ShopBot®

888-680-4466 • ShopBotTools.com

Holding Down Material for Cutting

Table of Contents

Introduction 5
Screws 5
T-Track Tables and Rails 5
Clamps 6
Press-Fit Jigs 7
Adhesives 7
Vacuum Hold Down Systems 7
Holding Small Parts within the Material 8

Introduction

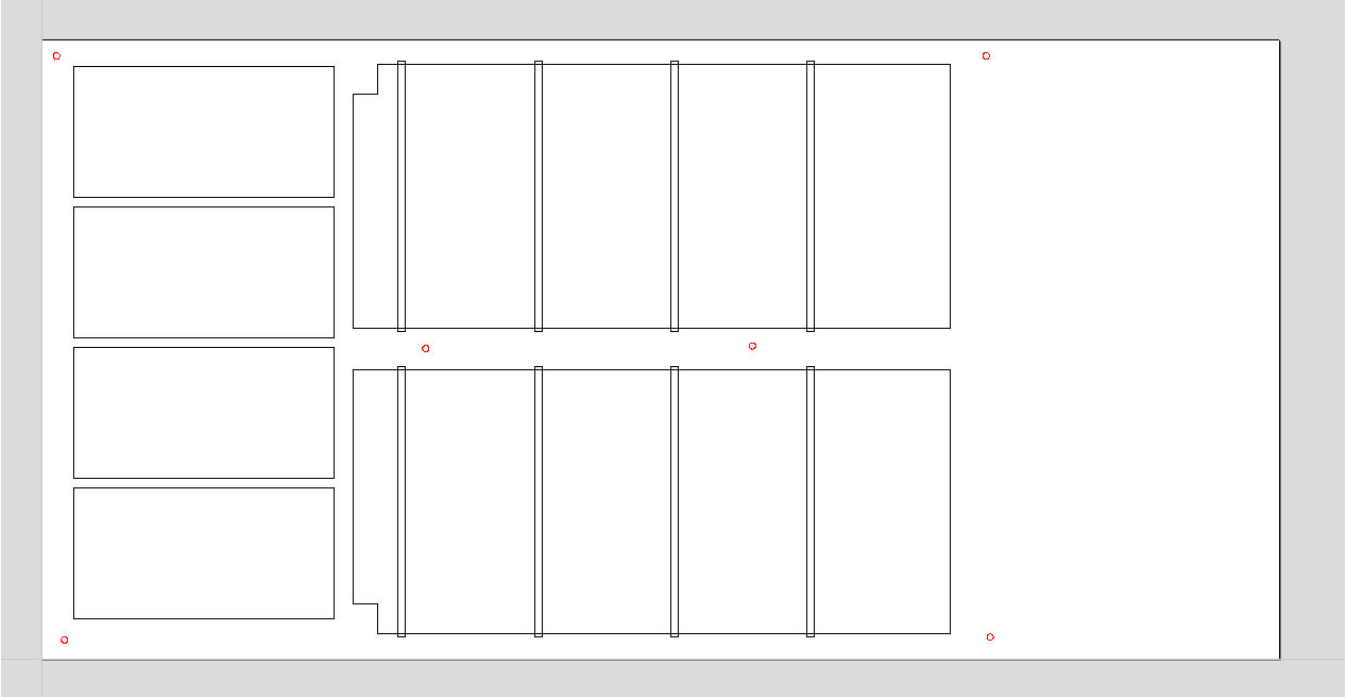
Choosing the right hold down method can be challenging, but it is an important part of project planning. Not only does the work piece need to be held securely, but it is important to know what will happen to parts as they are cut from the surrounding material. Small parts can be caught by the cutter and thrown across the room, causing serious injury or damage.

The following information is a brief overview of different hold down methods.

Screws

If a spoilboard is set up, screw the workpiece directly to the table. This is a quick and easy method that works well for most materials. However, this requires careful planning to make sure that all the screws are clear of the cut path.

With larger jobs it may be necessary to create a hold down toolpath based on the location of other toolpaths in the file. This will create clearance holes for the screws in safe locations. When using an end mill for drilling, there is very little lateral force on the piece, so less holding power is needed. One clamp on each end of the material is enough.



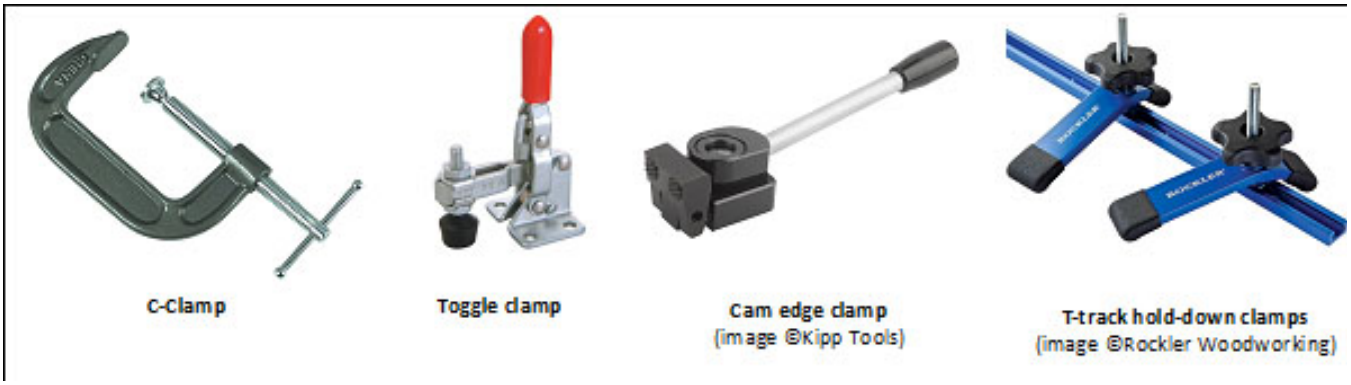
Shown here: In SB3 CAD/CAM software, the circle vector tool was used to place several hole locations around the parts. The drilling toolpath is saved as a separate part file so it can be run first. The material is screwed down through these holes, and the main cut file can be run safely.

T-Track Tables and Rails

The Shopbot Buddy and Desktop Tools have an aluminum table base that is ideal for setting up moveable clamps and fixtures. On full-size machines, it is possible to set up a system using T-track rails (available from woodworking supply stores), inlaid into the MDF deck. To use this method, ensure the rails sit low enough below the surface that they are out of the way when through-cutting.

Clamps

Whether working with a metal T-track table or a spoilboard, there are a variety of clamps that can be used to secure the material. Clamps offer strong holding power and are ideal when there is no excess material to drive screws into. This method, however, requires careful planning to avoid running the tool into the clamps.



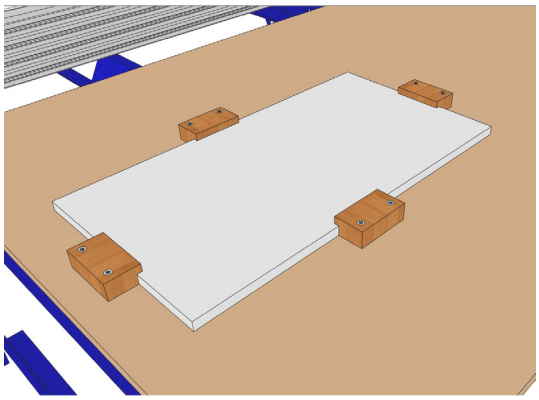
C-Clamp

Toggle clamp

Cam edge clamp
(image ©Kipp Tools)

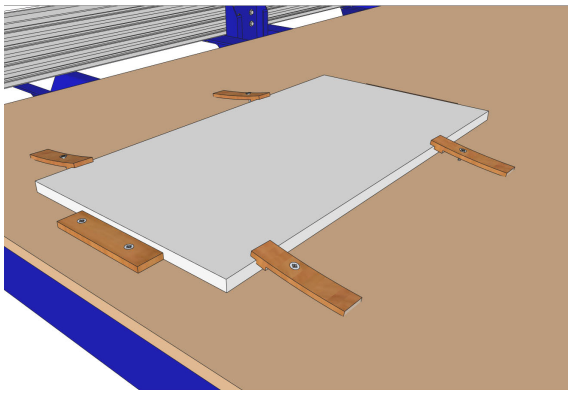
T-track hold-down clamps
(image ©Rockler Woodworking)

Clamps can also be made from scraps of wood. Here are two examples:



A block of wood with a rabbet (groove on one side) can be used on each side. The rabbet height should be slightly less than the material height, allowing it to pull down tightly when screwed in place.

A thin, slightly flexible strip of wood can be used on varying material thicknesses. Glue a smaller strip across it, which will butt against the material to prevent slipping.

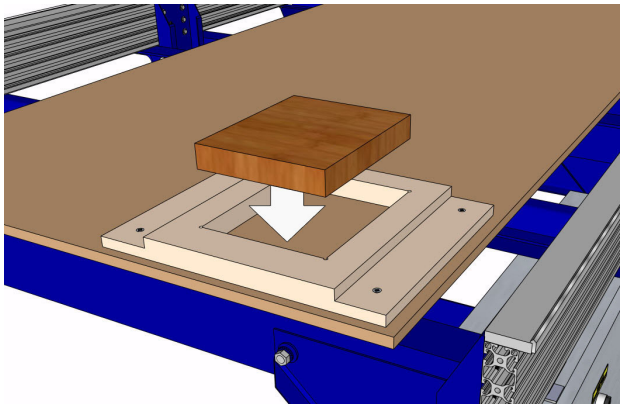


Press-Fit Jigs

A press-fit jig provides good holding power and can be made quickly and accurately using the Shopbot.

This is a good solution for holding small work pieces, extra-thick stock, or if the material has already been cut to its final size and there is no room for screws.

Shown here: two pieces of MDF have been glued together and pocketed out to hold this piece of hard-wood. The jig is screwed to the table, then the work-piece is pressed in.



Adhesives

Double-sided duct tape
(image © Duck Brand)

VHB foam tapes
(image ©3M)

Super 77 spray adhesive
(image ©3M)

Adhesives can be more difficult to work with, but they offer some advantages over other methods. This can work well for thin materials that cannot be held by a press-fit jig. More surface area = more holding power, so small projects will require additional hold-downs.

To use tape adhesive, both the table and work piece must be clean, flat, and dust-free. If planning to cut all the way through the material, keep the tape away from the planned toolpath if possible (it may gum up the cutter, reducing cut quality for the rest of the part).

For spray adhesive, Super 77 from 3M is highly recommended. Super 77 forms an extremely strong bond within minutes. To avoid damaging the table, bond the workpiece to a scrap board that is clean and flat, then clamp or screw this board to the table. Some people prefer to glue a layer of paper be-tween the workpiece and support board. This can weaken the bond, but it makes removal easier. Try both methods on some scrap to compare.

Vacuum Hold Down Systems

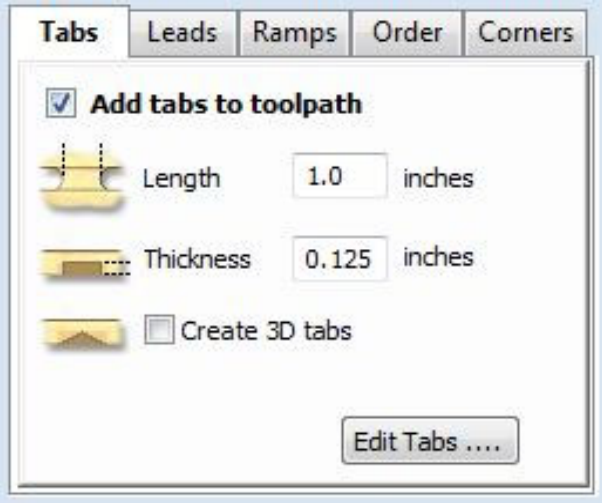
A well-sealed vacuum system can be one of the most convenient and effective hold-down methods. It is ideal for repetitive cutting of plywood and other large sheet materials.

Shopbot offers several kits for full-table vacuum systems. It is also possible to build your own. There are many resources online for both commercially available and DIY vacuum systems. An internet search for “CNC vacuum hold-down” would be a good place to start.

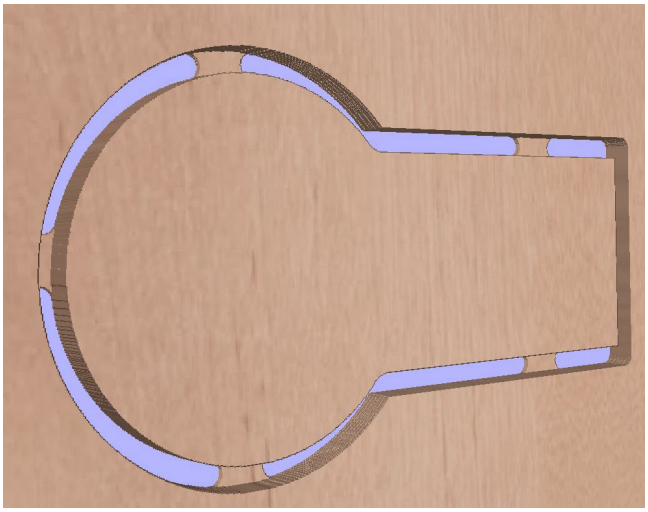
Holding Small Parts within the Material

Once the material is secure, it is still necessary to consider what will happen to parts as they are cut. Large parts may shift as they are cut free, leading to a small gouge or notch along the edge. Smaller parts can be destroyed or thrown by the cutter.

There are two ways to handle this from within the software. The first option is to create tabs, or left-over “bridges” of material between the part and its surrounding area. Most CAM programs will have an automated feature for this. The feature for V-Carve Pro is shown here.



Adding tabs in V-Carve Pro



Example of tabs on a part

A second option is to leave an “onion skin,” or very thin layer of material at the bottom of a profile cut. Set the final cut depth at slightly less than the thickness of the material (typically .010” - .030”, depending on material and size). The advantage is that the onion skin provides better hold and can be easier to trim/sand away than a series of thick tabs. However, if there is a lot of variance in the thickness of the material, or if the table is not flat, then a cut may be too deep or too shallow.