

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

How to Add Tapped Holes to Your Sheet Metal Parts

Chapter 5, Lesson 11

SendCutSend

What is Tapping?

- Tapping is the cutting or forming of internal threads into a pre-cut hole.
- In sheet metal, tapping is a secondary operation performed after the laser cutting process.
- Depending on the material thickness, the threads may be:
 - **Through holes:** cut completely through the sheet (common in thin materials).
 - **Blind holes:** stop part way through (more common in thicker stock).
- There are two main types of tapping:
 1. **Cutting taps:** use a hardened tool to cut the helical thread profile.
 2. **Forming taps:** push and shape material into the thread form (no chips created). These threads are often stronger due to work hardening of the material.



Figure 1.1

Thread Types and Nomenclature

- **Imperial Threads:** Imperial threads use two key measurements:
 - Thread size – the nominal outside diameter (e.g., $\frac{1}{4}$ ").
 - Threads per inch (TPI) – number of peaks per inch along the thread.

Examples:

- $\frac{1}{4}$ -20 UNC $\rightarrow$ $\frac{1}{4}$ " diameter, 20 threads per inch (coarse).
- $\frac{1}{4}$ -28 UNF $\rightarrow$ $\frac{1}{4}$ " diameter, 28 threads per inch (fine).
- **Coarse** (UNC) threads are stronger and easier to assemble.
- **Fine** (UNF) threads offer more thread engagement in thin materials but are more prone to galling.

- **Metric Threads:** Metric threads use:
 - Major diameter (e.g., M5 = 5 mm).
 - Pitch – distance between thread peaks in millimeters.

Example: M5 $\times$ 0.8 $\rightarrow$ 5 mm major diameter, 0.8 mm between peaks. Larger pitch = coarser thread; smaller pitch = finer thread.

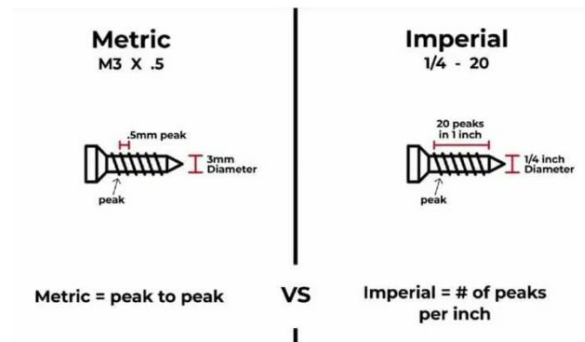


Figure 1.2

Thread Engagement

- Thread engagement measures how much of the male and female threads contact each other.
- If the pre-cut hole is too large, less material is available for the threads to grip.
- Ideal engagement is around 70%, providing strength without excessive friction. SendCutSend automatically sizes the pre-cut hole for your chosen tap (see Figure 1.3).
- You don't need to calculate drill sizes, simply select the thread type during checkout.



Figure 1.3

Minimum Material Thickness

- The thinner the sheet, the fewer full threads you can form.
- **Rule of thumb:** Material thickness should be $1\times$ to $1.5\times$ the bolt diameter for good thread engagement. If your material is thinner, tapping may not be available for that combination. When you reach that thin threshold, consider switching to hardware installation (covered in the next lesson).

Tapping Setup in CAD

- Here's how to model and prepare tapped holes in Fusion 360 (or similar CAD software):

1. Create a sketch on the surface where you want the tapped hole.
2. Add a circle at the desired location and dimension it.
3. Go to **Solid** → **Create** → **Hole** (see Figure 1.4).
4. In the Hole dialog box (see Figure 1.5):
 - Select 'Simple Hole' type and 'Tapped Hole' from the options.
 - Once you've selected 'Tapped' more options will appear below (see Figure 1.6).
 - Choose your thread size (e.g., 1/4-20 UNC or M5×0.8).
 - Leave 'Modeled Threads' unchecked for manufacturing.
5. Confirm and finish the hole feature.
6. Export your flat DXF for SendCutSend.



Figure 1.4

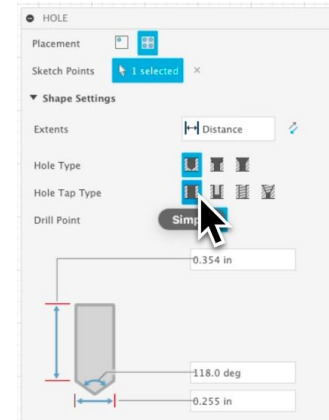


Figure 1.5

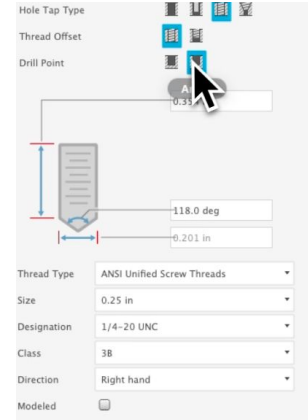


Figure 1.6

Adding Tapped Holes in SendCutSend

1. Upload your DXF or STEP file to SendCutSend.
2. Go to **Hole Operations** → **Tapping**.
3. Select your desired thread type (e.g., 1/4-20, 10-32, M5×0.8) (see Figure 1.7).
4. The system automatically resizes the hole to the correct pre-tap diameter.
5. If needed, change to a different thread type — the hole will auto-adjust.
6. Review your setup, then proceed to checkout.

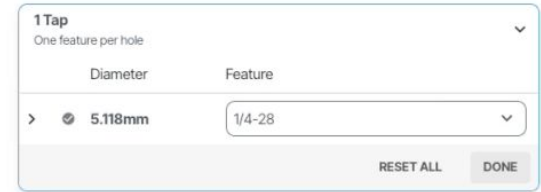


Figure 1.7

Summary

Tapping is one of the most efficient ways to add internal threads directly to your laser-cut parts. By understanding thread types, engagement, and material limitations, you can design parts that assemble cleanly and securely. SendCutSend's automated resizing and DFM checks make the process simple, accurate, and production-ready.

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