

## **ASSIGNMENT-01**

### **Industrial Design & Rapid Prototyping Techniques:**

#### **Laser Cutting:**

Design and create a sphere using laser cutting.

- The design must include an inner sphere that is  $\frac{2}{3}$  the size of the outer sphere.
- The inner sphere must have a vacuum inside (hollow).
- Material: MDF

**Title: Design and Fabrication of a Hollow Sphere Using Laser CAD and Fusion 360**

#### **Introduction:**

This report outlines the design and fabrication process of a hollow sphere using MDF (Medium Density Fiberboard) material with a diameter of 50mm. The design was created using Autodesk Fusion 360, and the manufacturing process was carried out using Laser CAD for precise cutting. The objective of this project is to demonstrate the application of CAD modeling and laser cutting techniques in creating complex geometrical structures.

#### **Design Process:**

The design process involves conceptualizing a spherical structure that can be fabricated using 2D laser cutting techniques. Given the constraints of MDF material and laser cutting, the sphere is designed as an assembly of interlocking curved pieces. Autodesk Fusion 360 was used to create the 3D model, and Laser CAD was utilized for generating the cut patterns.

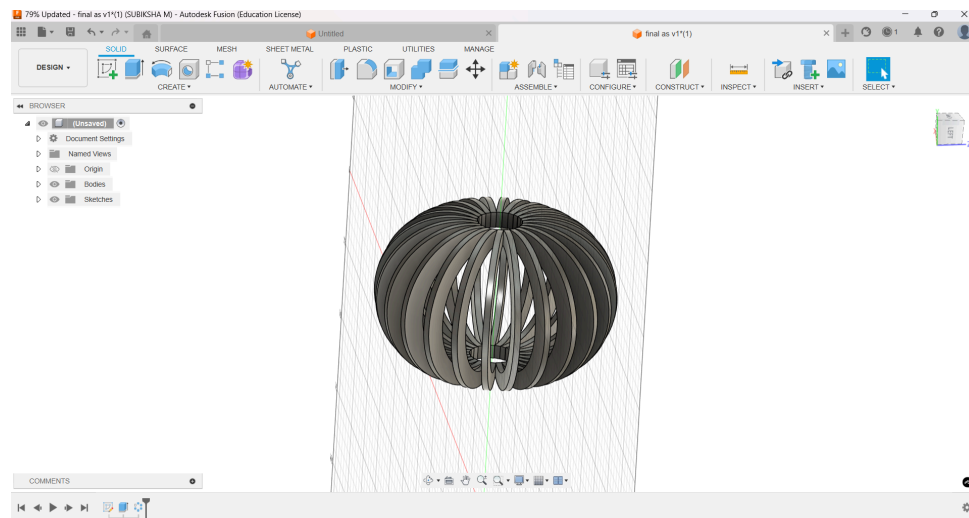
## Step-by-Step Procedure:

### 1. Conceptualization:

- Understanding the project requirements, including material selection (MDF) and dimensions (50mm diameter).
- Determining the feasibility of constructing a hollow sphere using laser-cut components.

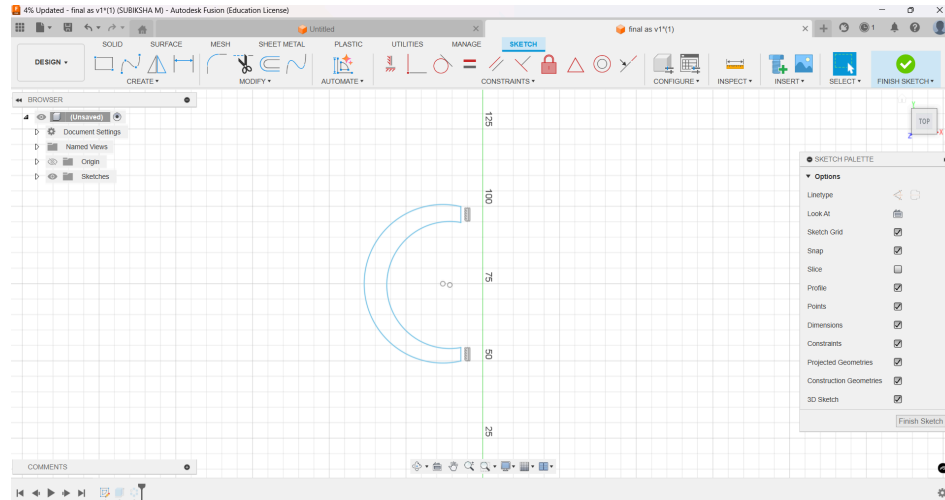
### 2. 3D Modeling in Fusion 360:

- Creating a solid sphere in Fusion 360.
- Designing the interlocking rib structure to achieve a hollow sphere.
- Using the 'Slice' feature to segment the sphere into multiple curved components that fit together.
- Ensuring appropriate tolerances for laser cutting.



### 3. Conversion to 2D Profiles:

- Extracting the 2D profiles from the 3D model for laser cutting.
- Exporting the sketches in DXF format to be used in Laser CAD.



#### 4. Processing in Laser CAD:

- Importing the DXF files into Laser CAD software.
- Arranging the parts efficiently to optimize material usage.
- Setting the laser parameters (power, speed, and focus) suitable for MDF cutting.

#### 5. Laser Cutting and Assembly:

- Cutting the MDF sheets using the laser cutter.
- Assembling the cut components by interlocking them according to the design.
- Applying adhesives if necessary to enhance stability.

#### 6. Finishing Touches:

- Smoothing out edges to remove laser burns.
- Painting or coating the sphere for aesthetics and durability.

## **7. Output:**



## **Conclusion:**

The project successfully demonstrates the application of Autodesk Fusion 360 and Laser CAD in designing and fabricating a hollow sphere. By leveraging 3D modeling and 2D laser cutting techniques, a complex structure was efficiently created using interlocking MDF components. This approach highlights the importance of digital fabrication tools in modern manufacturing and prototyping. Future improvements could involve optimizing the interlock design for better stability and experimenting with different materials for enhanced durability and aesthetics.