Green University of Bangladesh

Department of Computer Science and Engineering (CSE)
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3D Autocad Design of Eiffel Tower

Course Title: Engineering Drawing
Course Code: CSE - 208
Section: 213 D5

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Lab Project Status	
Marks:	**Signature:**
Comments:	**Date:**

Contents

Chapter 1

Introduction

1.1 Overview

The proposed project aims to create a comprehensive 3D AutoCAD design of the famous Eiffel Tower. This project uses advanced computer-aided design techniques to carefully recreate the intricate details of the Eiffel Tower in a virtual environment. The resulting 3D models serve as highly accurate and visually appealing representations of famous landmarks.

1.2 Motivation

The Eiffel Tower is a symbol of architectural brilliance and a testament to human ingenuity. By creating a detailed 3D AutoCAD design, we were able to preserve the beauty and complexity of this remarkable structure. Such models can be used for educational purposes, architectural studies, virtual tours, and visual simulations. It offers architects, engineers, historians and enthusiasts the opportunity to explore the Eiffel Tower from different perspectives and understand its architectural significance.

1.3 Problem Definition

1.3.1 Problem Statement

Currently, available 3D models of the Eiffel Tower are limited in accuracy, detail, and accessibility. Existing models do not provide comprehensive representations of iconic structures, hindering educational exploration, architectural analysis and virtual tours. A detailed and easily accessible 3D AutoCAD design of the Eiffel Tower must be developed that accurately captures the complex architecture of the Eiffel Tower and enables an immersive virtual experience.

1.3.2 Complex Engineering Problem

Table 1.1: Summary of the attributes touched by the mentioned projects

Name of the P Attributess	Explain how to address
P1: Depth of knowledge required	A 3D AutoCAD design of the Eiffel Tower requires a thorough understanding of architectural engineering principles, including structural analysis, material properties. AutoCAD software, 3D modeling techniques, and knowledge of geometric accuracy are essential to accurately depict the tower's intricate latticework and decorative elements.
P2: Range of conflicting requirements	A 3D AutoCAD design for the Eiffel Tower must balance conflicting requirements: accuracy, visual realism and geometric simplicity, and detailed representation. Finding the right balance between these requirements is critical to creating visually appealing and technically accurate models.
P3: Depth of analysis required	This project includes a comprehensive analysis of the Eiffel Tower's architectural and geometric complexity. Structural components, proportions, and decorative details need to be considered in detail for an accurate and faithful representation of a landmark. To create an accurate 3D AutoCAD design of the Eiffel Tower, it is important to analyze the dimensions, angles, and connections between the various elements.

1.4 Design Goals/Objectives

The project's design goals and objectives are as follows:
The main goal of this project is to develop a detailed and accurate 3D AutoCAD design of the Eiffel Tower. The design should include the various components, structural and decorative elements of the tower. The specific design goals and objectives are:

A. Capture intricate details. The 3D model should capture the details of the Eiffel Tower, such as latticework, arches, platforms, and decorative elements.

B. Maintain accuracy: The model had to be made with the utmost precision, respecting the original dimensions and proportions of the Eiffel Tower.

C. Improve visual appeal: The 3D design should incorporate realistic textures, materials, and lighting to create a visually pleasing representation of the tower.

D. Enable interactive exploration: This model is intended to allow users to explore the Eiffel Tower from different angles and angles, providing an immersive experience.

1.5 Application

A 3D AutoCAD design of the Eiffel Tower can be used in a variety of ways, including:

A. Materials: This model can be used as an educational resource to learn more about the architecture and engineering behind the Eiffel Tower. Helps teach structural concepts, historical analysis, and design principles.

B. Architectural Studies: Architects and designers can use these 3D models to study complex structural details, assess tower stability, and consider possible modifications and additions.

C. Virtual Tours and Simulations: 3D models can be integrated into virtual reality (VR) or augmented reality (AR) applications, allowing users to virtually explore the Eiffel Tower and experience its wonders.

D. Historical preservation: The 3D model can serve as a digital record, preserving the Eiffel Tower's architectural details for future generations and aiding in restoration or conservation efforts.

By undertaking this project, we aim to provide a highly accurate, visually appealing, and accessible 3D AutoCAD design of the Eiffel Tower, facilitating its study, appreciation, and virtual exploration.

Chapter 2

Procedure of the Project

2.1 Steps for completing this project

Here the steps for completing this project will be discussed with screenshots/figures.

Step-1: At first, we have drawn the basic shape of half of the Eiffel Tower by using lines and arc only.

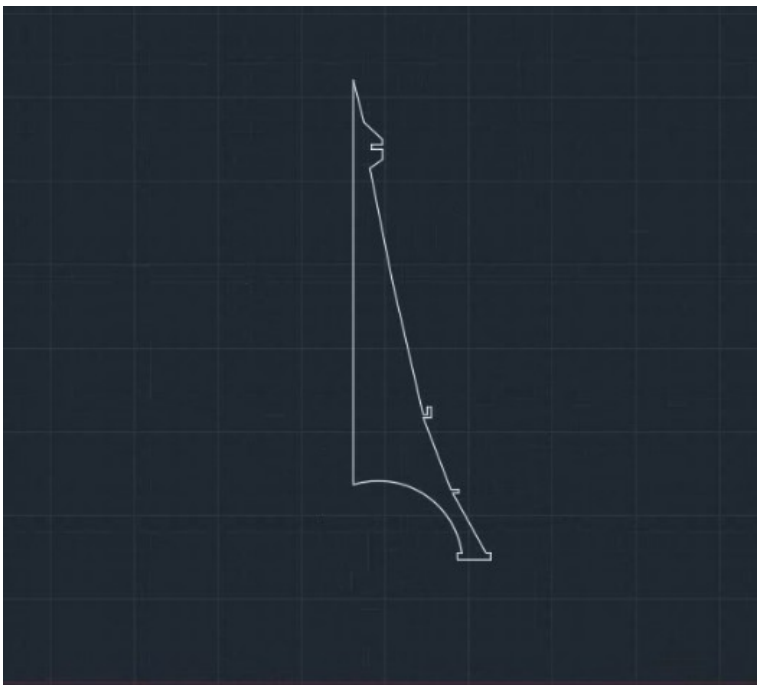

Figure 2.1: Basic shape of half of the Eiffel Tower

Step-2: Used offset (10) to create borderlines after using "Join" tools for joining all the necessary lines.

Figure 2.2: Creating borderlines by using "Offset" tool

Step-3: Draw the tower's primary edges using an estimated measurement by using the "line" tool.

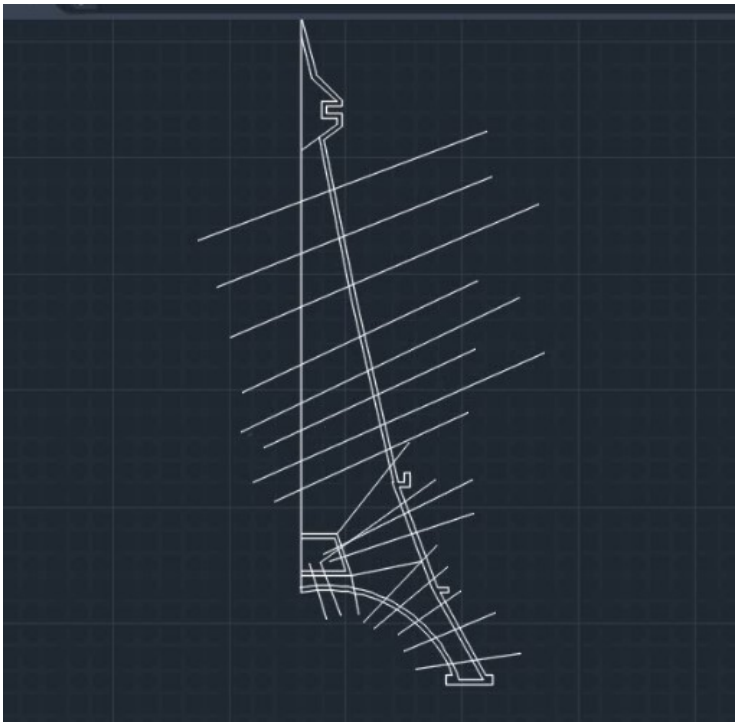

Figure 2.3: Draw the tower's primary edges

Step-4: Draw the tower's primary cross edges based on the primary edge's measurement by using the "line" tool.

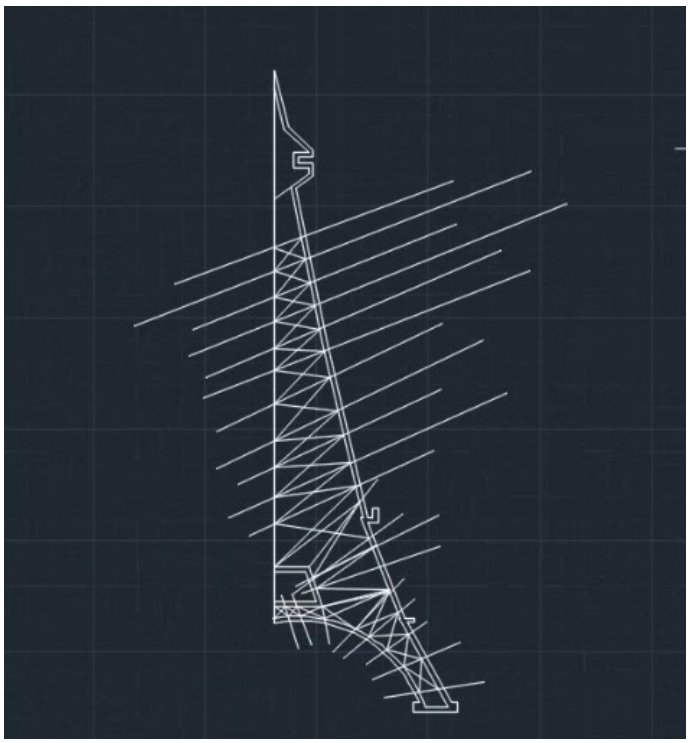

Figure 2.4: Draw the tower's primary cross edges

Step-5: Draw the "Offset" of the tower's primary cross edges. Each offset value is 10.

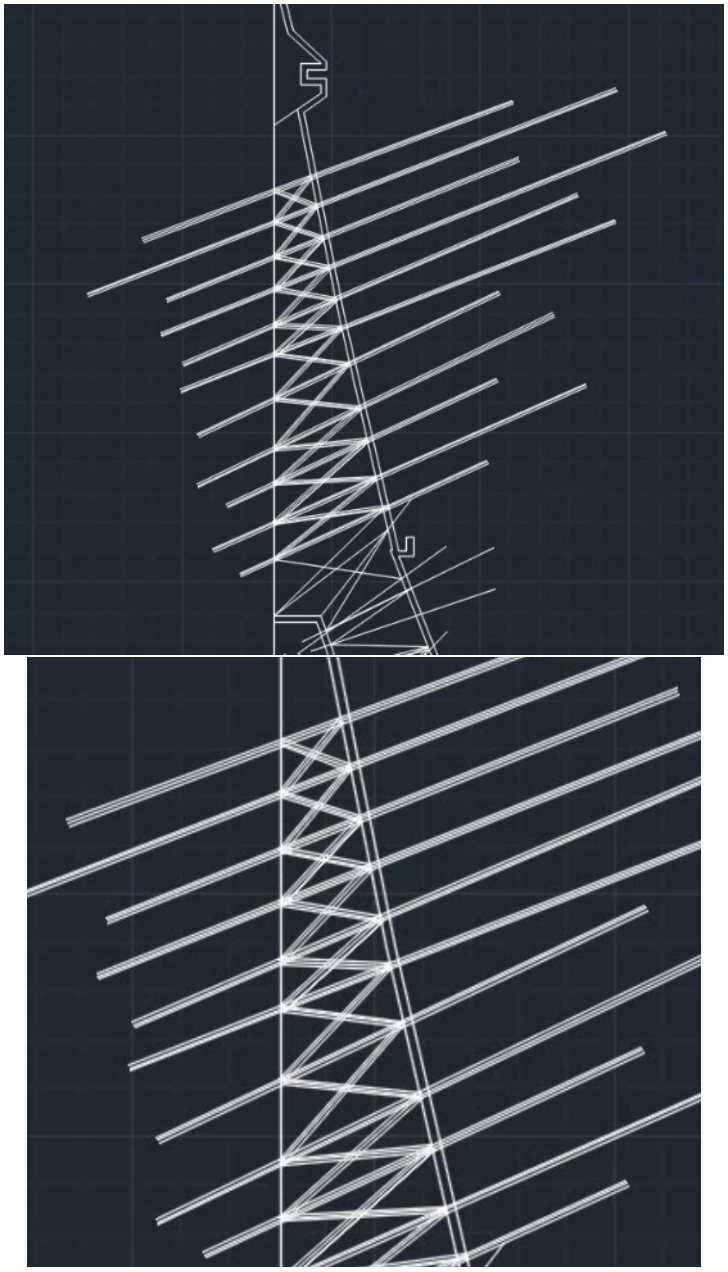

Figure 2.5: Draw the "Offset" of the tower's primary cross edges.

Step-6: Trimmed all unnecessary lines by using the "Trim" tool. Also, extended and re-created the line and add new horizontal lines to look like a real Eiffel Tower (just completed the half). Then, it looks like the figure below.

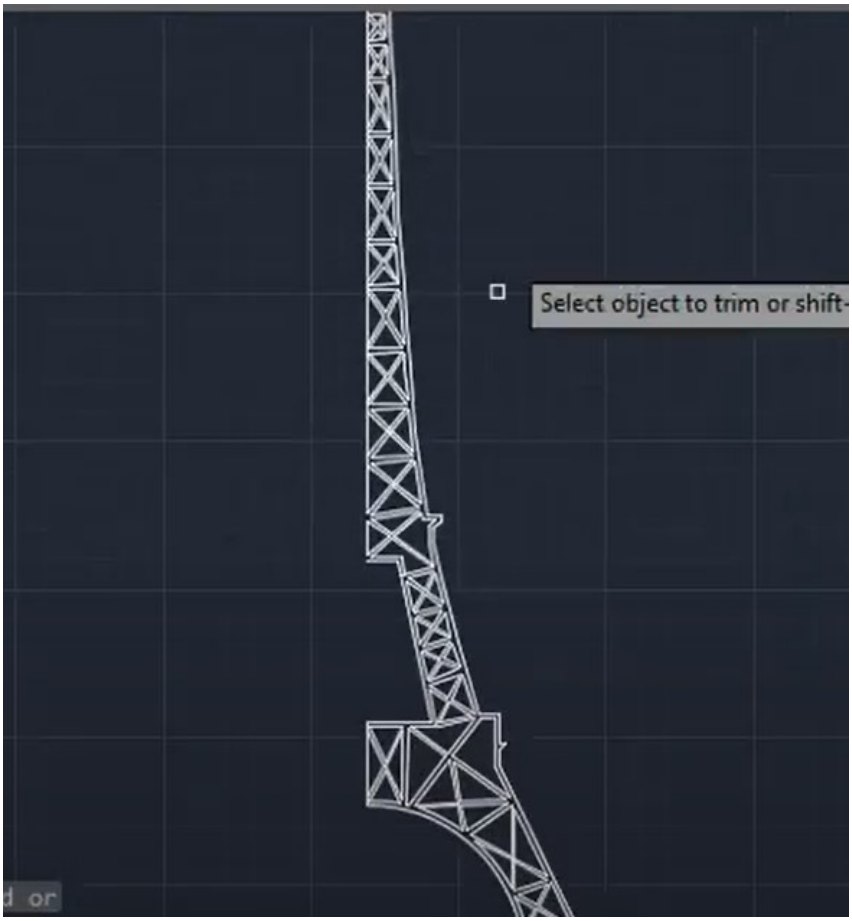

Figure 2.6: Furnished all lines

Step-7: Mirrored the whole half of the previous Eiffel Tower by using "Mirror" tool and now it looks like a 2D Eiffel Tower.

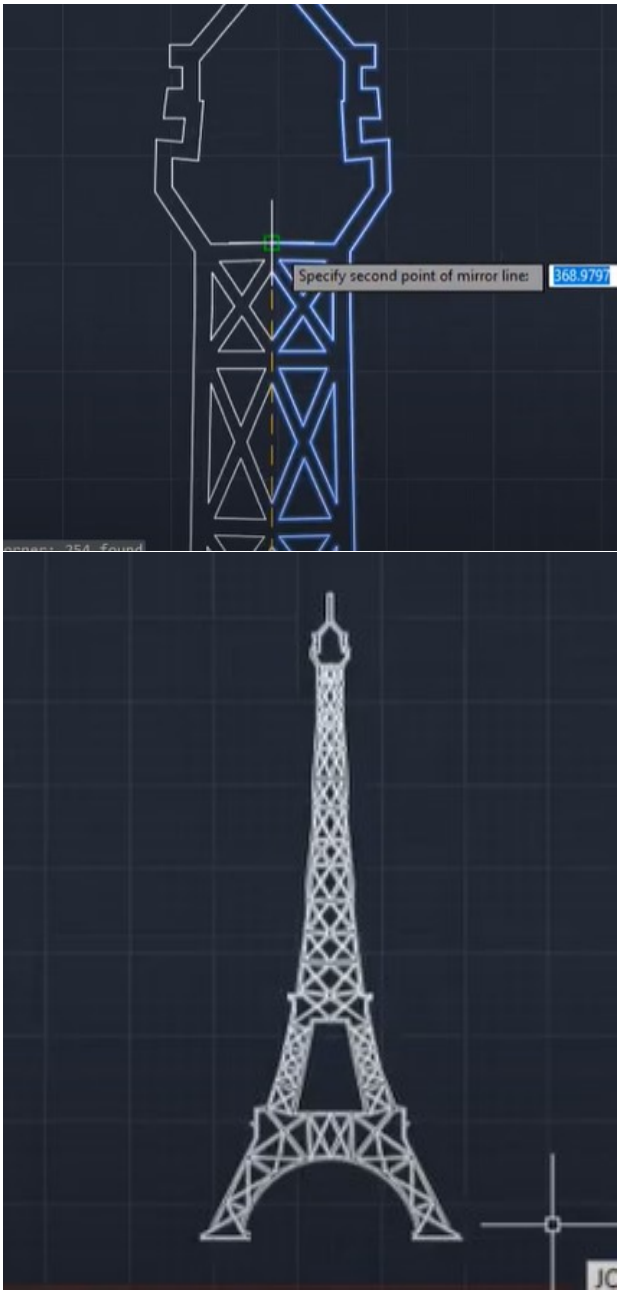

Figure 2.7: Mirrored the whole half of the previous Eiffel Tower

Step-8: Coping the joined border-line for creating 3D object.

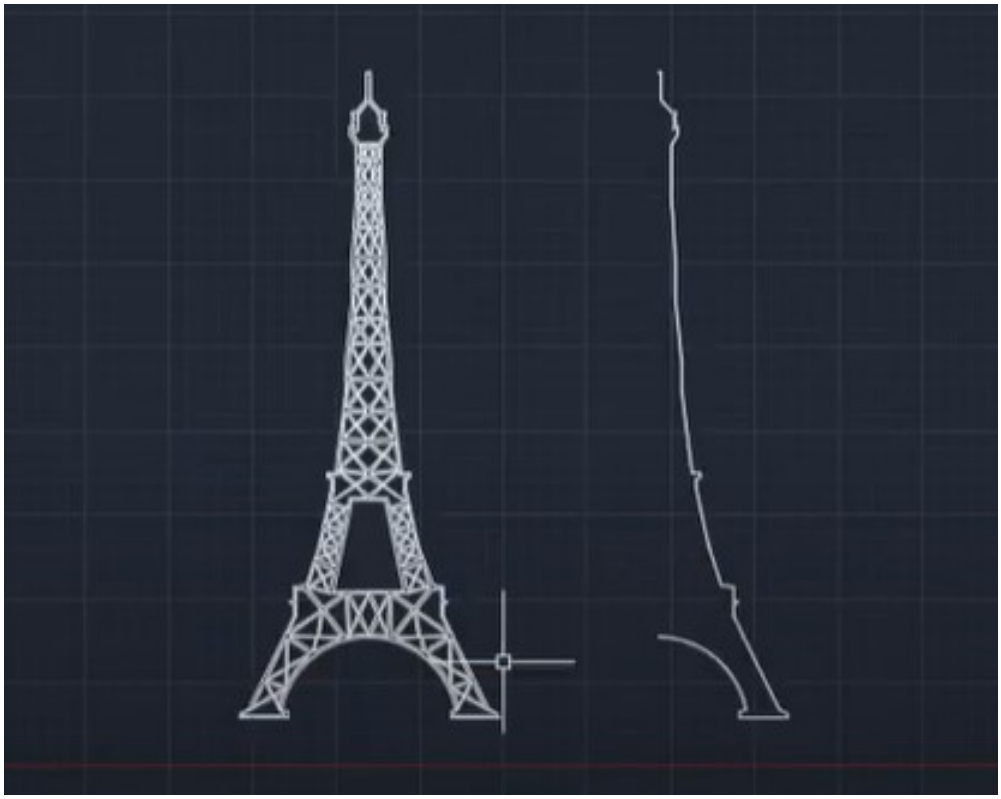

Figure 2.8: Coping the join border-line for creating 3D object.

Step-9: Drawing another border-line like the figure for creating 3D object.

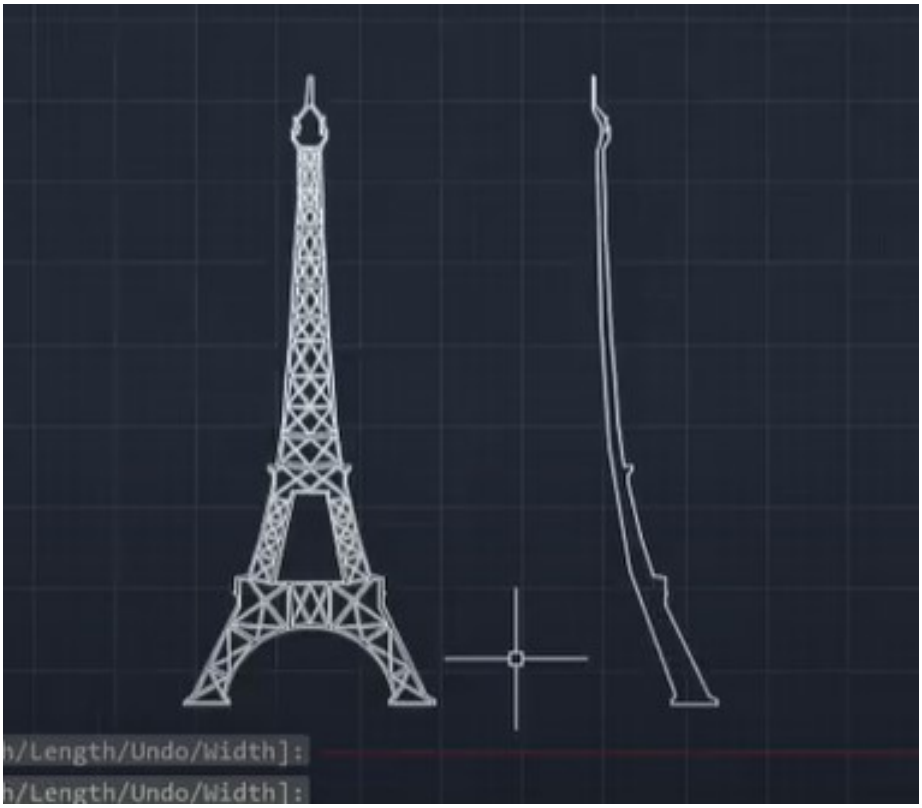

Figure 2.9: Drawing another border-line

Step-10: Extruding the whole 2D Tower for creating 3D object by using "Extrude" tool.

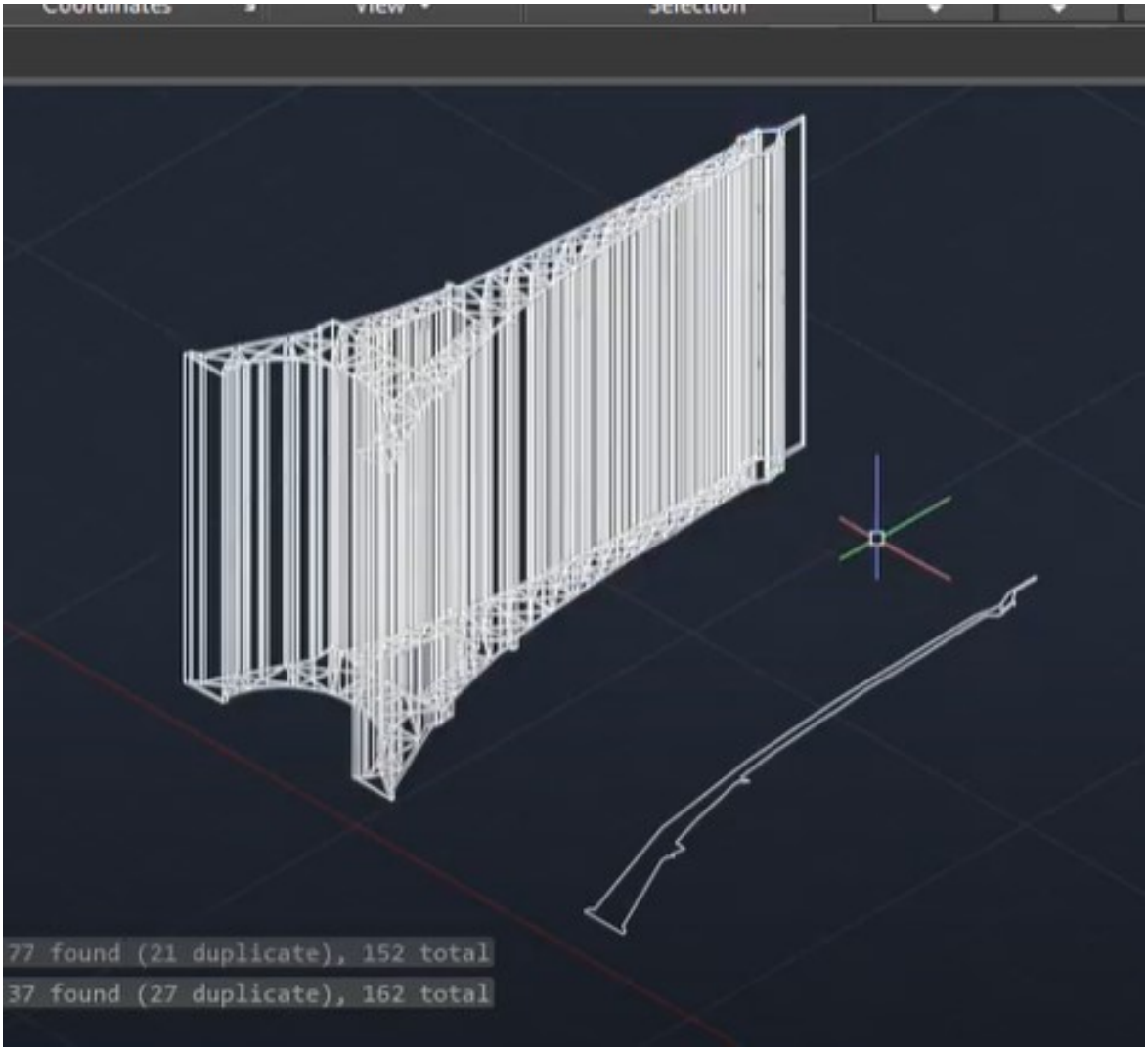

Figure 2.10: Extruding the whole 2D Tower

Step-11: Rotating the whole tower for make it standing on a surface for 3D design by using "Rotate" tool. Used the viewpoint "Right" from the "Coordinate" tab.

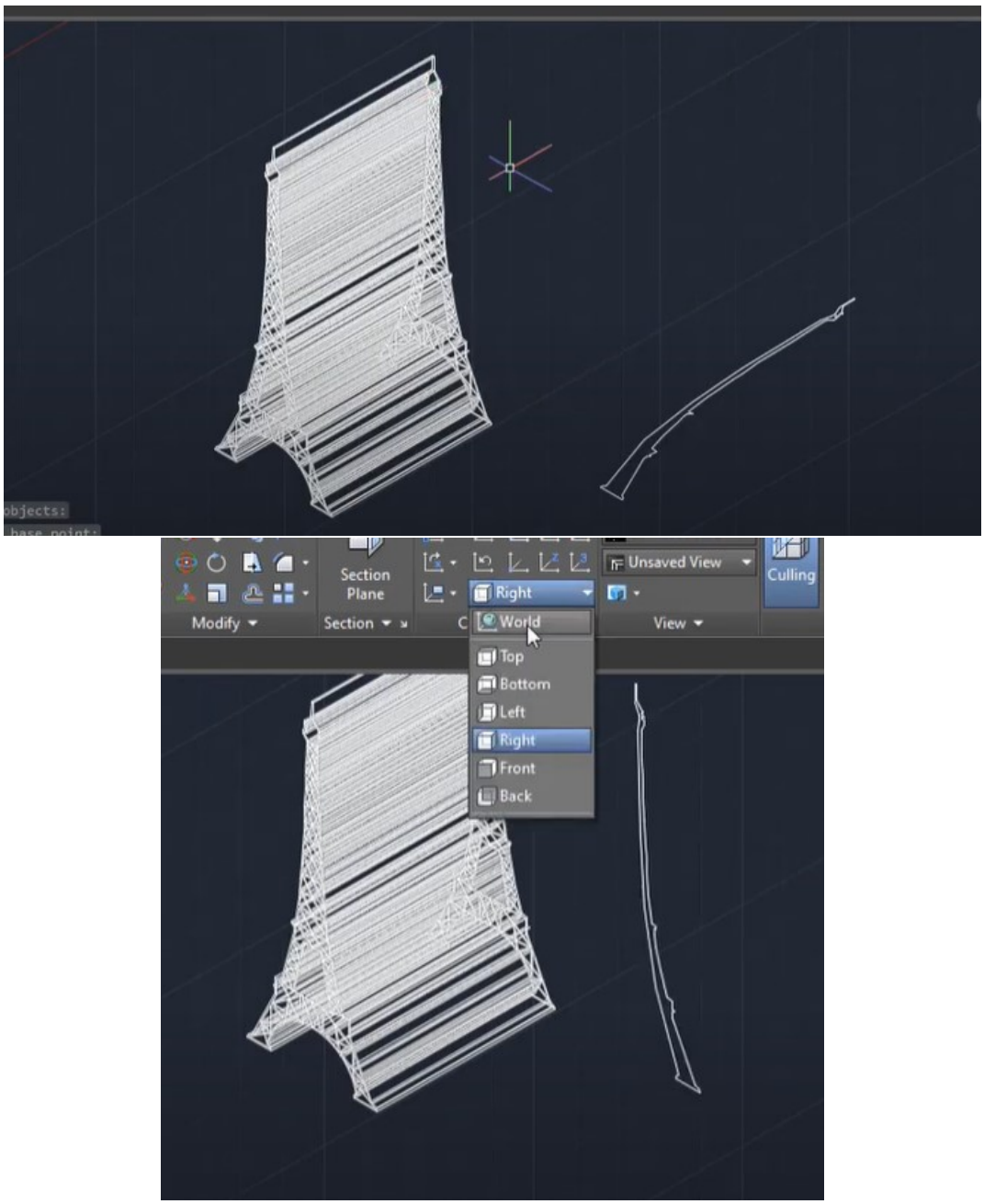

Figure 2.11: Rotating the whole tower

Step-12: Extruding the sideline by following the same measurement of the extruded tower. As it will align with the side-view of the tower.

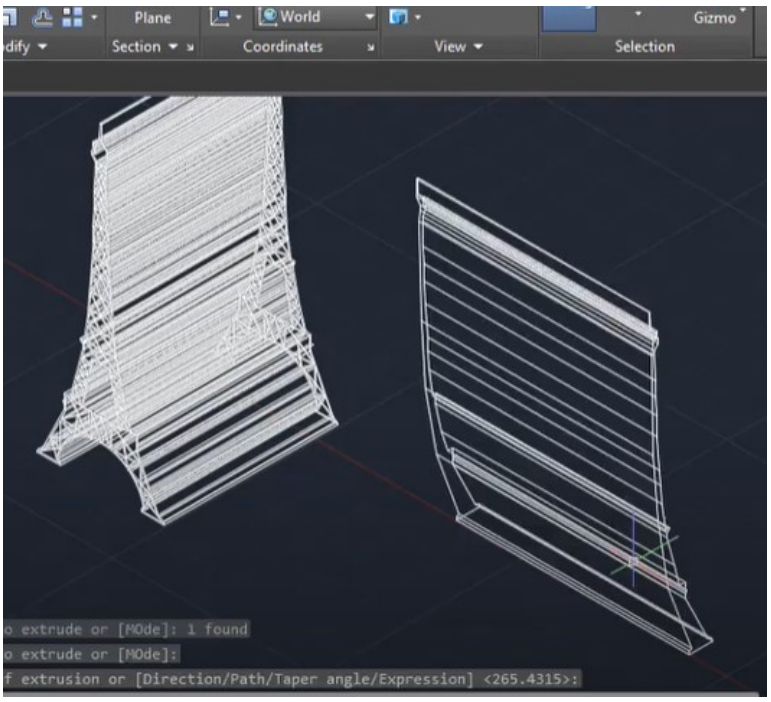

Figure 2.12: Extruding the sideline

Step-13: Moving the extruded sideline to the basepoint of the tower as in the picture.

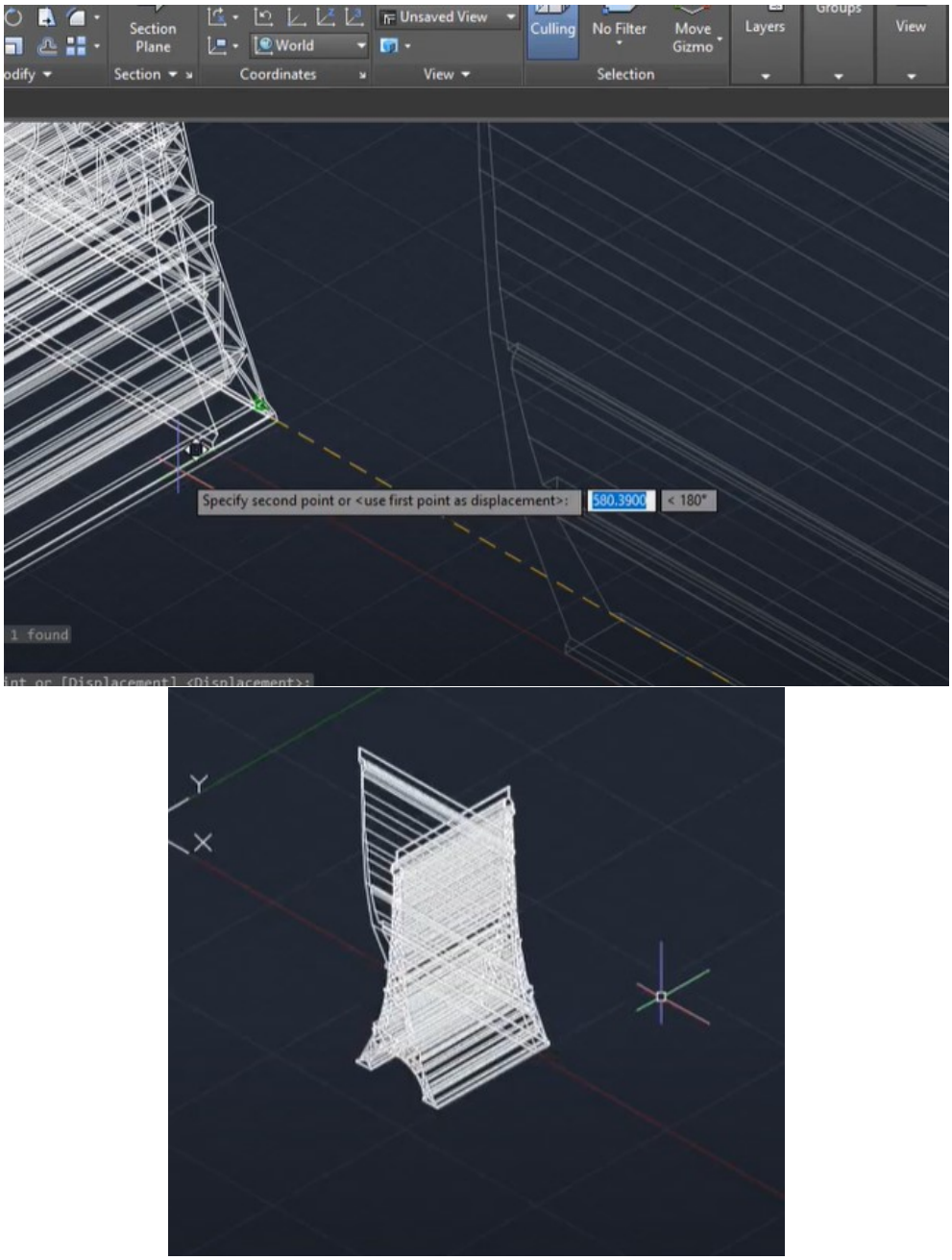

Figure 2.13: Moving the extruded sideline

Step-14: Intersecting two objects by using the "Intersect" tool as in the picture. And now we got a slightly 3D Eiffel Tower.

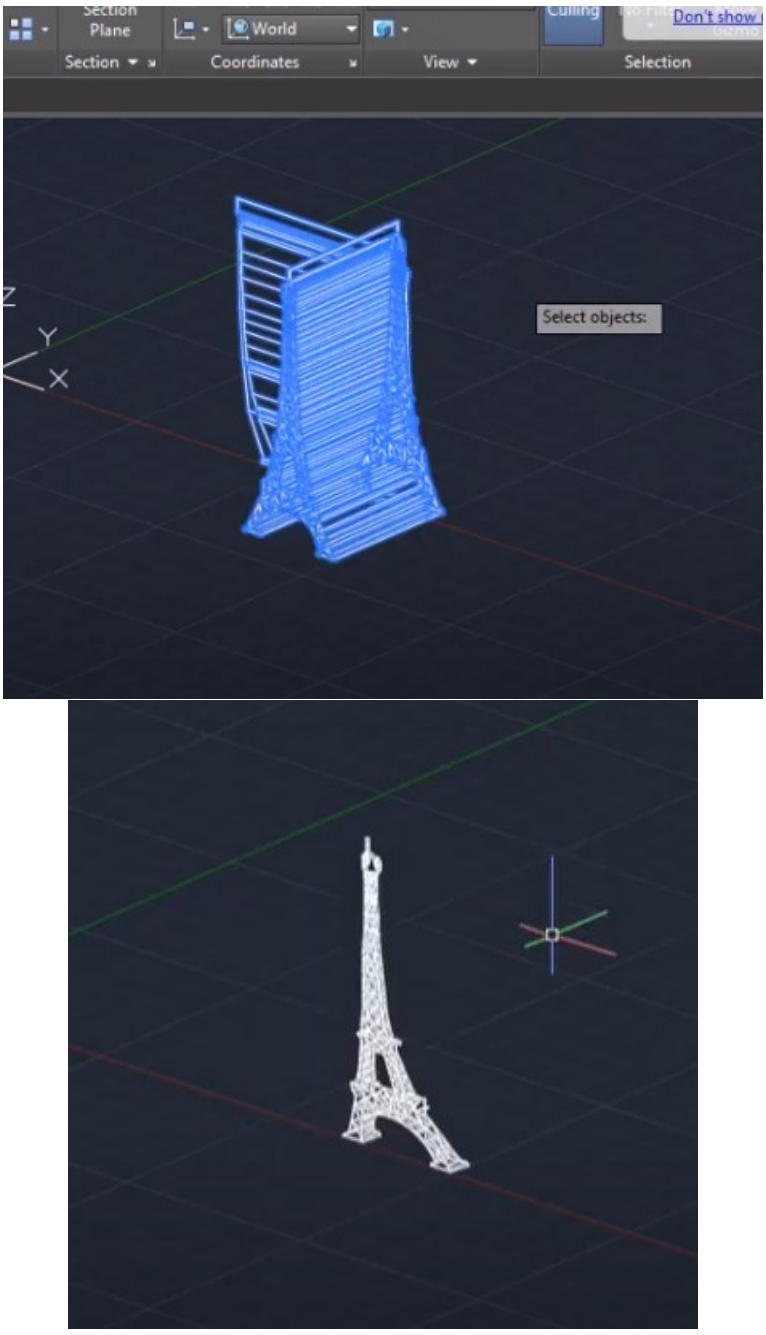

Figure 2.14: Intersecting two object

Step-15: Coping the whole 3D tower. We need total four copies for four sides of a fulfill 3D Eiffel Tower.

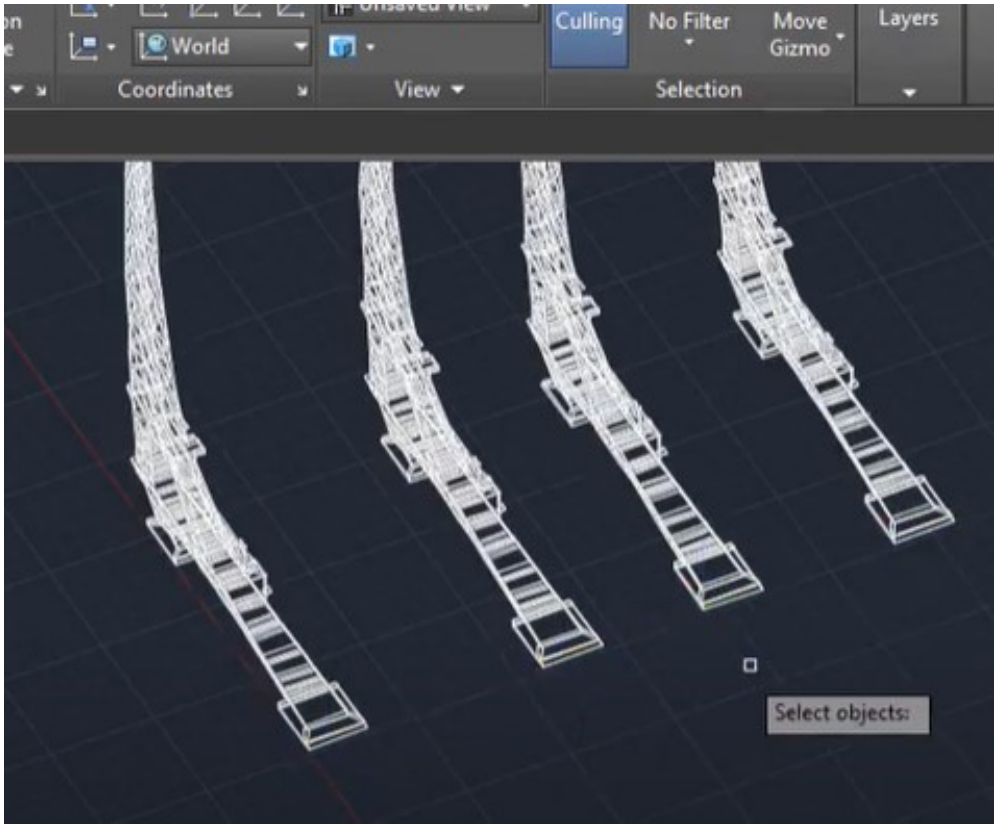

Figure 2.15: Coping the whole 3D tower

Step-16: Rotate all those four copies and set to each side of Eiffel Tower like in the picture.

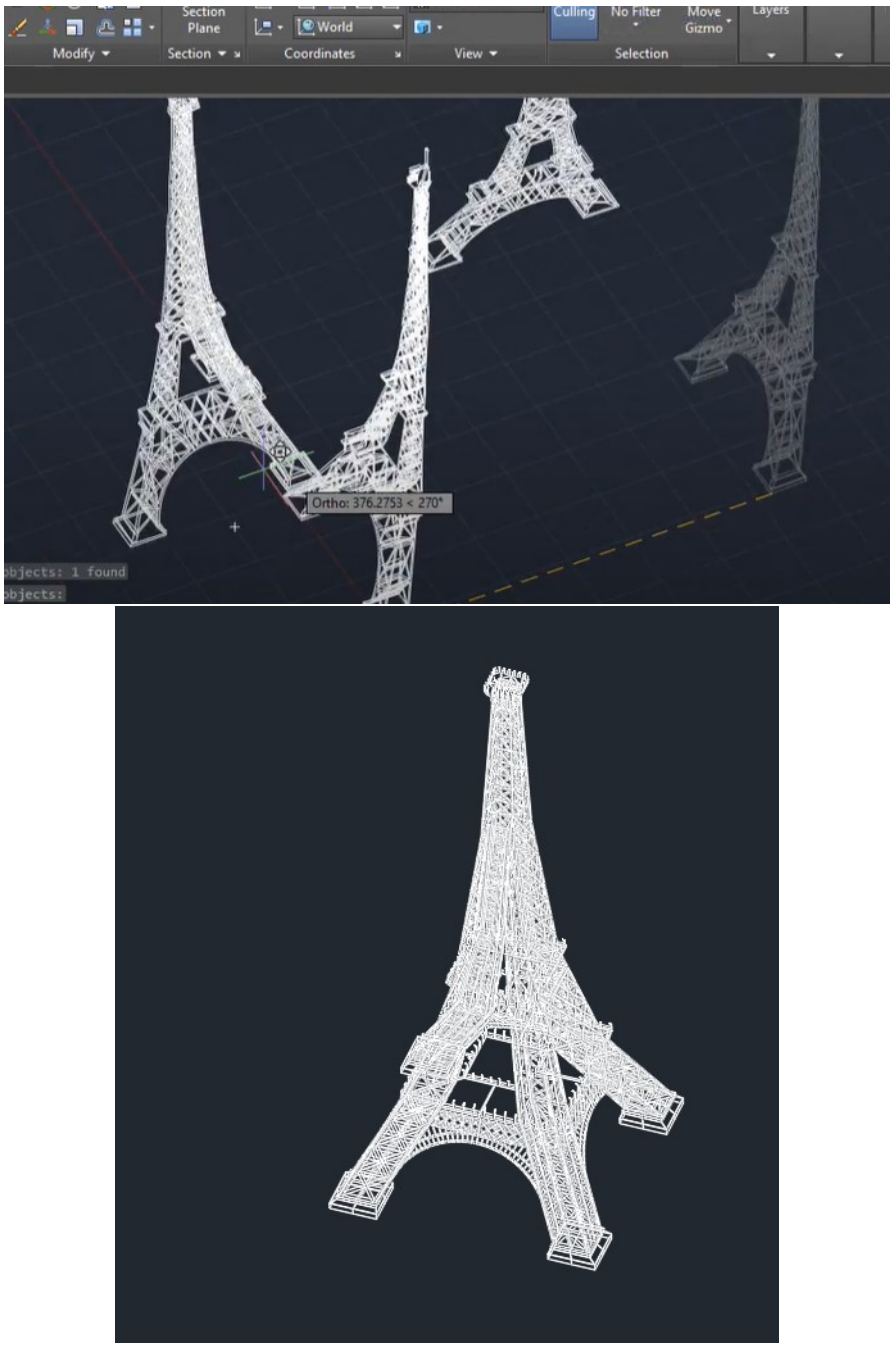

Figure 2.16: Rotate and set the copies

Step-17: Now draw a frame in the home or main layer thus when it will be viewed in realistic or other view mode, it will be clearly seen.

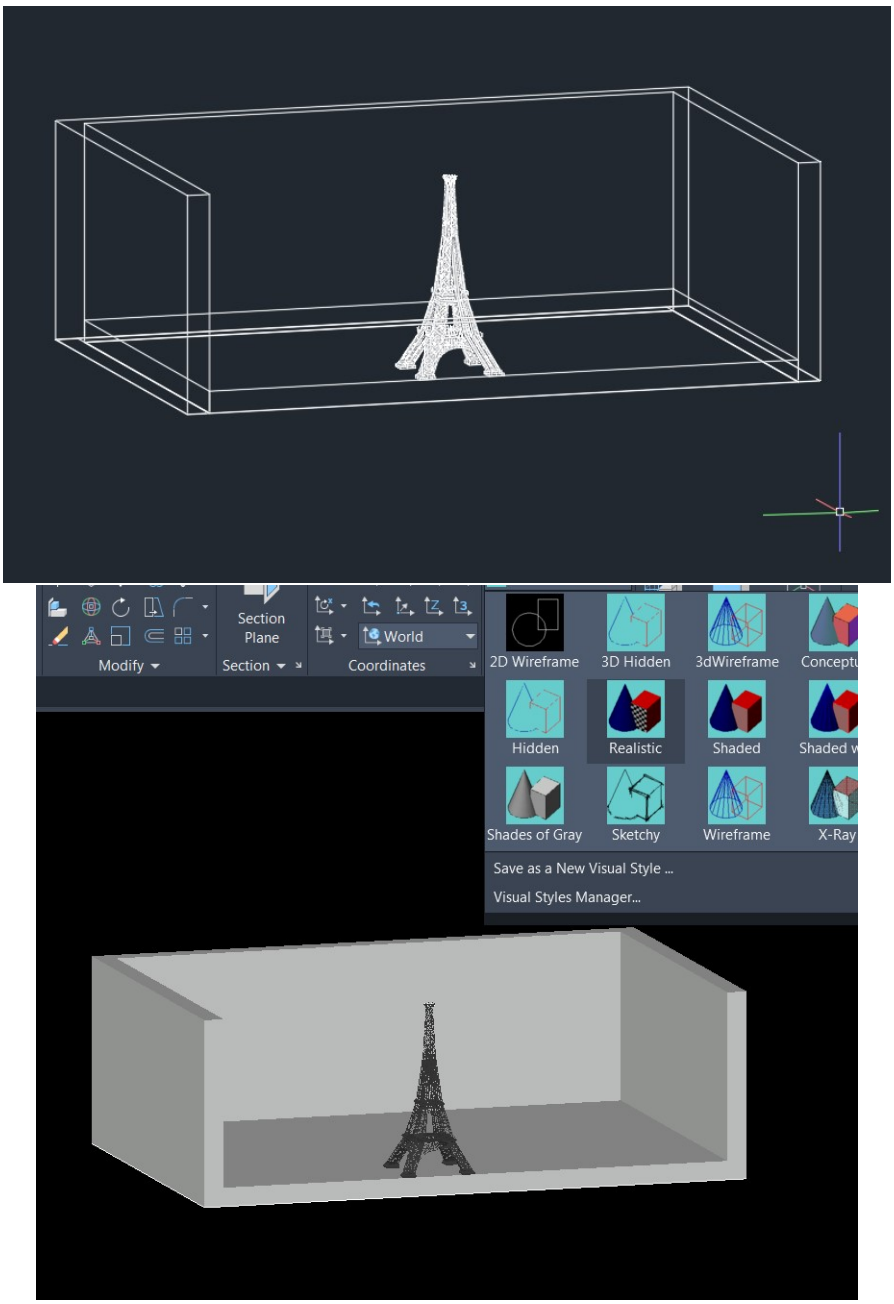

Figure 2.17: Draw a frame

Chapter 3

Result and Evaluation

3.1 Results Analysis/Testing

This is the final result showing from a different angle of view.

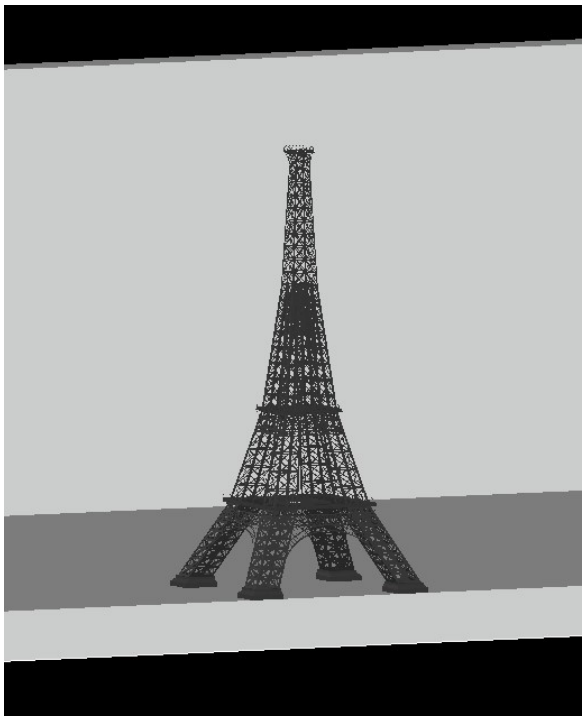

Figure 3.1: Result

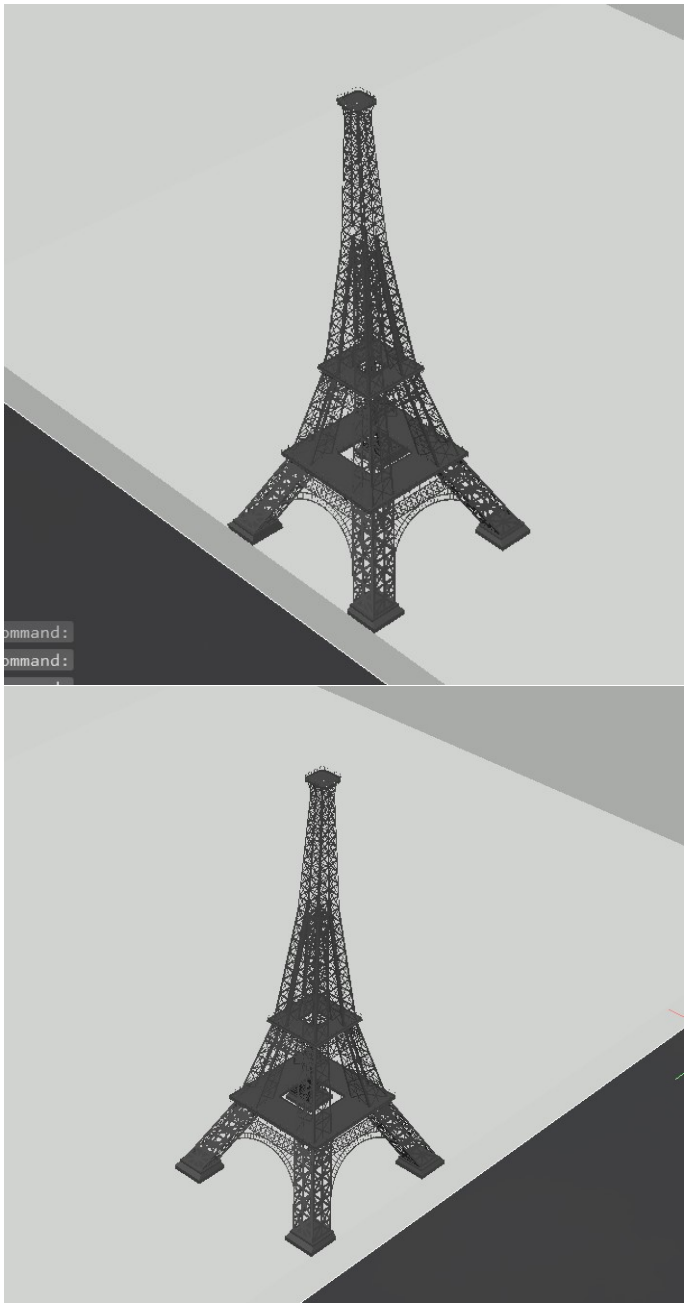

Figure 3.2: Result

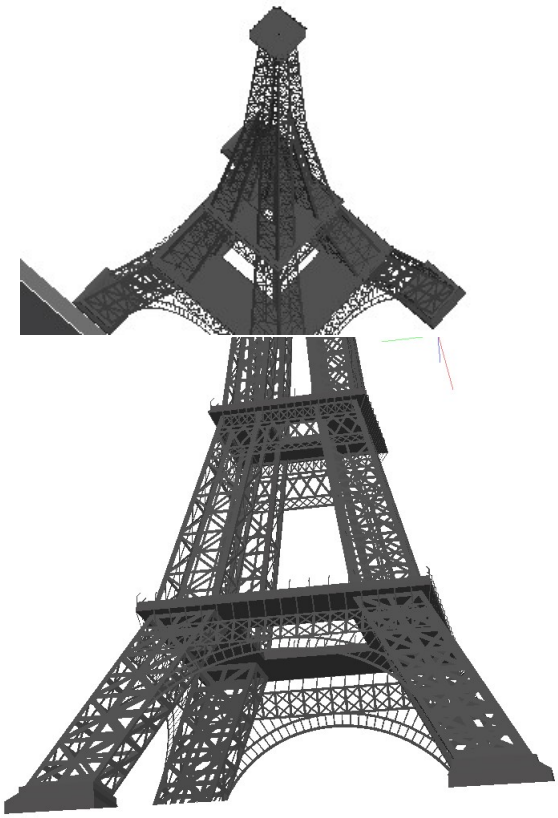

Figure 3.3: Result

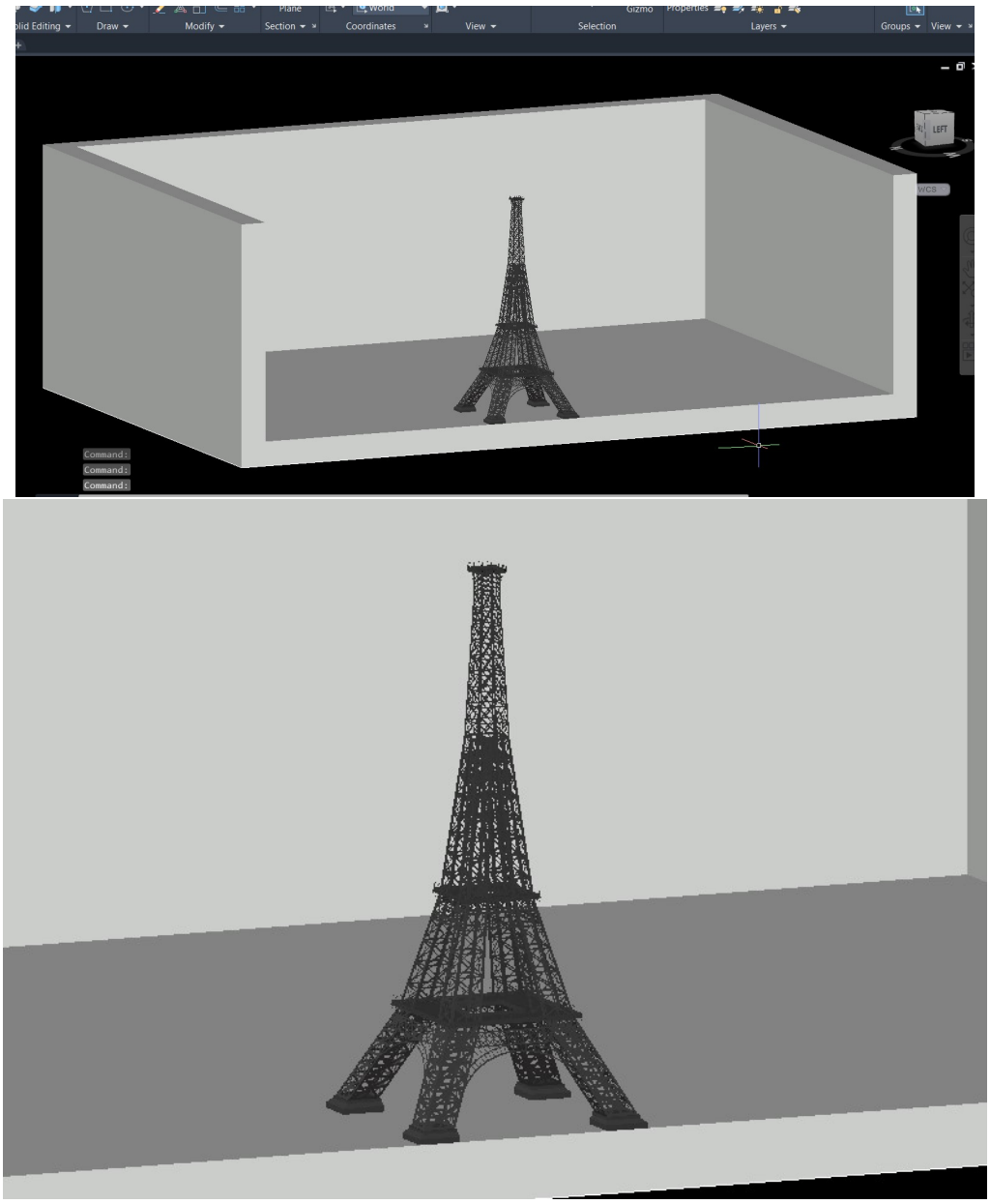

Figure 3.4: Result

3.2 Results Overall Discussion

We can see, our 3D model/design of Eiffel Tower is clearly viewable and it looks like a real 3D structure of Eiffel Tower from different angle (Top view, different side view, from bottom view). Overall, from every angle, the 3D model looks like a real Eiffel Tower.

Here one note, which is, every measurement is arbitrary value. We just focused on it's look and design.

Since, from every angle, the structure clearly reflect the Eiffel Tower, so we can say that, our project is completed successfully.

Link for watching project video:
https://drive.google.com/file/d/1pORoH_a4vGSyewRJTAE-AFsb7fkAqUTq/view?usp=sharing

Click Here to Play Video

3.2.1 Complex Engineering Problem Discussion

I have mentioned earlier that my project matches three criteria of complex engineering and it happened. My first criteria was **"Depth of knowledge required"**. For doing this project I needed a lot of knowledge about so many things like: Autocad, it's tools, usage of each tools, measurement, 2D design, 3D design converting from 2D design, tools about 3D etc. So, I can say, my first criteria matched clearly.
My second criteria was **"Range of conflicting requirements"** and it also matched clearly with this project. This project is clearly visible from each and every angle and it looks like a real Eiffel Tower 3D design. So, I must say that, the accuracy, visual realism, detailed representation is available in my project and so, the second criteria is matched successfully.
My third criteria was, **"Depth of analysis required"**, and it matches completely with this project. For drawing this 3D design, I had to design 2D first. And so, I need to analysis a lots of things, like: architectural and geometrical complexity, Structural components and right tools for right works, proportion, dimension, measurements etc. So, I must say, this third criteria is also matched successfully with this project.

Chapter 4

Conclusion

4.1 Discussion

This is a professional 3D design and architectural representation of the iconic Eiffel Tower, created with AutoCAD software. Before starting the design process, in-depth considerations were made, covering various aspects such as meticulous measurement, in-depth analysis of its distinct shape, turning a two-dimensional drawing into a 3D model. Hologram and study the necessary tools for its accurate representation. Dedication and persistence are paramount throughout the long process, which lasts several days, to successful completion. As the Eiffel Tower lacked standard measurements, many challenges arose during its creation; however, the design has been meticulously crafted based on its distinctive shape. By observing the end result from different angles and since it's fulfilling my project goal, I am pleased to confirm the completion proudly.

4.2 Limitations

The limitations are mentioned below-

1. Arbitrary Measurements: One significant limitation is the lack of standard measurements for the Eiffel Tower. As a result, I had to rely on estimates and approximations based on the shape of the tower, which may have introduced inaccuracies in the final design.

2. Interpretation of Shape: Due to the lack of precise measurements, I had to rely heavily on interpreting and recreating the tower's shape. This subjective interpretation may have resulted in slight variations from the actual proportions and dimensions of the Eiffel Tower.

3. Viewpoint Limitations: Although I have mentioned looking at the end result from different angles, there may still be limitations in the views captured in the design. Some complex perspectives or details may not be captured or rendered correctly, affecting the overall fidelity of the design.

4.3 Scope of Future Work

Here are some possible future scopes-

1. Refinement of Measurements: Future efforts may involve conducting further research and collecting precise measurements of the Eiffel Tower. By collecting accurate data about the tower's dimensions and proportions, subsequent 3D designs can work towards a greater degree of accuracy and realism.

2. Advancements in 3D Design Tools: As technology continues to evolve, future versions of 3D design software, such as AutoCAD, may offer enhanced capabilities and functionality. These advancements could allow designers to create more precise and detailed representations of complex structures like the Eiffel Tower.

3. Integration of Photogrammetry: The use of photographic techniques can bring a new approach to 3D modeling. By taking multiple high-resolution photos of the Eiffel Tower from different angles, these images can be processed to create a highly accurate 3D model that transcends the limits of rendering. subjective solution.

4. Virtual Reality (VR) Experiences: The 3D design of the Eiffel Tower can serve as the basis for an immersive virtual reality experience. By leveraging VR technology, users can virtually explore the tower, providing an interactive and realistic experience that enhances their understanding and appreciation of their architectural wonder.

References

[1] Learn Eiffel Tower 3D design: https://www.youtube.com/watch?v=CIa4LpqI2EI&ab_channel=QasimCAD