Sphere Design Using Circles and Semicircles in MDF – Fusion 360 & Laser CAD

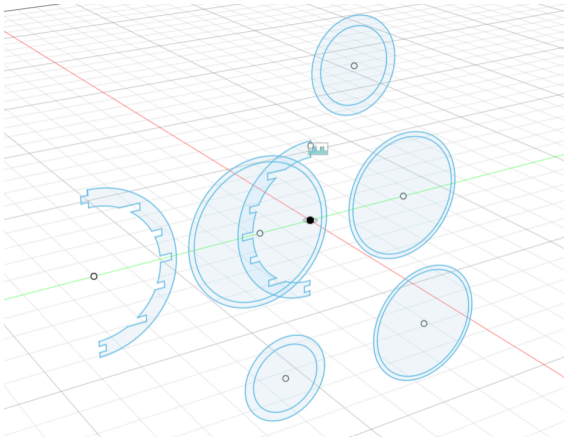
1. Introduction

This project focuses on designing a sphere using **2D circles and semicircles** in **Fusion 360**, followed by manufacturing through **laser cutting with MDF material**. The approach ensures efficient material use, a lightweight yet stable structure, and ease of assembly. The sphere has a **diameter of 50mm**.

2. Design Process

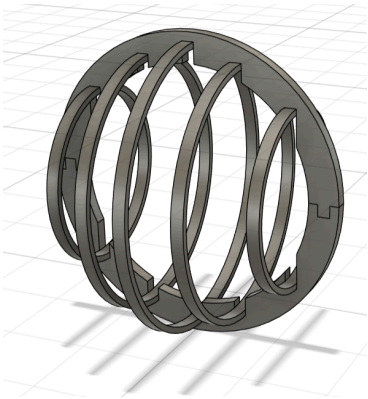
2.1. 2D Sketching in Fusion 360

- The design begins with **multiple circular profiles** representing the sphere's cross-sections.
- **Semicircles** act as interconnecting elements between these circular profiles.
- **Slots and joints** are incorporated for a secure press-fit assembly without additional fasteners.



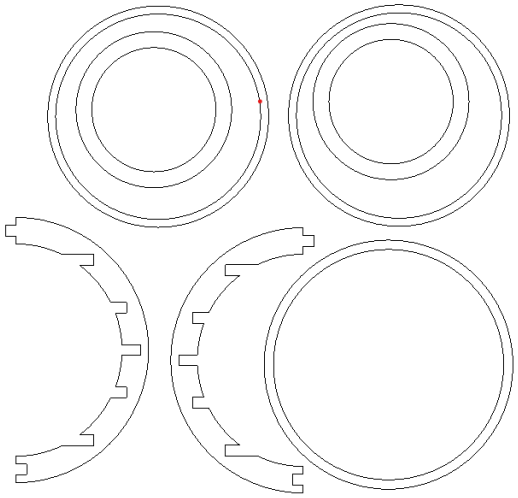
2.2. 3D Assembly

- The 2D sketches are extruded to match the **MDF thickness** for accurate slot fitting.
- **Interlocking tabs** provide structural integrity while keeping the sphere lightweight.
- The final assembly resembles a **geodesic sphere structure** with reinforcing rings.



3.File Preparation for Laser Cutting

- **DXF or SVG Export**: Fusion 360 exports 2D sketches in DXF or SVG format for Laser CAD software.
- **Layering for Cutting & Engraving**: Different layers can be assigned to:
    - **Cutting** (for the outer profiles of rings and semicircles)
    - **Engraving** (for assembly guides or markings)



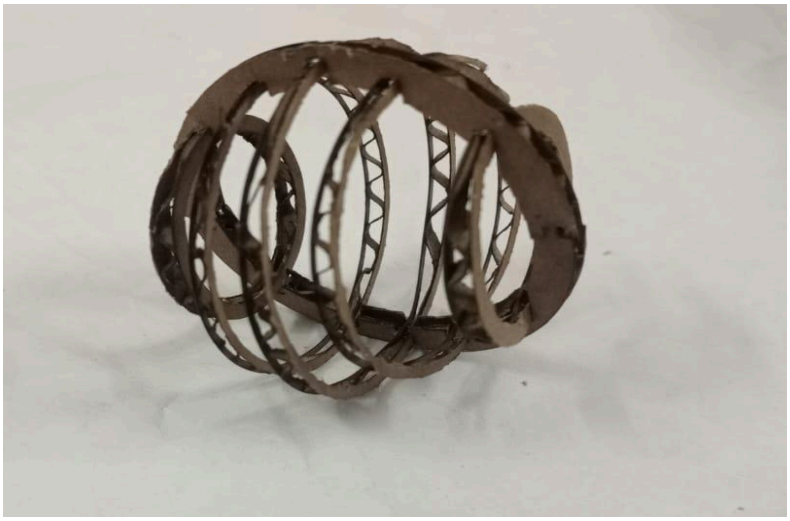
4. Assembly Process

- The laser-cut parts are **slotted together** following the pre-designed interlocking joints.
- **No glue or fasteners** are required when kerf and tolerances are precisely adjusted.
- The structure forms a **hollow sphere with reinforcing rings**, maintaining strength while being lightweight.

Laser-cut parts before assembly:

After laser cutting, I assembled the sphere by joining the interlocking pieces, successfully achieving the final 3D structure.

Fully assembled sphere:



5. Finishing & Post-Processing

- **Sanding**: Removes laser burn marks and smooths edges.
- **Clear coating or painting**: Enhances durability and aesthetics.
- **Test Cuts**: Running a small test cut ensures fit accuracy before full production.

6. Potential Applications

- Architectural and engineering models
- Decorative spherical structures
- Educational demonstrations of geometric principles
- Interactive displays or artistic installations

7. Conclusion

This sphere design, using circles and semicircles in **MDF**, efficiently balances **structural integrity, aesthetics, and ease of assembly**. The use of **Fusion 360 for precise modeling** and **Laser CAD for manufacturing** ensures a high-quality, interlocking construction suitable for various applications. The final sphere has a **diameter of 50mm**, making it compact and ideal for various design applications.