

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

How to Add Insert Hardware to Your Sheet Metal Designs

Chapter 5, Lesson 12

SendCutSend

What is Insert Hardware?

- Insert hardware allows you to add **threads**, **studs**, or **standoffs** to thin sheet metal where traditional tapping isn't possible or strong enough (see Figure 1.1).
- Rather than cutting threads into the part, a mechanical press crimps the hardware into the metal, locking it in place using small teeth or knurled ridges.
- At SendCutSend, PEM hardware is the standard, this is the brand name used for insert hardware, similar to how "Kleenex" is used for tissues.

Resources:

PEM Guidelines: <https://sendcutsend.com/guidelines/hardware/>



Figure 1.1

Why Use Insert Hardware?

- Insert hardware offers several advantages in both design strength and manufacturing efficiency:
 - Provides strong threads in thin material where tapping would fail.
 - Requires less assembly tooling, no need for wrenches on both sides.
 - Simplifies and speeds up assembly, reducing manufacturing costs.
 - Expands 3D design capabilities in sheet metal (especially with standoffs).
 - Enables modular assembly and better fitment for components like PCBs.

Types of Insert Hardware

There are three main types of insert hardware used at SendCutSend:

1. **Studs:** Threaded shafts crimped through the sheet metal, functioning like a built-in bolt (see Figure 1.2).
2. **Nuts:** Internally threaded inserts pressed into the sheet, eliminating the need for loose nuts (see Figure 1.3).
3. **Standoffs:** Cylindrical spacers with internal threads, used to elevate components like circuit boards (see Figure 1.4).



Studs

Figure 1.2



Nuts

Figure 1.3



Standoffs

Figure 1.4

Pull and Press Directions

- Since insert hardware is crimped into the metal, the press direction (insertion side) and pull direction (load direction) matter greatly:
 - **Stud:** Insert from one side; pull through same direction as press.
 - **Nut:** Insert from one side; load through same direction as press.
 - **Standoff:** Insert through sheet; load in same direction as insertion.
- Check SendCutSend's [hardware catalog](#) for each hardware's proper load direction.

Design Guidelines

1. **Minimum and Maximum Part Sizes:** Limited by the press machine's throat depth and holding capacity.
 2. **Clearance from Features:** Maintain spacing between PEM hardware and bends, dimples, or holes.
 3. **Access Requirements:** The press requires access from both sides; avoid blocking bends or flanges.
 4. **Warping:** Multiple inserts in thin metal can cause distortion; add bends to strengthen flat areas.
- **Finishing Considerations:**
 - **Powder Coating:** Install hardware before coating, and use plugs or caps to protect threads.
 - **Anodizing:** Install hardware after anodizing, since chemical reactions may damage hardware if inserted before

CAD Workflow for Insert Hardware

1. **Create Base Geometry:** Start with a flat sheet design and add sketch holes where hardware will go.
2. **Add Hole Placement:** Use offset sketches for even spacing from edges (e.g., 0.5"). **Note:** *SendCutSend will resize holes for hardware that you pick.*
3. Use **Create** → **Hole**, select **Simple Through Hole**, and size to match hardware (see Figure 1.5).
4. **Export DXF:** Save the flat pattern for upload to SendCutSend.
5. **Configure Hardware:** On SendCutSend's site, open **Hardware Insertion** → **Open Catalog** → **choose type and thread size** (see Figure 1.6).

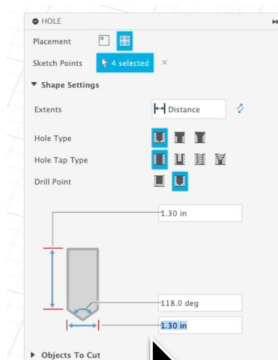


Figure 1.5

Choose below or click a feature on your drawing to add services

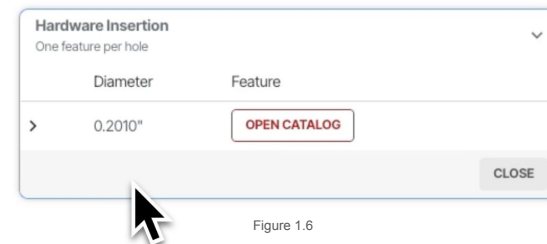


Figure 1.6

Summary

Insert hardware is essential for creating durable, professional sheet metal assemblies. By integrating PEM nuts, studs, or standoffs, you can produce thin yet strong parts without threading or welding. These components streamline assembly, improve design flexibility, and ensure manufacturable, reliable results.

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