Benchcrafted Tail Vise

Assembly and Installation Instructions

Version: July 2012
www.benchcrafted.com

Contents:

Quantity	Description
1	Handwheel
1	1 1/4 precision acme screw (left hand thread)
1	1 1/4 acme nut block (left hand thread)
1	Sliding plate
1	Flange
1	Large washer
1	Groove pin
2	Guide rails
8	#12 x 3” screws for guide rails
2	5/16”-18 x 4” flange bolts with washers and lock nuts
2	5/16”-18 x 3/4 button head cap screw
2	1/4 x 2 pan head screw (for attaching dog block to sliding plate)
1	Rosewood handwheel handle with shoulder bolt
1	Thick washer for mounting the handle
1	Piece suede, enough to cover end of dog strip and face of dog block

Unpacking your vise:

Some parts, especially the rails and nut block, are heavy. Be careful as you unpack and handle them. Also be aware that although we make every effort to ease all edges, being machined parts you may encounter a sharp egde or burr. If you do, ease it with some fine abrasive paper or a fine file. Some components will have a rust preventative oil applied. You should remove this oil before installing the vise. Wipe it off with a clean paper towel, followed by a clean towel with a bit of mineral spirits. This will leave a light film of oil on the parts that will help prevent rust and keep the parts moving smoothly. Follow the classic advice about disposal of oily rags.

IMPORTANT !

Read and understand these instructions completely and thoroughly before starting the installation or cutting into your bench. Confirm all template measurements with your vise before installation. Do not begin installation without the vise and all hardware in your possession.

! ATTENTION !
Make sure when printing the templates that you turn off your printer’s page scaling function. Then use the 1” scale on the templates to confirm that the template is actual size.

Assembling the Sliding Plate and Nut

The Benchcrafted Tail Vise is universal. You can assemble the sliding plate to the nut block for either right-handed or left-handed use. If you are unsure of which one to choose, read the FAQ section on Tail Vises at our website. Unless you have a special situation, you'll most likely assemble the plate to the nut based on your dominant hand. If you're right-handed, assemble the vise in right-hand configuration, etc.

Tools required:

3/16" Allen wrench

The plate attaches to the nut block with two included 5/16"x 3/4 button-head cap screws. Follow the pictures below to assembled your plate and nut according to right-hand or left-hand use. Visit our video gallery page for a video on assembling the vise and sliding plate assembly.

End-cap view (as if you were standing at the Tail Vise end of the bench and looking down) :

Left-hand Right-hand

Opposite end view (as if you were standing at the far opposite end of the bench and looking down towards the Tail Vise end)

Left-hand Right-hand

Assembling the Handwheel and Screw

The Benchcrafted Tail Vise and Glide Leg Vise ship unassembled. You will need to install three parts onto the 18" acme screw's shaft: the washer, flange, and handwheel. It only takes about a minute.

Tools required:

Small hammer
Pin punch or large nail set

smooth end

fig. 1

1. Remove the handwheel, flange, large washer, 18" acme screw, groove pin and logo from the box and remove the VCI paper.

2. First, place a couple drops of light machine oil on the shaft end of the acme screw near the shoulder for lubrication, then slide the washer onto the shaft.

3. Next, slide the flange onto the shaft.

IMPORTANT : Face the side with the two countersunk holes away from the screw. The countersinks need to face OUT once the vise is mounted in the bench..

4. Slide the handwheel onto the shaft, lining up the cross hole in the handwheel's hub with the cross hole in the shaft. Peer down into the hole and position the handwheel until the two holes line up precisely.

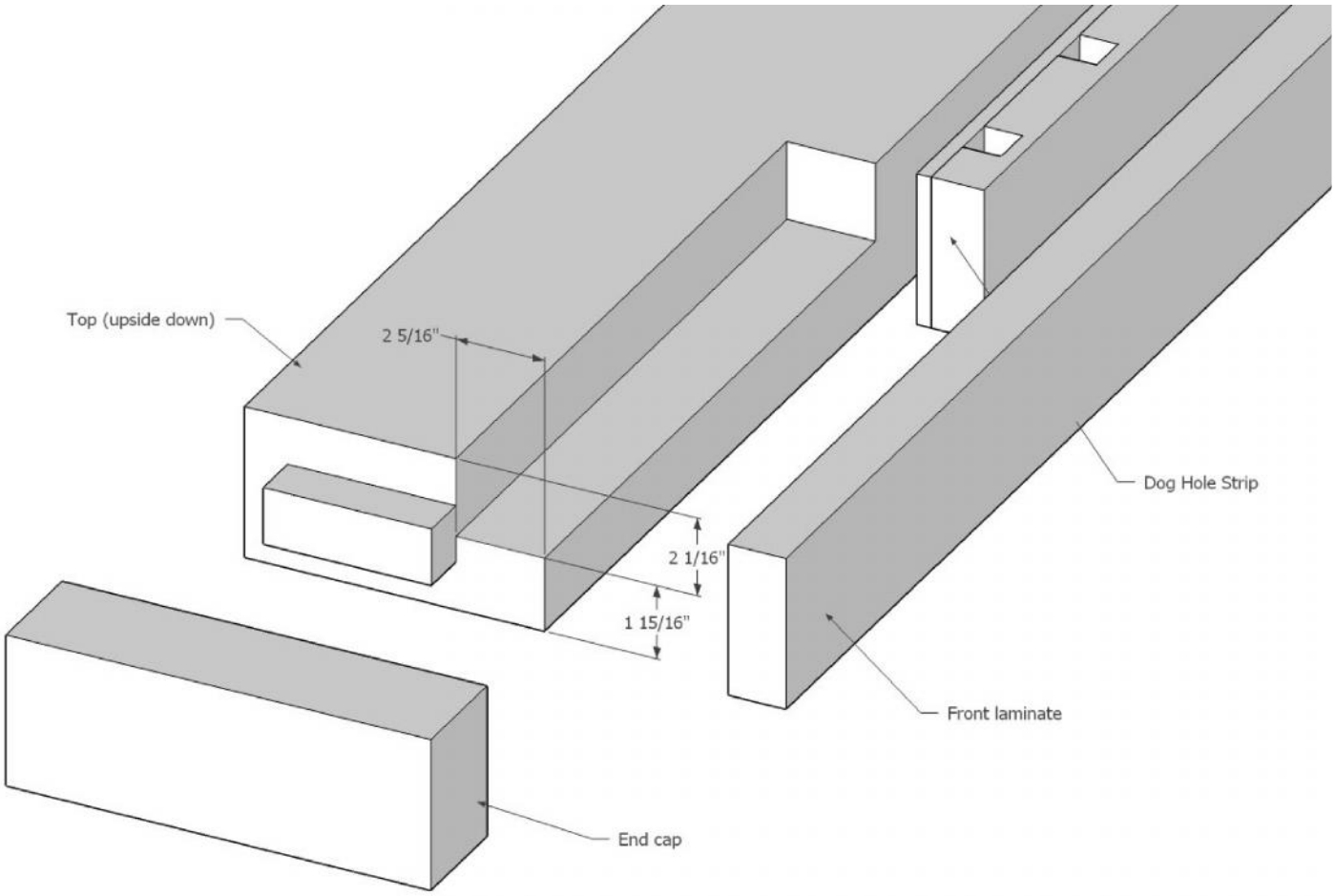
5. Get the groove pin, punch and hammer. Examine the groove pin. One end is smoothly round, with virtually no grooves. The grooves get wider as they reach the opposite end of the pin. See fig.1

6. Insert the SMOOTH END WITH NO GROOVES first into the cross hole in the hub and with finger pressure insert the pin until you feel it engage the hole in the shaft. If you can't insert it far enough with finger pressure, use the hammer to lightly tap the pin to get it moving towards the shaft. Try to keep the hub in line with the cross hole in the shaft as you tap the pin in. Keep tapping the pin in until you feel a little resistance as the pin meets the hole in the shaft. Tap some more until you feel the pin engage the hole in the shaft. Now take the pin punch and place it on the head of the pin and finish driving the pin through the shaft and the opposite side of the hub. Use light taps. The fit is machined precisely, it doesn't take much force. Do not over drive the pin, stop when its centered in the hub's diameter. The flange should spin freely on the shaft and have a little bit of play in the fit.

Getting Started

The vise can be readily adapted to thicker or thinner benches. Instructions will assume you are installing this vise in the construction of a new bench with a 4" thick top. The vise installation is not complex, and once you understand how it works, adapting it to fit other bench styles or existing benches will be straight-forward. Templates at the end of these instructions show how to adapt the vise for thinner benches. If you are installing in a left-handed position, we provide step photos of left-handed installation within these instructions . Unless noted, pics and illustrations are for right-hand installation.

NOTE: The templates are sized for a 4" thick top. It's important to register the templates from the top surface of the bench if your bench is not 4" thick. This ensures the handwheel's rim will remain below the top plane of the bench.



The first step in installing the vise is to prepare the top of the bench. If you're building from scratch you'll have four components. The top, dog hole strip (made up of two pieces if you're using square dogs) front laminate and end cap. If you're retrofitting you'll need to add an end cap at the very least. You may also want to add a dog hole strip and front laminate to make the install more precise. Otherwise you'll have to create the cavity and slot instead of building them up from the four components. The vise connects to the bench in three places: the two guide rails are screwed into the underside of the bench, and the screw/handwheel assembly bolts to the end cap. The more precisely you attach these parts, the better the vise will work. Work carefully and attentively and you'll be rewarded with a sweetly working vise.

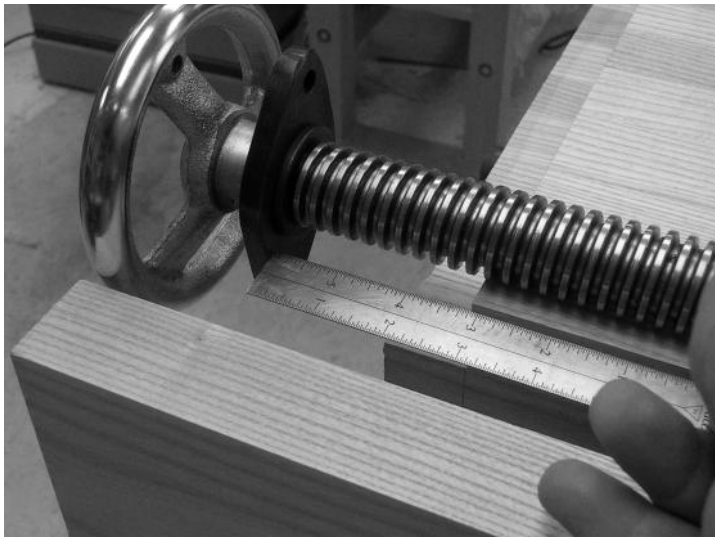
Note: For clarity, a narrow bench top is used for the illustrations. This is actually the front section from our Split Top Roubo.

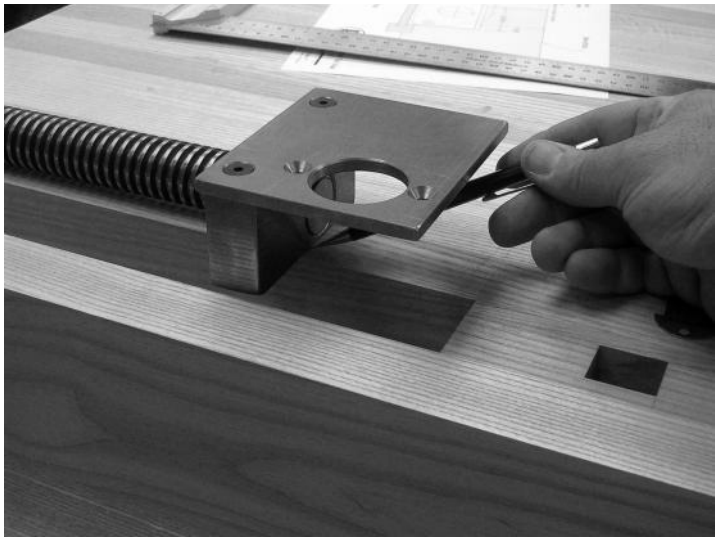
Mill all your stock to final dimension, but leave the end cap and front laminate long. You'll join them at the corner as you install the vise.

With a 3" wide end cap, the length of the cavity from the inside of the end cap shouldn't be less than 13-7/8". For maximum vise capacity, the slot portion of the cavity can be up to 17-3/4" long. This will allow the most travel of the sliding plate assembly. Before using these dimensions however, lay out the cavity and slot on your actual bench to double check the dimensions and to see how they work with your individual bench and leg locations. If your end cap is narrower than 3", take this into consideration when planning the length of your slot.

To begin the cavity excavation lay out the dimensions of the cavity that the nut block rides in directly on the end of the top. You should have already cut the tenon for the end cap, if you are using a tenon. The cavity dimensions are found in the illustration above, and on the templates. We use a router to remove the material. Clamp the dog hole strip and front laminate in place to provide support for the router base and fence. See the Benchcrafted FAQ for a video showing some technique for routing the cavity.

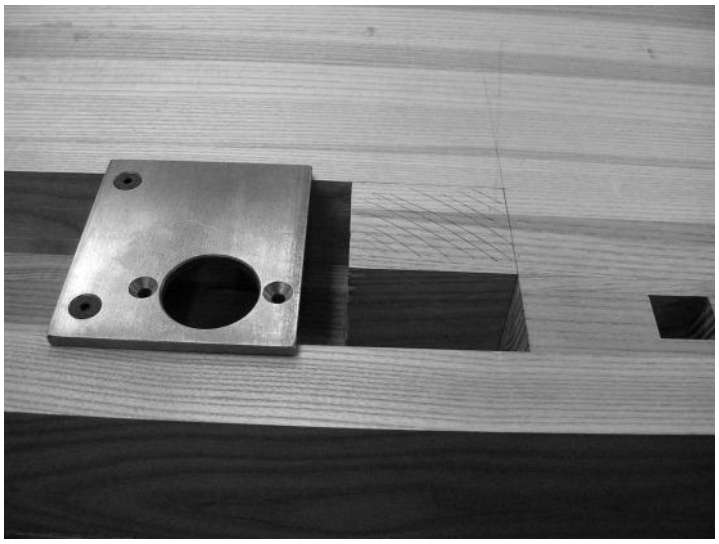
Here you can see the layout lines for the cavity, with the dog hole strip and long front laminate clamped in place. Slip a scrap of wood the same width as the dog hole strip in the slot between front laminate and dog hole strip to keep the front laminate rigid during routing. Pictured is one pass of the cavity excavation with the router.





If you like, you can stop the cavity for the nut block short of the slot's end. This keeps more of your benchtop intact. Position the screw assembly to accomodate your end cap (here, 2-7/8") and thread on the nut fully.

Now mark the position of the nut on the underside of the top and add about 1/4" past the nut. The nut will never travel past this location. (current sliding plates now feature a rectangular dog hole)



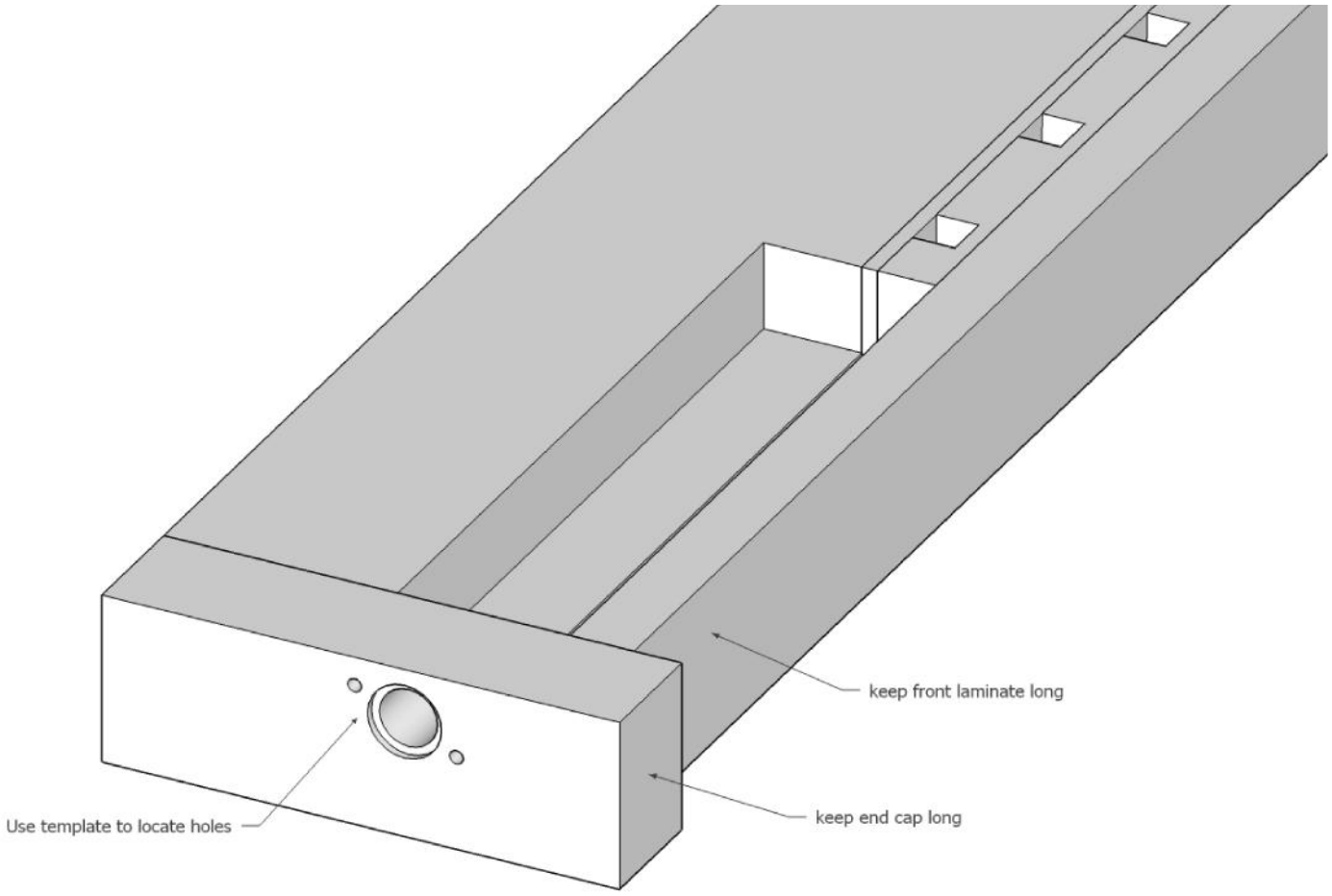
The excavated cavity. The remainder of the cavity that was left may interfere with the sliding plate depending on how deeply you mortise the guide rails. You may have to recess this area sllightly to allow the plate to travel freely.

The completed cavity with dog strip and front laminate in place.

The cavity with (long) end cap and dog hole strip in place.

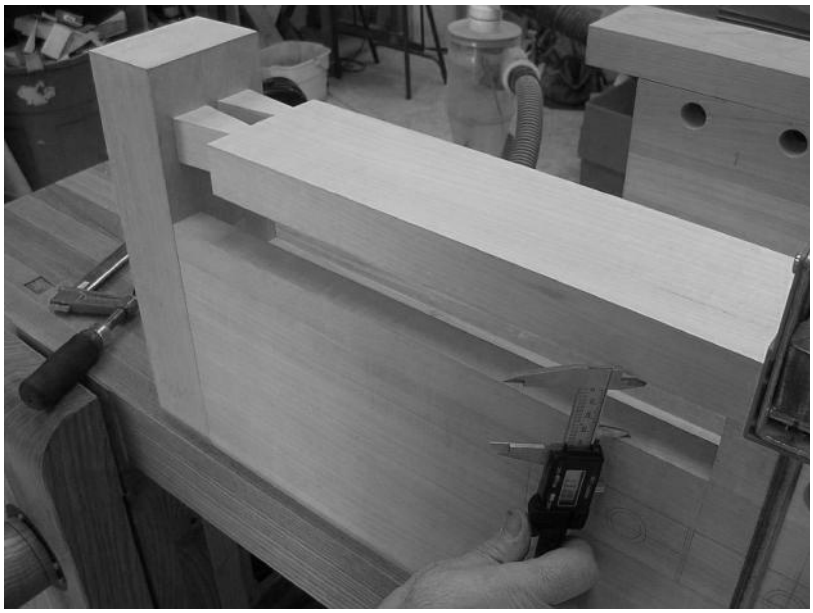
Two views of a left-handed installation.

Below: front laminate removed for clarity. End cap in place.

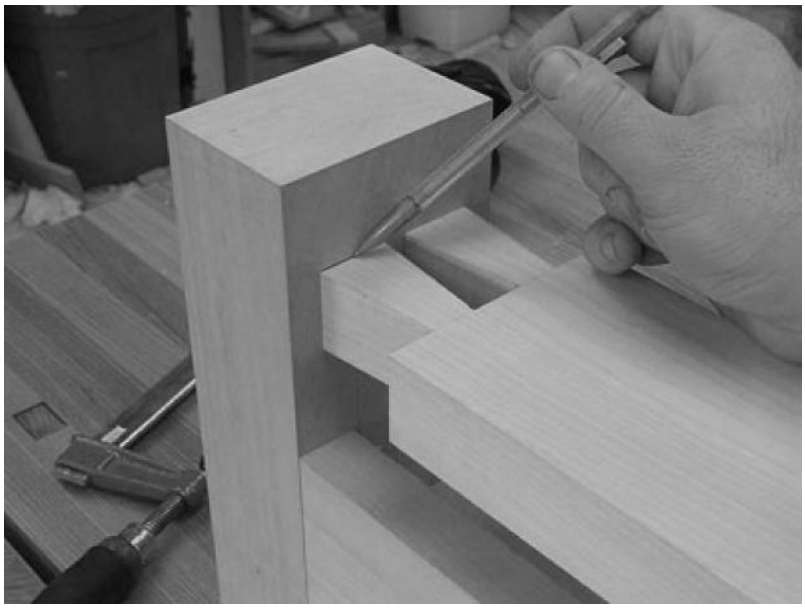


With the cavity excavated you can glue the dog hole strip on. After that, finish your end cap-to-top joinery (but don't install it permanently yet.) We like to use a tenon reinforced with two bolts and our End Cap Barrel Nuts. These are easy and quick to install. You can also use simple hex or square nuts in blind holes that intersect with the bolt holes. Another option is to use 1/2" Spax brand lag screws to attach the end cap. It's not as strong, but we've found it to be plenty robust. A spline helps position the end cap on the end of the top for drilling, if you don't want to use an integral tenon. Use the sequence on page 10 to drill the end cap for lag screws. With the end cap joinery complete, you know exactly where the end cap will be in the final assembly. Now place the template on the outside of the end cap (registered from the top of the bench) and line it up horizontally with the slot where the dog block rides. Mark with an awl through the template, then drill the counterbore for the washer (behind the flange) at 1-3/4" dia, 3/16" deep, the clearance hole for the main screw at 1-3/8" to 1-1/2" dia., and the two holes for the flange attachment at 5/16" dia.

With the end cap-to-top joinery complete you can join the front laminate to the end cap. With the end cap installed (but not permanently) Slide the front laminate to the inside of the end cap and make sure the slot (where the dog block rides) is parallel and consistent in width along its entire length.



Mark the end cap length directly from the front face of the front laminate and cut it to length. In the picture below you can see that the dovetails have already been cut on the end of the front laminate for joining to the end cap. This is why you kept the front laminate long, to leave room for cutting joinery at the tail vise end.



This large dovetail is beautiful in the finished bench, but its not a requirement. However, if you'd like to try it, we wrote a detailed article "How To Make Condor Tails" for Popular Woodworking Magazine issue #191. The issue and accompanying article are available at www.shopwoodworking.com

An easier method is to use massive lag screws to fasten the end cap to the front laminate. First drill the pilot holes in the end cap on a drill press using a bit that matches the root diameter of your lag screw. Fasten the end cap in place on the bench top and then clamp the front laminate firmly and accurately in place. Now grab a manual drill and use the holes in the end cap to guide your bit straight into the end of the front laminate. Remove the end cap and enlarge the holes in the end cap (to the size of the threads) and bore deeper into the front laminate if necessary for the lag screws. Be careful and diligent here, since these holes need to be positioned precisely. Use a sharp bit and back the drill out frequently to clear the chips. Reassemble the end cap and drive the lags into the front laminate to cut the threads. When you glue the front laminate to the dog hole strip, have your socket wrench handy so you can reinstall the lags immediately during the glue-up.

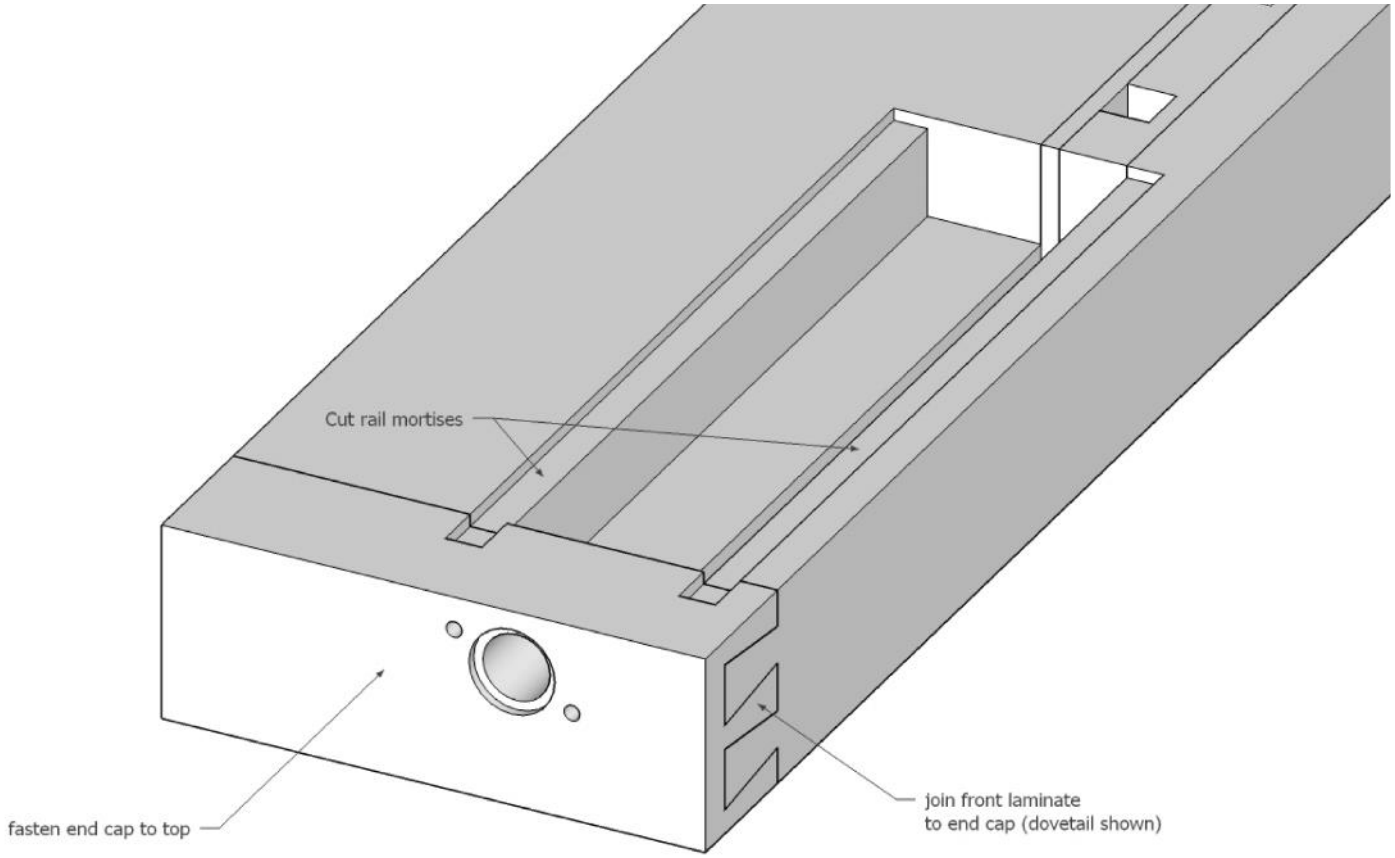
Make sure you use 1/2" Spax brand lags. They are made in American or Germany, and are the only lag screws we recommend for this technique, since they are properly heat treated, and have deep, robust and crisp threads. Do not use the hardware-store variety lags that are made in Asia. They are soft, have blunt, shallow threads and aren't much better than using a smooth dowel. Our local big box store carries Spax, but you can get them online from places like McFeely's and Ultimate Garage.

If you're cutting the dovetail, you can now transfer the tail locations to the end of the end cap. Clamp the front laminate in place, raising it up with a couple blocks the same thickness as the tails (cut a shallow rabbet in the backs of the tails to help in locating the tails square and tight to the inside of the end cap.) Above you can see the bolts and captive nuts holding the end cap on.

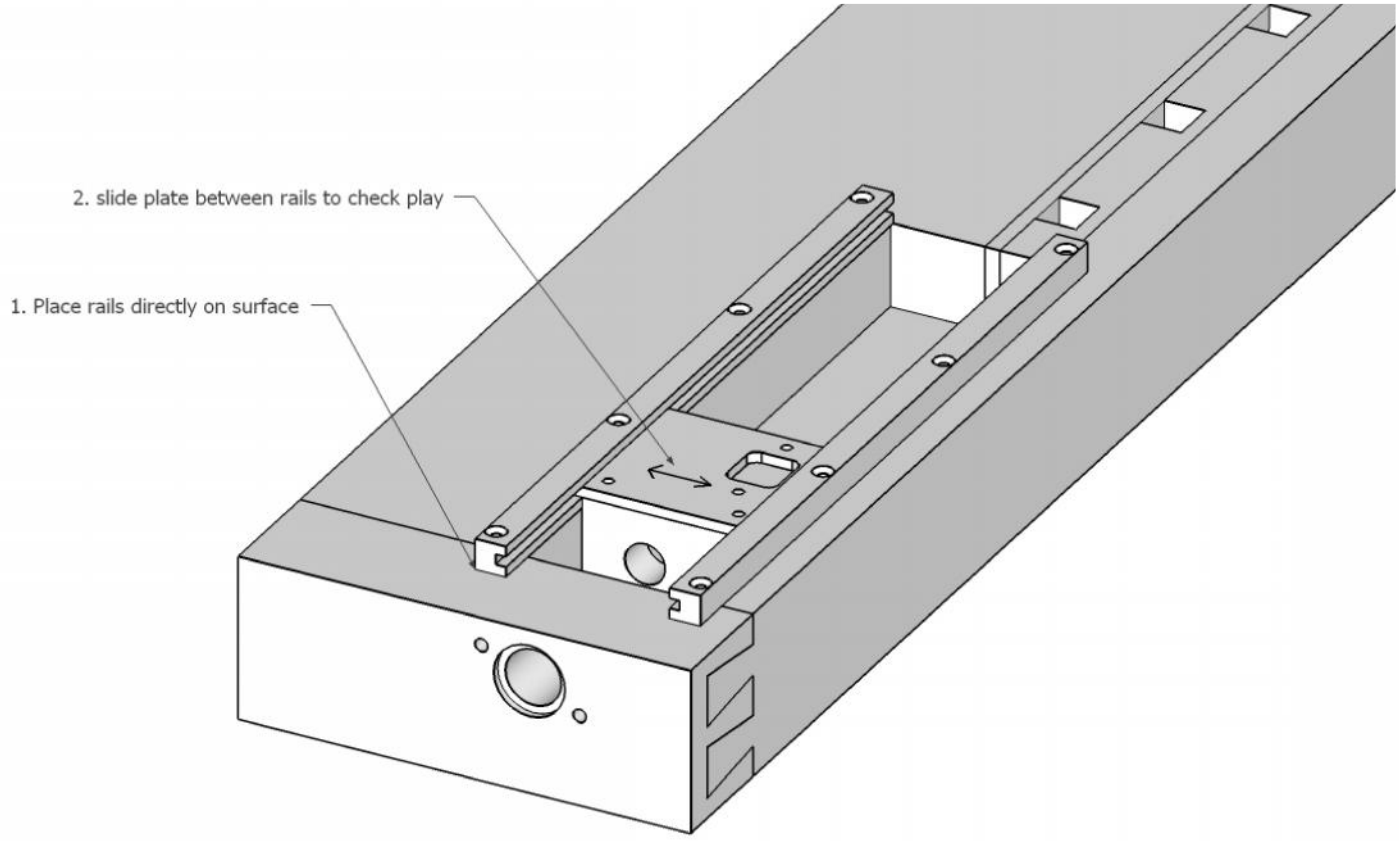
Marking the pin locations
from the tails.

The joint going together.

When you're satisfied with the fit of the end cap and front laminate you can assembly them permanently.



With the bench's top completely assembled, the next step is to excavate the mortises for the two guide rails. The mortises are laid out on the underside of the top. Use the template, again registered from the top of the bench to determine the depth of the mortises. The inner edges of the rails should end up flush with the inside face of the front laminate and the inside edge of the cavity. If your bench is exactly 4" thick, you can simply mortise 1/4" deep. If you mortise too deep its not a huge mistake. You can simply cut some shims for the mortises to locate the rails properly. The distance from the rails to the tapped hole in the nut block is critical. We've designed the vise for a bit of wiggle room here, but best to shoot for spot on. Again, if things are off, its easily corrected with shims. You can use paper, veneer, or even layers of the ever-handy blue painter's tape. Just make sure the rails seat flatly and in the same plane. They need to be coplanar for the sliding plate to ride smoothly.

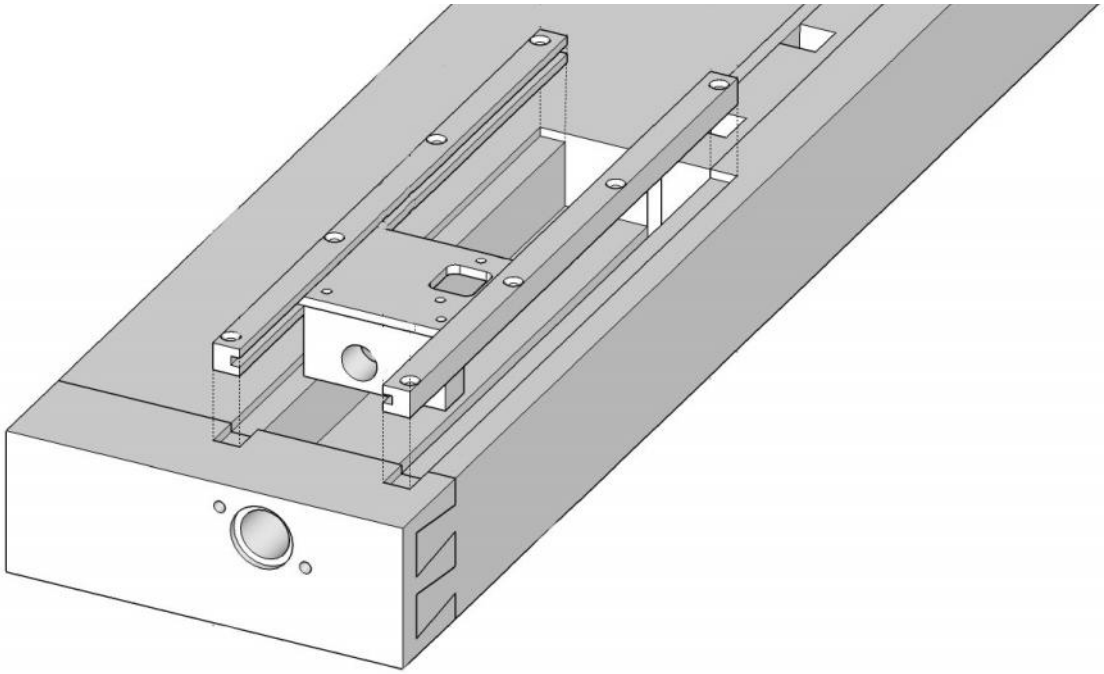


The sliding plate rides in grooves milled into the guide rails. Although the edges of the sliding plate and their mating grooves are accurately machined, it's possible to position the guide rails too close together. This could cause the sliding plate to bind in the grooves. You want a loose fit here. It's best to position the guide rails so the sliding plate has some lateral movement. 1/16"-3/32" of side-to-side play is adequate. The templates account for this, but best to double check in real time. Place the rails directly on the surface and position them so the inside edges are flush with the inside of the front laminate and cavity. Now gently shift the plate back and forth between rails to check for this play. Make sure the rails don't move. You can clamp them in position for this test if you wish.

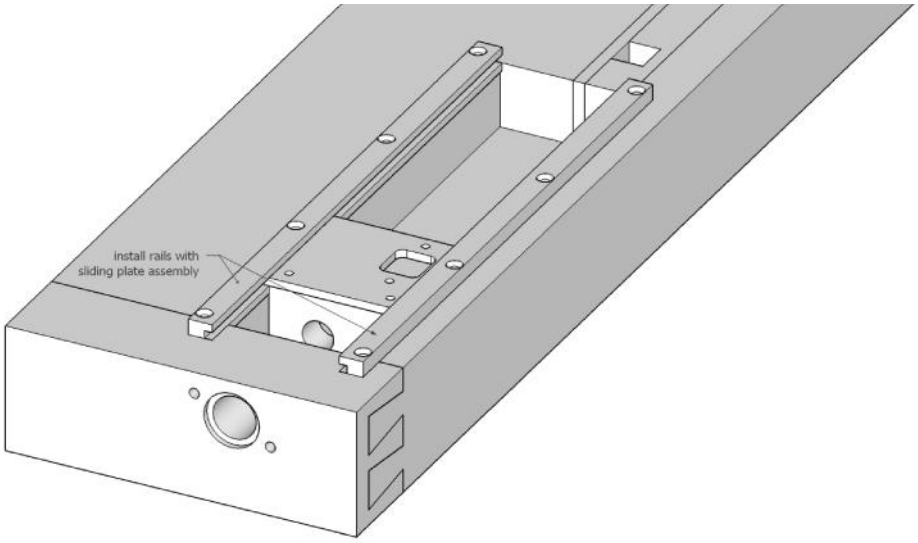
In use, the lateral tracking of the plate is not dependant on the amount of play between the guides. The fit of your dog block (which you fit as the last step), along with the screws's alignment will determine the ultimate travel of the vise, so it's important to install the guides with this side-to-side play. This also allows for some wood movement during changes in your shop environment.

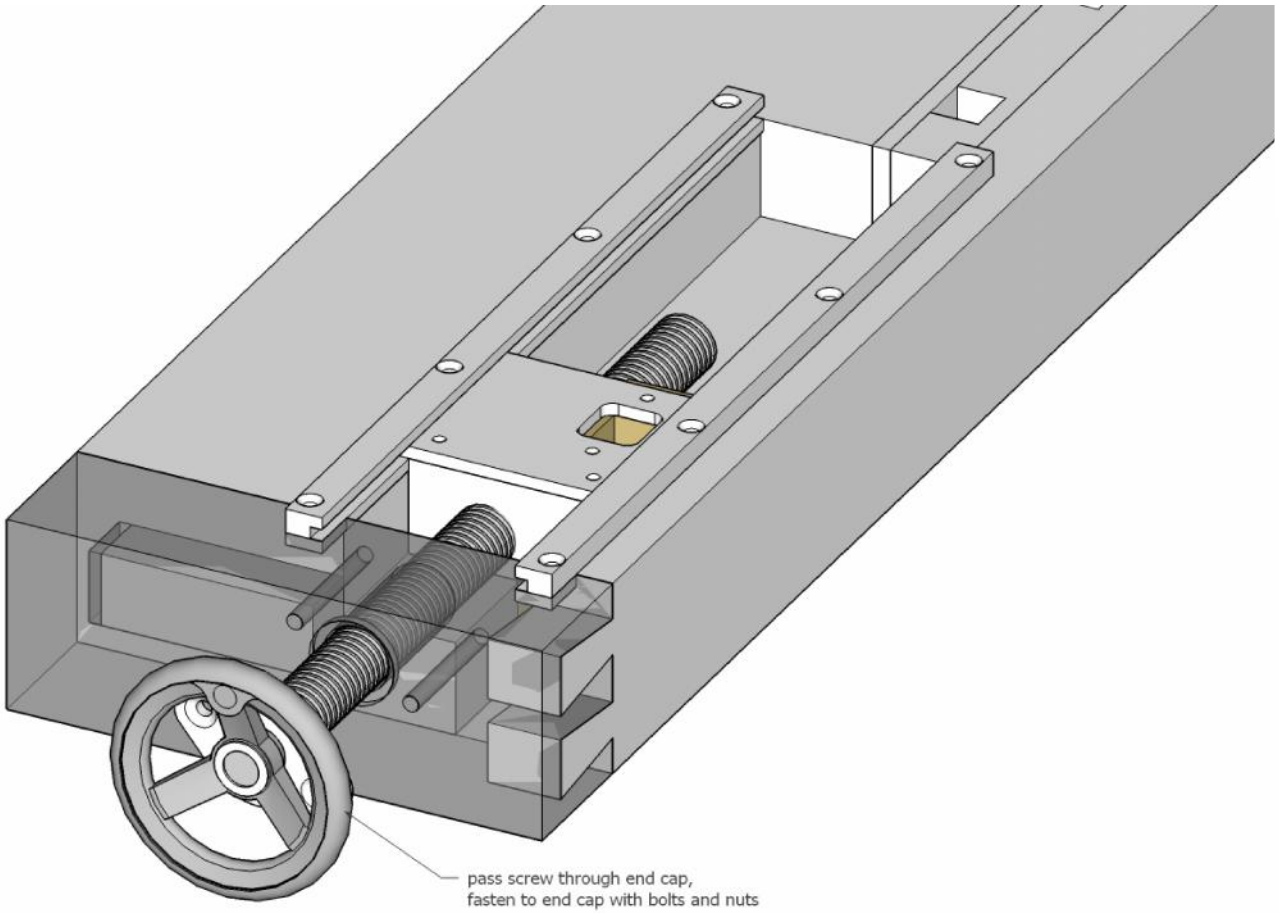
It's also important that the mortises for the guide rails be parallel to each other to prevent the sliding plate from binding, parallel to the slot (to match the travel path of the dog block), and square in both planes to the end cap, so when the screw is engaged, the plate travels smoothly along the screw. There is some room for error, but it's best to shoot for perfection. This will guarantee a smooth running vise. The most important plane to consider is whether the guides are vertically parallel (coplanar). The grooves in the guide rails are milled for a smooth fit with the sliding plate, so there isn't much room for error here. Again, shims can correct almost any error.

Once you're satisfied with the location of the rails, scribe around them with a knife or sharp pencil. Make sure you position the rails along their length so the end screw hole falls within the end cap. This really adds a lot of strength to the entire top, further locking the end cap to the top. Also be sure the opposite end of the rails are not going to interfere with any joinery for attaching the top to the base, or the leg itself. The guide rails are 18" long.



Cutting the mortises is easy work with a router, 3/4" straight bit and edge guide. Square up the ends with a chisel. If you work by hand, chisel and router plane are the tools for the job. Either way, make the floors of the mortises as dead flat as you can, so when you drive the screws through the rails, they seat completely flat. If one end of your mortise is sloping down, the screws will deform the rail. Try to make the rails fit precisely with no play. This will help keep the rails from shifting when you drill the pilot holes for the attachment screws. Once the mortises are cut, slip the rails and sliding plate assembly in place and test the sliding plate again for smooth movement and some play. Also make sure the nut block isn't touching wood in the cavity. If it is, correct this now. The sliding plate should never come in contact with the top.

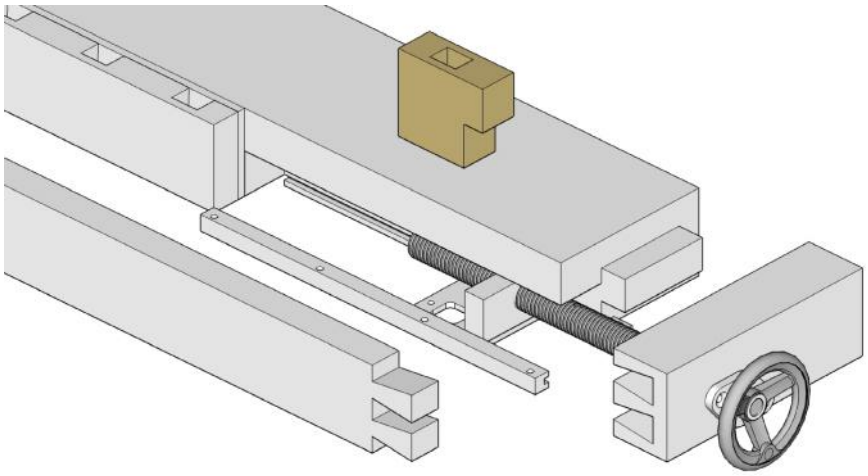


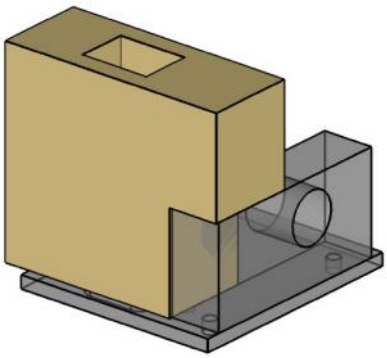


With the rails and sliding plate in place, thread in the screw assembly, fasten the flange to the end cap (use plain 5/16 nuts, as the nylon lock nuts should be used only for the final assembly) and test the operation of the vise. Everything should run smoothly and freely. Sight down alonside the screw, it should be parallel with the slot. If you're satisfied with the fit you can drill for the eight #12 screws that hold the rails to the top. Use a properly sized center punch (a bradpoint bit will also work) to locate the holes, directly through the rails. You may need to remove the rails to pre-drill deep enough for the 3" screws. Drill and drive the four corner screws first. Tighten one, then test the function of the vise. Repeat for the remaining three screws. If the vise binds after tightening a screw, you've located the spot where you many need to shim a rail. Drill and drive the remaining screws the same way.

Extra long flange bolts are provided to accommodate a range of end cap thicknesses, so you may want to cut off the extra thread past the nut. Don't cut them too short. These two bolts provide the opposing force for the vise and must be fully engaged in the lock nuts.

A couple drops of light machine oil between the flange and the handwheel's hub (apply while turning the handwheel) helps keep the screw turning smoothly.



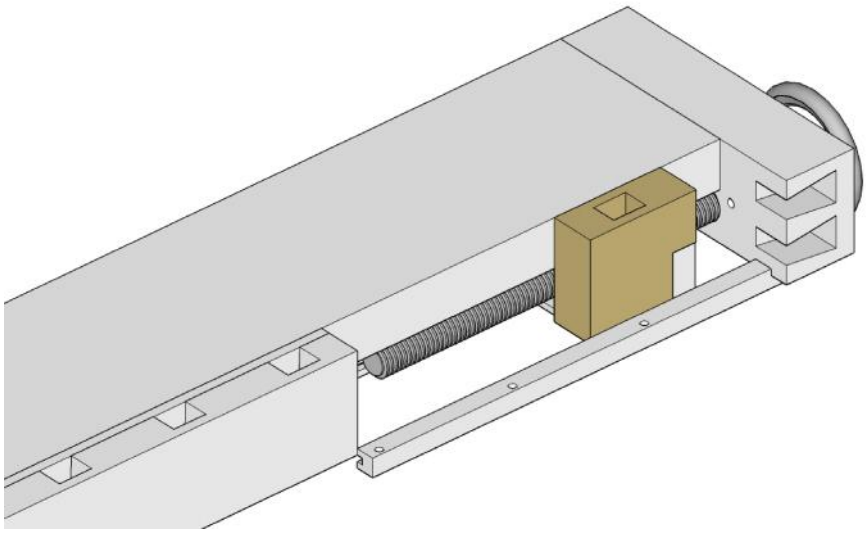


Next, make the dog block. It should fit well in the top's slot, but not tight. It needs to slide freely. Make the block a little too tall, then plane it flush to the top.

For square dog holes, the dog block is made just like the dog strip on a bench top. (The dog hole is milled into the side of the block, then the outer cheek is glued on.)

Install the dog block by marking from below with a center punch (or simply drilling directly through the attachment holes) and predrilling for the two 1/4 x 2 pan head screws from below. The holes in the plate are sized for a tight fit , you may need a screwdriver to drive the screws through the plate. It shouldn't take much.These screws are used to hold the block in place only. Clamping force is transferred directly to the block and dog by the vertical portion of the massive steel nut block. Make sure you drill accurately. You don't want the screws to be offset, thus forcing the dog block tight against the inside of the slot causing friction. Ideally, the sides of the dog block fit loosely in the slot for smooth and effortless action. If you find one side rubbing the slot, remove the dog block and plane that side until it rides smoothly.

The face of the dog block and the end of the dog hole strip are lined with suede (included) for a good grip when holding work with the jaw of the vise.



The handwheel is cast iron and may rust. Check our FAQ for info on treating the handwheels to help prevent this. If your shop is conditioned this shouldn't be a problem. The rest of the vise is lightly oiled steel and should be kept lubricated for smooth action. Like any fine tool, the vise should be periodically cleaned. It's important to keep the screw and nut free of built-up dust and grime. The precision acme screw is smooth and polished, so it should need only occasional attention. Unbolt the flange and back the screw out of the bench. Clean out the threads with compressed air or a small brush. Also clean the dust and grime from the guide rail slots. Reapply a light lubricant periodically, depending on your shop conditions.

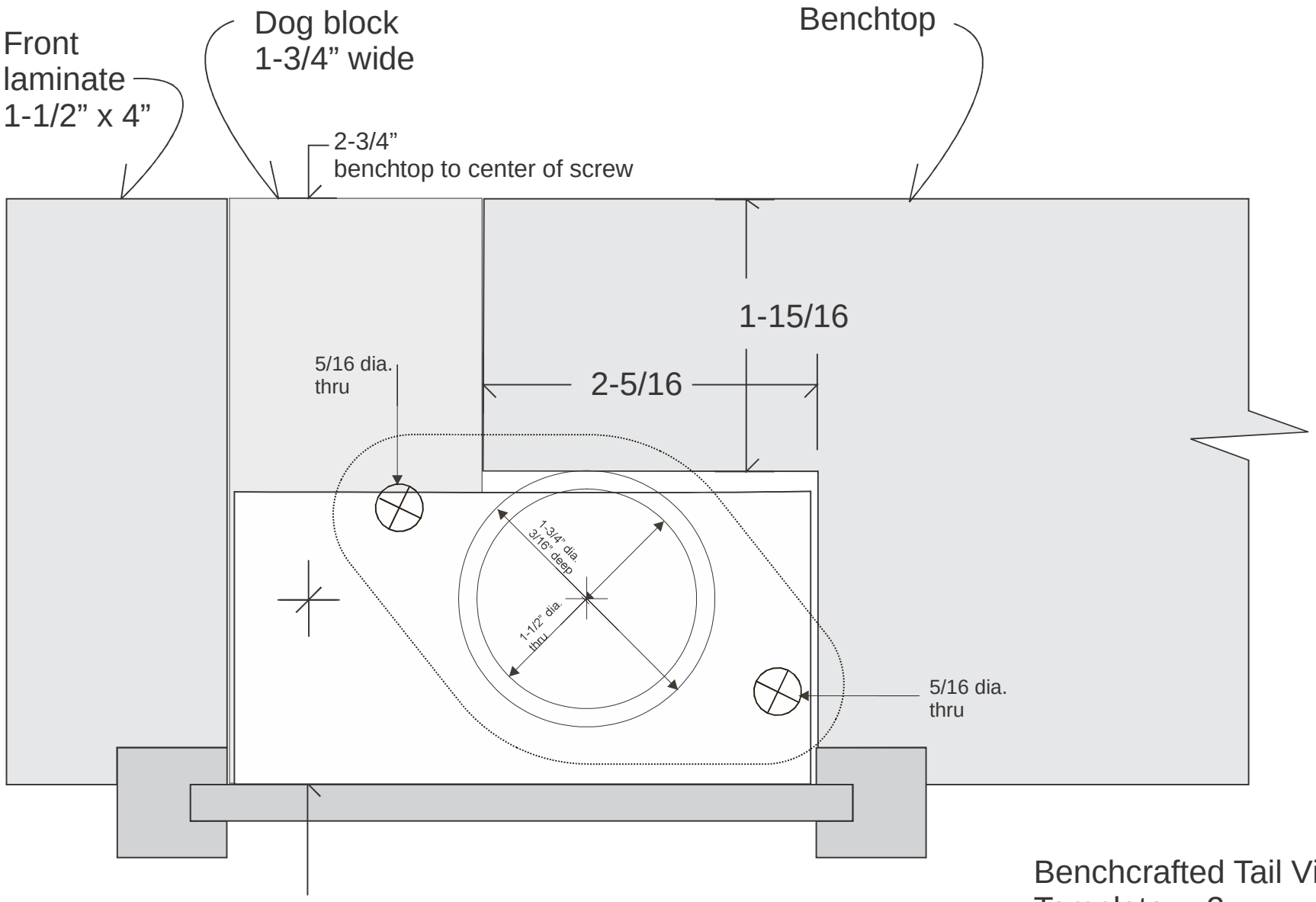
Using the vise is simple. When clamping between dogs it's easy to overdo it. Just spin the handwheel, advancing the dog block up to your workpiece and the let the dog stop against it. It's usually not necessary to tighten the vise past this point, especially with thinner pieces. We recommend lining the faces of your dogs with leather, this will dramatically increase the grip of the vise while using less clamping pressure. We offer suede scraps on our ordering page for such a purpose. You'll be impressed with the holding power of the vise. It's not necessary to crank the handwheel tightly to hold the workpiece. When clamping between jaws (as in dovetailing or other vertical sawing operations) spin the vise to the workpiece, then grasp the rim of the handwheel and give it another half inch or so turn. If you've lined your jaws with suede, this provides enough grip that you can even move your bench with the workpiece--much more force than any joint cutting operation would entail.

For more tips and techniques, please visit our blog which contains lots of information on using the vise.

http://benchcrafted.blogspot.com/ Select "Tail Vise" from the "Categories" list at the right of the blog.

If you have any questions about the installation, we're glad to help. Contact us at info@benchcrafted.com.

Thank you for purchasing the Benchcrafted Tail Vise. We hope you enjoy using the vise as much as we do.



Benchcrafted Tail Vise
Template v.2

1” 1”

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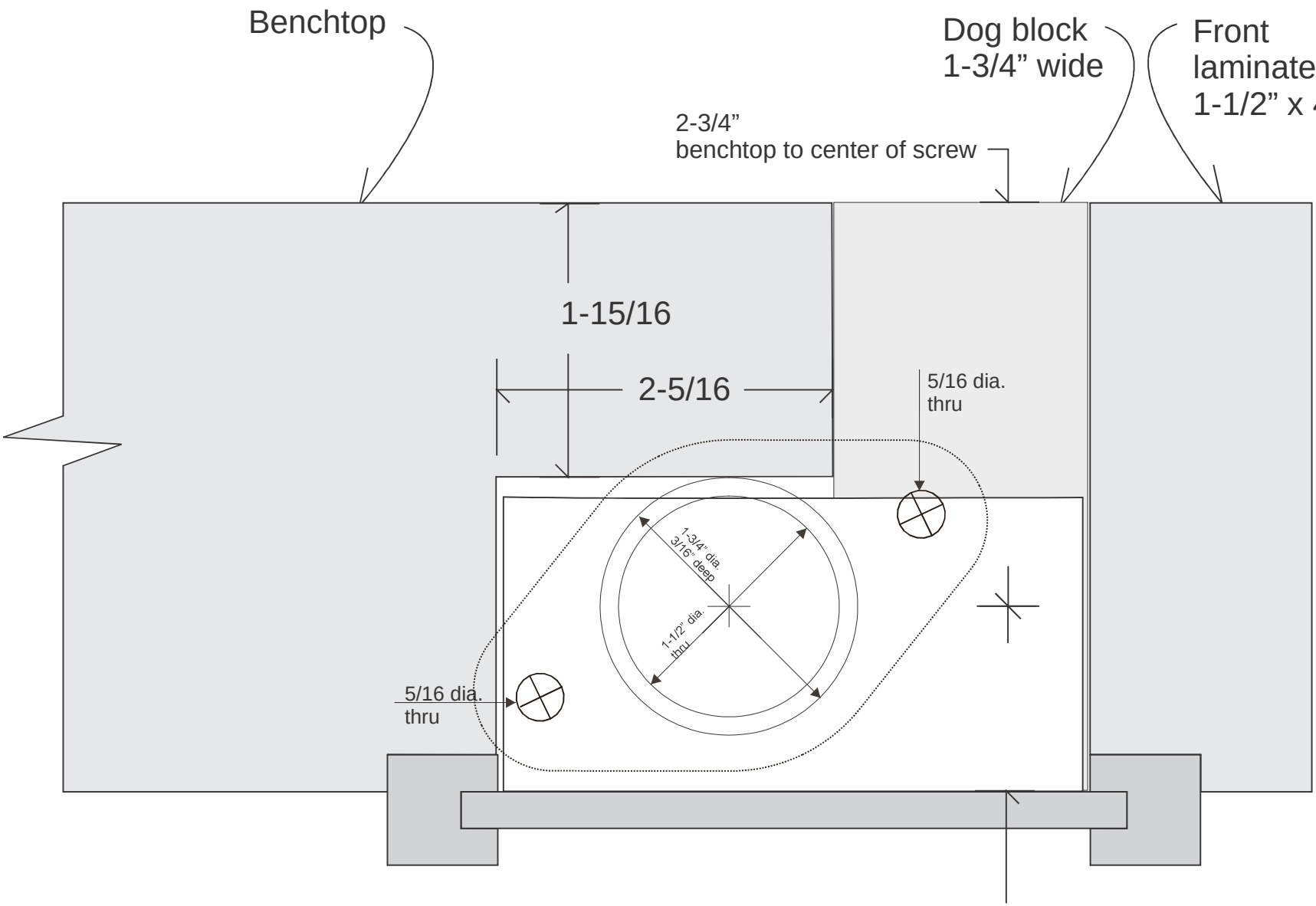
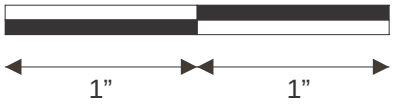


Benchcrafted Tail Vise
Template v.2
Left-hand installation



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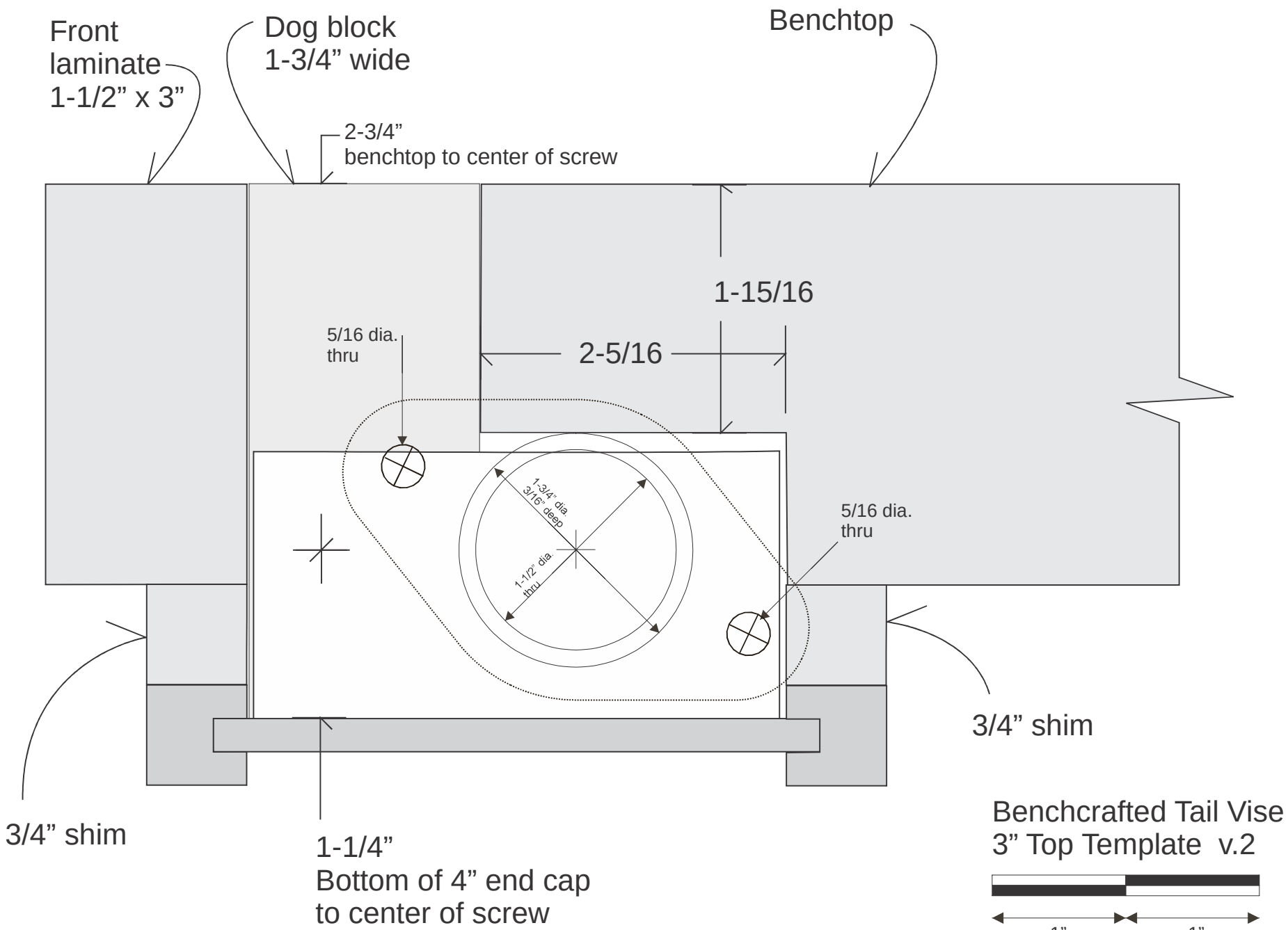
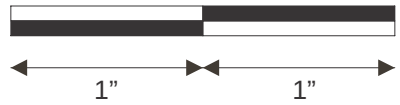


Benchcrafted Tail Vise
3” Top Template v.2



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