AutoCAD Software

Gowri Salunkhe and Sharvari Modi

Sarhad college of Arts, Commerce, and Science, SPPU, Maharashtra, India

gowriss6767@gmail.com , sharvari325@gmail.com

ABSTRACT:

AutoCAD is one of the most common computer-aided design software that has been used to transform drafting and modelling by many industries. This paper delves deep on need of AutoCAD in Architecture/Engineering/Manufacturing /Interior Design. It helps to increase the productivity and minimizes errors as the software with its accuracy can produce fine 2D drawings and even more challenging 3D models. Apart from this, AutoCAD is also perfectly suited for automation and customization as well other design tools with excellent interactive functionality in workflow also enhances. AutoCAD is still an industry standard that has grown to include technology advancements including cloud-based collaboration and integration with Artificial Intelligence though it has serious shortcomings. In this paper, we will take a look and analyse AutoCAD from the perspective of modern design processes in different industries.

KEYWORDS:

AutoCAD software, 2D Drafting tools, 3D Modelling, Design, Engineering.

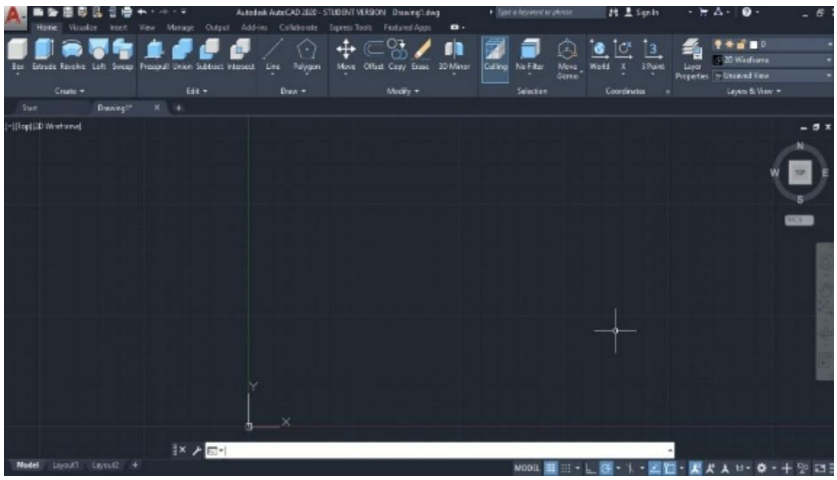
INTRODUCTION:

In the olden days manual drafting method was used by architects and engineers. It was time taking process due to use of pen and papers. Nowadays industries are using Computer-Aided Design/Drafting systems with help of computers to design, drafting, modelling and even analysis too. These Computer Aided Design & Drafting tools replaced the manual drafting method. There are various software for design purpose in the market, but one of the most user friendly commercially CAD software is AutoCAD.

WHAT IS AUTO CAD:

AutoCAD is a combination of the words “Auto” from the company’s logo and “CAD” which means Computer Aided Design/Drafting. The software was developed by an American company called Autodesk founded by John Walker. It was first launched in December of 1982. AutoCAD was designed to run on mini and personal

computers, making it more cost efficient for smaller design, engineering and architecture companies to produce intricate technical drawings. In India, it launched in 1988. These days, AutoCAD has evolved into a powerful tool for both 2D and 3D design. The first version was known as AutoCAD R1 with subsequent versions R2 and R3 then later R14. Autodesk developed AutoCAD 2000 in the year 2000, then after that came yearly updates such as 2001, 2002, and so on. The latest release is AutoCAD 2022 launched in March 2021.Along with new technology came new versions of AutoCAD. The latest version 25.0- AutoCAD 2025, was released in March 26,2024. [dwg tag-AC1032]. In 2010, it included new parametric constraints in which a user can set relationships between different parts of a design to ensure higher accuracy. Currently, the software has integration for cloud storage, mobile software capabilities, and productivity tools including scripting and macros. Autodesk has also converted the software to a subscription service instead of the traditional payment version.



AutoCAD Screen

PRODUCTS:

AutoCAD has several different products for different industry's efficiency and here are some major AutoCAD products:

1. AutoCAD (Standard) – the main software edition of 2D drafting and 3D Modelling in industries (general area).
2. AutoCAD LT — A 2D Drafting program that does not include 3D modelling, targeting professional users needing only 2D tools.

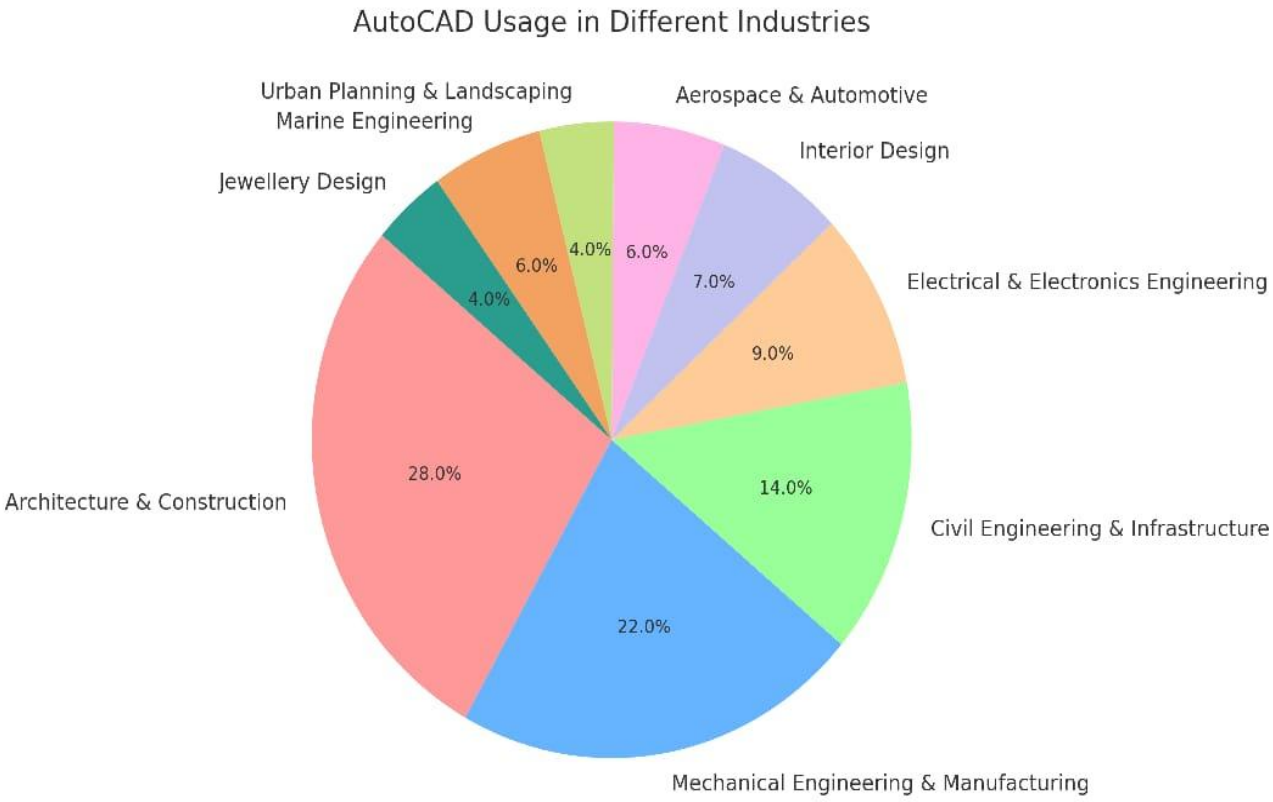
3. AutoCAD Architecture - utilizes special tools designed for architects and the design of buildings and structures.
4. AutoCAD Mechanical - mechanical engineers to do machine part design, manufacturing note taking.
5. AutoCAD Electrical – For the electrical engineering areas, with tools related to circuit design and both panel layouts / as well as an electrical schematic.
6. AutoCAD Civil 3D — Tool for civil engineering on infrastructure projects (roads, bridges and land development etc).
7. AutoCAD Map 3D – Geospatial and mapping software, for city planning apps.
8. AutoCAD MEP -- intended to be simple for mechanical, electrical and plumbing (MEP) design of building systems.
9. AutoCAD Plant 3D — This version is used for process plants designs, Piping, equipment layouts and industrial structures.
10. AutoCAD Raster Design — Provides users to raster images (scanned blueprints or maps) to vector drawings.

APPLICATIONS:

AutoCAD is used in many industries because of its accuracy and flexibility. The most important of which to be:

1. Architecture and Construction - Making plan, as well as elevation/s, section or 3D renderings of buildings.
2. Mechanical Engineering Help - Design machine parts, tools and components through exact measurements.
3. Electrical Design - Electrical Diagrams, wiring layouts, industrial and house electrical designs.
4. Civil Engineering - Planning and designing roads, Bridges, water supply systems of urban infrastructure.
5. 1110Design for interior design - Detailed room layout, furniture positioning and decor items.
6. Manufacturing and Production - Designing Molds/jigs/fixtures/production parts.
7. Automotive and Aerospace — Design of car parts, aircraft engines, vehicle assembly models.
8. GIS and Urban Planning — provides zoning, land surveying, city mapping utilities.
9. Shipbuilding and Marine Engineering — Design ship hulls, navigation systems and Offshore structure.

10. Fashion & Jewellery Design – Generating precise jewellery models and fashion accessories.



BENEFITS:

1. Precision and Accuracy - High level of accuracy and detail creation with very small amount of errors involved. It allows exact measurements to be taken and prevents any calculations from being done wrong.
2. Time Efficiency - Great for speeding up the design process instead of doing it manually. Provides features such as Spreadsheets, Templates and Libraries so you can save time.
3. Easy Modifications - It is simple to edit/modify/update designs without having do reinventing the wheel. This makes it easier to organize and edit Layers as well as object properties.
4. 3D Modelling Capabilities - Posters 3D modelling, visualisation and rendering capabilities that enables designers to create life-like models.
5. Interoperability and Integration - Validates various form of file (DWG, DXF, PDF etc.) for share it quickly. Interoperable with other applications such as Revit, Civil 3D and SolidWorks.
6. Automation and Customization - Supply automation features: scripts, macros, Auto LISP programming etc. This enables to configure user interface and commands for better usability.

7. Better Collaboration - Allows for cloud-based tools to facilitate team collaboration and access like a shared drive. A version control that let multiple users edit the same project.
8. Less Material Loss - Automates the usage of material in industries such as manufacturing and construction. Reverts only the unavoidable rework of design mistakes — before production.
9. Industry Standard Software - Common across all engineering, architecture and design industries. AutoCAD Skills are the Best Way to Secure Your Job and Career Channel.
10. Better Documentation - Details of AutoCAD is generated automatically with the help of dimensions, annotations. Supports gathering of clear records procedure and so projects are compliant with industry standards and compliance regulations.

DRAWBACKS:

AutoCAD is above all else a design tool but also one of the biggest blights you can inflict on your professional life. Some of the top drawbacks include:

1. High Cost - AutoCAD is a subscription (for people with small business), Upgrade and plugins will eventually add up to increase prices.

2. Stair-stepped learning curves -

- Hard for newbies: Even some of the advanced features will become tough to know.
- Needs to be trained in order to really get the most out of it.

3. Hardware Requirements -

- Requires high-powered machines with enough RAM, storage and graphics horsepower.
- Will slow down on older / lower PC's.

4. File format limitations -

- AutoCAD handles a proprietary file format (DWG; DXF) which is not necessarily compatible with other applications.
- Converting files to other formats will only result in lost or damaged data.

5. No parametric design -

- AutoCAD — unlike most flagship (e.g. SolidWorks, Revit) parametric CAD steams, it is NOT parametric.

- This means that changes to one item in your design might not automatically update associated items.

6. Poor for Anything More Complex than 3D

- Although it supports 3D modelling it's still not as good as worked in professional 3D software (Blender, SolidWorks, Revit etc.).
- Renders and views in 2D are not as powerful as the real 3D software.

7. Few collaborations features -

- Either newer versions provide cloud collaboration, which is less elegant compared to stuff like BIM 360 or cloud CAD.
- File sharing and real time collaboration is still figuring it out.

8. Repetitive Manual Work -

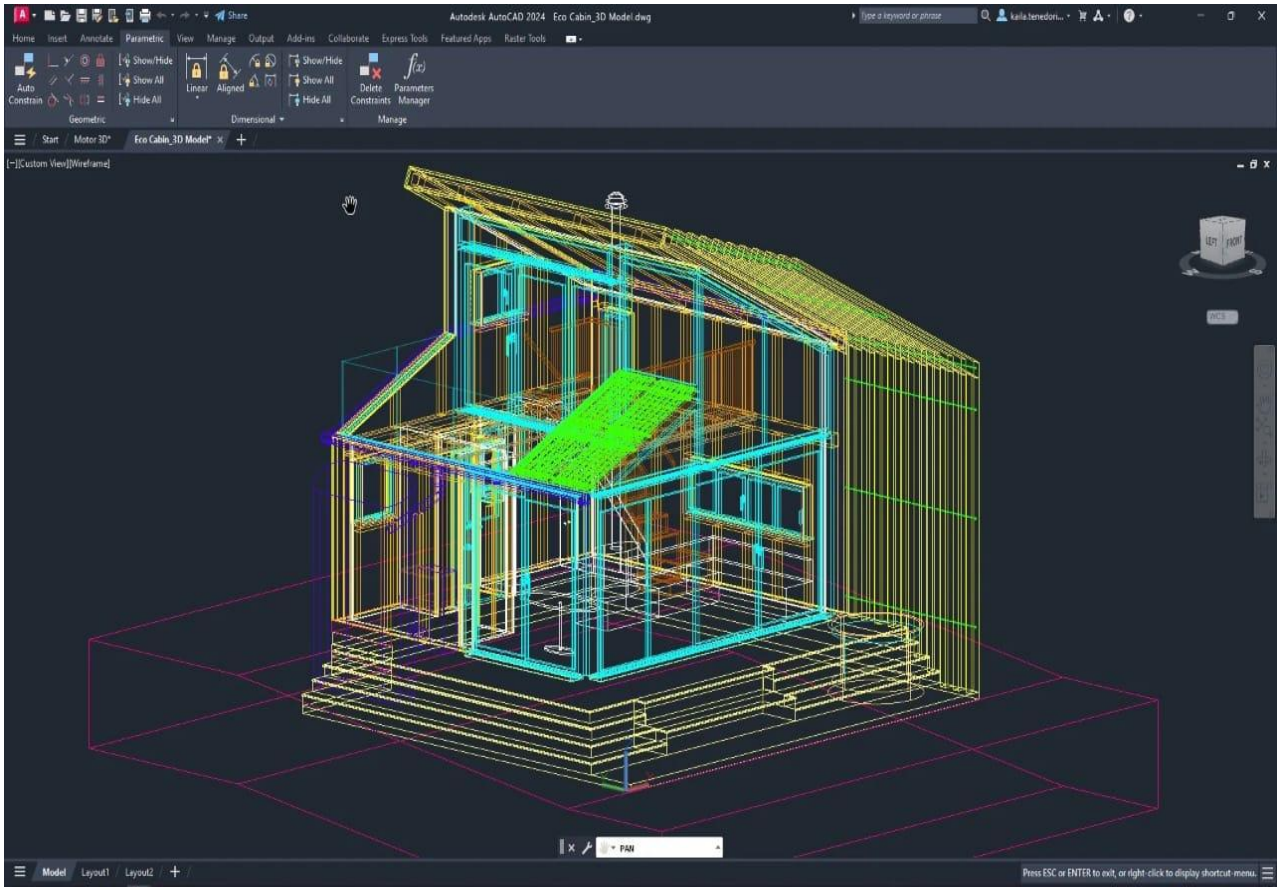
- Some tasks command manual input (or macros or scripts).
- Others use parametric modelling in CAD software to automate more of the design work.

9. Big projects –

- Risk of Errors, Complex, layered projects can wear out even the smartest project manager.
- Overlapping layers or disorganized files can result in expensive errors.

10. Updates -

- Software updates can be really annoying because newer versions might have issues with older file format compatibility.


Autodesk AutoCAD 2024 Eco Cabin_3D Model.dwg
Home Insert Annotate Parametric View Manage Output Add-ins Collaborate Express Tools Featured Apps Raster Tools
Auto Constrain
Show/Hide
Show All
Hide All
Linear
Aligned
Delete Constraints
Parameters Manager
Geometric
Dimensional
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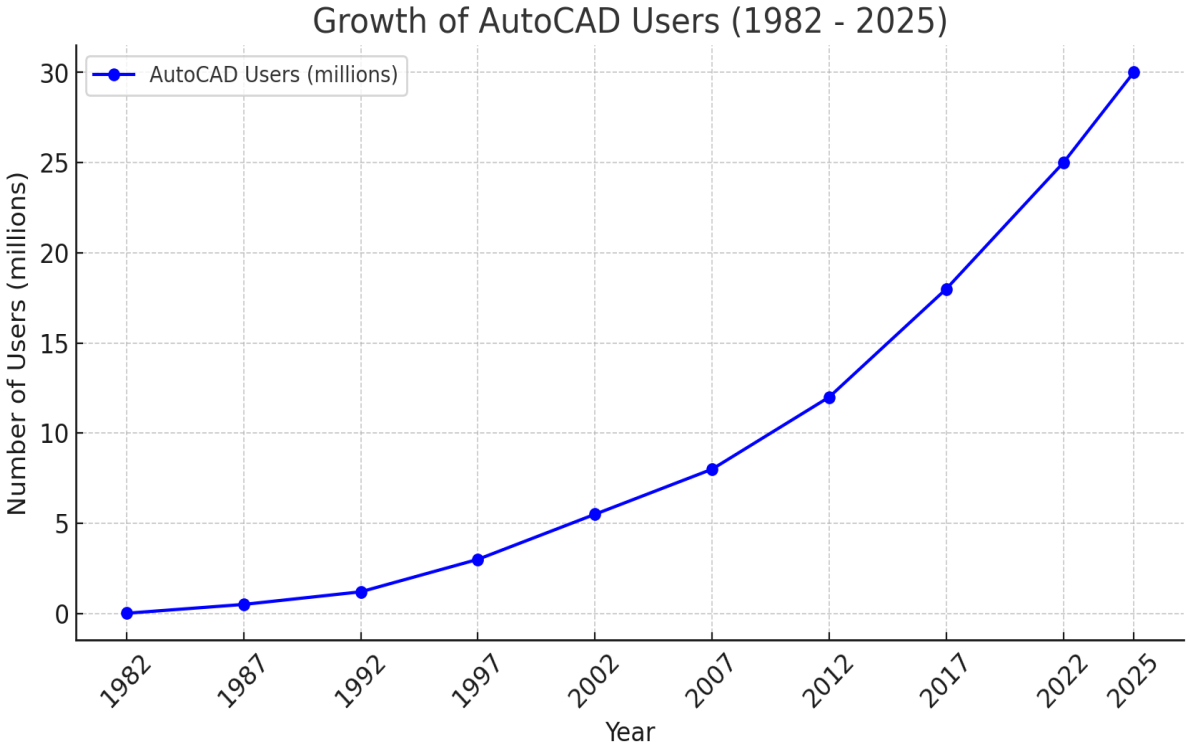
Growth of AutoCAD Users (1982 - 2025)
AutoCAD Users (millions)
Number of Users (millions)
0
5
10
15
20
25
30
1982
1987
1992
1997
2002
2007
2012
2017
2022
2025
Year

CONCLUSION:

AutoCAD is a multifaceted powerful computer-aided design drafting (CAD) software performed in design, architecture, engineering, construction, and manufacturing industries. Its accuracy, agility and ease-of-use make it a must-have for all technicians. The increased use of 3D modelling, automation and for working in combination with other CAD software applications make the software much more usable and efficient in modern design processes. On the other hand, AutoCAD is limited too by its exorbitant price, being too difficult to learn and having design requirements of hardware. SolidWorks or Fusion 360 if you do a lot more than 2D drafting and simple 3D modelling — Revit, maybe some of you classicists have heard of it! — is excellent for the more parametrical and collaborative nature of industrial design. So, AutoCAD is an integrated tool even to this day as it is one of the least bad software (versatile, accurate, predominantly used in design and engineering). AutoCAD mastery can double the efficiency, prevent design mistakes, and open more job opportunities.

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