature English, Hindi, French, Spanish, Chinese can be the Language. Numbers are the language for mathematics similarly Engineering Drawing is the language of Engineers, specially Mechanical Engineers. The technical Engineering Drawing have existed since the ancient times. The strong traces of engineering drawings are also found in the literature of Leonardo da Vinci. Gaspard Monge is frequently considered the "father of descriptive geometry". Gaspard Monge faced this problem when he started as an Engineer in the French Military. He created a system that could be used to interconnect an object to anyone across the world. This system was called **Orthographic Projection**. Today Mechanical Engineering without Engineering Drawing is same as a hardware without a software to run it.

INTRODUCTION

The main objective is to focus on the various aspects and importance of Engineering Drawing. Engineering Drawing a way pictographical way which is used to convey the technical information about an entity may it be a machine, building or any commodity. During development of any product the first part is the creation of the idea and then the idea is conveyed to others by means of Engineering Drawing. The journey of Engineering drawing as known is very old, in the Renaissance period (1300-1500) the Perspective drawing technique was invented, Later in 1765 Descriptive geometry was invented by Gaspard Monge which became the base of modern engineering drawing. Orthographic projection technique was invented during the Industrial Revolution period (1770-1850) and then in 1980's and 1990's the 2D and 3D CAD systems came into play.

Overview of Engineering Drawing Drawing and Design

Et al Jian-Wen Guo, Xiao-Chang Cao, Li Xie, Jian-Jun Jin and Chu-Diao Wang anticipated that Engineering Drawing is a obligatory ability in engineering majors, such as Mechanical Manufacturing, Trade Design, Industrial Engineering, Ecological Engineering, Civil Engineering, Process Equipment, etc. The rapid updating of manufacturing technology and the unending changes of manufacturing market demand puts forward fresh requirements for student's drawing ability.[1]

Many people think that Engineering Drawing is a very complex portion which needs high level of intelligence for understanding, but in reality its not the case. In fact unknowingly almost all of us actually use the concepts of engineering drawing in our daily life. For example if a student makes notes while studying he/she outlines the important points which thick marker same is the case for engineering drawing where the outlines are marked with solid continuous lines and the hidden objects with dotted thin lines.

The course of creating engineering drawings is often stated to as technical drawing or drafting.[2]

The common features of Engineering Drawing are Geoety, Dimensions, Tolerances, Material, Finish. It uses multiple views to demonstrate the drawing of any entity as single view sometimes may not be sufficient to convey the overall message to the reader.

Very often the terms Drawing and Design are clubbed together by many persons but in reality these are tow different things. Designing is the process of making mathematical calculations of the size and other prospects of the entity whereas Drawing is the pictographical representation of the entity using the drawing rules in either compute or manually on sheets.

Projection

If straight lines are drawn from several points on the contour of an entity to encounter a plane, the entity is believed to be projected thereon plane. The figure shaped by joining, in precise order, the points at which these lines meet the plane, is termed the projection of the object. The lines from the object to the plane are so-called projectors. Out of various methods of projection in drawing the most commonly used methods are-

- (i) Orthographic Projection
- (ii) Isometric Projection
- (iii) Oblique Projection
- (iv) Perspective Projection

When the projectors are parallel to each other and also perpendicular to the plane, the projection is so-called orthographic projection.

Isometric projection is a form of pictographic projection in which the 3 dimensions of a solid are not only publicized in one view, but their authentic sizes can be measured directly from it.

The two planes engaged for the determination of orthographic projections are called reference planes or principal planes of projection. They interconnect each other at right angles. The vertical plane of projection (in front of the observer) is typically signified by the letters V.P. It is repeatedly called the frontal plane and denoted by the letters F.P. The added plane is the horizontal plane of projection known as the H.P. The line in which they interconnect is termed the reference line and is denoted by the letters xy. The projection on the V.P. is named the front view or the elevation of the object. The projection on the H.P. is named the top view or the plan.[3]

Projection Angles

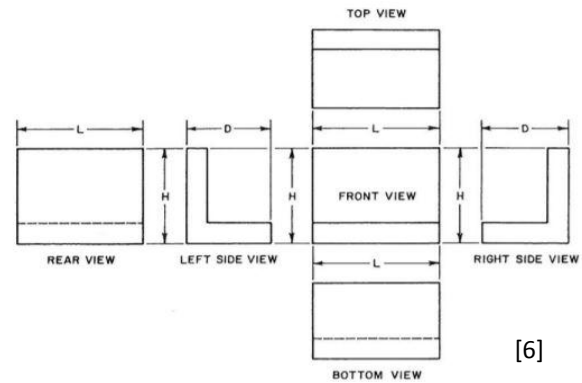
The slant at which an spectator draw an entity to alter it from 3D to 2D plane such as real entity image to a plane sheet is recognized as angle of projection.

In actual there are four angles of projection- First Angle Projection, Second Angle Projection, Third Angle Projection and Fourth Angle Projection. The Second and Fourth Angle of Projection is very rarely used due to its complexity of planes being overlapped. The most widely accepted projection method globally are First and Third Angle Projection.[4]

No.	First-angle projection method	Third-angle projection method
1.	The object is kept in the <i>first quadrant</i> .	The object is assumed to be kept in the <i>third quadrant</i> .
2.	The object lies between the observer and the plane of projection.	The plane of projection lies between the observer and the object.
3.	The plane of projection is assumed to be non-transparent.	The plane of projection is assumed to be transparent.
4.	In this method, when the views are drawn in their relative positions, the <i>plan</i> comes <i>below</i> the <i>elevation</i> , the view of the object as observed from the <i>left-side</i> is drawn to the <i>right</i> of <i>elevation</i> .	In this method, when the views are drawn in their relative positions, the <i>plan</i> , comes <i>above</i> the <i>elevation</i> , <i>left hand side view</i> is drawn to the <i>left hand side</i> of the <i>elevation</i> .
5.	This method of projection is now recommended by the 'Bureau of Indian Standards' from 1991.	This method of projection is used in U.S.A. and also in other countries.

Views in Engineering Drawing

To draw an object on 2D sheet the object must drawn from various vies which would conceptualize the 3D model of the object through the 2D drawing. The various views include the Front View, Top View Side



Advancements in Engineering Drawing

As there is advancement to any technology the technology of Engineering Drawing has also become advanced nowadays with the introduction of CAD. The CAD is a computer tool for the development of drawings which enhances us to maintain the speed and accuracy of the drawings very prominently. The early stages of CAD can be outlined to the year 1957, when Dr. Patrick J. Hanratty established PRONTO, the first marketable numerical-control programming arrangement. In 1960, Ivan Sutherland MIT's Lincoln Laboratory designed SKETCHPAD, which validated the elementary principles and viability of computer technical drawing. The main CAD systems aided as mere alternates of drawing sheets. 3D wireframe features were industrialized in the beginning of the sixties, and in 1969 MAGI unrestricted Syntha Vision, the first commercially accessible solid modeler program. Solid modeling auxiliarily improved the 3D skills of CAD systems. NURBS, mathematical symbol of freeform planes, seemed in 1989 -- first on Silicon Graphics workstations. In 1993 CAS Berlin recognized a cooperative NURBS modeler for PCs, called NÖRBS.[5]

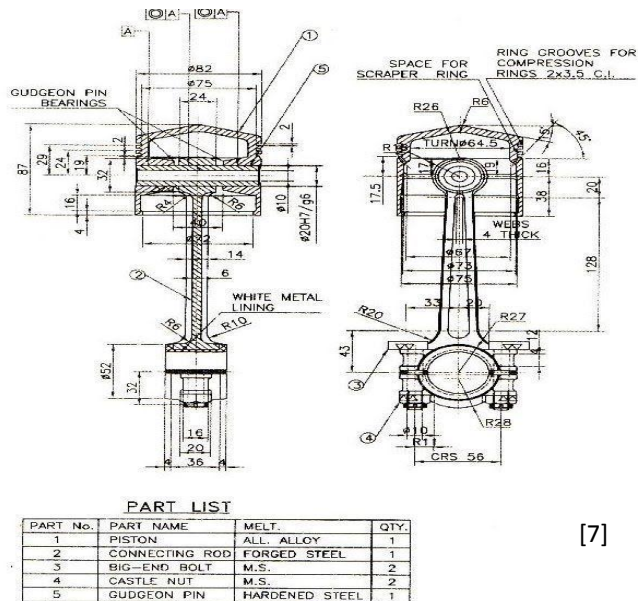
At present Autocad is most widely used drafting software which is developed by Autodesk. Autodesk has also developed various other tools to ease the Engineering drawing and also to add a flavor of reality to the drawings using its tools like AutoCad 3D, Fabrication, etc.

Apart from Autodesk there are also many companies which directly provides us the 3D modeling tools such as the Dassaults Systems provides us with Catia, SolidWorks for the 3D modeling.

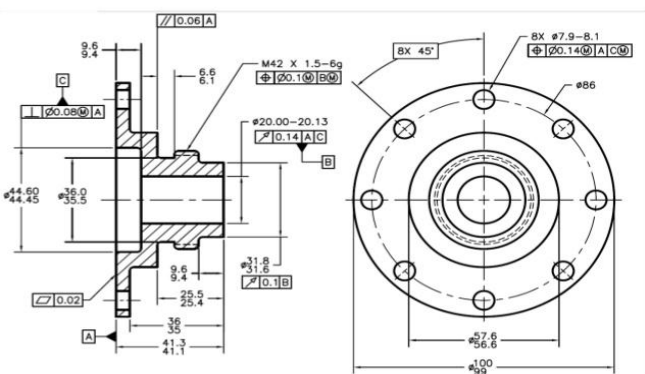
In upcoming time some forestall 3D modelling deprived of flat monitors or mouse points -- a completely immersive 3D milieu where modelling apparatuses include exceptional gloves and specs. In the future, designing will be nearer to sculpting than painting.

Engineering Drawing in Real Life

This section depicts some real life examples where Engineering Drawing plays an important role.



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