



BENCHCRAFTED GLIDE ORIGINAL LEG VISE

Assembly and Installation Instructions

Copyright, Benchcrafted 2008-2012
Version: November 2012
www.benchcrafted.com

Contents:

Quantity	Description
1	Handwheel
1	1 1/4 precision acme screw
1	1 1/4 Acme Nut
1	Flange
1	Large washer
1	Groove pin for attaching handwheel to screw
1	Acetal bushing
8	1/4-20 x 1" button head cap screw
2	5/16-18 x 1-1/2 flat head machine screw
1	Rosewood handwheel knob with shoulder bolt
1	Thick washer for mounting the handle
1	Piece suede, enough to cover inside of chop and leg face

Roller Bracket Hardware:

2	Ball-bearing guide rollers
2	Guide roller axles 3/8x1-3/4 steel dowel pin
1	3/8 x 8 Steel parallel-guide pin
1	1/8 x 7/8 stainless steel roll pin
2	10-24 x 1/2 set screw
4	3/8-16 x 3" socket head cap screw
4	3/8" washer
4	1/2" washer



IMPORTANT!

Read and understand the 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.

Unpacking your vise:

Some parts, especially the handwheel, 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 edge 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.

Assembly Instructions for Benchcrafted Tail and Glide Leg Vises

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. Note: your vise may arrive already assembled.

Tools required:

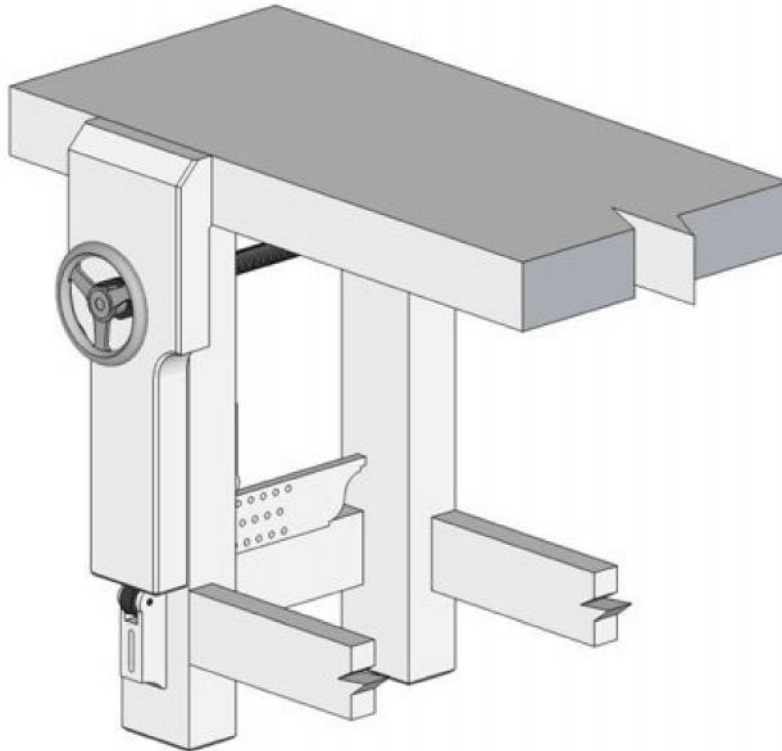
Small hammer

Pin punch or large nail set



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.



The Glide can be installed in an existing bench with flush legs or installed in a new, unassembled bench.

Installing in an existing bench is a bit more involved, and these instructions will cover both types of installation. If you're installing the Glide in a new, unassembled bench, the leg portion of the vise can be worked before the base is assembled (using a drill press, mortiser, etc.). These operations will be pointed out when applicable. For clarity, the benchtop, legs and rails will not appear in some of the illustrations, but only when necessary.

Initial layout

The Glide can be mounted in a number of ways, and it's up to you to determine the ultimate position and dimensions of the wood components of the vise. Few of the dimensions are critical, so there is some room for flexibility.

Refer to the overview drawing for some basic dimensions that suit the Glide. For example, we find that an 8" wide chop works well and is wide enough for typical use. Depending on your bench base construction, you'll need to determine the best place for the parallel guide mortise. Make sure you position it so it doesn't interfere with or compromise your base joinery. Make sure any knockdown hardware, like a bolt, falls above or below the mortise, and also doesn't interfere with the screws that hold the roller guides in place (see illustration above.) It's best to layout the positions right on the actual bench leg before cutting anything. If you plan to make a custom handle for your parallel guide pin, make sure you place the parallel guide high enough (or the rail low enough in new bench construction) so the handle doesn't interfere with the rail when placed in the lowest row of holes. You can place the roller guides as low as you want (this will increase the Glide's holding power). Just keep them high enough that you can adjust the front guide easily. We recommend at least 1" up from the bottom of the leg. Remember, don't compromise your base joinery with the parallel guide mortise. The vise will be plenty strong if you need to place the bottom roller a bit higher. You don't want to place the parallel guide too high though either. This will make the vise

weaker. You want the distance from the top of the bench to the screw (we recommend 8-9" for typical benches) to be roughly 1/3 the distance from the top of bench to the parallel guide.

Layout the Chop and Parallel Guide

The first step is to build the vise's chop and parallel guide. To determine the length of the parallel guide, first thread the nut fully onto the screw. Place the plate of the nut at the back of the leg and measure the distance from the front of the leg (this surface will become the inside chop of the vise) to the inside face of the mounting flange. The thickness of your leg and chop will determine the maximum capacity of the vise. In this example the length is 9-3/8".

Use the following formula to determine the length of the parallel guide.

Screw projection = 9-3/8"

Subtract chop thickness - 2-3/4" = 6-5/8"

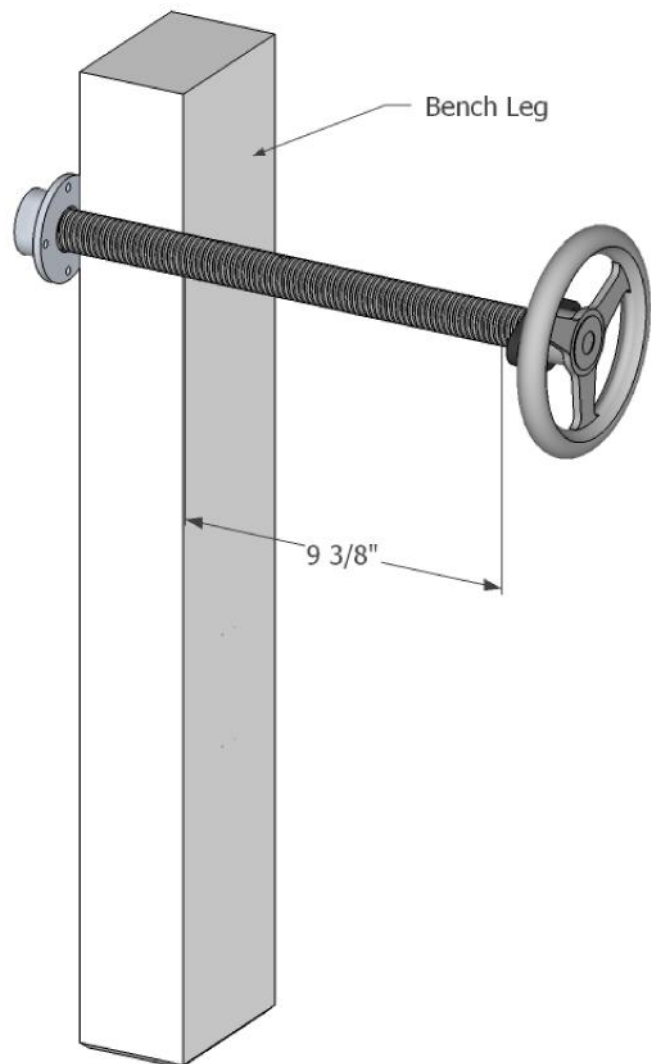
Add leg thickness + 5" = 11-5/8"

Add 2" for rear roller bracket + 2" = 13-5/8"

So 13-5/8" is the minimum length of the parallel guide from the inside of the chop to the end for this installation. Your length may be different. If you'd like to cut a decorative design into the end of the parallel guide you'll need to add length for this. You'll also need to add length for the tenon that joins the parallel guide to the chop. We recommend at least 1".

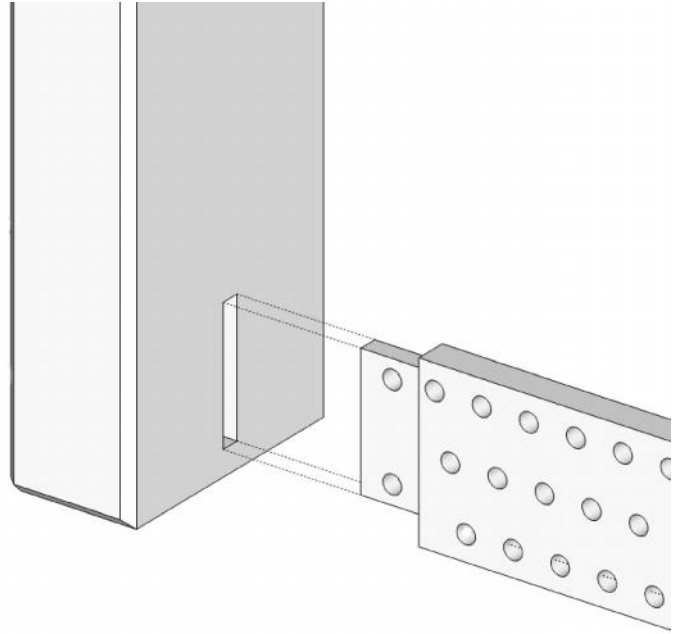
Build the chop and parallel guide

For this bench we're using a chop that's 2-3/4" thick X 8" wide. A thick chop like this will have more mass and initial holding power, but a thinner chop around 1-3/4" is also acceptable. A thinner chop will have a bit of flex and allow a bit more clamping control because of this flex. We've used both with



good results. If you'd like to get more capacity out of the vise, opt for the 1-3/4" chop. But don't go thinner than this. Use a strong hardwood for both the chop and parallel guide. We like to use quartersawn white oak for the parallel guide for stability and strength.

Orient the bark side of the chop towards the inside. If the chop should cup, a concavity here won't be as problematic. It's a good idea to use straight grain quartersawn wood for the parallel guide. You want this element to stay as straight as possible. Avoid figured or wildly grained stock. Join the parallel guide to the chop with a drawbored mortise and tenon joint. Fit the tenon snugly with no play and assemble the joint without glue. The drawbored pegs will keep the joint rigid and allow later disassembly if desired. An open-ended mortise can also be used here. It's easier to cut too. Make sure the bottom of the chop is flush with the bottom of the parallel guide. You'll also want to keep the length of the chop (the height) about 1/2" long past the top surface of the bench. You'll cut the chop to final length at the end of the installation process.



Determine the length of the series of parallel guide holes.

With the parallel guide dry fit in the chop and the final length of the guide marked, hold the chop and guide (upside down) to the bench leg while positioning the guide so the final length (A) is 2" past the back of the leg. (the extra length past A will be cut off later)

Mark the guide where it meets the front of the leg. This represents the position of the last hole in the parallel guide.

Once the guide is marked remove it from the chop and use the template to layout the holes for drilling. The holes are arranged in three rows, with each subsequent hole offset by 5/16". This allows for a broad range of workpiece thicknesses while still allowing smooth and effortless action. The parallel guide pin provided is 3/8" diameter. You want



the pin to fit in the holes somewhat loosely. Drill the holes with a 3/8" bit (this might be a little snug if your bit and drill press are accurate), or drill a fractionally large hole at 25/64". Or you can achieve a fit that suits you by chucking the pin in a drill and sanding or grinding the pin to the perfect diameter.

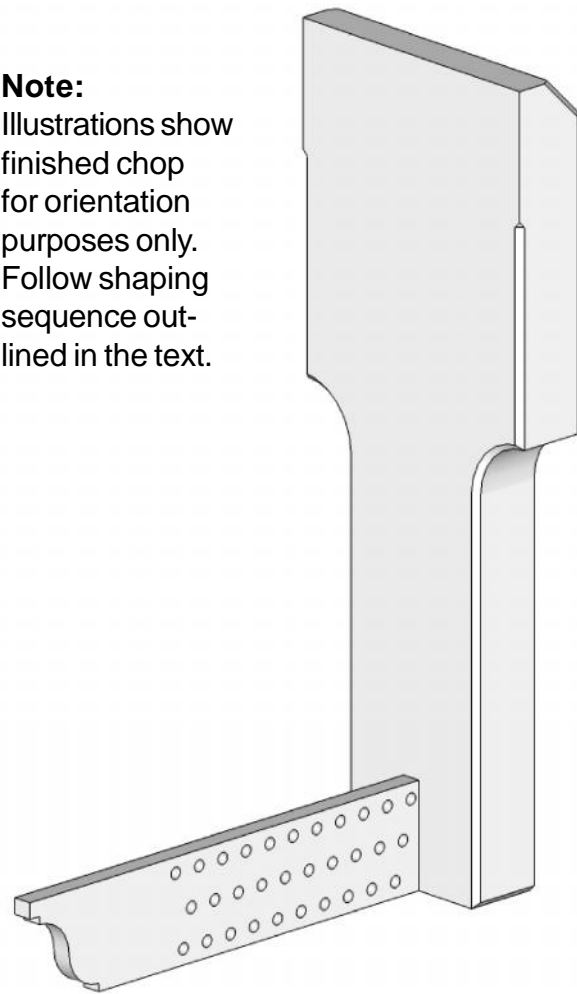
Once the holes are drilled and the joinery cut, the rest of the chop can be cut to shape (don't cut it to final length/height yet). We like to reduce the width of the lower half of the chop to the same width as the leg. This makes for easier access when adjusting the pin. You can now cut the guide to final length and incorporate any decorative element at the same time. Don't drive the drawbore pins at this point.

Layout the parallel guide mortise

Refer to the overview drawing.

The mortise for the parallel guide should not contact the parallel guide in use. It's strictly a clearance hole. Make the mortise 3/16" longer than your parallel guide's width and about 1/8" wider than its thickness. You can make it wider than this, but anything beyond 1/16" on each side is usually unnecessary. If you find after installation that the guide is binding or rubbing the sides of the mortise, it's easy to pare some wood from the sides of the mortise. Remember, position the mortise so it doesn't compromise or interfere with your base joinery. The mortise here is 3/4" wide and 3-1/2" long. Layout the mortise accurately and parallel with the side of the leg. Continue the lines onto the back of the leg and layout the mortise there as well. You can use a variety of tools to excavate the mortise. We used a combination of a plunge router, brace and bit and chisels. If you are installing the Glide in a new bench, you can route or drill (with a drill press) easily from both sides of the free leg. You could also use a hollow-chisel mortiser.

Note:
Illustrations show finished chop for orientation purposes only. Follow shaping sequence outlined in the text.



Once the mortise is cut, check the fit of the parallel guide. It should be nice and loose with more clearance at the top and bottom than at the sides.

At this point you should complete the final joining of the parallel guide to the chop.



Determine the screw location

Determine the placement of the screw by measuring down from the top about 9" and drawing a square line across the face of the leg. The farther down you position the screw the more capacity you'll have between the screw and the top of the bench, but you'll also reduce the holding power of the vise. If you move higher, the vise will be stronger but you'll have less capacity above the screw. We find that 9" is a good compromise. Keep the 1/3 rule in mind and you'll be set. Using a square, transfer this line to the side of the leg.



Make an accurate 3/32" thick shim and place it in the bottom of the parallel guide mortise.



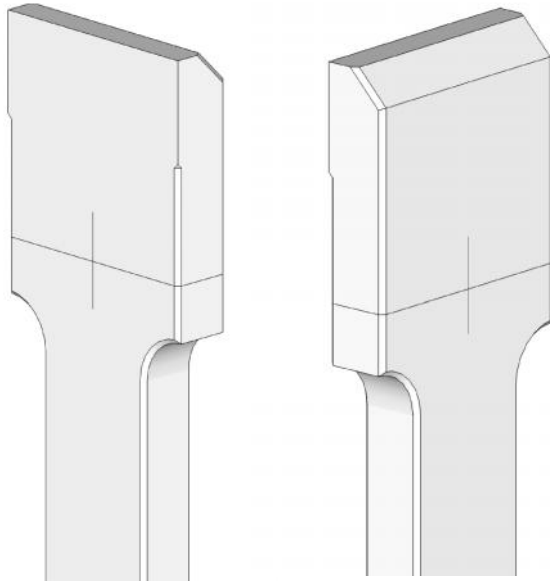
Slide the guide and chop into the mortise, making sure the shim stays in position at the bottom of the mortise.



The 3/32" shim vertically centers the parallel guide in the mortise. This is an important step since the parallel guide and screw both need to be centered in their clearance holes.



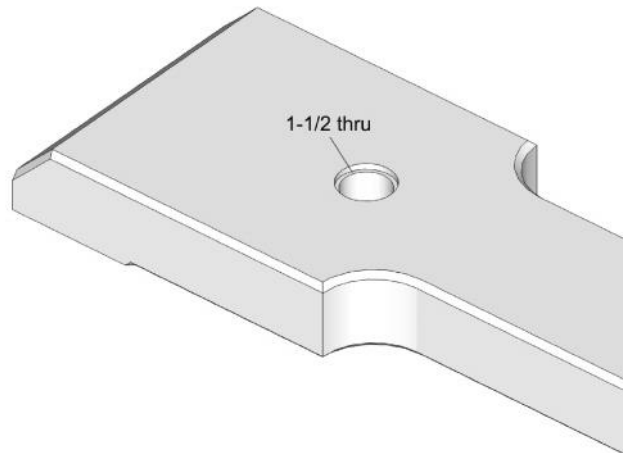
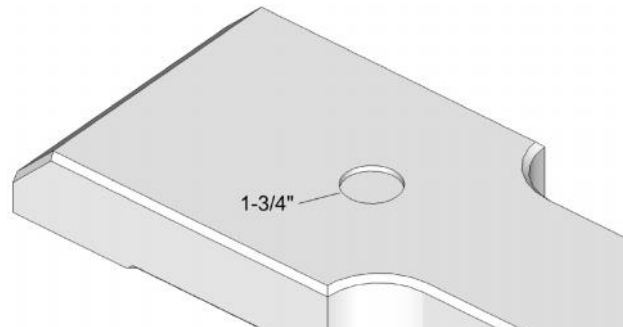
Holding the chop against the face of the leg, transfer the mark from the edge of the leg to the back of the chop. This is the vertical position for the screw's clearance hole. Using a square, extend this line across the inside and outside faces of the chop and mark a center point across the width of the chop on both faces.



Drilling the screw clearance holes

On the outside face of the chop, drill a 1-3/4" counterbore hole about 3/16" deep. This is to accommodate the large washer between the flange and screw, allowing the mounting flange to seat flat to the chop.

Next, use a 1-1/2" bit and drill completely through the chop. This is a clearance hole for the screw, and like the parallel guide, the screw should not touch the hole at all. You will want to drill almost all the way through then flip the piece and finish at the back face to prevent blowout.



With the chop assembly back in the leg and with the shim still in the parallel guide mortise, center the chop horizontally on the leg (left to right), place the pencil inside the hole and mark around the inside the of hole onto the leg.



Mark the center point of the circle. It should already be centered vertically. Double check this by confirming that the circle you just drew falls vertically dead center on the horizontal line you drew across the front of the leg on page 8.

Drill the 1-1/2" clearance hole for the screw. Again, this is strictly a clearance hole, the screw should not touch the leg at all. Better to err on the side of too large here. Use a drill press if you're working with a free leg.



Mounting the screw and nut

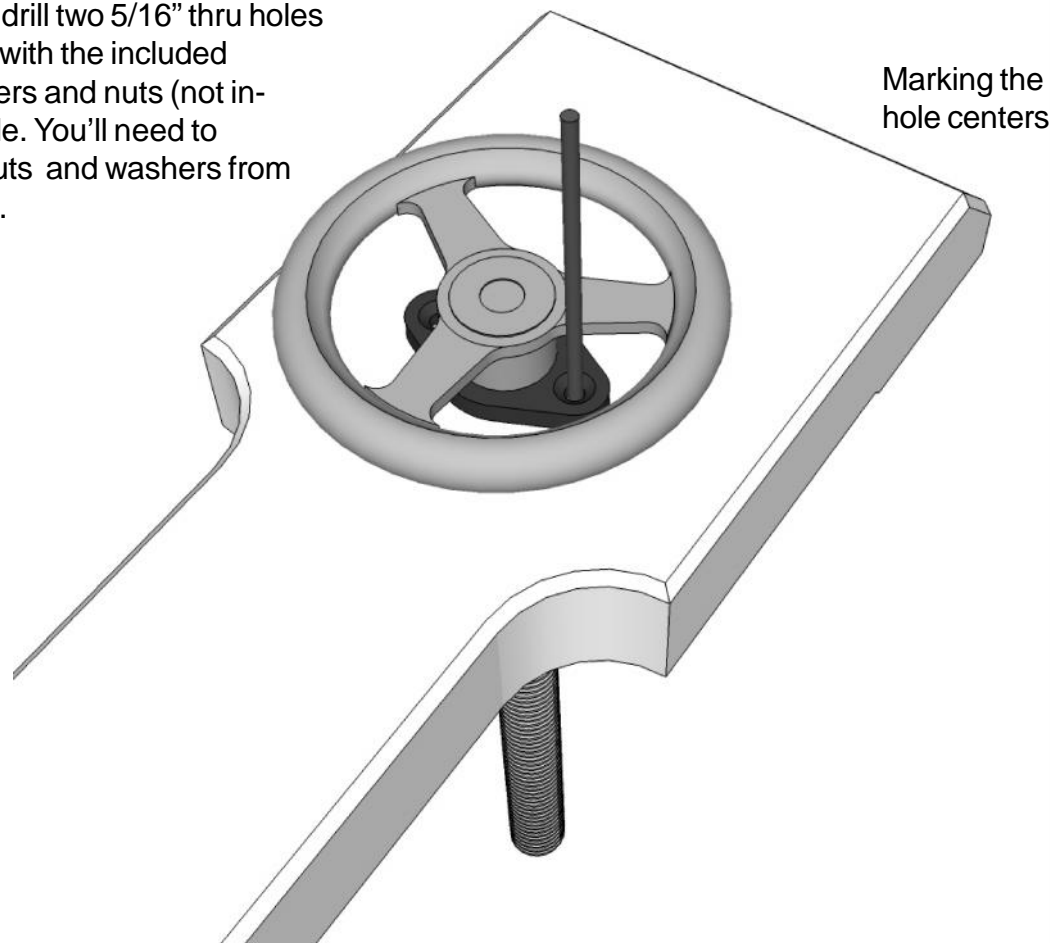
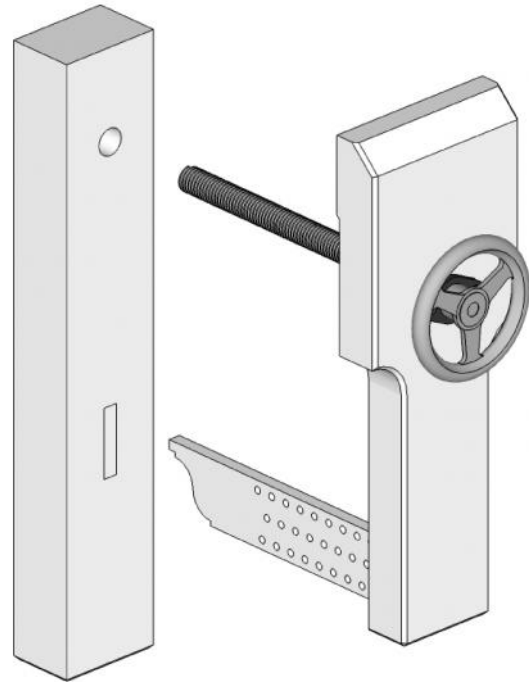
To mount the handwheel assembly to the chop, place the screw through the hole and center the screw in the hole. You can use the horizontal line for vertical positioning (center the line in the two holes of the mounting flange). For horizontal positioning shift the flange back and forth marking each position, then center the flange between these two marks.

You MUST be certain the screw is centered in the hole and not touching the chop at all!

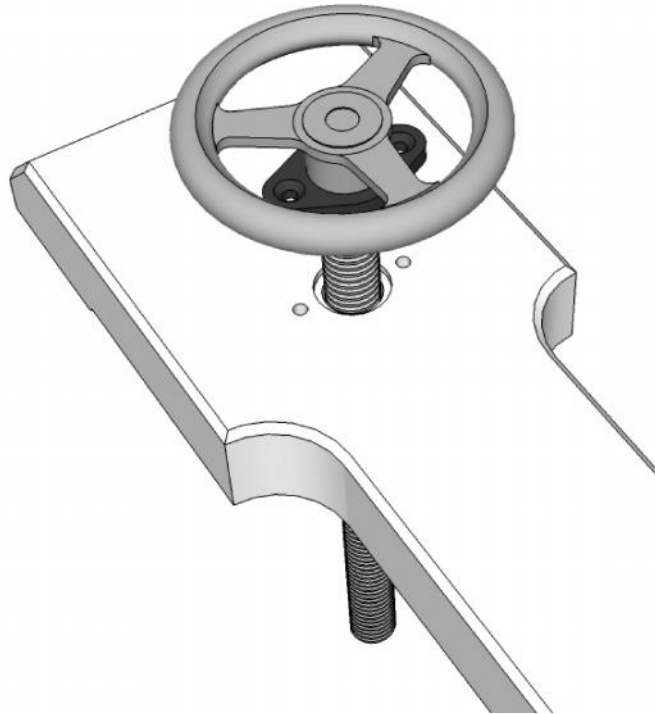
When its in position, mark the hole centers with a transfer punch or awl.

Using a 1/4" bit, drill for the 5/16-18 tap. See the addendum for tapping techniques in wood. Tap the holes for the 5/16 flat head machine screws.

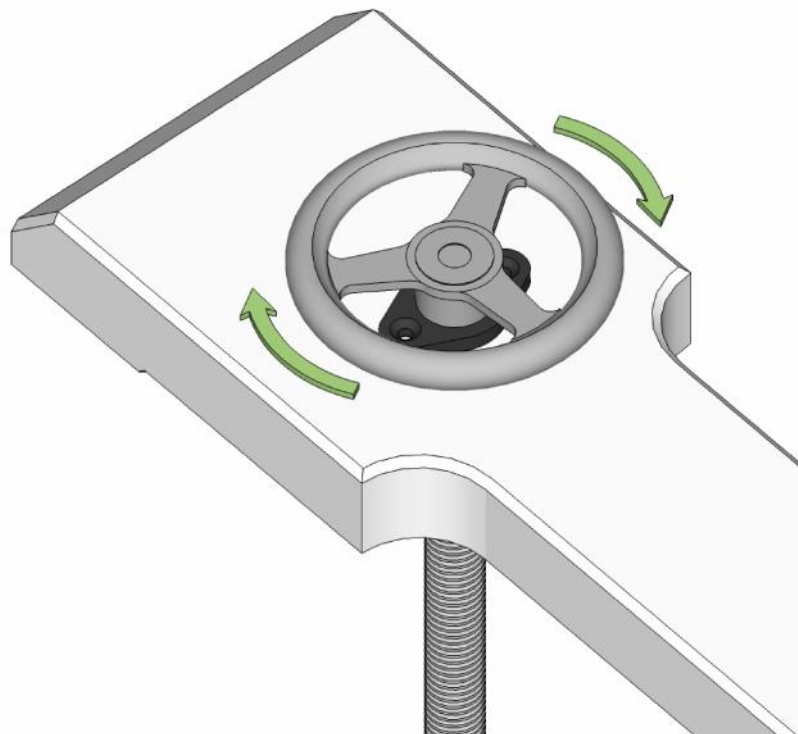
Alternatively, you can drill two 5/16" thru holes and attach the flange with the included screws, adding washers and nuts (not included) from the inside. You'll need to counterbore for the nuts and washers from the inside of the chop.



Once the holes are tapped, screw the flange in place and check to see that the screw spins freely.



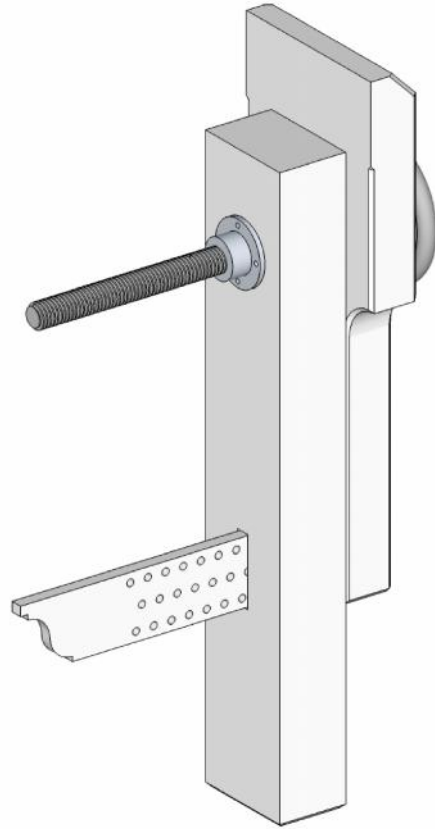
The screw should not touch the walls of the hole at all, and the wheel should rotate freely.



Place the chop into the leg and thread the acme nut onto the screw. Make sure the 3/32" shim is still in place under the parallel guide.

Slightly tighten the nut against the back of the leg.

If your base includes a top rail, make sure the placement of the rail does not interfere with the nut.



To find the center position of the screw in the leg clearance hole make sure the nut is slightly loose, then push the chop all the way to the left and mark the front edge of the benchtop. Make sure the screw moves as well.



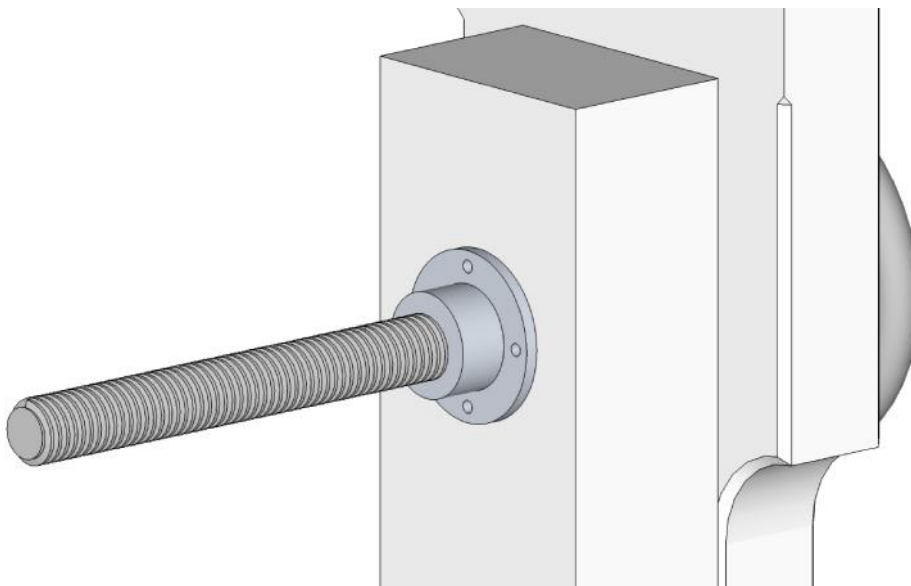
Now push the chop all the way to the right and make a second mark.



Make a third mark directly between the two marks, slide the chop to the this mark and tighten the screw. The screw is now centered in the hole.



Now that the screw is centered in the hole you can mark for the attachment screws, then drill and tap for 1/4-20 button head cap screws to attach the nut to the back of the leg.



Making the roller brackets

Using the roller bracket templates, make two roller brackets from hardwood.

The brackets fit within the dimensions provided by 8/4 lumber. We usually build two brackets from the same piece of wood (end to end), so when the slot is routed there is more support for the base of the router.

The curves at the front of the bracket and at the bottom are purely decorative. You can make your brackets completely rectangular if you wish. Just keep the thickness dimension the same, you don't want to shorten the amount of screw going through the bracket, and ultimately into the leg.

It's a good idea to drill the axle holes before cutting the cavity to prevent blowout. The cavity for the roller should be milled accurately in width. You want the bearings to fit nicely without much, if any, side to side slop. It's okay even if it's a little snug--the rollers run on ball bearings and won't be affected by a snug fit. The cavity cheeks are easily cut on the bandsaw using a fence. A tenoning jig on the table saw can also be used. Drill and tap the hole in the bracket for the 10-24 set screw with a 9/64" bit. The set screw keeps the axle in place.

There are two sets of washers. The larger pair will inevitably recess themselves into the face of the bracket, fixing their position (and this preventing adjustment of the bracket) The second set fits the cap screws and allows vertical adjustment of the bracket. The slot, which is the same width as the screws (3/8") keeps horizontal play to a minimum.

After building the brackets, test the roller's motion. It should spin freely.



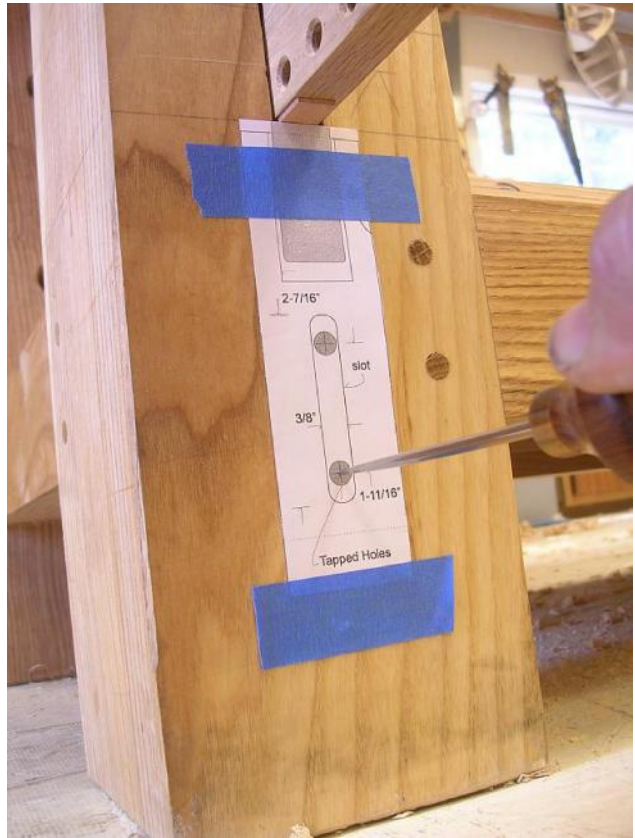
You can also mill two slots, if you want to be finicky, so there is no slot visible between the cap screws.



Mounting the brackets

Cut the template out and mount it to the leg just below the parallel guide and shim. (open the chop a few inches) Make sure you cut the top portion of the template off (marked with scissors.) This compensates for the thickness of the shim.

Mark for the tapped holes with an awl.



Repeat the process at the back of the leg using the same template. You may need to push the parallel guide down a bit to check the position the template---which should be about 3/32" above the top edge of the guide while pushing down on the guide.

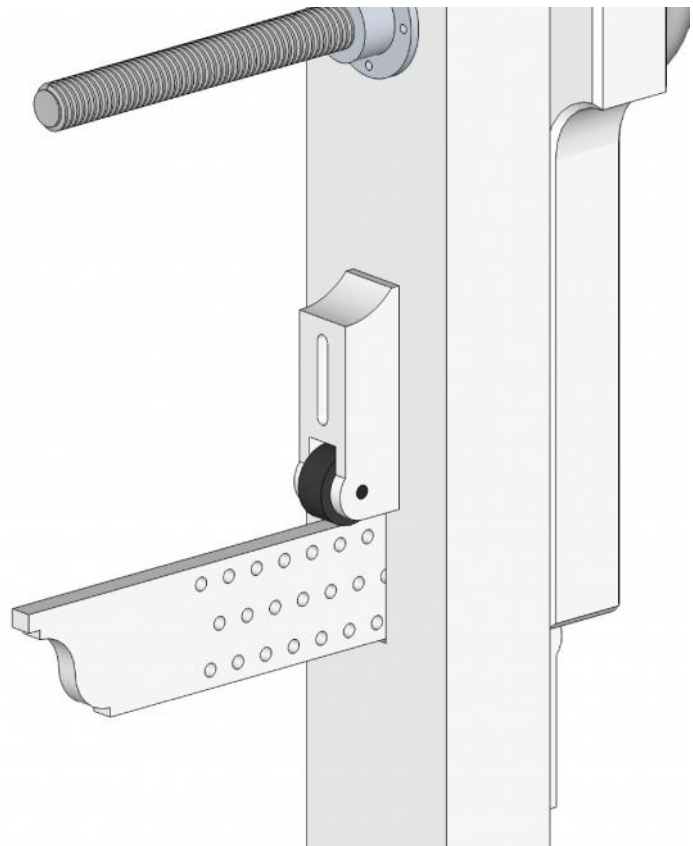


Drill and tap the holes. Use a 5/16" bit to drill the holes. These holes need to be fairly accurate, so use appropriate techniques to make them such. We like to use a bradpoint bit when working on an existing bench. Otherwise a drill press is preferred.

Once the holes are tapped, the roller brackets can be mounted.



To adjust the roller brackets initially, close the vise almost all the way--leaving about 1" or so open. Loosen the lower bracket (at the front of the leg) and slide it up until the roller just contacts the edge of the parallel guide. Snug up one of the screws a bit, but not completely. Continue to slide up the bracket until you see it just raising up the parallel guide. If the bracket is too snug, use light hammer taps to make incremental adjustments to the height of the bracket. When the parallel guide and chop is being supported by the roller, tighten up both screws. The rear roller is adjusted so it just touches the top edge of the parallel guide. You don't want it to pinch the guide. Experiment with the upper bracket. If it's too low (tight), the guide will bind and the wheel won't spin freely. If it's too high (loose) the action won't be smooth mostly in the extreme open positions. Tuning the vise is much like setting a hand plane with a hammer. There is a slight learning curve, but after a few minutes you'll get a feel for it. Once set, the roller brackets will only need adjustment once a year or so.

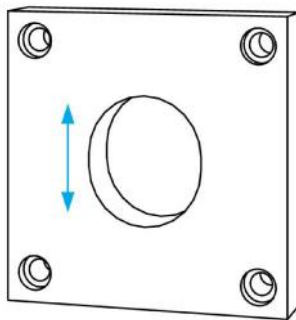


Installing the acetal bushing

A special bushing which stabilizes the lateral movement of the screw, but still allows free movement is installed next. The bushing is made from acetal, a very durable material that is widely used in bearing applications. The bushing is milled to be just a few thousandths larger than the screw's diameter, thereby guaranteeing good guidance for the screw and thus smooth action of the handwheel.

Unthread the chop and slip the bushing over the screw with the counterbores facing out. Thread the screw back into the nut.

Acetal bushings manufactured since September 2012 feature an elongated central hole. It's important to orient the hole vertically, since the bushing only provides horizontal (left-right) stabilization.



Orient long axis
of hole vertically

Use a square to keep the bushing level while tracing around the bushing on four sides.

Remove the chop from the leg and widen the outline of the bushing by about $3/32$ " all the way around. The bushing should not fit tightly in the mortise, it needs to be able to move.

Excavate the mortise to a depth of just over $1/2$ ". You don't want the bushing to be proud of the leg's surface, it should be dead flush or slightly slightly recessed.



Reinstall the chop and screw it in a few turns.

Move the chop back and forth until the bushing is centered in the mortise. Use a transfer punch (or bradpoint bit) to mark the leg in the upper left hole in the bushing.

Remove the chop and the bushing and drill and tap for the 1/4-20 button head cap screw.



Reinstall the bushing and chop. Thread in a cap screw into the hole you just tapped, and while repetitively turning the handwheel in and out (about one revolution's worth) gradually tighten the cap screw against the bushing. Make sure the bushing is centered in the mortise.

Once it's tight and the wheel turns smoothly and freely, mark the remaining holes.

Remove the chop and bushing once again and drill and tap the remaining three holes.

Reinstall the bushing and chop, threading in the remaining three cap screws.

Follow the same procedure above to set the bushing in place. Gradually tightening all 4 screws incrementally while turning the handwheel. If you feel the main screw getting tighter as you turn, loosen the cap screw and start again.



It's also very important that the bottom of the mortise be very flat. If it's not, the bushing will be distorted as you tighten the cap screw, possibly binding the main screw. If you need to remove more material from the bottom of the mortise to get it flat, do so. It doesn't matter if the bushing is slightly recessed into the leg a bit.

Once you have the bushing set, the vise should run smoothly. If you find that you need to adjust the roller brackets, first loosen the acetal bushing and adjust the brackets. Once the brackets are set to your satisfaction, readjust the bushing as before.

An 8" long piece of cold rolled steel is provided for the parallel guide pin. Depending on your tooling, this may fit snugly or loosely. Feel free to enlarge the holes in the guide, or grind the pin (while spinning in a drill) to get the fit you like.

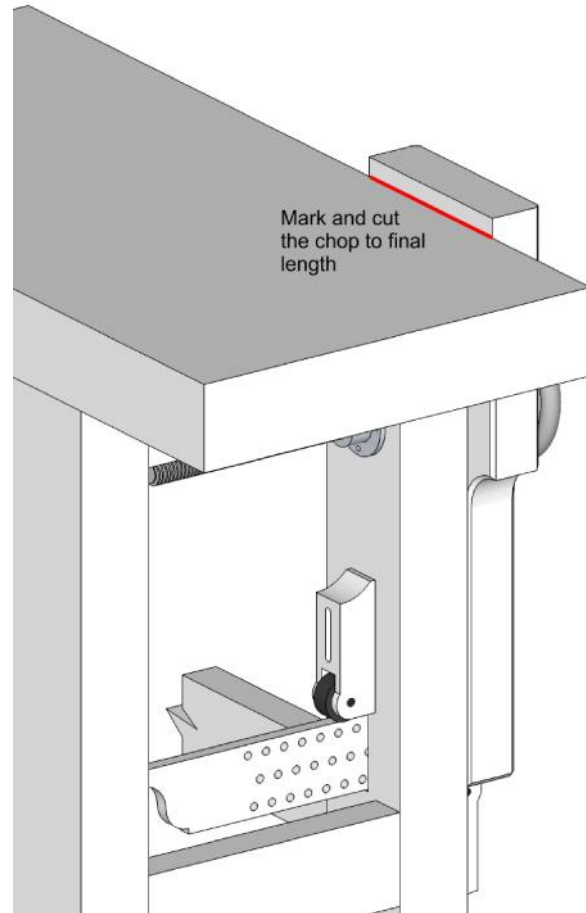
You may eventually want to tweak the function of the pin, to make it quicker and easier to reposition. Here's how:

Two things improve the pin. A wood handle to aid in grabbing the pin, and a stop placed about midway down the length of the pin to keep the handle from being placed between the vise jaws. The handle can be turned and finished nicely, or you can make a simpler one in the shape of an octagon, for example, if you don't have a lathe.

A steel roll pin is provided to use as the stop. Drill a 1/8" hole through the pin and drive the roll pin half way through. Make sure you position the roll pin so the handle stays past the edge of the leg and the chop.



Once the Glide is completely installed and functioning smoothly, mark and cut the chop to final length. Of course you should disassemble the vise to work on the chop.



Now you can bevel the top outside corner of the chop or round it over. This is also a good time to glue on the suede leather. We use water-based contact cement, but any glue will work.

The suede leather is an important part of the Glide. It provides incredible holding power with little effort. We line all of our vises with suede, including the faces of our bench dogs.



The final step is to reinstall the chop and give the Glide a test run. Grab some boards and a hand plane and give it a go. The knob is handy for spinning the vise quickly for rapid and gross adjustments. But for repetitive clamping and unclamping of similar thickness workpieces---edge jointing panels or cutting numerous tenons for door frames for example--grasping the rim of the handwheel and giving the vise about a quarter turn is all that's necessary to open the jaw and regrip. Experiment with how much force is really necessary to hold your workpiece securely. You'll find it's much less than you initially think, making workholding even more effortless as you learn to use the Glide.

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

<http://benchcrafted.blogspot.com/> Select "Glide Leg 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 Glide Leg Vise. We hope you enjoy using the vise as much as we do.



Addendum

Tapping Holes In Wood For Machine Screws

Aside from the typical woodworking tools required to build the wood components of the vise and install it, you'll need some machine screw taps to install some of the components. Many of you will already have these, and for those who don't, you'll be able to pick them up at any hardware store or home center. Mail order suppliers like Enco or McMaster will also have taps. The 4 taps required for installation shouldn't cost more than about \$10 total.

The roller guides are attached to the bench legs with 3/8-16 chromed cap screws. You'll need a 3/8-16 tap for these holes. Standard plug taps will work fine for all the holes, but bottoming taps (they cut threads almost to the bottom of a hole) will require a shallower hole. I use the more common plug taps and just drill about 3/8" deeper than the ultimate length of the threads in the hole. You'll also need a 10-24 tap for the set screw that holds the wheel's axle in place.

To attach the garter or flange to the chop you'll need a 5/16-18 tap. If you like, you can dispense with this tap, drill clear through the chop and countersink 5/16 nuts to receive the bolts. Although the tapped holes make for a cleaner installation and are plenty strong enough. The flange on the Glide in opening mode only pulls back on the chop, and with the roller guide system, there is almost zero force in this direction. It's also a lot easier to remove the screw assembly from tapped holes. You'll be doing this a few times during installation, so it's worth it.

The nut plate is attached to the leg with 1/4-20 cap screws, as is the acetal bushing that's mortised into the front of the leg. Buy a 1/4-20 tap for these screws.

The holding power is about the same as using a threaded insert, and you don't have to buy the inserts. It's great for making jigs and knock-down joints. You'll also need matching drill bits, but chances are you already have them (see the table below).

Once I drill the pilot hole (use a drill press for accuracy if possible, but it's not necessary) I like to chuck the tap in a small, cordless, variable-speed driver set for driving (the slower setting). Hold the drill perpendicular to the surface and without pushing on the drill (just support its weight while keeping it square) press the trigger and let the tap feed itself into the hole. When you feel the tap tighten up a bit and you've reached the depth of threads you're after, release the trigger. Switch the drill into reverse and press the trigger without pulling on the drill. Let the tap thread itself out of the hole. It's important to go slow and feel how the tap is working. If you go too fast you risk binding the tap. At that point the tap becomes a drill bit and you just end up making a larger hole. If you're new to this, practice on some scrap first. You can also tap the holes by hand, but once you get the hang of using the driver it makes tapping quick and easy.

Glide Leg Vise Taps and Drills required:

10-24 tap - 9/64" drill
1/4-20 tap - 13/64" drill
5/16-18 tap - 1/4" drill
3/8-16 - 5/16" drill

bench top

8-9"

8"

vise chop (jaw)

centerline of screw

leg

NOTE: Handwheel, flange and nut not shown.

$X+3/16"$

$X"$

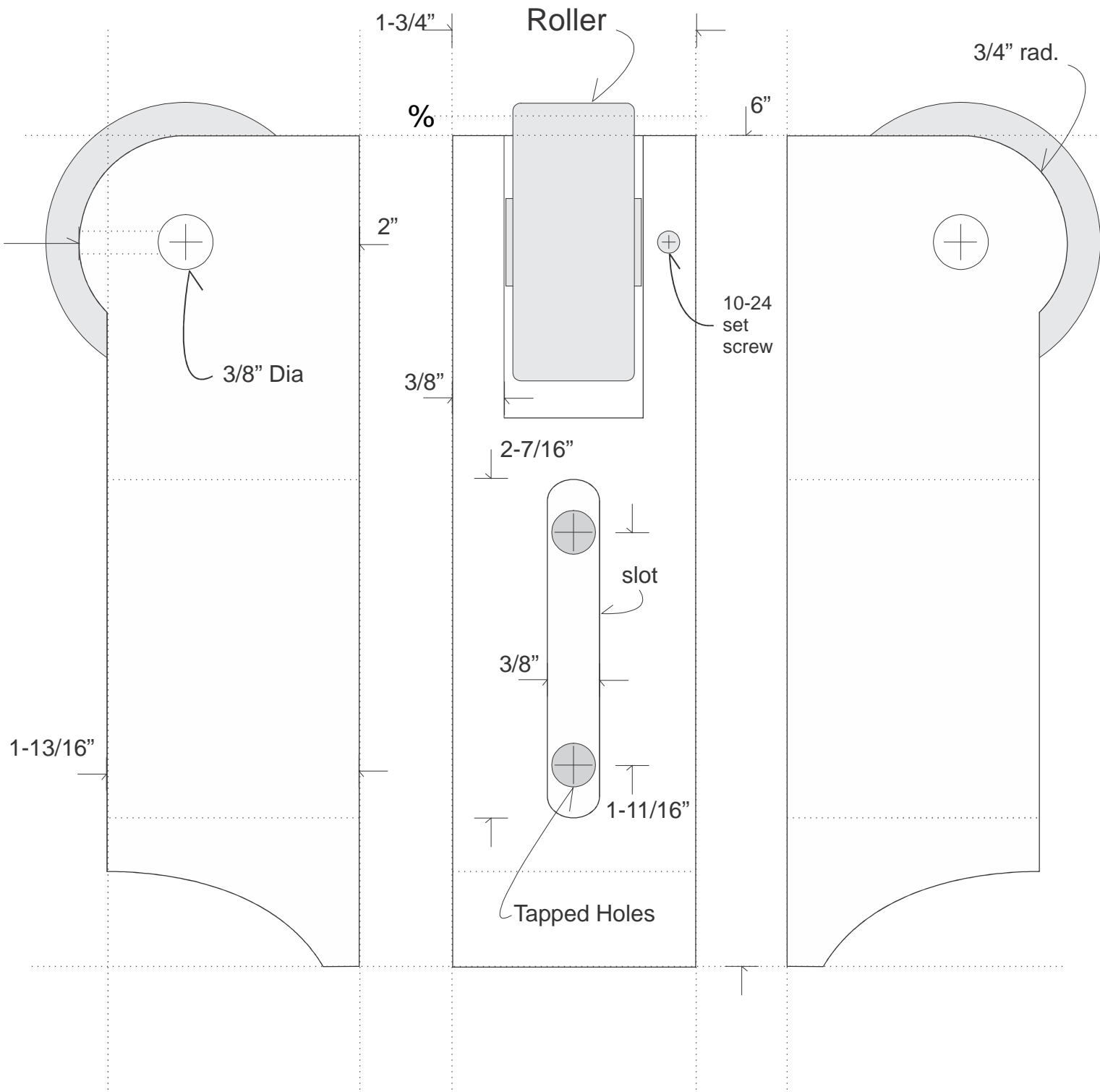
centerline of parallel guide

parallel guide

potential rail joint



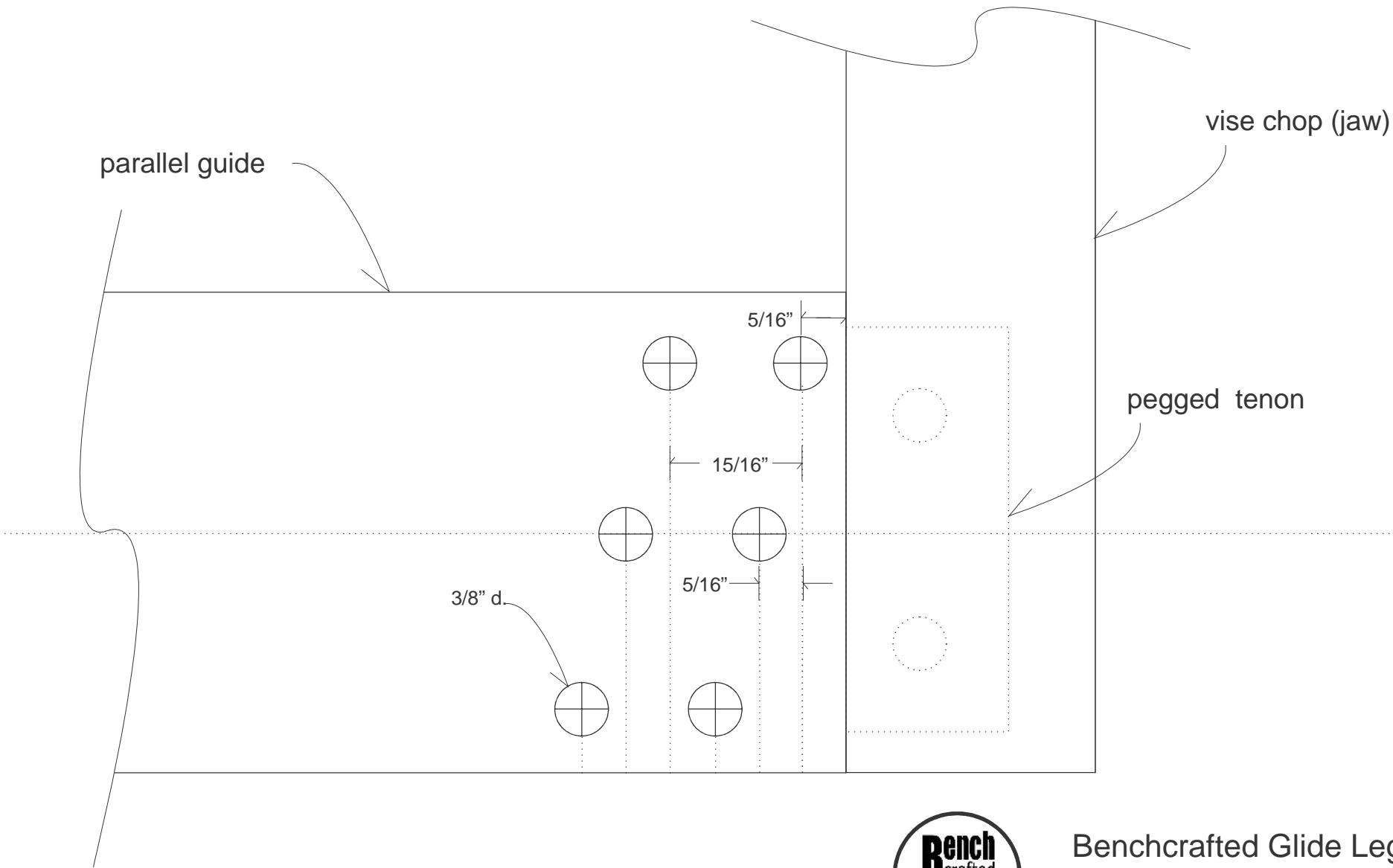
Benchcrafted Glide Leg Vise
 Overview
 Copyright 2012



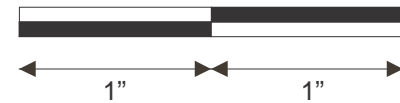
Benchcrafted Glide Leg Vise
 Roller Bracket Master Template
 Copyright 2012



STOP! Check template
 for actual size



Benchcrafted Glide Leg Vise
 Parallel Guide
 Copyright 2012



STOP! Check template
 for actual size