



ISSN (E): 2277-7695  
ISSN (P): 2349-8242  
NAAS Rating: 5.23  
TPI 2022; SP-11(7): 2340-2346  
© 2022 TPI  
[www.thepharmajournal.com](http://www.thepharmajournal.com)  
Received: 03-05-2022  
Accepted: 17-06-2022

**Meena Kumari**  
MSc. Student, Department of Horticulture (Floriculture and Landscaping), School of Agriculture, Lovely Professional University, Phagwara, Punjab, India

**Thaneshwari**  
Assistant Professor, Department of Horticulture (Floriculture and Landscaping), School of Agriculture, Lovely Professional University, Phagwara, Punjab, India

**Sabina Raut**  
MSc. Student, Department of Horticulture (Floriculture and Landscaping), School of Agriculture, Lovely Professional University, Phagwara, Punjab, India

**Corresponding Author**  
**Thaneshwari**  
Assistant Professor, Department of Horticulture (Floriculture and Landscaping), School of Agriculture, Lovely Professional University, Phagwara, Punjab, India

## AutoCAD for garden layout

**Meena Kumari, Thaneshwari and Sabina Raut**

### Abstract

AutoCAD is the most extensively used computer-aided design (CAD) software for creating architectural, engineering, and construction drawings, and is used by interior designers, real estate developers, and artists. AutoCAD's advantages include the ability to swiftly produce designs, alter them easily, transfer them easily, and save time. Errors in drawings can easily be fixed, and drawings can be emailed and received fast using e-tools. For more detailed areas, the drawing can be magnified, copied, and pasted. Reuse designs can be saved on a personal computer, and it can work at all hours of the day and night to manufacture a product 24 hours a day. Finite element analysis can virtually assess and optimize a design, reducing delays and errors. Landscape is an important component of the environment because it meets one of people's most basic visual needs. Landscape design and engineering entails the systematic design and engineering of outdoor areas, landmarks, and structures. It investigates current social, ecological, and social conditions that will result in environmental restoration, green infrastructure planning, and provision. Here in this paper various commands like shortcut command, drawing command and modifying command along with various tools and technology used in CAD has been discussed.

**Keywords:** AutoCAD, command, computer, designing, drawings, magnified, software

### Introduction

The term AutoCAD is composed of two words: "Auto" (the company's logo) and "CAD" (Computer-Aided Design/Drafting) and was created by the American company Autodesk, founded by Mr. John Walker, and first released in December 1982. AutoCAD is intended for use on minicomputers and personal computers (Chandra, 2021) [4]. This CAD tool allowed users to create detailed technical drawings while remaining affordable to smaller design, engineering, and architecture firms. John Walker is the developer of AutoCAD. It was first introduced in India in 1988. AutoCAD is 2D and 3D modeling software that is used with computers. R1 was the first version of AutoCAD, followed by R2, R3., and R14. Autodesk released a version of AutoCAD 2000 in the year 2000, followed by 2001, 2002, and so on. The most recent version is 2022, which was released in March 2021 (Khoroshko, 2020) [10]. Using network licensing, the designer can use and administer AutoCAD on numerous devices. It is used globally by students, teachers, architects, freelancers, engineers, fashion designers. Like other CAD programs, AutoCAD works on a database of geometric systems, including points, lines, arcs, polygon etc. The user's works on the application through the commands and the drawing is done from the inbuilt command line (Haixiao, 2013) [8]. AutoCAD software is recognized internationally for its remarkable editing capabilities, which make it likely to digitally draw building plans or recreate 3D images and also, we can see this in video mode. Autodesk developed this programmer in 1982 (Khoroshko *et al.*, 2018) [11]. The version history of AutoCAD software application by Autodesk, began with the release of version 1.0 in December 1982. The software has been continuously updated up to now. Computer-aided design is an essential industrial art that is widely used in industry, landscape architecture design, and many other fields. It represents a practical solution to the urgent needs of landscape designers. CAD is now used to create 2D or 3D computer models (Tiwari *et al.*, 2016) [17].

Landscape is an important component of the environment because it meets one of people's most basic visual needs. Landscape design and engineering entails the systematic design and engineering of outdoor areas, landmarks, and structures. It investigates current social, ecological, and social conditions that will result in environmental restoration, green infrastructure planning, and provision (Van, 2013) [18]. The variety of plant species, cultivars, hybrids, and varieties allow for creative and appealing compositions in landscape design. We may be drawn to them for their ornamental value or to serve a specific function or purpose in the landscape, such as providing a screen, blocking unwanted views or stabilizing a soil bank (Cervelli 2005) [3].

## Advantages and disadvantages of cad technology for landscape or garden layout

### A. Advantages

#### 1) High efficiency

Before the introduction of CAD software, garden landscape design was mostly hand-painted, with a sand table model as a presentation. In this operation, excellent sketching skills and techniques are required. The performance approach of hand-painting will allow people to experience continuous reverie, but its limitations will soon manifest. Using computer graphics, for example, to exactly calculate the proportionate relationship between each garden ornaments, building and plant, this problem can be readily handled (Liu, 2021) <sup>[13]</sup>. In the hand-painting process, each drawing cannot be occupied by numerous designers at the same time, and each designer's drawing skill and style must be considered. AutoCAD operates based on a dynamics engineering model. Save time and money, data transport is easier and the environment is more manageable (Dacheng, 2014) <sup>[15]</sup>.

#### 2) Rich expression way

Computer graphics can offer rich reality sense, three-dimensional shadow and multi-sensory virtual reality experience, which is very different from traditional hand-painting methods. Hand-painting and computer graphics are becoming increasingly these days, thanks to designers' innovative innovations (Li, 2013) <sup>[12]</sup>. Papery hand-drawn maps can be converted into computers using HD scanning technology, and then drawn in the colour and style of hand-painting, creating a unique means of expression.

#### 3) Less resource consumption

Traditional modelling was done in the form of sculpture, which required the coordination of various materials to complete one garden landscape design project. Furthermore, it requires the collaboration of related technical personnel from purchase to production, whereas the CAD technology modelling process only requires one person from start to finish. Its main advantage is its quick modelling speed and high reliability, which allows it to overcome time and space constraints while also allowing the modelling to be discoloured and reshaped. As a result, employing CAD technology in the design of garden landscapes would significantly reduce resource usage (Chandra, 2021) <sup>[4]</sup>.

### B. Disadvantages

#### 1) Lack of vividness

Garden landscape design is an art of time and space. Characters of Chinese garden, especially natural style garden has formed complex terrain and utilize the solitary plant, group plant and mass plant to create abundant space with vividness. In CAD garden design works, because the pattern scale and line thickness is too normative and often need to use the command, the lack of vividness leads to the lack of interest in garden landscape design. Garden landscape design mainly focuses on plant landscape, so vividness is quite important (Alexey, 2020) <sup>[1]</sup>.

#### 2) Three-dimensional space shortage

In the domestic, garden designers often complete landscape graphic design and then import it into 3D max for modelling and rendering and finally complete post-processing with Photoshop. This has already become a standard model. However, such a production model is not only a waste of time

but also a waste of human and material resources (Jia and Zhao, 2014) <sup>[9]</sup>. Although its effect is real enough, the scene is very different because of the weak relevance between two-dimensional and three-dimensional scenes. In garden landscape design, CAD technology lacks the technical parameters of the three-dimensional and the functions of integrating solid modelling with rendering and animation (Autodesk, 2007) <sup>[2]</sup>.

#### 3) Inconsistence of design and reality

with the popularization of CAD technology, there are two aspects of human malpractice: on the one hand, some designers just pay attention to the aesthetic effect of the works, but ignore its quality, which makes the design inconsistent with the reality; on the other hand, with the development of network application, sharing and explicability of cyber source allow designers to quickly share and accumulate, and meanwhile scrape together some fragmentary schemes to design so that the design is short of design soul and originality (Khorosko, 2020).

### Different commands used in AutoCAD

In AutoCAD, command window is present at the bottom of the drawing screen. In this various commands and shortcuts words or letters are typed and entered in order to give drawing command. For example, if we wish to draw an arc, rather than searching for an arc among the tools directly we could just use a command. We can type 'ARC' or even 'A' into the command window, and press enter, and arc will appear. AutoCAD recognizes hundreds of commands. Different commands used in AutoCAD are; basic command, drawing command and modifying command.

#### A. Basic commands of AutoCAD

These are the basic commands that are required to get started with the software in the first place, while starting. From pasting to spell check, the list of commonly used commands are mentioned below:

1. **AUDIT:** Used to check and correct faults in the work of AutoCAD.
2. **CLOSEALL:** The close all command in AutoCAD is used to close all open windows.
3. **CLOSEALLOTHER:** This command closes all open windows except the one that we are working on.
4. **CO/COPY:** To copy objects or text, we use this command.
5. **DI/DISTANCE:** This command is used in order to find the distance between two points in a drawing.
6. **LIST:** This command is used to get information about the different objects within a drawing.
7. **PASTECLIP:** This command is used to paste copied objects from the clipboard into the work.
8. **PREVIEW:** The Preview command allows you to see how the work will look when printed.
9. **QSAVE:** Saves the file that we are working on automatically.
10. **RECOVERALL:** To recover and repair a corrupted or damaged drawing, use the Recover all command.
11. **ROTATE/RO:** The command rotate is used to rotate an item.
12. **SAVE ALL:** In AutoCAD, this command is used to save all of the open drawings.
13. **SP/SPELL:** This command is used to check the spelling of a piece of text.

**14.ST/DDSTYLE:** This command is used to open the text style window.

### B. Drawing commands in AutoCAD

These commands are specifically designed with technical drawing in mind, so we can find a wide range of geometric shapes and sketching capabilities at the disposal when working in AutoCAD. To save the time of scrolling through the library every time there are particular commands, which are listed below:

1. **ARC/A:** We can create an arc with this command.
2. **AREA:** This command is used to find the area of a drawing's closed or open shapes. We can find out the area of rectangle, circle and polyline geometry used in design with area command. For using this command 1<sup>st</sup> select a particular object from this prompt and then click on the boundary of circle or rectangle or polyline geometry for which area need to be calculated. The area of that object will appear just above command line sideways with its circumference or perimeter.
3. **ARRAY/AR:** To create a rectangle, polar, or path array, we use the Array command. Array means creating copies of particular object (rectangle, polar or path) arranged in a pattern. Copies of these objects can be distributed into any combination of columns, rows and levels.
4. **BLOCK/B:** To make a block, this command is used. Different shape can be created by using different drawing commands. When clicking over these objects or shape, at one time we can select only one object. In order to select many objects together, we can block these shapes or objects in one by using block command.
5. **BCOUNT:** This command is used to count the number of blocks in the drawing.
6. **CIRCLE:** To make a circle, this command is used.
7. **DS/DDOSNAP:** The Drafting Settings window is opened with this command.
8. **GROUP:** This command is used to assemble a set of items into a single object.
9. **HIDEOBJECTS:** This command is used to hide objects in a drawing that have been selected.
10. **HIGHLIGHT:** The highlight command is used to highlight a particular object in drawing.
11. **ISOLATE:** The Isolate command hides all objects in a drawing except the one that we have chosen.
12. **LINE/L:** To make a basic line, this command is used.
13. **MIRROR/MI:** The mirror command creates a mirror image of an object or design.
14. **MLINE:** To make several parallel lines, this command is used.
15. **PLINE/PL:** To create a polyline, this command is used.
16. **PO/ POINT:** Point command is used to produce a single point.
17. **POL/POLYGON:** To make a polygon, this command is used (we can select the number of sides, from 3 to 1024).
18. **QSELECT:** This command is used to make a specific selection from your design based on the filters you've set, such as selecting all lines under a certain length.
19. **REC/RECTANGLE:** To make a rectangle, this command is used.
20. **SKETCH:** Within a piece of work, this command is used to draw a freehand sketch.

### C. Modifying commands in AutoCAD

It is used to conduct editing actions on the objects in a

drawing, such as move, erase, and trim. The most frequent of these tools may be found in the home tab's edit panel. The modifying commands used are listed below:

1. **BASE:** Base command is used to change a drawing's base point without affecting its origin.
2. **BREAK:** This command is used to break (or gap) objects at one or both places.
3. **BURST:** This command is used to explode a block while keeping all of its attributes and layer definitions.
4. **CHAMFER:** The Chamfer command is used to give sharp corners of objects sloping edges.
5. **COPYBASE:** This command copies an object based on a starting point.
6. **DIVIDE:** This command is used to divide items into several portions that are all the same size.
7. **F/FILLET:** Fillet command is used to provide sharp edges of objects softened corners.
8. **LAYERS/LA:** The Layer Properties Manage Palette is opened with this command.
9. **MATCH PROPERTIES/MA:** This command is used to duplicate an object's properties to another.
10. **MOCORO:** This command combines the functions of moving, copying, rotating, and scaling an object into a single command.
11. **OVERKILL:** This command is intended to eliminate things from your work that are overlapping or superfluous.
12. **PURGE:** This command is used to delete objects from a drawing that are no longer in use.
13. **SC/ SCALE:** This command is used to adjust an object's scale.
14. **SCALETEXT:** This command is used to adjust the text's size.
15. **TEXTFIT:** This command is used to change the size of a piece of text in order for it to fit into the available space.
16. **TEXTTOFRONT:** This command brings annotations to the front of the screen.
17. **TORIENT:** This command is used to alter the text's direction.
18. **TRIM/TR:** To trim a form or a line, use this command.
19. **UNITS:** This command is used to change the drawing's unit settings.
20. **EXPLODE:** This command is used to deconstruct an object into its constituent parts, such as a polyline into simple lines.

### D. 3D commands

With an incredible set of tools, AutoCAD provides an exclusive range of commands and functions for both 3D and 2D modelling and drawing. 3D is all about the third Z coordinate. When working in 2D, the user is only concerned with the X and Y axes, and coordinates are rarely used. When working with 3D, the user uses all of the coordinates, which can make their work much easier.

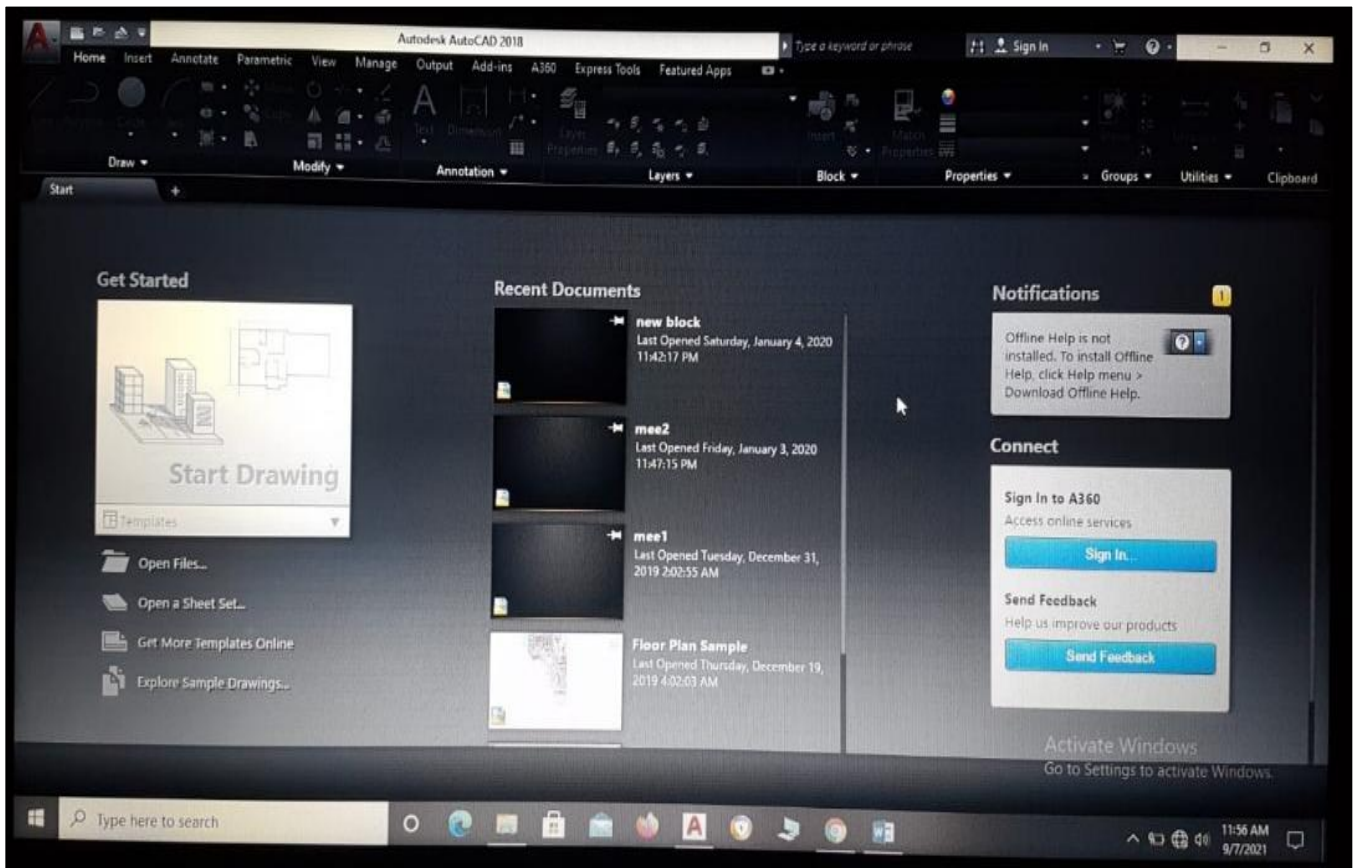
1. **POLYLINE (PL):** The POLYLINE command allows us to create a 2D polyline. When working with the Solid Model Tools, it is crucial to close a polyline when trying to make a shape. Not closing a polyline will result in a mesh object being created. Mesh objects are not recognized by the Solid Model Tools.
2. **EXTRUDE (EXT):** The EXTRUDE command will extrude a 2D object into a 3D object. When using the EXTRUDE command, the original 2D object will be removed from the drawing.
3. **PRESSPULL (PRESS):** The PRESSPULL command will

- extrude a 2D object into a 3D object, or extend a 3D surface. When using the PRESSPULL command with a 2D object, the 2D object will remain in the drawing.
4. **BOX:** The BOX command allows us to create a 3D box by selecting 3 points in the X, Y, and Z axes.
  5. **3DMOVE (3M):** The 3DMOVE command allows to move an object either in the X, Y, or Z-axis.
  6. **3DROTATE (3R):** The 3DROTATE command allows to rotate an object about the X, Y or Z axes.
  7. **3DPOLYLINE (3DPOLY):** The 3D POLYLINE command allows to create a polyline with points that can exist in the X, Y and Z axes.
  8. **UNION (UNI):** The UNION command allows us to join separate 3D objects into one.

9. **SUBTRACT (SU):** The SUBTRACT command allows to subtract 3D objects from another 3D object.
10. **SLICE (SL):** The SLICE command allows us to create a joint through a 3D solid.

**How to start AutoCAD**

To start AutoCAD from the Start menu (Microsoft Windows) choose Programs. Then choose AutoCAD from the menu. When it starts, we will get a dialog box. The dialog box provides us with four ways to start a drawing. We can either, open an existing drawing, start a drawing from scratch, start a drawing based on a template or we can use wizards to help us set up the drawing.



**Fig 1:** AutoCAD screen

We also can select a different template by clicking [TEMPLATES] under start drawing. Our recent documents will show in the middle of the first page. We also can click to

open the recent documents. When we click [START DRAWING], we will see this user interface below:

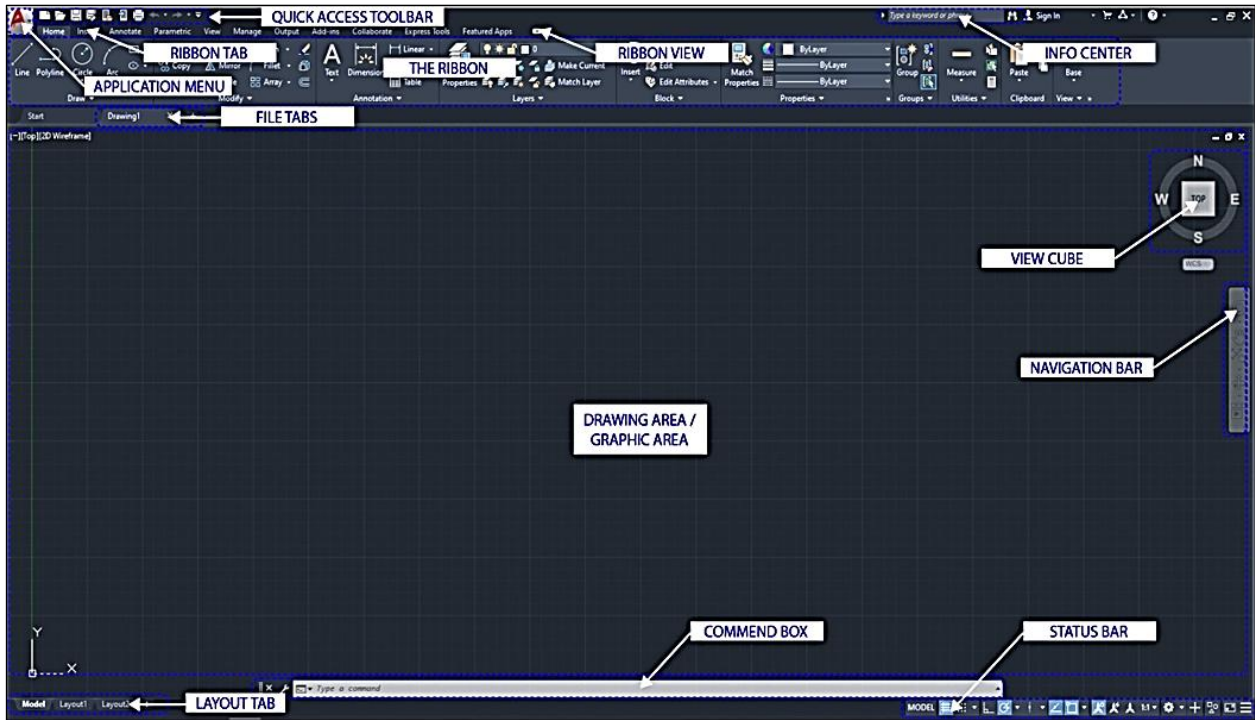


Fig 2: AutoCAD Drawing Interface

The drawing interface consists of the following tools:

- **Application menu:** New, open, save, import, export, print.
- **Quick access toolbar:** User can save tools that they often use.
- **Info Center:** Ask a question, find out answers from Autodesk community.
- **Ribbon:** Main menus-Home, Insert, Annotate, View, Manage.
- **Ribbon tab.**
- **Ribbon view:** User can minimize and maximize the ribbon.
- **File tab:** Navigate files and create and open files.
- **Drawing area/graphic area:** Main drawing space.
- **View cube:** User can change the view, top, front, 3D or more.
- **Navigation bar:** Zoom in and out, pan, zoom to all, and more.
- **Command box:** Can type commands and see the previous commands.
- **Layout tab:** Can see model space and print spaces.
- **Status bar:** Can set grid, snaps, scales and more.

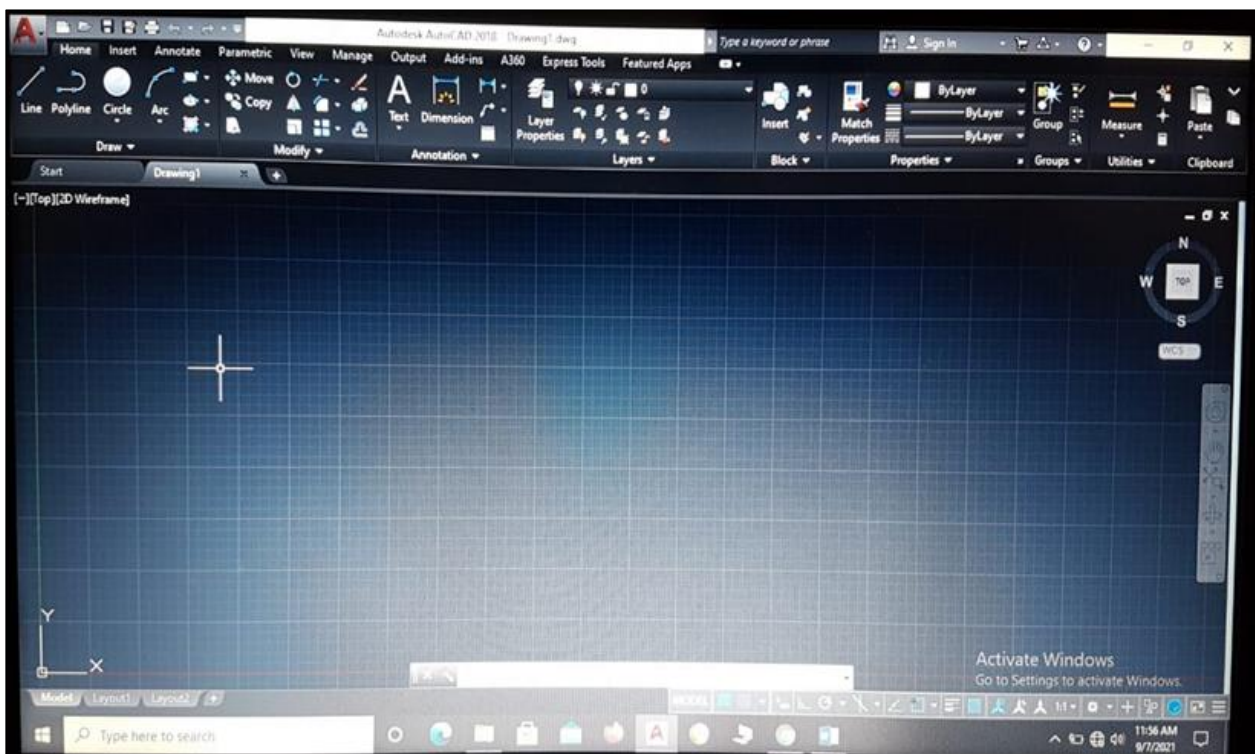
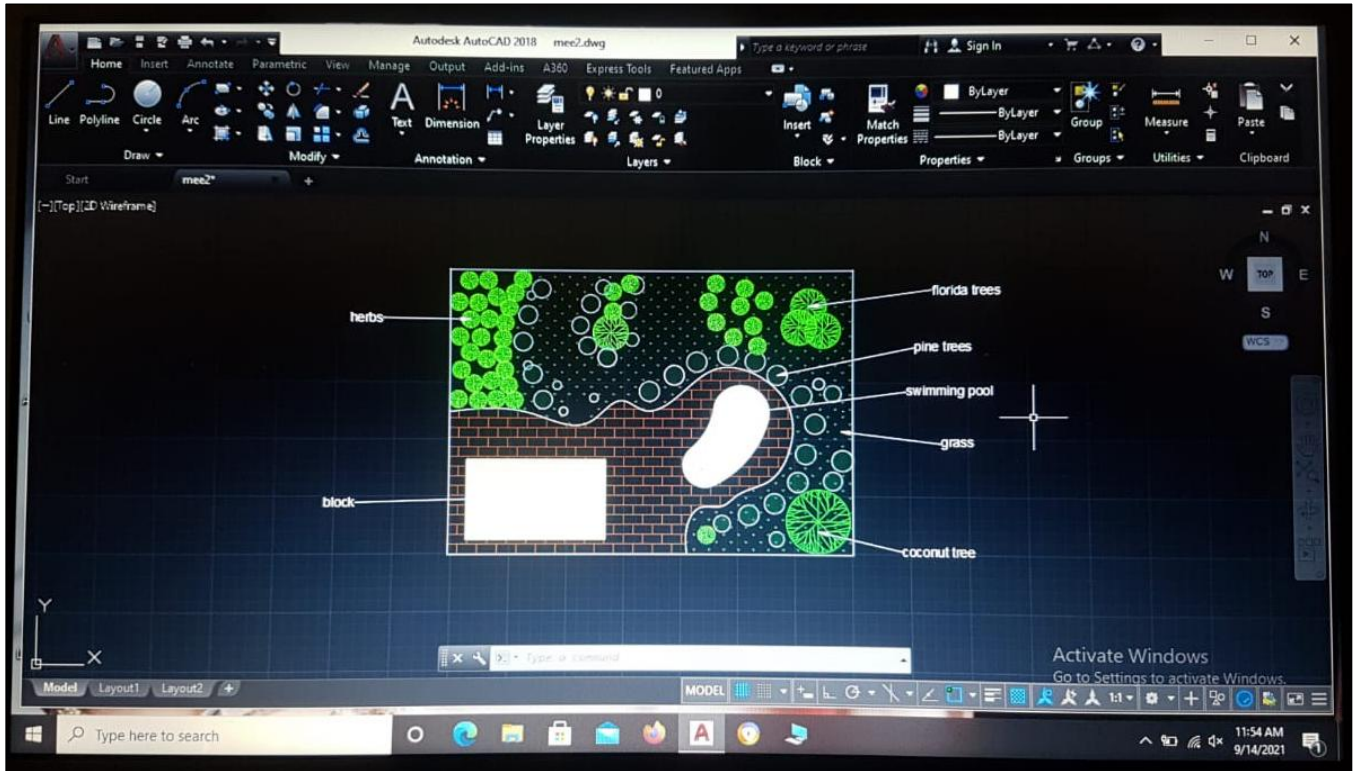


Fig 3: AutoCAD screen

In this AutoCAD screen, we can see the following tools in the home bar:

1. Line
2. Polyline
3. Circle
4. Arc
5. Move
6. Copy

7. Layout properties
8. Insert
9. Match properties
10. Group
11. Measure
12. Paste and several other tools helpful for drawing in AutoCAD.



**Fig 4:** Simple Garden Plan in AutoCAD

For Simple Garden view we can add some trees like Florida trees, pine trees, grass, coconut trees, some shrubberies, herbs, green facades, etc. using several drawing commands as shown in figure 4.

- If we want to add some kitchen wares or any garden plants,
- We need to go in command line and then enter ctrl+2/ADCENTRE.
  - Click on home default home select MENUS folder and design Centre house designer, blocks, bathtub, toilet, sink.
  - Click on home, MENUS, design center select home space planner.
  - Select and drag outside bed, dinning, select lamp, sofa, plant, and again click MENUS folder and then select kitchen and select oven, refrigerator and double sink etc.

A good landscape design layout can be created easily or in short duration by using various commands (basic, drawing and modifying command) in AutoCAD and keeping principle of landscaping (unity, balance, rhythm, scale, proportion, emphasis, accent and sequence) in mind. Before creating a layout in AutoCAD, it is important to follow important steps of landscape design layout making. These are: site analysis, prioritize current and future landscape needs and want, consider maintenance requirements, determine a budget etc.

**Advances in landscape design with cad technology**

**A. Modeling**

Computer-aided design (CAD) modelling is an integral aspect

of the design process. In the digital realm, CAD helps to bring our ideas to life. 3D printing and photorealistic representations are just a few of the possibilities for computer-aided design.

**B. Rendering**

A rendering is a specific view of a 3D model that has been transformed into a realistic image in this CAD. Basic lighting and shading are included, as well as more advanced effects such as shadows, reflection and refraction.

**C. Post-processing**

Post-processing is similar to the final adjusting and polishing process of hand renderings. It is to conduct polishing and machining of the obtained image file in the rendering stage. For garden landscape renderings, adding entourage and background is an important step. The software used in this step is Photoshop, which is one of the most outstanding graphic image processing software nowadays. The perspective effect of the entourage (especially plants) is to refer to the perspective angle of the image obtained by rendering and its perspective law to adjust the entourage in terms of size, orientation and colour. As the same as other types of renderings, entourage files of garden landscape renderings are obtained mainly in three ways:

1. Map depot file: there are many software products containing various entourages in the market.
2. Scan various exquisite pictures of the entourage from

books and then process them with Photoshop.

3. Directly take the photos from real life by digital camera.

### Conclusion

Due to its many benefits, AutoCAD comes as a much-needed help to landscape designers in this day of multitasking and dwindling time. As AutoCAD software employs some of the most advanced technologies, the percentage of errors caused by manual design is greatly decreased. The amount of labor required to develop the various models has been greatly reduced thanks to the software, which automates the majority of the process. Using computer-aided design software saves time and allows for the creation of better and more efficient designs in less time. It will be much easier to make any modifications by utilizing computer-assisted design software because faults may be readily remedied. There is little doubt that manual drawings will never achieve the level of accuracy that AutoCAD software provides. The AutoCAD tools make it easy to save and preserve files in such a way that they may be used again and again, as well as sent without any unnecessary complications.

### References

1. Alexey L Khoroshko. The Research of the Possibilities and Application of the AutoCAD Software Package for Creating, Electronic Versions of Textbooks for "Engineering and Computer Graphics". TEM Journal. 2020;9(3):1141-1149. ISSN 2217-8309.
2. Autodesk. AutoCAD, 2007. [Online]. Available: <http://usa.autodesk.com/autocad/features>.
3. Cervelli JA. Landscape designing with plants: Creating outdoor rooms. University of Kentucky, College of Agriculture. Kentucky: University of Kentucky Cooperative Extension Service, 2005, 67-75.
4. Chandra Prem. AutoCAD and Computer. International Advanced Research Journal in Science, Engineering and Technology, 2021. 8.10.17148/IARJSET.2021.8956.
5. Dacheng Liu. Research and Design of Automobile Car Body CAD System under CAD/CAM Integration Environment. Applied Mechanics and Materials. 2014;443:44-47.
6. Ervin SM, Hasbrouck HH. Landscape modeling: digital techniques for landscape visualization [M]. New York: McGraw-Hill, 2001.
7. Ervin SM. Digital landscape modeling and visualization: a research agenda. Landscape and Urban Planning. 2001;54(1):49-62.
8. Haixiao S. Landscape design based on computer aided design technology. Lecture notes in electrical engineering. Inform and Manage Sci., 2013, 257-262.
9. Jia N, Zhao C. Study on Computer Aided Landscape Design Experimental Teaching. Modern Agricultural Science and Technology. 2014;4:206.
10. Khoroshko AL. The Research of the Possibilities and Application of the AutoCAD Software Package for Creating Electronic Versions of Textbooks for "Engineering and Computer Graphics" Course. TEM Journal. 2020;9(3):1141-1149.
11. Khoroshko LL, Ukhov PA, Leonidovich, Khoroshko A. The Use CAD/CAE Systems to Create E-Learning Courses on Technical Subjects at University. International Journal of Engineering Pedagogy (iJEP). 2018;8(2):64-71.
12. Li DC. Research and Design of Automobile Car Body CAD System under CAD/CAM Integration Environment. Applied Mechanics and Materials. 2013;443:44-47. <https://doi.org/10.4028/www.scientific.net/amm.443.44>
13. Liu W. Computer-Aided Design AutoCAD is Widely Used in 3D Modeling. In: Sugumaran V, Xu Z, Zhou H. (eds) Application of Intelligent Systems in Multi-modal Information Analytics. MMIA. Advances in Intelligent Systems and Computing, Springer, Cham., 2021, 13-85. [https://doi.org/10.1007/978-3-030-74814-2\\_53](https://doi.org/10.1007/978-3-030-74814-2_53)
14. Muhar A. Three-dimensional modeling and visualization of vegetation for landscape simulation. Landscape and urban planning. 2001;54(1):5-17.
15. Pavan W, Naomi K. Computer-aided design approaches for landscape designing: a survey. Seventh international conference on p2p, parallel, grid, cloud and internet computing, 2012, 254-261.
16. Raj D. Floriculture at a glance, 4th edition. Kalayani publisher, Ludhiana, 2015, 339-348.
17. Tiwari Anupam, Singh Anil, Kanth Neeharika, Pal Sumit. Review Paper Computer Aided Designing for Landscape Gardening. The Global Journal of Pharmaceutical Research. 2016;5:386-388.
18. Van Assche KR. Co-evolutions of planning and design: Risks and benefits of design perspectives in planning systems. Planning Theory. 2013;12(2):177-198.
19. Xin J. Application and Prospect of 3D Computer Aided Design. Chongqing Architecture. 2014;2:015.
20. Zuo W. Study on comprehensive assessment of the regional ecological environmental system security based on Rs, Gis and Models. J Ecol Environ. 2002;8(12):674-679.