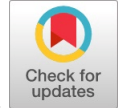


Effect of Computer Aided Drafting on Manual Drafting Skills



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Abstract: Manual drawings were the early of the evolution of drafting. With the modernization of tools like technical pens, straight edges, protractors, compasses, French curves and T-squares are generally used in manual drafting. Scientific evolution brought the innovation of computers and software like Auto-CAD that brought about Computer-Aided Drafting and Design (CADD). The tools of manual drafting are converted into commands/codes and used in modern way of drafting. These innovations made drafting faster accurate and more precise. This paper shows that what are the benefits of Computer Aided Drafting (CAD) & modern techniques are using in engineering, How to protect manual drafting skills why because to make students independent of software and on the other hand comparisons of both Computer Aided Drafting (CAD) and Manual Drafting.

Keywords- Accuracy, Auto-CAD software, CAD, Manual drafting, Tools/commands.

I. INTRODUCTION

The technical drawing which is used to define clearly and completely the requirements of engineered items. Basically it's two dimensional representations of three dimensional or two dimensional objects on a sheet of paper. However the drawing of pictures symbols or signs are also a language. Engineering Drawing is graphical means of communication which transfers ideas and information from one mind to another. It is therefore, one of the principal functions of drawing to convey ideas from the design engineer to the fabricator. Hence, the skill to understand and construct engineering sketches and drawings is of supreme importance.

AutoCAD is a computer-aided design and drafting software application. Developed by Autodesk, AutoCAD was first released in December 1982. On the other hand, in

the eighteenth century Gaspard Monge French mathematician introduced the utilization of orthographic projections. AutoCAD allows the engineers to use & deal with multiple machines using network licensing. Being an easily available program, AutoCAD is used worldwide by students, faculty and engineers. Like other CAD programs, AutoCAD also works on a database of geometric systems including points, lines, arcs, etc. The user works on the software through the commands, editing or drawing is done from the inbuilt command line.

II. LITERATURE REVIEW

Table- I: Reference links and its content description.

S.No.	Assignment URL	Description
1	https://www.educba.com/introduction-to-autocad/	The above platform provides the content for Introduction
2	https://knowledge.autodesk.com	The above platform provides the history, features and knowledge about Auto CAD software.

The speedy transform in teaching of engineering drawing by help of computer aided design (CAD) technology, which has made lot of revolutionize on the students and staff in accepting/educating engineering drawing in technical institutions. Mastering CAD technology has become order of the day for staff/students especially in technical institutions. CAD course have become a compulsory subject in many technical institutes and universities. In this article a research on the training of Computer Aided Engineering Drafting (CAED) are discussed. The challenges are discussed on the present and future improvement of classes and teaching methodologies of this subject. There are a number of solutions are evolve in designing the content, complexity of the course and also improving the teaching methodologies. [1]

The way of the progress of the engineering design progressively approaches mechanical-electrical addition and electronic and informational products. With the rising development of its scientific content and enhanced social economic circumstances, people's utilization concept is getting more and more diverse. Customer concerns not just the quality & functionality of the product, more and more public are opening to spotlight on the look of the manufactured goods, ecological shield, degree of innovation, and so on, which brings a superior degree of difficulty to the industrial technology.

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Comparison between Computer Aided Drafting and Manual Drafting

It is due to the growing demands of community and the industrial design. Lots of scholars are progressively more concerned regarding the industrial design in recent years. With the nonstop growth of computer technology, the broad range of software and hardware are developed, and multiplicities of ever-changing technologies are attracting the industrial design talents as well. [2]

Computer aided design (CAD) is the main family tree which plays an important role in information based engineering. The computer aided design plays a vital role in engineering drawing and technical drawing which make it more flexible, consistent and clear while using it in corporate or educational sector. [3]

A CAD can have various scope based on its nature and shape. It is able to be supportive to human being related to doing textile design, research and apply on industry of textile filed. Quite a little type of dimensions is observed for a variety of substance in numerous directions, alignments, point of reference arrangements and configurations. The basic types of dimensions are linear, angular, ordinate, radial and arc length. Configurations are mainly dependent on the objects, types of nature and shape. It is likely to compute the dimensions of CAD by its actual form in surroundings. Configuration describes to recognize the directions, reality, shape, arrangements and orientation with its fundamental standards. [4]

III. PROBLEMS ASSOCIATED WITH MANUAL DRAFTING AND COMPUTER AIDED DRAFTING

Both drafting methods has certain advantages and also on other hand has disadvantages too. Now let's focus on both one after the other.

A. Manual drafting

The manual drafting methods is traditional method of drafting for design engineers and for students of engineering drawing is in common for many years ago and requires good drafting skills. As it's a manual drafting hence maintaining accuracy and precession of components by draftsmen is a challenge. Manual drafting uses the tools such as T-scale, mini drafter pencils etc hence the instrument errors need to be taken care and drawings drawn by pencil led need to be taken care against the blurriness form clarity point of view.

Keeping all problems aside the major task is to meet the required time for completion of project using manual drafting which takes lot of time and patience.

B. Computer aided drafting

Before the invention of AutoCAD, all designing and modeling were done manually. This was a time-consuming. Task and resulted in a lot of expensive errors. But, after the invention of AutoCAD the process of modeling and designing got more accurate, more precise, digitalized and simplified.

On the other side of computer aided drafting the problem is that the draftsmen or students are dependent only on software the hands on skill will be going to vanish gradually.

IV. PROBLEM SOLUTION

In conventional teaching methods in which chalk and talk method is used this is not enough for an enhanced

understanding and average accuracy on board. Teachers can use power point presentation etc for modern methods of teaching.

The CAD practice session can only be done in CAD laboratory. Hence it's a best practice to use both techniques, many institutes use both methods such as modern as well as traditional. At the initial stage problem solution its application and concepts are to be educated theoretically and there by the students will practice the drawings by manually then the same should be drafted in a laboratory by help of CAD software. The theoretical and practical together takes lot of time but the manual skills of drafting will be alive in student's hands. A comparison of some entities with respect to CAD vs. Manual drafting is shown below in table II.

Table- II: Features of CAD vs. Manual Drafting

Entity	Computer Aided Drafting (CAD)	Manual Drafting
Line Weights	Available from 0.0001mm to 5.0000 mm	Depending on type of individual pencil
Space for Storage	Less space as it is in digital form such as portable document file (pdf) or jpeg image file	Drawing sheets requires more space
Precision	More precession even average skilled person can produce better drafting	Depends on Individual skills
Transport	Very easy via email files can be send in entire world	Possible but difficult and time consuming
Prototyping	Possible	Not possible
Modifying/Edit	Possible	Not possible
Scalability	Can be done by single command	Need to draft
Conversion 3D to 2D	Possible	Not possible
Virtual Manufacturing	Possible	Not possible
Animation	Possible	Not possible

V. RESULT AND DISCUSSION

- By using manual drafting the software independently skills will be maintained.
- However CAD is useful for time saving and should be adopted only after getting manual drafting skills thoroughly by the candidates.
- The accuracy, precession and line weight of CAD is more preferable than that of manual drafting.
- Further CAD has verity of applications which have been mentioned in table II.

- By adopting both manual drafting as well as computer aided drafting skills students will be getting hands on experience and more accurate while dealing with complex engineering drawings respectively.

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