



2nd International Conference on Materials Manufacturing and Design Engineering Ease of Use Experimentation of Isometric Template

Sudeep N. Upadhe

Department of Mechanical Engineering, VVPIET, Solapur University, Solapur 413008 Maharashtra, India
upadhyesudeep@rediffmail.com

Dheeraj D. Shinde

Department of Mechanical Engineering, BVCOELP, SPP University, Pune 412115, Maharashtra, India

Umesh S. Mugale

Department of Mechanical Engineering, VVPIET, Solapur University, Solapur 413008 Maharashtra, India

Abstract: The objective of this research was to find out whether using a specially developed isometric template helps students to reduce time and efforts while drawing isometric drawings. The standard method of comparison of performance of two groups has been used to achieve the objective. An Isometric template specially designed was given to a group of 15 students. The time measurement has been done on group using stopwatch performed by volunteers. It has been found that the group using the template shown average reduction in time of about 3.39 min. This time reduction is very much of importance at the time of examination. There has been no such kind of effort has been carried out for the objective stated above. The application of this tool may be useful for the students of technical education such as ITI, Diploma, and Engineering etc. The template can be improved by adding various other features like circles of various diameters, French curve, a roller etc. such that it can be useful for other drawing concepts.

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1. Introduction

The concept of an Isometric had existed in a rough empirical form for centuries [3]. From the middle of the 19th century isometrics became an invaluable tool for engineers, and soon thereafter axonometric and isometric were incorporated in the curriculum of architectural training courses. According to Jan Krikke, "axonometric originated in China. Its function in Chinese art was similar to linear perspective in European art. Axonometry, and the pictorial grammar that goes with it, has taken on a new significance with the advent of visual computing"⁴

An isometric drawing is one of the most used drawings in engineering education. It also has a reputation of one of the most difficult to understand and draw. However the basic principal behind its inclusion in engineering curriculum worldwide is to develop imagination power of the students. It basically contains of three axonometric drawings and they are matched or imagined in such a way that they create a parallel projection technique.

In Isometric drawings, the image plane is associated with the three principal axes which make equal angles.

The three principal axes as shown in the Figure 1 are inclined at 120° and also parallel to the cube edges in the Isometric view. These three principal axes are known as isometric axes. There are two receding axes which are inclined at 30° to the horizontal line while the vertical axis is at 90° to the horizontal line. There are three planes called as isometric planes or isoplanes which contains the three visible faces of the cube. The lines from object which are parallel to the isometric axes are referred to as isometric lines whereas non parallel lines are known as non-isometric lines.

* Sudeep Nabhiraj Upadhe.

E-mail address: upadhyesudeep@rediffmail.com

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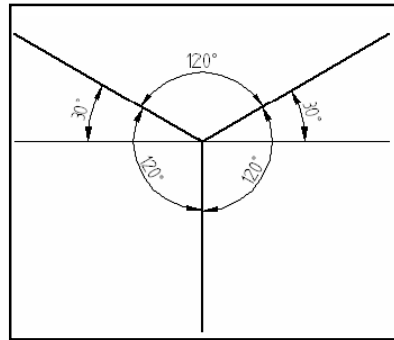


Fig 1 Isometric axes in image plane [2]

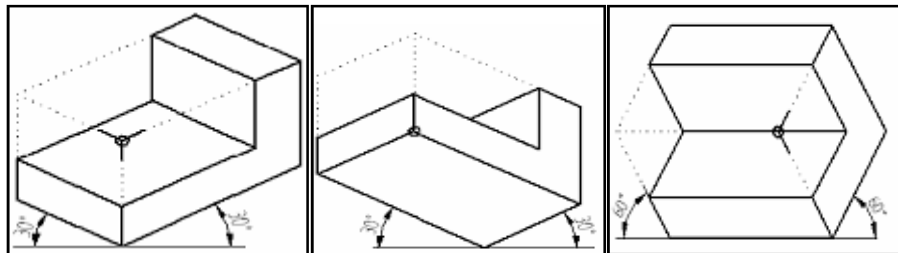


Fig 2 a) Regular [2] b) Reverse isometric [2] c) long-axis isometric [2]

1.1 Importance of Isometric Drawing

Interpretation of the shape of an object from a multiview orthographic drawing requires a thorough knowledge of the principles of orthographic projections. A pictorial projection in general and an isometric projection in particular, helps the students and also the shop floor workers (from whom the knowledge of orthographic projection is not expected) to visualize clearly and fully the shape of the object. Pictorial drawings are mainly used to show complicated structures such as aircraft, rocket cell etc. Pictorial drawings in the form of exploded views are used in maintenance catalogues and manuals.

1.2 types of Isometric Drawings

Different isometric views of an object can be obtained by positioning Isometric axes.

Three basic views are

1. Regular isometric,
 2. Reverse isometric
- And

3. Long-axis isometric as Shown in Figure 2.

In regular isometric, the viewer is looking from top down position so that the top of the object is seen. Whereas reverse isometric is exactly opposite to this view, Long axis is some kind of different view which is not generally used to describe the object.

1.3 Existing work for Isometric Template

The Isometric template used in this research was apparently influenced by the Iso-sketch tool innovated by The Drawing Tool Company [4] [5] as shown in Figure 3a) & the figure 3b) shows another type of isometric tool used by architects. The template design is shown in Figure 3c) consisting of various portions which are generally required to draw an isometric drawing. The template used in this particular research is as shown in Figure 3c) is having 30° lines from horizontal, The template was also designed by considering ergonomics of age group who are using it. Plastic material was used for it due to its various advantages over other materials. Figure 5 represents the actual prototype of the isometric template used by the group of students in this research.

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