

A Few Remarks about the Granite Surface Plate Box

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A WARNING - PLEASE READ

Woodworking can be dangerous! It's up to you to determine if you can safely use the tools and perform the tasks needed to complete this and any other woodworking project. If you are unsure, STOP! Get advice from someone knowledgeable or do some careful studying on your own. Be safe!

Always wear at least an appropriate N95 dust mask or respirator when sanding or spraying paint. For advice about dust masks and respirators, visit this link:

<https://woodworkingtoolkit.com/best-dust-masks-respirators/>

**READ, UNDERSTAND, AND FOLLOW ALL OF THE
INSTRUCTIONS AND WARNINGS THAT CAME
WITH YOUR TOOLS. BE CAREFUL!**

This Is Not Standard Documentation - Fill In the Blanks

I generated the original material in this ZIP package just for me, not for a general audience. This gave me the freedom to create a minimal amount of written design documentation. And it allowed the documentation to be technically incomplete. I simply carried some ideas around in my head.

Please be aware that I might not have included every detail that you need to build this project. So I suggest that if you want to build it, carefully look things over and determine ahead of time if you have enough information to go forward.

It might be sufficient to simply guess at any needed information if you can't find it in the included files.

Information is missing in some cases. For example the four 1/8" holes in the front of the box are countersunk from the inside of the box but the countersinks aren't shown in the drawing; however, there is a callout in the drawing indicating where the countersinks must be.

Please be aware that there might be mistakes in the documentation that I accounted for during the build but failed to note in the documentation.

Non-standard Dimensioning

My attitude toward dimensioning is to make it "good enough." Professional mechanical designers follow certain conventions regarding dimensioning. I'm not that careful. So understand this ahead of time when you find any dimensioning that is unconventional.

The Granite Surface Plate Box

This box is a storage and protective container for a granite surface plate that measures approximately 12" x 9" x 2". The particular plate used in this case is available from <https://www.woodcraft.com> as Item #144838. Be sure to carefully check the dimensions of your surface plate and make any needed adjustments to the design information provided here.

Though one surface of the granite is extremely flat, the sides of the granite are not necessarily square. So be careful when building and doing any re-dimensioning of your version of the box.

The inside dimensions of the box are only slightly larger than the surface plate. Despite the fact that the granite is not exactly square, it does fit in the box. Be sure your surface plate will fit before building the box.

The Materials Used

Plywood

The front, back, and sides of the box are made using 3/4" plywood. The gate and the box's bottom are made using 1/2" plywood.

Hardware

Carriage Bolts, Etc.: A set of four 1/4"-20 x 3 1/2" carriage bolts, together with flat washers and nylon-insert locknuts secure the front of the box to the sides and back of the box. The granite is very heavy, so the bolts are needed to strengthen the box.

Threaded Insert: A single, steel 1/4"-20 treaded insert sold by <http://www.rockler.com> as part number 28803 is used in the gate.

Thumbscrew: A single 1/4"-20 x 1" thumbscrew is used in the threaded insert to secure the gate into the top of the box by extending the end of the thumbscrew through the insert and into the hole in the shelf.

Screws: Four #6 x 1 1/4" countersunk screws secure the shelf to the front.

Biscuits

A pair of #20 biscuits was used to align each side of the box to the back. These biscuits are not shown in the drawings or photographs. If you use them, be sure to locate them so that they don't interfere with the carriage bolts that hold the box together.

Glue

Tite Bond II or equivalent should be used to glue the pieces together. The granite is very heavy, so the box must be made strong.

Finish

No finish was used since the box is strictly utilitarian. A finish could compromise the integrity of the granite surface plate if it were to rub off onto the plate.

Using the Drawings

A SketchUp File and an Equivalent PDF File

File *Granite_Surface_Plate_Box_10.skp* is the SketchUp design for the box. This file is useful since I think all of the necessary details are incorporated here. So, for example, if you find a dimension or other detail missing, it can be determined by examining this file. You can orbit and move the model around for a better look at everything.

File *Granite_Surface_Plate_Box_10.pdf* contains all of the images and dimensions from the SketchUp file. Use this if you're not familiar with SketchUp.

Note that certain details are deliberately missing: the countersinks for the four 1/8" holes in the front are not shown.

The Details

The information that follows will help to make clear the details of each component so that possible misunderstandings might be avoided. Each of the box's components will be discussed. Use the included SKP or PDF file to follow along with these descriptions.

3/4 View

Look at the 3/4 View page. You can see the overall nature of the box. The green items are 3/4" plywood. The khaki items are 1/2" plywood.

Note that 3/4" plywood typically has a thickness of about 23/32" and 1/2" plywood typically has a thickness of about 15/32". The 23/32" and 15/32" dimensions were assumed in this design. If the thickness of your plywood is different, you might want to change some dimension in the drawings.

Exploded View

Look at the Exploded View page. All of the individual wood parts are shown and identified.

No hardware or biscuits are shown.

Note that the green items are 3/4" plywood. The khaki items are 1/2" plywood.

Notice that the bottom of the box is 1/2" plywood captured in dados in the front, back, and sides. (The dado in the front can't be seen in this view.)

A "gate" at the top of the box is contained in dados in the back and sides, and in a slot in the front. The gate is free to slide in and out of the slot and the dados to allow access to the granite surface plate. Any force of the granite against the gate is contained by the slot and the dados.

The gate has a hole where a threaded insert is to be installed. A thumbscrew threads into the insert. When the gate is fully seated in the slot and dados, the thumbscrew can be screwed in far enough that it extends beyond the threaded insert and into the hole in the shelf. The gate is locked in place and prevented from sliding out of the top of the box when the thumbscrew extends into the hole in the shelf.

So the gate is secured in the box and prevents the heavy granite surface plate from coming out of the box. The box is designed so that any stress caused by the granite pressing against the gate is contained by the slot and dados, not the thumbscrew.

Back

Look at the Back page. Both sides of the back can be seen. The back of the back is shown in the left view. The front of the back is shown in the right view.

A slot for a handhold can be seen at the top. You should round over the inside edges of this slot. You should also round over the edges of the back above the top ends of the side pieces. This will make carrying the box more comfortable.

Four 3/4" counterbores that are 7/16" deep can be seen in the left view. A 1/4"-20 3 1/2" carriage bolt comes in through the front and sides and into the back. Place a flat washer over the bolt and into each counterbore. Screw a 1/4"-20 nylon-insert locknut onto each bolt and tighten securely.

In addition to the 1/4" hardware, glue is used to secure the back to the sides.

Two stop dados are shown in the right view. Each slot is 9 11/16" long, 1/4" deep, and 1/2" wide.

Front

Look at the Front page. The slot for the gate is cut into the front. The slot's position corresponds to the positions of the dados cut into the sides and back at the top.

A stop dado is cut near the bottom of the front piece. The dado's position corresponds to the dados cut into the sides and back at the bottom.

Four 1/8" through-holes are arranged just below the slot. These holes must be countersunk for 1 1/4" #6 screws. Be sure the countersinks are sufficiently deep so that the heads of the screws cannot touch and damage the granite surface plate.

The through-holes are positioned to align with the centerline of the edge of the shelf on the other side of the front. The shelf is also secured to the front with glue.

Be sure that the shelf has been assembled to the front before assembling the front with the rest of the box. If you don't assemble the shelf to the front first, you won't be able to drive the screws through the front and into the shelf.

Four 1/4" diameter holes are shown near the edges. No position dimensions are provided for these holes. Do not drill these holes directly into the front. Instead, assemble the box using glue and clamps. Then drill 1/4" holes through the back at the counterbores and drill all the way through the back, sides, and front. This ensures that all of the holes for the 1/4" carriage bolts are aligned exactly. A drill press is the ideal tool for doing this drilling.

Sides

Look at the Sides page. The sides are simple. They contain only two dados and two 1/4" holes.

Biscuits (not shown) were used to align the sides with the back. No biscuits were used to align the sides to the front. Of course, be sure to locate the biscuits so they don't interfere with area where the carriage bolts will pass through.

Two 1/4" diameter, off-center holes are shown. No position dimensions are provided for these holes. Do not drill these holes directly into the sides. Instead, assemble the entire box using biscuits, glue, and clamps. Then, once the glue has had time to set completely, drill through the back at the counterbores and drill all the way through the back, sides, and front. This ensures that all of the holes for the 1/4" carriage bolts are aligned exactly. A drill press is the ideal tool for doing this drilling.

Bottom

Look at the Bottom page. This piece of 1/2" plywood is simply cut to the given dimensions.

Gate

Look at the Gate page. Cut this piece of 1/2" plywood to the given dimensions. The hole is intended for a threaded insert.

Installing the threaded insert: As mentioned earlier, a threaded insert is used in the gate. The 1/4"-20 steel insert was obtained from <http://www.rockler.com> as part number 28803. You might want to consider buying their Power Drive Threaded Insert Tool, part number 30174, also.

If you have no experience using threaded inserts, you should do some research on YouTube. The specific information that came with the 28803 threaded insert indicated that you should use a 15/32" hole in hard wood or a 29/64" hole in soft wood. As shown in the gate drawing, I used a 7/16" hole in the gate.

You might have to experiment with methods for inserting the threaded insert and for the optimum hole size in your case.

The method I used successfully: I stacked and clamped the gate piece on top of a piece of 1/4" plywood. To be clear, the gate piece was on top. Carefully mark the location for the hole.

After drilling the 7/16" hole through both pieces, TURN THE STACKED ARRANGEMENT OVER SO THAT THE GATE PIECE IS NOW ON THE BOTTOM.

Clamp the stacked arrangement to a bench. Use the 30174 driver tool with a drill or driver and begin driving the threaded insert into the hole. It might begin a little bit crooked but it should align itself with the hole once it begins to be seated in the hole. Using the 1/4" plywood gives the alignment process sort of a head start. Continue driving the insert until it's fully captured in the gate piece. This method might work for you. If it doesn't work, do some experimenting with scrap until you're comfortable with an insertion technique.

Shelf

Look at the Shelf page. One edge of the shelf mounts against the front so that the centerline of the edge is aligned with the centerline of the screw holes in the front. Carefully screw four #6 x 1 1/4" countersunk screws in through the back of the front and into the centerline of the edge of the shelf. Be sure to use glue in addition to the four screws to secure the shelf to the front.

Be sure that the shelf has been assembled to the front before assembling the front with the rest of the box. If you don't assemble the shelf to the front first, you won't be able to drive the screws through the front into the shelf.

Some Afterthoughts:

What I Would Do Differently If I Were Designing the Box Again

It should be said that the box as presented in the accompanying photographs, drawings, and dimensions serves its purpose and does it well. But there are changes that, in my opinion, would make the box better.

These proposed changes would make the box feel better when carrying it. And, they would make the box less likely to break if it were dropped with the heavy granite inside. Note that the box with the granite surface plate inside is heavy. It weighs about 30 pounds. So a lot of stress would be placed on the box if it were to be dropped onto a hard surface. If the box landed on the bottom, the area around the dados could break. These are the proposed changes:

- Improve the grip on the handhold. The area where the hand is wrapped feels too small. So, the hole of the handhold should be moved down about 1/2" or the top of the back should be moved up about 1/2". This will give the handhold a better feel.

- Use rabbets in the back and front to align the sides. This would eliminate the biscuits and provide a superior alignment mechanism for assembling the box.
- Use a larger distance between the dados and the ends of the sides, back, and front. The current design uses a 1/2" distance. It might be wise to increase this distance to 3/4" or 1" for increased strength. If this box, as currently built using the 1/2" distance, were to be dropped on its bottom side with the granite block inside, the dados would likely fracture under the stress of the heavy stone. The design is probably weak in this regard.