

Communicating: Technical Drawing

Chapter Overview

Technical drawing is a form of graphics commonly used by engineers to communicate design. Drawings and sketches are used to give shape to vague ideas during the conception stage of design, and continue to be useful throughout the design process. More detailed drawings are used for evaluation and approval of the designs, and for manufacturing after the design is complete. In addition, drawings often accompany invention records and contracts. It is important for engineers to develop the skills of sketching and understanding technical drawings. Today, formal technical drawings are often prepared by specialists using CAD software.

Depending on the situation and purpose of the drawing, one can choose to use single-point, dual-point perspective, oblique, and isometric perspectives to communicate different 3-dimensional information about the object. The isometric drawings are the standard way of representing 3D objects. They can be drawn quickly in meetings and can be very useful for conceptualization. With some practice, almost anyone can draw isometric sketches with little drawing experience.

Orthographic projections are often used in manufacturing because they provide more room for dimensions and details than 3D drawings. In orthographic projections, there are six standard views: top, bottom, front, back, left-side, and right-side. Usually, only the front, top, and one of the sides is sufficient to communicate the necessary information about an object.

Visible lines in drawing or sketches represent the edges of the object or surface projections. Other lines are mostly used in orthographic projections. Lines can be drawn by first marking the end points, then several intermediate points, and finally connecting the points. Shapes are similarly drawn. Different line thicknesses and styles can be assigned to distinguish their purposes.

Appropriate dimensional information must be provided in technical drawings. The information included with the dimensions is determined by the purpose of the drawing. For example,

manufacturing drawings will require tolerance information along with the dimensions. Sectioning is a technique for revealing interior details of an object. In sectioning, an imaginary cutting plane is used to divide an object, and one side of the plane is removed to reveal the interior of the object. Rules and guidelines regarding dimensioning and sectioning are given in the textbook on page 148 and page 150 respectively. Following these conventions can significantly improve the clarity of your drawings.

An engineering office can generate thousands of drawings a year, making the organization and control of drawings crucial to its operation. Large, complicated machines are often broken down into several sub-assemblies, which are in turn broken down into more sub-assemblies or components. This hierarchy of parts and sub-assemblies can be visualized using a drawing tree. Today, this hierarchy typically is stored in computers using a product data management system.

Over the past several decades, computer-aided drafting (CAD) software have advanced dramatically and have become the standard way of making engineering technical drawings. An object created in a CAD software can be rendered in a variety of different perspectives and scales and viewed from any angle desired. Additional information about the object can be stored alongside CAD drawings. Advances in this area is continually impacting the way engineers work.

In this chapter, we have focused on technical drawings oriented towards mechanical engineering. Other engineering disciplines often make use of different technical drawings.

Learning Objectives

In this chapter, you will:

- learn about the different perspectives and when to use them;
- learn about most common line types;
- learn the basics of dimensioning;
- learn about sectioning; and
- learn about CAD software.