How to install heat-set inserts straight without a press

Asked 3D Content Team
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Abstract. A soldering-iron procedure for square, flush heat-set inserts: iron 10 to 20 °C above printing temperature, melt about 90 % of the way, finish with a flat tool.

Keywords: heat-set-inserts, threads-and-fasteners

1 How do you install heat-set inserts straight without a press?

Set the iron 10 to 20 °C above the material's printing temperature and rest the insert on the hole. Let the iron's own weight sink it about 90 % of the way, per CNC Kitchen. Lift the iron, press the last stretch flush with a flat tool, and hold it a few seconds.

1.1 The number

Table 1. The number

Step	Figure	Source
Iron temperature	printing temperature + 10 to 20 °C	CNC Kitchen, Prusa Research shop page
Depth reached with the iron	about 90 % of the insert	CNC Kitchen
Final push	the last short stretch, with a flat tool	CNC Kitchen
Hold after the push	a few seconds, until the plastic has solidified	CNC Kitchen
Blind hole depth	about 1 mm deeper than the insert	CNC Kitchen

Figures from CNC Kitchen's Tips & Tricks post and the Prusa Research shop page for the same inserts. Neither source states a press force or a time for the iron stage, which ends when the insert reaches depth, not on a clock.

1.2 Why

A press keeps the iron on one axis. Without one, the insert tilts for two reasons: the iron pushes off-center, or the tip drags the insert sideways when it lifts. The procedure below handles both.

Weight, not hand pressure, does the sinking. Hackaday's guide puts it as letting gravity do most of the work, and UltiMaker warns that any twisting or sideways pressure leaves the insert askew.

A conical soldering tip sits in the insert bore at an angle you cannot see. Dedicated insert tips remove the guesswork. CNC Kitchen's have a centering pin sized to the bore, so the insert seats true on the tip. The Adafruit tip has a square shoulder that shows whether the insert is square in the part, and a vertical wall so the iron pulls out without dragging the insert. Adafruit's rig, which holds an iron vertically, is the press alternative for volume work.

Stopping at 90 % matters because the last millimeter is where a tip pushes molten plastic over the flange, and where the insert follows the tip back out. CNC Kitchen found that inserts creep out of the part right after melting. The flat tool finishes the insert flush and pins it while the plastic sets. DigiKey adds the pace: go slow, because plastic flows over the top of the insert if it is pressed too fast.

The hole has to cooperate. CNC Kitchen wants it straight, not tapered, no chamfer, and about 1 mm deeper than the insert

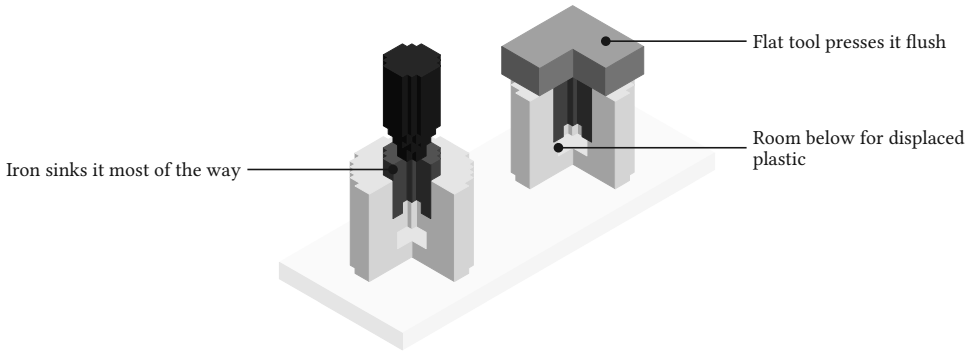


Figure 1. The iron stops before the insert is flush, then a flat face held square to the surface pushes the last stretch and holds it while the plastic sets.

so the displaced slug has somewhere to go. Hole diameters per size are in What hole size does an M3 heat-set insert need?.

Get it wrong and the insert sits proud or tilted, the screw enters at an angle, and the first firm tightening cracks the boss or strips the plastic around the knurl.

1.3 How to check it on your own print

1. Heat the iron to the material's printing temperature plus 10 to 20 °C, with an insert tip fitted if you have one. Support the part flat on the bench, hole pointing up.
2. Place the insert on the hole, tapered end down, and lower the tip into its bore. Hold the iron vertical and let its weight carry the insert down; do not push.
3. When the insert is about 90 % in, lift the iron straight up. If the insert lifts with it, the tip was gripping: wiggle the iron before lifting, or use a vertical-wall tip.
4. Press the insert home with a flat tool held square to the surface: a screwdriver blade, tweezers, or the flat face of a straightener. Hackaday describes pressing a flat, heat-resistant plate over the whole part, which seats it flush by definition.
5. Hold for a few seconds until the plastic has solidified, then check: the insert top is level with the surface, no plastic sits on the flange, no burr shows on the back of the boss, and a screw threads in straight by hand.

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