EDU[**CAD**]TION **STUDY GUIDE**

How to Choose the Right CAD File for Manufacturing

Chapter 4, Lesson 1

SendCutSend

Native vs Neutral Files

- **Native Files**: Proprietary to specific CAD software and include design history, parameters, and constraints.

- **Neutral Files**: Universal formats meant for sharing between different CAD programs or manufacturing systems.

Tip: Use neutral formats for sending designs to manufacturing. Native formats are best for collaboration within the same CAD software.

2D File Types

• 2D file formats are used for flat parts made with laser cutting, waterjet cutting, or plasma cutting. These files contain outlines and profiles for through-cuts only.

Common 2D File Types:

• **DXF** (Drawing Exchange Format): The industry-standard neutral format, compatible with nearly every CAD system and accepted by SendCutSend.

• **DWG** (Drawing): Autodesk's native format, widely supported but less universal than DXF.

• **SVG** (Scalable Vector Graphic): Common for web-based and design applications.

• **AI**: Adobe Illustrator's native file type, primarily for 2D vector graphics.

Key Concept: Think **2D machine** → **2D file** → **DXF** format. **DXF** should always be your go-to format for laser or waterjet projects

3D Solid vs 3D Mesh

- 3D files are divided into two main categories: **3D Solids** and **3D Meshes**.

- Each serves a specific purpose depending on how your part will be manufactured.

- **3D Solids**: Represent a full, closed volume (like a solid block). These are ideal for machining, milling, and simulation because they include physical properties like density and mass (see Figure 1.1).

- **3D Meshes:** Represent surfaces made up of connected triangles, similar to a paper-mâché shell. Meshes are used for 3D printing or visualization, where only the external surface matters (see Figure 1.2).

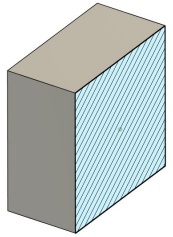

Figure 1.1

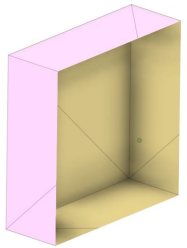

Figure 1.2

3D File Types

- The **STEP** (.stp or .step) file stands for Standard for the Exchange of Product Model Data.

- It's the universal format for sharing solid 3D models across platforms. STEP files preserve geometry and scale but not feature history.

- When preparing files for CNC machining or milling, always use the STEP format for best compatibility.

3D MESH File Types

• **Mesh** files are typically used in 3D printing and additive processes. They describe external surfaces only.

Common Mesh Formats:
• **STL** (Stereolithography): The most common 3D printing format.
• **OBJ** (Object File): Supports color and texture data for visual models.
• **3MF** (Modern STL): A modern format supporting advanced metadata and materials.

• Mesh files are not ideal for CNC or laser cutting workflows because they lack internal structure and precision features.

File Type Summary Table

- 2D Manufacturing (Laser, Waterjet, Plasma) → Recommended File: **DXF**
- 3D Manufacturing (CNC, Milling) → Recommended File: **STEP** (.stp)
- 3D Printing (Additive) → Recommended File: **STL**

Summary

Understanding CAD file types ensures that your designs move seamlessly from concept to production. Whether you're laser cutting flat parts or machining 3D solids, exporting in the correct format is the foundation for accurate, manufacturable results.

Learn more at https://sendcutsend.com/education/