

**BENCHCRAFTED**

# **CLASSIC WORKBENCH**

Design, Construction Notes & Techniques



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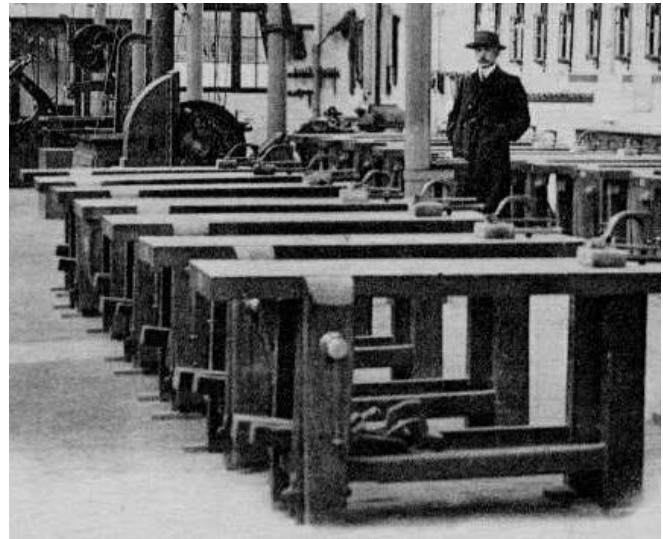


## DESIGN

When we set out to design a new workbench for our customers, from the very beginning we decided it should, above all, be simple. Not only in function, but also to build. We make no bones about it, our vises are designed and made to work sweetly, but not to a price point. However, not everyone is ready for their ultimate Split Top Roubo bench build, either monetarily, or technically. For those looking to get their feet wet in traditional woodworking, using time-proven techniques and tools, this bench will provide all the workholding required to test the waters. For many, this will be all the bench you need, and for others it will be an excellent springboard to our Split Top Roubo, while keeping the Classic as a second bench.

The Classic Workbench is based largely on the famous Plate 11 workbench from Roubo's "The Art of the Joiner". We've built dozens of these "Roubo" benches over the past decade, helped others build hundreds more and examined extant French benches from the period. We've haven't changed our opinion on this fundamental design. The Classic is a simpler, easier to build version of Roubo's Plate 11 bench that captures all the functionality of Roubo's design. French technical schools of the late 19<sup>th</sup> and early 20<sup>th</sup> centuries were outfitted with benches just like this.

Paring down the bench to its essentials, we've incorporated our Classic Leg Vise, Planing Stop and Holdfast as workholding devices. With a clever arrangement of our Planing Stop, Roubo's Doe's Foot [more on that later] and a holdfast, you're able to mimic the function of bench dogs and a tail vise, albeit in a more rudimentary manner.



*A small group of classic French benches at the Henri Brisson National Technical School in Vierzon, France. Late 19<sup>th</sup> c.*

Keeping it simple, we've designed the bench to assemble with only one type of joint: the drawbored half-lap mortise and tenon. We refined this joint during our French Oak Roubo Projects and it is, for this purpose, indestructable. Not only is this joint extremely easy to make, it's also extremely difficult to screw up. Your tenons can be on the loose side in their mortise with no ill effect. As long as your drawbore pegs are tight and sound and your shoulders flat and square, the bench will be as rigid and monolithic as any bench made with fancy dovetails or wedged tenons. There's a certain understated strength in a humble drawbored tenon. The joint is also very quick to make.

We also wanted to design a bench that eliminated the need for massive slabs of wood, which can be somewhat difficult to source and work with. So we designed the bench to be made entirely from widely available 8/4 stock, plus a few feet of 4/4.



## BEFORE THE BUILD

This project requires knowledge and skill in basic woodworking processes and techniques that fall beyond the scope of these notes. If you're just getting started in woodworking, get some experience under your belt first by taking some classes, or learning from a friend or local club. That said, this is a very simple build, and most people with basic woodworking experience can complete the bench without much trouble.



## SAFETY

With any woodworking project using hand or power tools, your own personal safety should be your first concern, and is your own responsibility. Under no circumstances should you perform an operation or technique we describe if you feel unsafe or unsure. Use guards and safety measures at all times. Keep in mind that the parts for the bench, once assembled, and even the bench itself are very large and very heavy and take a fair amount of effort and strength to manipulate. Get help if you think you'll need it, and make your physical well-being your first priority. You are responsible for how you work, and what happens in your shop.



## CHOOSING WOOD SPECIES

Ah, wood species. So many choices. The Classic Workbench pictured here was made from hard maple. This is an ideal wood for benches. It's heavy, hard, stiff, not ridiculously expensive and readily available. However, we also have built benches from other woods such as soft maple, oak and ash. These are all excellent woods. The abundance and low cost of ash have made it a popular choice lately. It's stiffer, but lighter than hard maple and it makes a very beautiful and functional bench, although you might not like the tendency for the open-grain structure of the ring porous wood to

collect dirt and grime. Softwoods like yellow pine and douglas fir are also considerations if you insist. We don't recommend softwoods however, other than yellow pine since its much heavier and harder than other conifers. These are probably the least expensive choices, but not everyone likes the idea of a softwood bench. The dimensions of this bench mean its going to stay put regardless of species, so using a softwood might make sense--it has some "give" in the top surface, meaning that its less likely to damage a project part than a harder bench. Beech, if you have it in your area, is also an excellent choice. If we had to rank the woods, our first choice would be hard maple, then beech, soft maple, ash. In the end, you can use pretty much any species you like. No matter what wood you choose, get it in the shop and let it rest for as long as you can stand before starting the build.



## AT THE LUMBER YARD

The Classic Workbench requires about 80 board feet of 8/4 lumber and about 8 board feet of 4/4 for the shelf. These numbers reflect the actual volume of wood in the bench, they don't account for waste. There are some general rules for accounting for waste, but we don't like to use them because there are too many variables to be accurate. You can get everything you need from 8' boards, which are quite common. 10' boards will also be useful, as you can get top boards and leg boards from their 120" length. The main variable at the lumber yard will be board width. Width is important to get the best yield. Make yourself a rough cutlist from the plans and take it with you to the lumberyard. Note the width of the legs and the thickness of the top. For example, the top is 3" thick. That means you're going to want to find boards around 3-1/2"-4" wide, or at least 7" wide so you can rip without a lot of waste and still have material for jointing and planing to final thickness. Wide boards are cool, but you want best yield here. If your lumber yard has shorts, you can usually save a bit of money by buying these and using the stock for the legs and short rails. On the other hand, you can simply spend a few extra bucks and order 150bf of lumber, straight-lined and skip planed and use the leftovers for other projects. We're frugally minded folks here, so we like to be efficient as possible.



## GET EVERYTHING FIRST

It's a wise idea to get your Classic Leg Vise, Planing Stop, and Holdfasts before beginning your build. You'll want to reference these items from the very beginning and it's risky to build without having these in the shop first. It's also a good idea to read completely through these notes with the plans handy, along with the installation instructions for the vise and planing stop before cutting wood. Surprises aren't a fun part of the build process. You want to be anticipating the next step while finishing up

the previous one. Basically, get to know how the bench goes together before you even order the lumber.



## WORKING FROM THE PLANS

The plans are comprehensive and include some dimensions that you won't necessarily need, but are included for reference. For example, the locations and dimensions of the rail tenons are given. But the shoulders of these tenons are scribed from the legs during the assembly process, the shoulders being positioned relative to the actual position of the legs, not by an arbitrary number. Follow the sequence outlined in these notes, and in the vise installation instructions and the "for reference only" dimensions will become apparent.



## BUILD THE TOP FIRST

Because you'll be building the base to suit the final dimensions of the top, the top is made first. The added benefit is, you can use the finished top on a pair of sawbenches to help build the base. The top is also really simple. It's more or less just a slab of wood with a few holes in it. In all, the top should only take a couple days to make if you've got some basic machinery. If you're building entirely by hand, well, you know what to expect. Select the clearest, best wood for the top. It's all made from 8/4 lumber, flipped onto its edge and laminated to make a very stable top. Here's our process for prepping these boards. We'll assume that you're starting with straightlined material. If not, you'll need to get one edge straight first either by jointing or sawing. Cut the boards 1" longer than your final top length. Now rip your boards to a consistent width. All the top boards should end up at the same ripped width no matter what that width is. If you're ripping down boards that are close to 3", rip them a bit oversized, say to 3-1/4" if you've got good, straight stock that is well seasoned and stable. If you're getting two boards from a wider single board, rip to 3-3/4" and see if the board moves. It may develop some crook. If so, set it aside, along with its mate [if its wide enough to get another board out of for the top] and let it rest for a couple days before processing it further.

With the top boards ripped to rough width, joint one face and then one edge. Do the whole pile. Now run the boards through your thickness planer and plane them all to thickness *and* width. On your final pass for width, which should be 3-1/16" or so, make sure you run all the boards through, even though some may have cleaned up a couple passes ago. Be especially mindful that your planer isn't sniping the ends of the boards. If you have snipe, you'll have loads of work when flattening the top, trying to get the majority of the top [the middle] lowered down to the sniped ends. By following this sequence, you're building flatness into the top from the beginning, meaning you'll be able to flatten the top later when its glued up in just a couple passes with your jointer



plane. Likewise, if your planer is sniping you'll have gaps in the glue lines between each laminate at the ends of the top—the last place you want weakness.

If you feel clever, you can plan for the position of the planing stop's wooden stock and leave a gap in one or two of the laminates to create a very uniform mortise for the stock. If the laminates don't allow a perfect placement or size, you can at least leave some material out and that will help with enlarging the mortise later on.

With all the laminates milled to final dimension you can arrange them as they'll be in the assembled top. You may want to check the grain direction of each board so when you flatten the top later you'll be able to plane with the grain, but isn't critical. Now check your joints. Each laminate should mate up to its partner with no gaps with just hand pressure. You may need to rejoin or plane a laminate or two to get airtight joints. We also like to use a little trick. Take a pass down the middle of each glue surface with a block plane. This makes a slight hollow so the joints end up tight as a drum. When you've got all the joints fit to satisfaction, clamp the whole top together and check the joints under dry clamping pressure. If there are gaps now, they aren't going to get better later. Fix them. You will also want to use a registering method to keep the laminates from becoming misaligned when you glue up. We use biscuits or Dominoes, but dowels or splines also work fine. The important thing is, you want all the laminates to be as dead even as possible, so when you take the clamps off, the top is more or less done, with only a couple light passes needed to clean it up. Finally, check the final width of the top. You may need to adjust it by eliminating a laminate, or just planing a couple down a little. It will be very difficult to accurately rip the top to width later.

Here's how we glue up a top like this in one shot, with one person. It takes some confidence, so if you're unsure about your abilities or have never done this before, you can simply repeat the process in two or three rounds, then glue the two or three smaller slabs together. Or get some help with the one shot method. But there is some merit to gluing up the top in one go. If you do it in two or three sections you will likely need to refit the joints between the smaller slabs. This can be difficult since the sections will be large and heavy and your small jointer may not be up to it. You also run the risk of getting the slabs misaligned with each other, meaning lots of flattening work later. With diligence and care, it can be done. Gluing it up one shot helps you end up with a flat top.

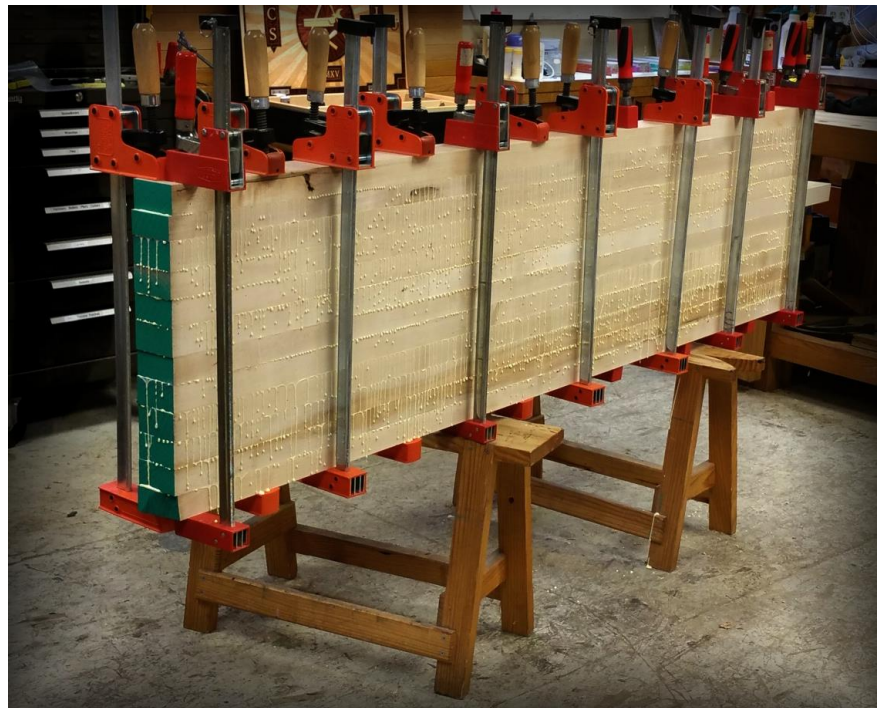




Back to the one shot glue up. The pics show how it's done for legs, but the process is the same. Lay out all your laminates on a large surface or bench just as they will end up in your top. Your biscuits slots (or whatever) should all be cut and ready, as should your pile of biscuits (or whatever.) Now turn each board 90 degrees and lay it flat, butting each laminate edge tight to its mate so the glue surface is facing sky. You don't want any gaps between laminates. Now get a gallon of glue

and pour some out onto the surface of the laminates in an S pattern. Move with purpose, don't dilly dally, but don't rush either. Immediately spread the glue to every edge, working across and along the joints with a 1/8" notched trowel. We like the disposable plastic ones shaped like a putty knife. In your other hand should be a large piece of cardboard or a small bucket or tub that you can wipe excess glue onto. You're not simply spreading the glue with the trowel, you're also metering it. Too much glue will make for a huge mess. This should all take no more than a couple minutes. You may want to use a glue with an extended working time to lessen the stress.

Place the first laminate on a set of sawbenches, insert your biscuits, grab the next laminate and place it onto the previous one, insert biscuits (don't bother trying to put glue in the slot), and repeat until you run out of laminates. You'll notice that we only glued one side of each joint. That's all that's necessary. Once you've built your tower of laminates, start clamping the top together. You should have your clamps staged right next to your sawbenches before you open the glue. Begin in the middle, alternating clamps from one side to the other. Use a clamp about every 8". Keep the metal bars off the surface of the top, otherwise the steel will react with the glue and discolor the wood.



If you've spread the glue properly, you should end up with little beads of squeeze out along each joint. That's the perfect amount. Don't be tempted to grab a wet rag and clean the glue. That will just make a mess. Instead, go take a break and come back to the top in about 30 minutes or so. If the glue beads are starting to get hard, but are still a little rubbery, that's perfect (if they are still soft with some wet glue inside the beads, wait another 15 minutes.) Take the clamps off **ONE SIDE ONLY** and scrape the glue beads off each joint. Replace the clamps. Now move to the other side and repeat the process. Leave the top clamped overnight. With this method, you'll end up with a top nearly void of squeeze out, and pretty much completely flat in both planes. Most of the work of getting a flat top is in the assembly process.

The next morning, remove the clamps and mark the ends of the top for final length on both faces and edges, but don't cut it to length yet. Find the general locations of the legs on the underside of the bench and lightly plane these areas with a smoothing plane to make the areas flat where the top will rest on the legs. Don't go overboard here. Just enough to even up the laminates. Now mark a line across the underside of the top that represents the final position and width of the base.



## BUILD THE BASE

The next step is to use more of your 8/4 lumber to glue up the legs and chop. Each part is glued up from two pieces using the same gluing technique described above, except you don't need to worry so much about making each piece uniform before glue up. Just get the gluing surfaces flat and true, glue them together, then you can four square the blanks after they come out of the clamps. Now is also the time to mill your stock for the rails. Don't cut them to length yet though. Leave them an inch or so long. Once the leg blanks are four squared to final dimension, cut them to final length and make sure you get them all the same. Don't forget to add length for the tenon at the top. It's very easy to make this mistake. Lay out the mortises in the legs. Now place all four legs onto the underside of the benchtop in their



*Place the legs onto the underside of the top to layout the rail tenons.*





*Layout the eight mortises in all four legs*

final length. Next, cut all eight mortises in the legs. Now cut the tenons in the short rails and make sure you leave the pencil line at the shoulder. This will assure your legs are dead even with the long edges of the top. This is a very easy joint to make since you only need to make two cuts: the shoulder and one cheek. When you cut the cheek make it a little fat so you can sneak up on a sweet fit. But if it's a tad loose, don't sweat it. The strength of this joint comes mostly from the drawbore peg pulling the shoulder tightly to the leg.



*The completed rail mortise and tenon.*

respective locations. Make sure the outside faces are dead flush with the long edges of the top.

Now, without disrupting the legs (clamp the legs to the top if you need to) place the short rails up against the sides of the legs. Reach inside and scribe a fine pencil line along the leg onto the inside face of the rail. This is the shoulder line for the half lap tenon. Do this for both short rails. Use this line to measure and layout the length of the tenon. Cut to these lines to make the rails their



*Scribe the rail's tenon shoulder from the inside of the leg.*

With short rails fit, assemble the rails to their legs and again place the legs on the underside of the top and align them with the layout marks. Now, like before, place the long rails against the legs and scribe along the inside of the leg to mark the shoulder line. Cut the tenons on the long rails and fit them to the mortises in the legs.

Now that you've got all the tenons fit to the legs, layout for the drawbore pegs and drill the holes in the legs only. Incidentally, if you've never used drawbore pegs before, do an internet search for "drawboring" and you'll find everything you need. Chris Schwarz has covered this topic in full, and its that information you'll want to follow. Notice that the pegs for the short rails intersect with the pegs in the long rails. These are blind holes. Make sure when you drill for these that you stop short of the other holes. Now is a good time to cut the half-lap tenons at the tops of the legs.



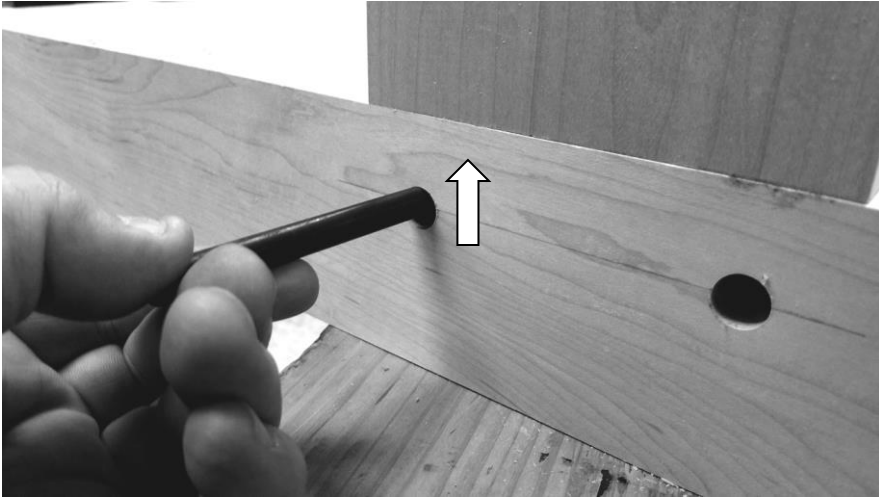
*Place the long rail against the legs to scribe the shoulder location.*



*Scribe the tenon shoulder locations onto the long rails.*



*Stop short when drilling for the short rail drawbore pegs.*

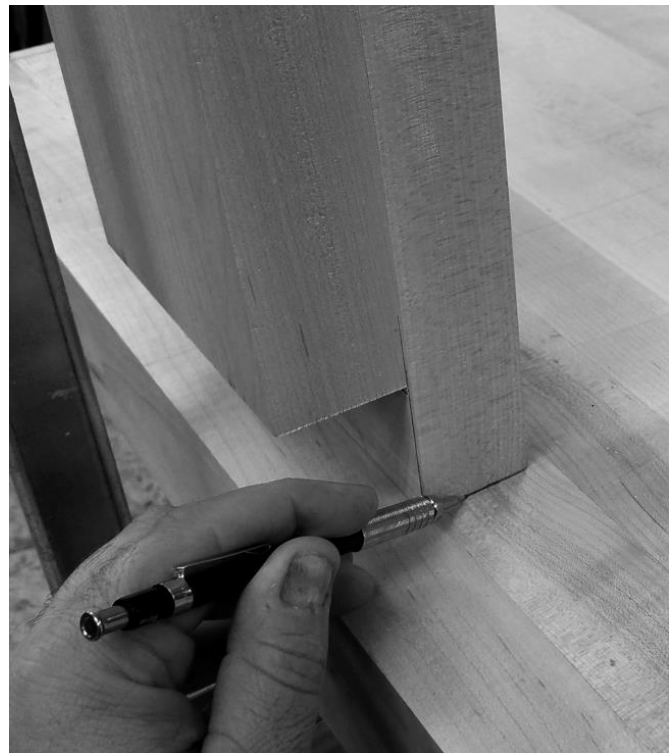


*Bias the undersized punch towards the tenon shoulder.*

into the tenon cheek through the hole in the leg. Traditionally you would then disassemble the joint and remark the locations, offsetting the mark towards the tenon shoulder. Here's a little trick that eliminates that step. Use a smaller punch or drill [5/16" works well in a 1/2" hole—that makes for a 3/32" offset] press the punch against the side of the hole, and this is important, against the side closest to the tenon shoulder, then press the point into the tenon. This will automatically establish your offset and eliminate the extra step. It also helps reduce the tendency to mark the offset in the wrong direction. Envision the punch as the peg, drawing closer to the shoulder, and thus making the joint tighter. It's virtually foolproof. Do this for all 16 holes. Also mark your rails and legs with a letter or number so you can reassemble the bench exactly the same later during final assembly.

With the base still assembled and in its exact location on the underside of the top, scribe around the tenons at the top of the legs to transfer their locations to the underside of the top. Make sure the outside faces of the legs are dead flush

Assemble the base dry and upside down and run clamps across the short ends to draw the joints tightly together, and also clamp the legs down onto the benchtop. This will help keep the long rails from shifting about [you can clamp the long rails too, if you've got a pair of long clamps.] Using a transfer punch or bradpoint drill, mark the tenons by pressing the point of the punch/drill



*Transfer the locations of the leg tenons to the underside of the top.*



with the long edges of the top before transferring the tenon locations.

Next, disassemble the base and drill the drawbore holes in the rails' tenons. Excavate the mortises in the underside of the top for the leg tenons. Make sure you make the mortises a little deeper than the tenons so they don't bottom out in the mortise. Layout for the drawbore pegs in

the front and back edges of the top for the leg tenons and drill the holes in the edge of the top. Fit each leg tenon to its mortise in the top and mark for the drawbore holes as you did with the rail tenons. Remove the legs and drill the peg holes in the tenons.

Before you put the base components aside to work on the Classic Leg Vise installation, cut your shelf ledgers and attach them to the inside of the rails. We use traditional cut nails. Leave the ends of the ledgers a tad shy of the inside of the legs so they don't interfere with the final assembly.

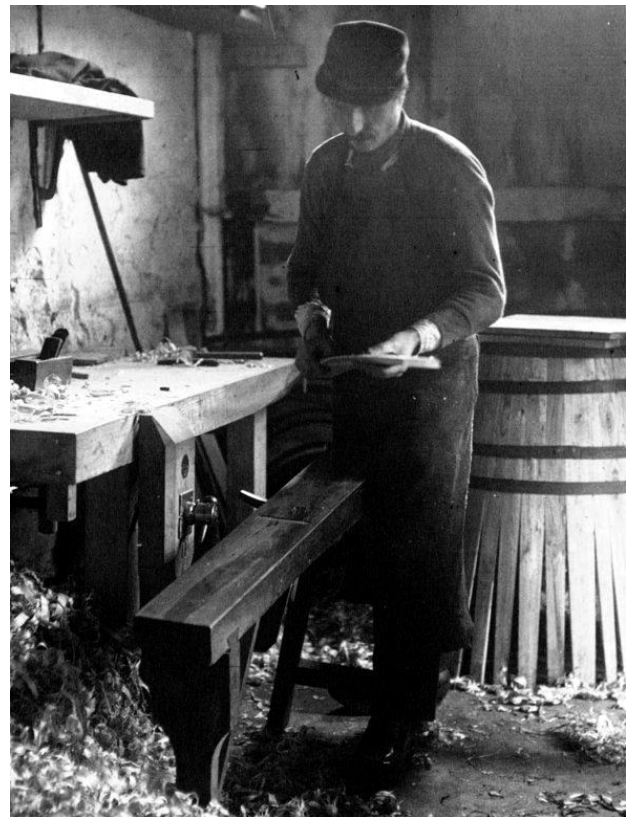


## AB VISE INSTALL

Now that the base joinery is complete you can turn your attention to installing the Classic Leg Vise. Follow the installation instructions, which you can download anytime from our website. The best time to install the vise is now, while the leg is free of the bench.

The shape of the chop can be the one place where you individualize the bench. We like classic shapes and designs that evoke an era of traditional woodworking, so we try not to be too inventive. This cooper's bench, likely manufactured by the La Forge Royale company, features a chop shape that we like. Here's how to make it.

Before you begin, complete the install of the Classic Leg Vise and make sure it's functioning properly. Take your





top thickness into account and cut the chop to final length. It's okay if it ends up slightly long after you flatten the top, you can always trim or plane the top end of the chop to match.



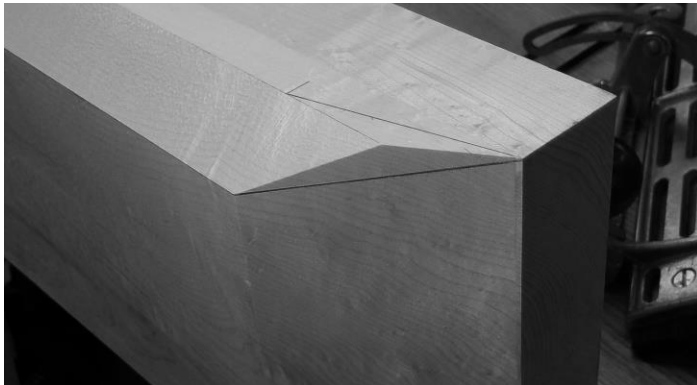
First, cut the bevel at the top of the chop and the two long tapers along each edge. We use a bandsaw or rip saw. Then smooth plane the sawn surfaces to perfection.



Layout the chamfers on the long edges and the tapered chamfer at the top of the chop.



Carve away most of the large chamfer at the edge with your tool of choice. Use a jack plane set for a rank cut [watch your grain direction.] But a drawknife can hog off a lot of wood quickly [also watch grain direction.] Follow up with a jack or jointer set for a finer cut.



The edge chamfer leaves little material to remove from the tapered chamfer. Again, the drawknife gets you close. But you can also use a block plane.

Perfect the chamfer with a finely set block plane. Break all the sharp edges and the chop is done.

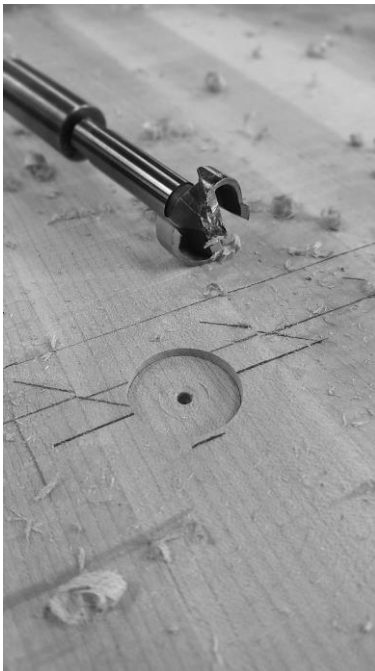




## FINISH UP THE TOP

You can now mill the stock for the planing stop and prepare the mortise in the top. Instructions for installing the Benchcrafted Planing Stop are provided on our website's downloads page. If you've glued up your top to leave a void for the mortise, you're more than halfway there.

Now you can drill the holdfast holes in the top. For holdfasts to work properly, the holes must be drilled perpendicular to the bench top. Obviously you can't use a drill press for this. You can use a brace and bit for this task, but be prepared to get a workout. We use a heavy duty electric corded drill [cordless ones are too weak] along with a Japanese-made Wood Owl Auger bit. These bits zip through hardwood like nobody's business and leave a fairly clean entry and [surprisingly] exit hole. Here's the process. First, use a Forstner bit at each hole location to drill a hole that's about 1/8" deep. This serves two purposes. First, it cleanly scores the perimeter of the hole, reducing the chance for the Wood Owl bit to tear the fibers, which can happen if you start the hole too aggressively with the Wood Owl bit. Secondly, it establishes a center



point for the auger on the Wood Owl bit. Now make a drilling guide out of a thick piece of wood about 3" tall by a couple feet long, and cut a V-shaped notch in the end. The angle is not important, but it should be 90 degrees or less. Get your drill ready and chuck up the Wood Owl bit. Place the bit in the center of the hole and turn the drill manually so the auger bites into the wood for a turn or so. Now slide the V notch up to the bit until you feel the notch contact the entire height of the bit—this means the bit is now at 90 degrees to the face of the top in both planes. Without moving the guide, clamp it down to the bench. As long as you don't lean away from the guide, the hole will



be perpendicular. Depending on the length of the bit [Wood Owl makes two lengths] and your particular model of drill, you may need to remove the guide to drill clear through the top, just drill as deep as you can with the guide in place. Finish off the holes by chamfering the openings slightly. Ignore the rabbet and the hole in the guide pictured here. We simply used an offcut from a scrapped leg vise to build the guide. The point is, it doesn't have to be pretty. If you're using less expensive  $\frac{3}{4}$ " shaft holdfasts instead of our's or Crucible's, make sure you drill  $\frac{3}{4}$ " holes.

Use the same technique to drill the holdfast holes in the front leg opposite the leg vise, or use a drill press. Now would also be a good time to mention building a left-handed version of the bench, with the leg vise placed on the right front leg of the bench. The only thing you need to change on the bench to make it left-handed is which leg you install the leg vise in, the holdfast holes on the opposite leg, and the layout of the holdfast holes in the top [simply flip the layout.] Everything else stays the same.

With the planing stop and holdfast holes finished up you can cut the top to final length. 3" of hardwood isn't the easiest thing to cut with good results. Here's a slick way of doing it with tools you probably already have in your shop. Using a sharp circular saw, clamp a straight edge across the bench [if you've got a track saw like a Festool, you know what to do] and run your circular saw against the guide and cut as deep as the saw will allow. This will get you within  $\frac{1}{2}$ " of the other side of the top. To finish up the cut, flip the top over and use a router equipped with a bottom bearing or "flush trim" bit to trim the remaining waste. Depending on how much waste you need to remove, you might need to make a preliminary cut with your circular saw so your pass with the router takes off as little material as possible, no more than  $\frac{1}{8}$ " for a nice cut. This technique yields a near perfect end grain surface that cleans up with only a light pass from a dead sharp block plane. Wet the surface of the wood with alcohol and your plane will cut the end grain much easier.



## ASSEMBLY

Before final assembly you'll want to double check all your joinery and surface finishes. Did you forget anything? Will your joinery assemble dry? Now is the time to



pass a smooth plane over the legs to tidy up any pencil marks or planer chatter, if that sort of thing bothers you. You may have a rail that's proud of the legs, if so plane it flush. If it's recessed, just leave it alone—don't plane the legs to match the rails.

The first step in assembly is to make at least 30 pegs for drawboring the joints together. You'll only need 24, but having extras is always a good idea. The traditional method is to split, or rive the stock from a very dry piece of white oak or hickory. You want a very resilient species for the pegs, and one that will hold up to



hard pounding and bending as you drive them into the holes. If you can't rive them, you can saw the blanks from dead-straight material. Don't settle for anything less than dead straight, as any runout will simply cause the peg to shatter or split. Sawn blanks are a little more easier to process. Saw them about 1/16 oversize, then plane the corners off with a block plane to make long octagons. Now plane a taper on one end (like you're sharpening a pencil) and chamfer the other end heavily. Finally, drive them through a dowel plate to make them round. Don't be tempted to buy commercial dowels, they almost always have runout. Make the pegs about 6" long and rub the first half of each peg with wax all around. We use canning wax, the same stuff we lubricate our plane soles with. This wax greatly helps the pegs make the bend as you drive them through the tenons.

To assemble the bench, set the top upside down onto your saw benches. Now assemble the base upside down onto the top, but keep the base shifted to the side of the mortises. Apply glue to the leg tenons and their mortises. Now slide the entire base over until the tenons fall into their mortises. The weight of the base should be more than enough to allow the base to fully seat in the top. But if you need to persuade the legs, use a small sledge hammer on the bottoms of the legs to drive them home. Now place a peg in a hole. Don't be tempted to wail away on the pegs. Steady, firm taps are what



gets the job done here. If you're too aggressive, you won't hit the peg squarely on the head, and it could break. Likewise, if you go too fast the peg won't have a chance to snake its way around the offset hole in the tenon, and it could break under the shock of the blows. Don't be stingy with the wax either, pegs of this size need lubrication to move through this much wood. It's best to use a small sledge hammer rather than a wood mallet or even a typical 16oz. hammer. The sledge allows you to apply concentrated blows to the peg in a far more controlled manner than swinging a smaller tool in a large arc. It's a good idea to support the peg with your opposite hand until the peg gets driven in an inch or two. If you're unsure of the technique, you may want to build a test joint in scrap using the same materials and dimensions as the joints in the bench to get a feel for the process. Once you feel and hear a change in the sound, stop. It means you've reached full depth. Insert the next peg into the hole and repeat the process. Make sure you only drive one peg at a time. If you have one peg sticking out of



*The long rail drawbore pegs will pass completely through the leg, whereas the short rail pegs go in blind holes.*

together tightly. Believe it or not, a mortise and tenon derives its strength mostly from the accuracy of the joint and the fit between the tenon and mortise. If you fit a tenon properly to its mortise, most of the glue applied to the cheeks of the tenon and the walls of the mortise will get scraped off when you assemble the joint. But if you would like to use glue anyway, use a slow setting glue like liquid hide glue before assembling the base. Now drive the pegs into the legs just as you did before with the top. At the long rail tenons you should see the pointed end protrude through the back. The short rails will stop in their blind holes, just like in the top. Once all the pegs are driven, cut them flush.

the adjacent hole (just partially tapped in) you can easily break it off with an errant move of the hammer while driving the other peg. Once all the pegs are driven in, trim them off with a flush cut saw.

Now move up to the leg and rail joints. You're probably wondering if we forgot the glue. Nope. These joints really don't need glue to do their job. The drawbore pegs keep everything



At this point you may notice that the character of the bench has changed as you drove the final pegs into place. It should start to ring like a bell and feel like one monolithic piece. This is the beauty of using drawbore joinery. The 24 pegs are constantly in a state of tension, trying to pull the joints together. They will likely never fail, and this bench should be as rigid today as it is when your great grandchildren use it for, well, woodworking we hope!

With the bench still upside down, plane a heavy 3/16" chamfer all around the bottom of each leg. This will help prevent splintering when moving the bench. Break all the sharp edges on the legs and rails while they are easily accessible. Now flip the bench onto its legs by rotating the top on the saw benches, and let the two legs come to rest on the floor. Get behind the bench and rotate the rest of the way. Be careful! The bench is heavy. If you feel uneasy, get help. A long bar clamp placed across the width of the top can act as a long lever and allow you to rotate the bench a little easier.

The last step is to flatten the top. Before you begin planing, you'll need to chamfer the back long edge of the top. This will help prevent the grain from splintering [spelching] as you work across [traverse] the top. Even with the chamfer, spelching can occur, especially if you take a heavy cut. Pay attention to the grain direction and take light cuts to start. If you blow out some of the grain, stop and try to glue the loose splinters back in place before continuing. You should have built flatness into the length of the bench when you glued up the top, so that should be done. All you should need to do is bring the laminates flush by traversing the top. If its not flat along its length, you'll need to remove more material from the high spots. Use the longest bench plane you



have, preferably a #7 or #8 with a lightly cambered iron. Check with winding sticks for twist before you begin. Again, plane the high spots down if your top is twisted. Your plane will tell you when you're done—you'll get continuous shavings all the way across. Remember, if your top is flat long its length, you'll need to make even passes

across the top *all along the top*—even if some areas don't make shavings—otherwise you'll spoil the flatness along the length. If you've built your top accurately, you should be able to take full shavings across the top after about 3 passes over the top. The surface left by traversing lightly across the top is a toothy, slightly rough texture that prevents workpieces from skating around on your bench. Chamfer the edges all around the top.

Mill up 4/4 stock for the shelf boards and cut the lap joints on the long edges. The notches around the legs should be laid out directly with the board in place, don't use measurements off the measured drawings since your boards will be random widths. Reinstall the Classic Leg Vise chop, adjusting the height of the chop if necessary to bring it flush, or slightly below, the level of the top.

To finish the bench, apply a wiping varnish like Minwax Antique Oil. This helps keep the bench clean. You can build up as many coats as you like to build some sheen and depth, but only apply one coat to the top of the bench. This helps keep the top clean and fresh looking. Don't be tempted to polish the top, you want to keep the toothy surface that your plane left, and more finish will only negate that. Make sure you don't get any finish in the holdfast holes—the last place you want a slick finish.



## MAKE YOUR MARK

Congratulations. Your bench is complete. Some folks like to sign the bench, inlay a coin from the year they finished it, or carve their initials into the chop. Whatever you do, you'll make your own mark by what you produce with the bench—the true measure of any fine bench.





## USING THE BENCH

The Classic Workbench is simple to use. The leg vise is used primarily for working the edges of boards and the ends of narrower boards. This is self explanatory. To work the faces of boards along the grain, tap up the planing stop (don't make it any higher than necessary) and butt the end of the board into the teeth of the stop. With the right technique you can plane across wide boards without repositioning the board. You usually don't need to tap the opposite end of the board to engage it with the stop, but in some cases, especially with rougher stock, you may need to give a tap with your mallet. Working the faces of a stack of boards is extremely quick with the planing stop since you don't have to open and close a vise constantly.

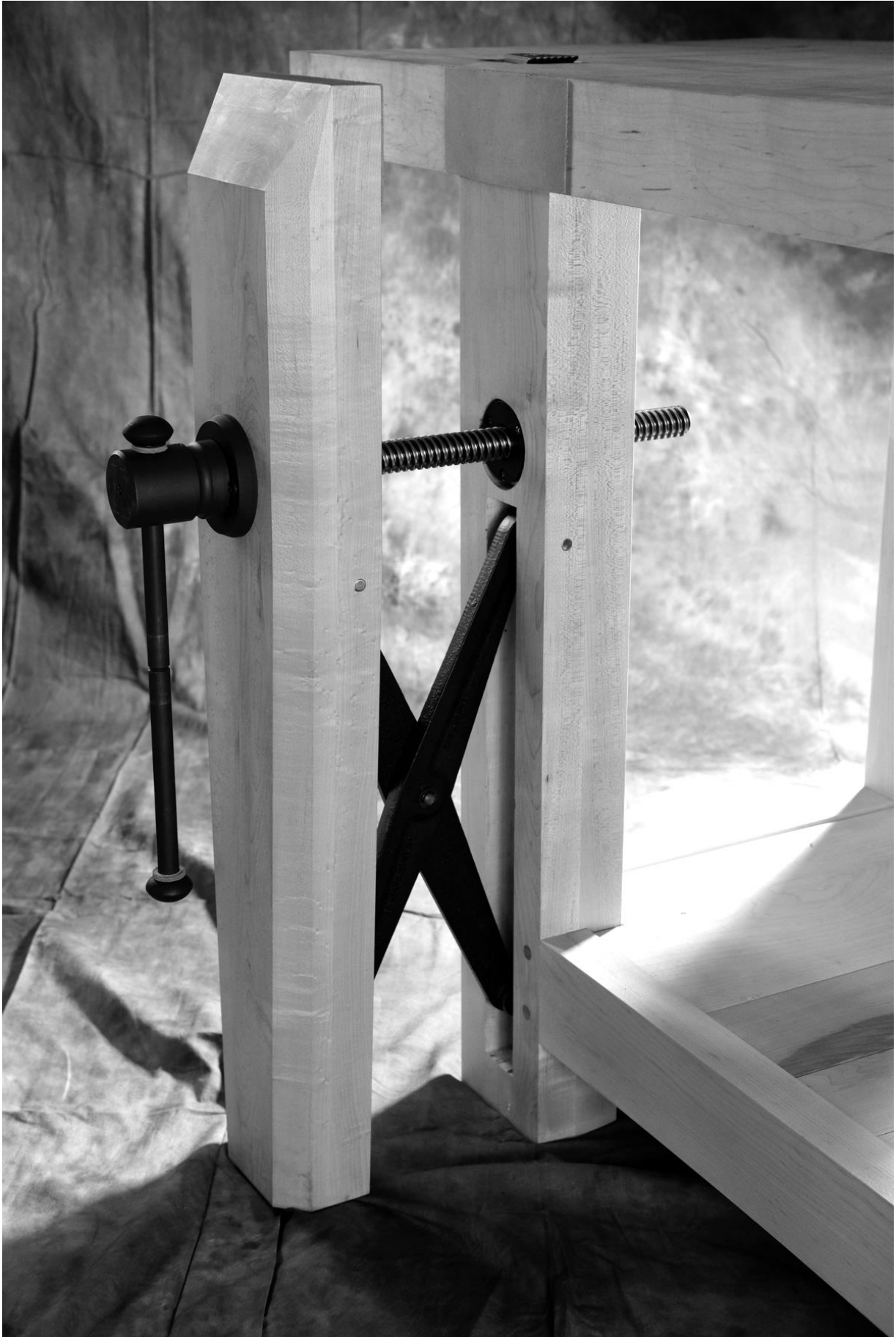
To work across the face of a board, make yourself a doe's foot and position it at



the back corner of the board, holding it down with a holdfast. The doe's foot is simply a piece of wood with a V-shaped notch cut into one end. The bottom

surface of the doe's foot can be lined with sandpaper or Crubber to help it stay put on the bench top. To work long boards, fasten a batten to the right leg with a holdfast and use that to support the end of the long board. For more techniques on using the bench, see our website.















As always, if you have questions about the bench build, or the bench itself, we can be reached at [info@benchcrafted.com](mailto:info@benchcrafted.com) where we promptly reply to all inquiries.