



One of my daughters breaking down lumber for her future bench.

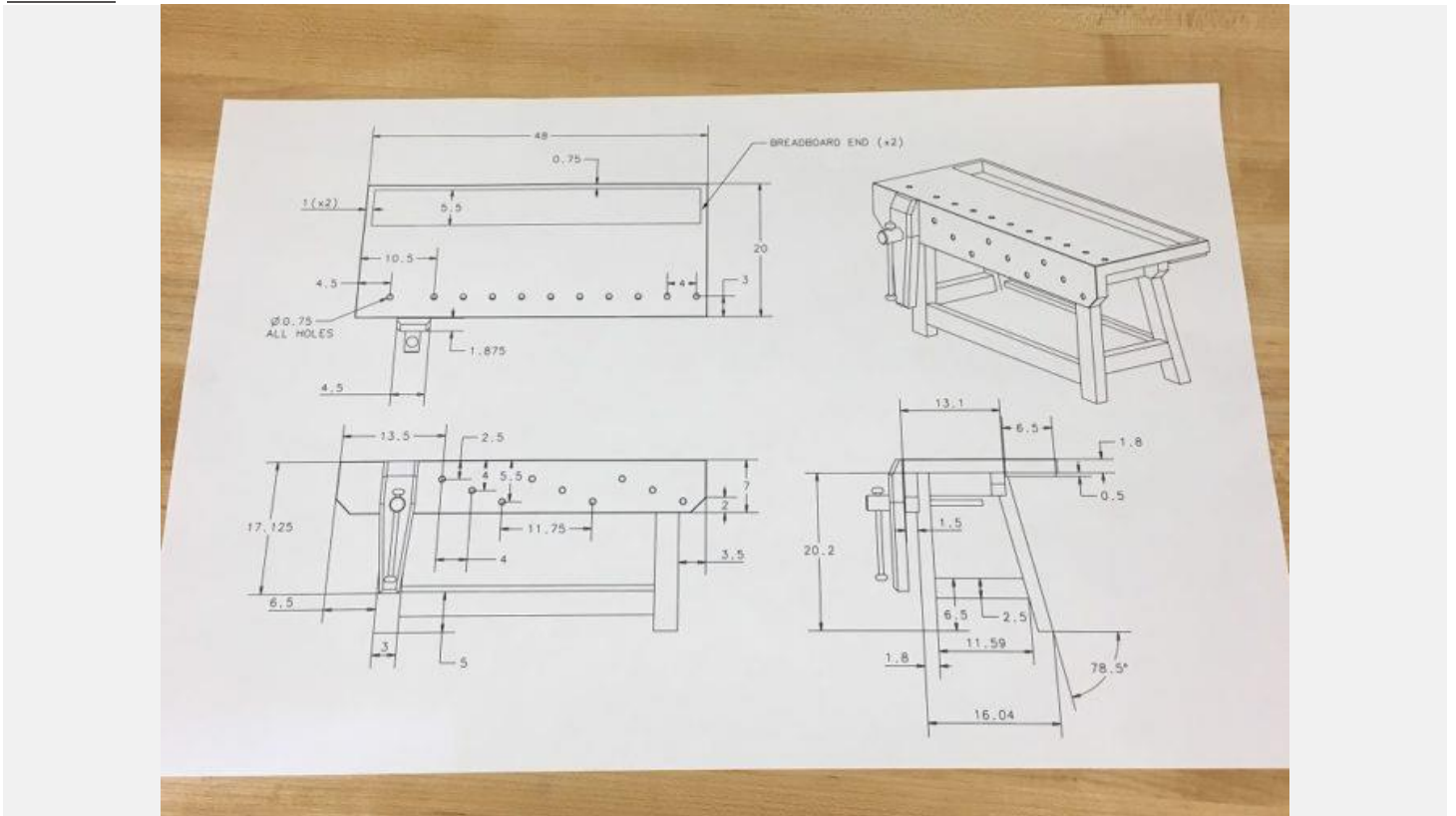
I have kids. 3 of them. All girls. They all enjoy spending time in the shop with me and as they've grown, their interest in using tools and building things has taken off. I would occasionally set them up on my bench with some tools, but everything is too big for them and watching them plane wood while sitting on top of the bench and the board they're trying to plane was just sad. So for a year or so I started thinking about what kind of bench to make them, but I couldn't figure out what type of vise to get. Ideally it would be a seriously functional vise, but move smoothly and easily enough for a 4 year old to use. I didn't make much progress until Handworks 2017 when Benchcrafted did a kid bench giveaway using their scaled-down vise hardware as a front vise (the hardware is normally used in their portable HiVise product). Seeing that vise was the missing link for me, so I bought the HiVise kit and started designing my kids' bench when Handworks was over.



The BenchCrafted kid bench from Handworks 2017.

In the end, my design was based around the bench from Charles Hayward's *The Woodworker Vol. 4*, the same design Benchcrafted used for their giveaway bench. By that I mean it's a bench with a tool tray and lower shelf, front vise but no tail vise, and a front apron with dog-holes for supporting wood (as opposed to a sliding deadman). There's a variety of ways to incorporate these features into a bench ranging from fast and simple to more complicated and time consuming... I'm making this for my kids and want it to be something that expresses how much they mean to me, so naturally I opted for the complicated and time consuming route. That's not to say the extra effort is just for show, there's a lot of logic driving most of the decisions I made so without further adieu, let's get into it.

## The Plans



This was my first draft of the bench, final version available for download below. I don't usually go into nearly this much detail on my plans, but with a bench it's easy to misplace a dog hole or mortise location and suddenly things won't assemble correctly.

I designed my bench to ideally fit a ~7-8 year old and uses almost exclusively 8/4 lumber. It's smaller than the bench made by BenchCrafted, but I think it's a good compromise for my kids. It's not so tall that a 4-5 year old couldn't use it, but not so short to prevent a 10-11 year old. After that, I plan on either shimming the bench up a few inches or transition my kids over to my full-sized bench.

### The Base

I knew from the beginning that my kids' bench would have a painted base. Our WMT travel bench (which is also my daily user) has a black base painted with milk paint and I love it. It's also what my kids are used to, so they just expected their bench to have a painted base. Given the painted finish, I didn't use a more expensive wood (like Maple) nor an open-grain wood (like Oak). My preferred lumber of choice for this kind of situation is Poplar. It's readily available, inexpensive, cuts well with machines or hand tools, and looks great when painted. So with the wood selected, I got it milled square and to size so the joinery could begin. The base is assembled with drawbored mortise and tenons. I typically make the mortise first, hogging out most of the waste on the drill press and then cleaning it up with chisels. The tenons were roughed out on the band saw with the fit being tuned via a router plane until it fit the mortise perfectly.



The pile-o-lumber for the base awaiting joinery.

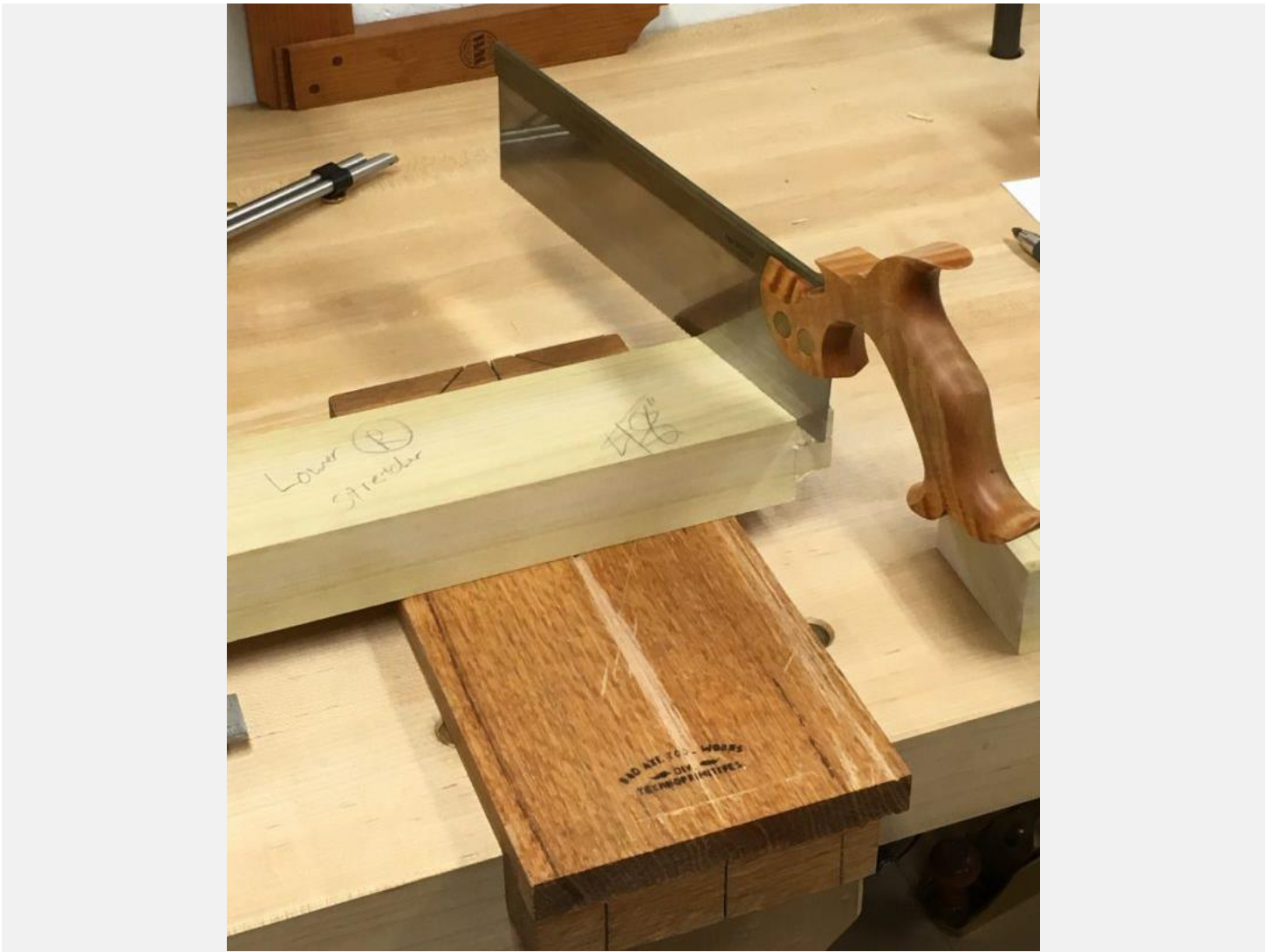


Lay out the mortises referencing off the same face. Use 2 different gauges or a dual mortise gauge like this one from Veritas.



The tenons were roughed out on the band saw and refined using a router plane until it just presses into the mortise using hand pressure.

The joints in the back of the base were a little tricky because they aren't square, but angled. For these, it was faster to just do everything by hand. I laid out the angles and locations, cut to my lines with hand saws, and again tuned the fit with a router plane.

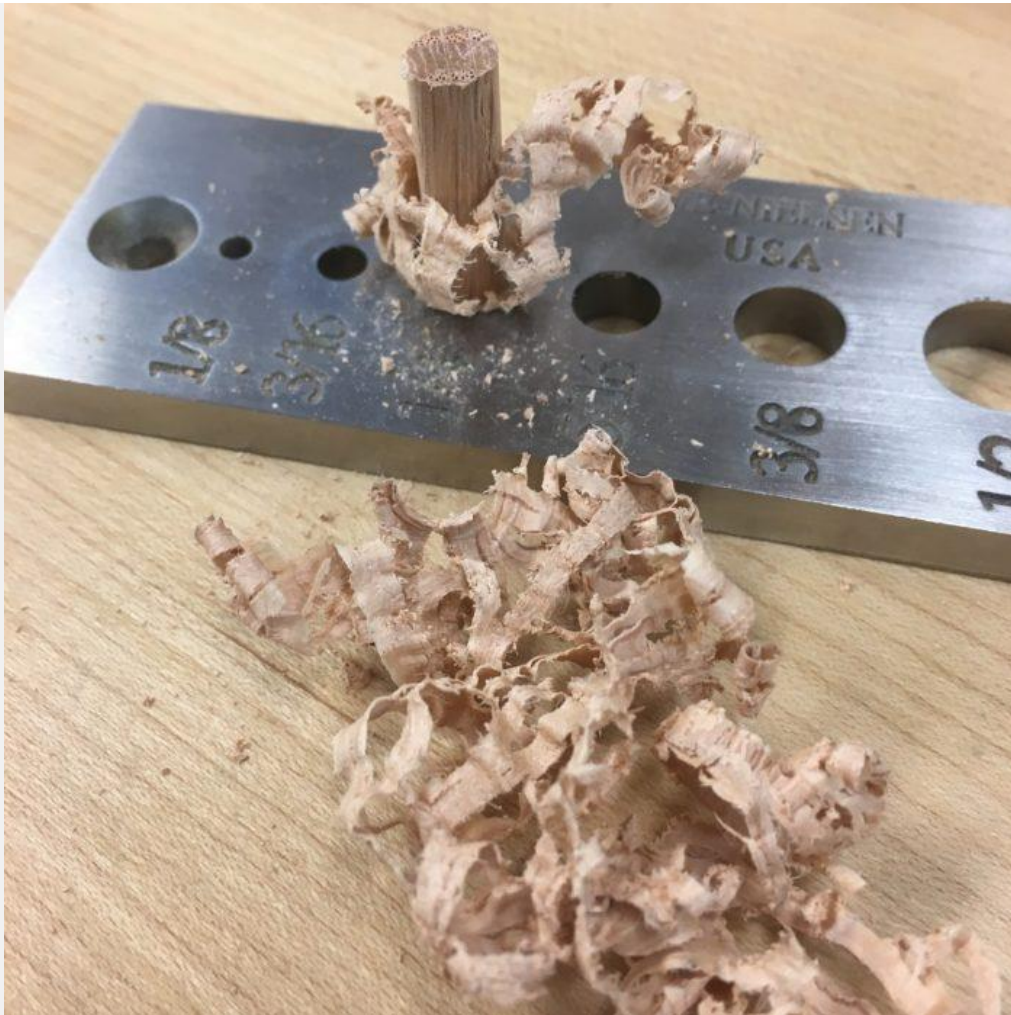


Cutting the angled tenon shoulder.

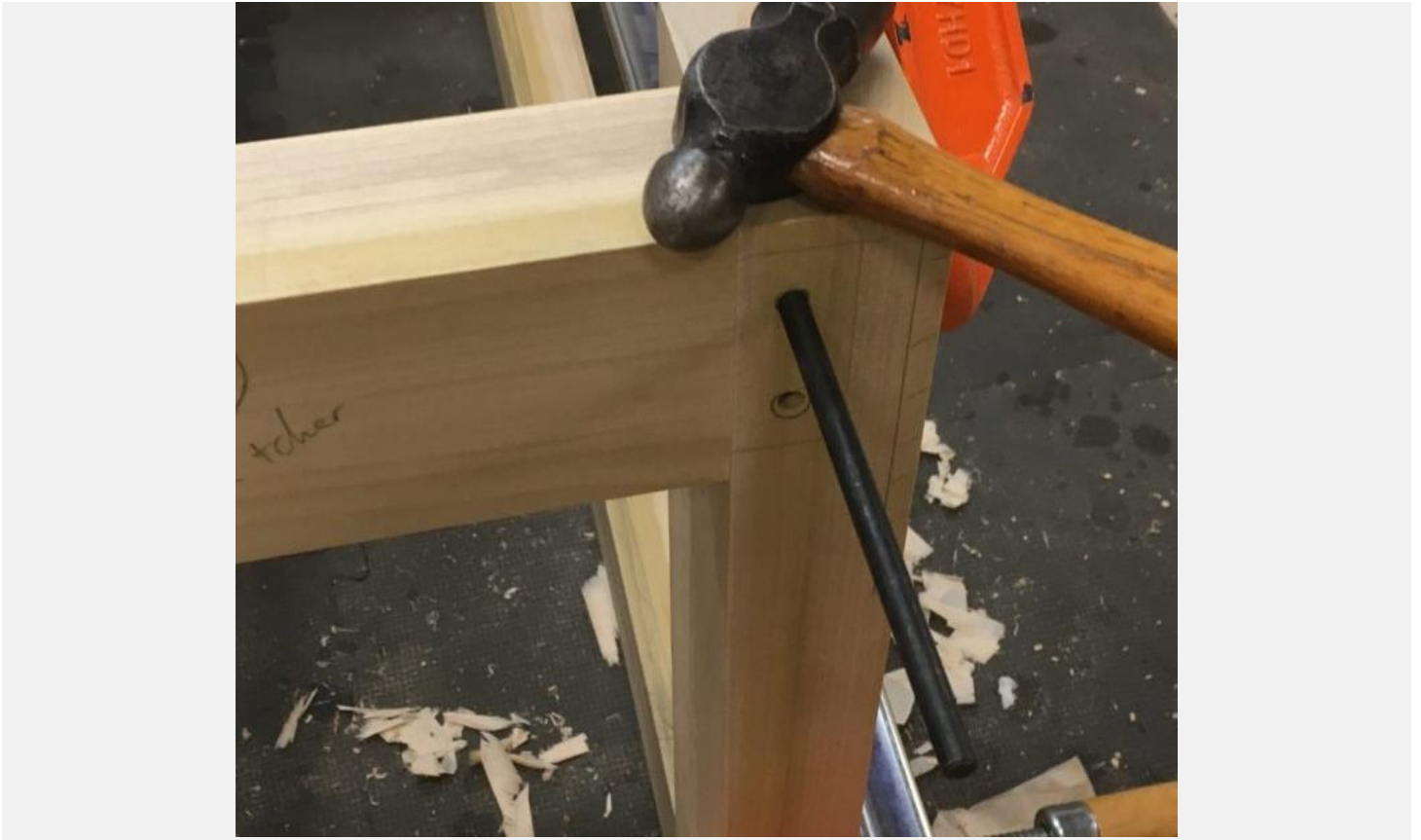


Cutting the angled tenon cheeks.

With all the joinery cut, the prep for drawboring can begin. If you aren't familiar with drawboring, it's basically just sending a wooden peg through a hole that's drilled through the mortise walls and tenon to pin the joint together. The one trick is you don't just drill a straight hole. First, drill the hole through the mortise, then insert the tenon and mark the hole's center location to the tenon and remove it. Now, shift that center location toward the shoulder by a small amount (~1/16"), the exact amount can vary based on wood species and the size of the joint. Reinsert the tenon and you'll see the hole from the mortise is offset from the hole in the tenon. Now when you pound your wooden peg through the offset holes, it tries to pull the tenon deeper into the mortise. This pulls the joint extremely tight at the shoulders and locks the peg in place, even with no glue everything would stay locked in place. Now go ahead and add glue to the mortise and tenon, assemble the joint, and pound the pegs through. Note, the pegs should be tapered at their ends so they can snake their way through the holes and if you have drawbore pins (aka, just a tapered rod) you can twist that into both ends of the hole before inserting the peg which also helps ease the path of the peg through the offset holes.



Pounding wooden pegs through a dowel plate brings them to a precise final diameter.



After drilling the hole through the mortise, insert the tenon and mark the hole's center location with a transfer punch.



A drawbore pin gets pressed and twisted into the hole from both sides before pounding the peg through. This crushes some fibers and helps smooth the path of the peg through the hole.





After the pegs are driven home they will get cut off on each side with a flush cut saw. Notice the pointed tips of the peg.



Getting the base glued up and drawbored.

After the base is assembled, there's a few final details before it can get painted. First, there's a few cuts at the top of the front legs that the bench top apron will sit in and an extra block gets glued to the left leg that's necessary for mounting the vise hardware, but I feel that's best left until the bench top is finished. Then use the top itself to locate those cuts, otherwise you're asking for issues. You can cut the feet flat at this point and if you haven't done it already (which I hadn't) you can drill the holes through the top stretchers for the bolts to pass through which will attach the top to the base. Finally, add all your chamfers or whatever edge detailing you like and you can move onto the top.

### **The Top**

Start by gluing up some 8/4 stock into a panel that's about 14" wide by however-long-your-bench-is... in my case it was 48". That will act as the main surface. You will also need an 8/4 board ~5.5" wide to act as the front apron of the bench. Now prep the two end rails which are 1" thick x 20" long x 8/4" wide (to match the bench thickness). Finally, the rear rail is 3/4" thick x 48" long x 8/4" wide.



Main bench top surface getting glued up.

When all the components are prepped to size, flat, and square, you have a choice to make: you can either move onto the bench assembly and add the dog holes later on or add them now. Adding them now (which is what I did) is easier as the components are still manageable on a drill press, but you need to make sure your layout is precise relative to the location of the legs on your base. Otherwise, you may have holes that get blocked which make them useless and looks sloppy. So plan ahead and be careful. If you wait until everything is assembled, you can virtually guarantee you'll clear all the base components, but it takes more effort to ensure the holes are perpendicular depending on your methodology for drilling large holes without a drill press. It's your call, do whatever you feel most comfortable with. Regardless of when you drill them, add hefty chamfers around the holes so they don't blow out when you're flattening the bench top.



Components getting prepped and drilled, nearly ready for assembly.

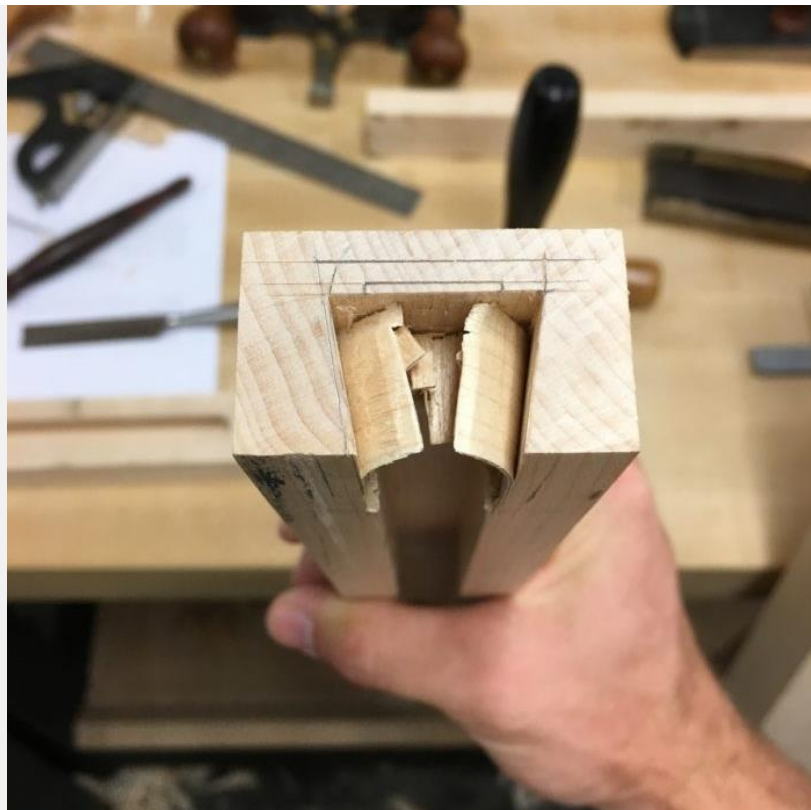
The next step is fitting the end rails to the top surface. There are a few things going on here, so bear with me. First, it's going to be a breadboard-style end cap, meaning part of the bench top gets milled off each end to create a full width tenon. A matching groove gets placed in the end rail, but the rails extend beyond the back of the main surface to capture the rear rail, so it has to be a stopped groove. This helps keep the bench top flat (which is the whole reason breadboard ends are used in table construction), but also provides a method of attaching the end rails to the bench so that they can reach to the back of the bench and secure the rear rail. Additionally, there is a dovetail feature cut into the front 1" or so of the bench top tenon and again, this gets a mating feature cut out of the front of the end rails. The dovetail needs to be just slightly larger than the breadboard tenon in order for things to assemble properly. This feature gets repeated in the back of the end rails as a means of attaching the rear rail. This all sounds a bit confusing to read, but you can check out a drawing of the end rails and review the pictures below to help fill in the blanks.



Cut the breadboard tenon short, leaving material for the larger dovetail key at the front face. Lay out the dovetail and cut it out by hand.



Run the groove through the end rail to match the breadboard tenon, slide it over the tenon and butt it up against the back of the dovetail key. Then transfer the dovetail over to the end rail and cut it out like you would for any other half-blind dovetail. Repeat this process in a similar fashion for the rear rail (shown here) by cutting the tail on the rear rail first, then transferring it to the end rails.



Chiseling out the remaining waste in the dovetail socket.

When the bench top, end rails, and rear rail are finished, there's one more detail to discuss... glue. You can't simply glue everything together because the top needs to be able to expand and contract and gluing the end rail directly to the top will prevent that, leading to self-destruction. So dry-fit the end rails onto the bench and clamp them tight against the top so there are no gaps where they meet the bench top. Drill 1/4" holes through the bottom surface of the end rails every 2"-3", but stop them a little short of piercing through the top. (You can drill them straight through, but then you'll see them on the top surface and I chose to leave them hidden, but it's just a cosmetic choice, so it's your call). The holes should be centered on the tenon. Next, remove the end rails and file the 1/4" holes in the tenon into 1/2" slots. Now you're ready for assembly. Start by gluing the end rails to the top, but only use glue on the dovetail key. This will lock the front edge in place (more on that later) and all the expansion will shift the bench towards the back. Then drive 1/4" dowels through the holes to pin the breadboard end to the top. Because you added the slots in the tenon the top can slide as necessary while still keeping the end rails tight. No glue should be used anywhere in the breadboard tenon area. Don't even use glue for the 1/4" pegs until they're almost completely seated. A bit of glue in the final 1/4" or so will keep them from backing out while preventing glue from getting in the joint itself. Now you can glue in the rear rail and when its dry, flatten everything so you're left with a 20" x 48" bench top with a rectangular hole in the back.

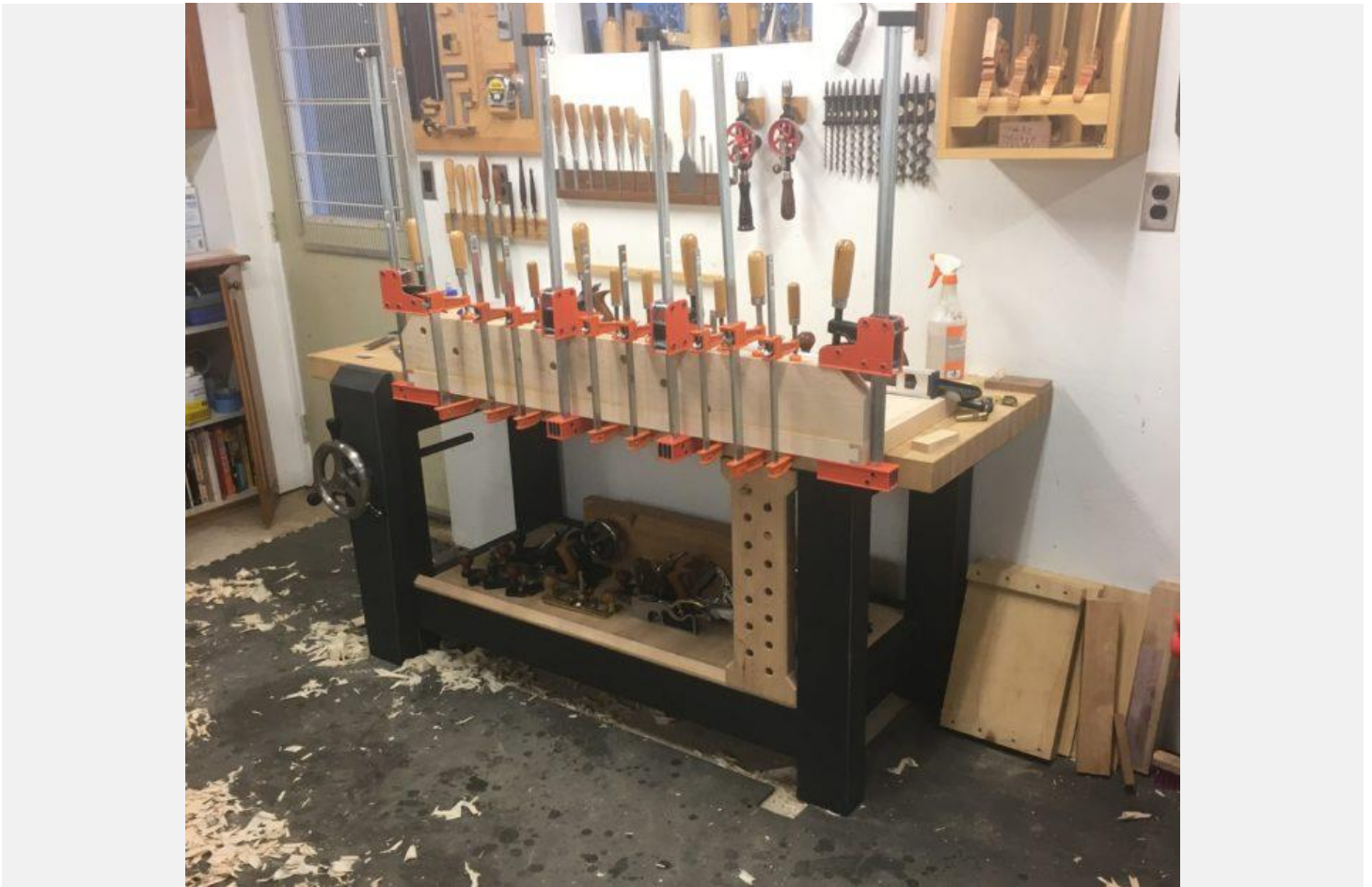


Completed breadboard end rail with dovetail key.



Adding chamfers.

The final step is to glue on the apron. Remember that we put glue in the dovetail key, so the front edge of the bench is treated as our stationary datum. Wood expansion is going to move away from that corner, so it's perfectly acceptable to glue the apron on over the entire length of the bench, including the overlapping cross-grain in the corners of the end rails.



Front apron glue up.



After the glue dries, make sure the apron is flat and square to the bench top surface.





Final bench top with finish applied.

With the top complete, all that remains is adding the 1/2" thick bottom panel for the tool tray. Nothing special here, it just gets screwed into the bottom of the bench surface. This is preferable to capturing it in a groove because the bench is only ~1.8" thick after milling, so it's not a terribly deep tool tray. Trapping the bottom surface in a groove would only reduce this depth further and it would be impossible to replace the panel should it ever get cracked or otherwise damaged.



Laying out the bottom panel. You can also see the location of the breadboard pegs running through the underside of the bench.



Pre-drilling all the screw holes to secure the bottom panel.

## Assembly, Painting, & Vise Installation

With the base and top complete, the vise still needs to be installed. It's made from the Benchcrafted Hi Vise kit and installation is best accomplished by downloading and following their instructions. I needed to add a block to one leg to house the crisscross hardware, but the rest is fairly simple.



The base, vise chop, and top in their unfinished, unassembled state.



After the vise was installed, I let the girls take it for a test drive.

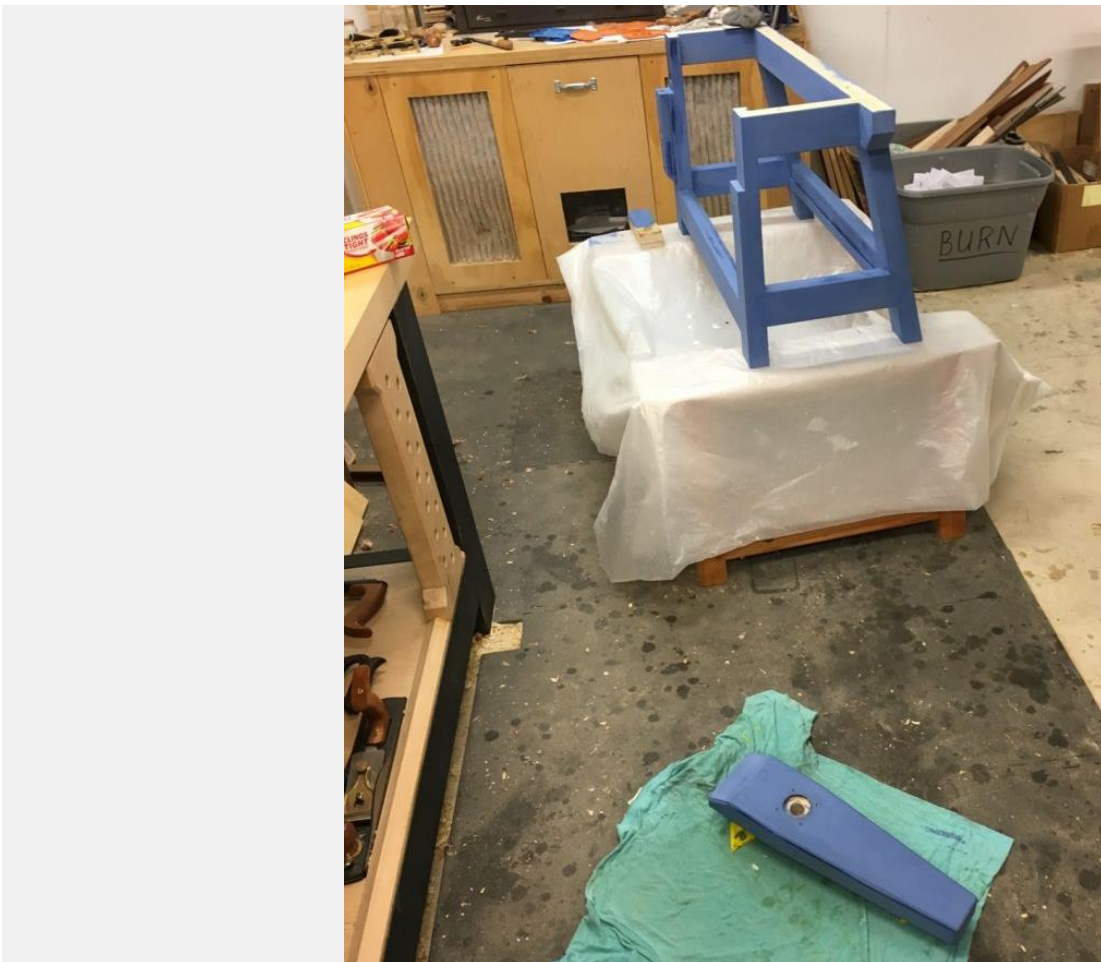


Ava takes a shot at edge planing.

Onto the finish work. For the base, I painted it with 3 coats of Federal Blue milk paint, then a coat of Watco Danish Oil over that. The top got a few coats of wipe-on poly.



First coat underway.

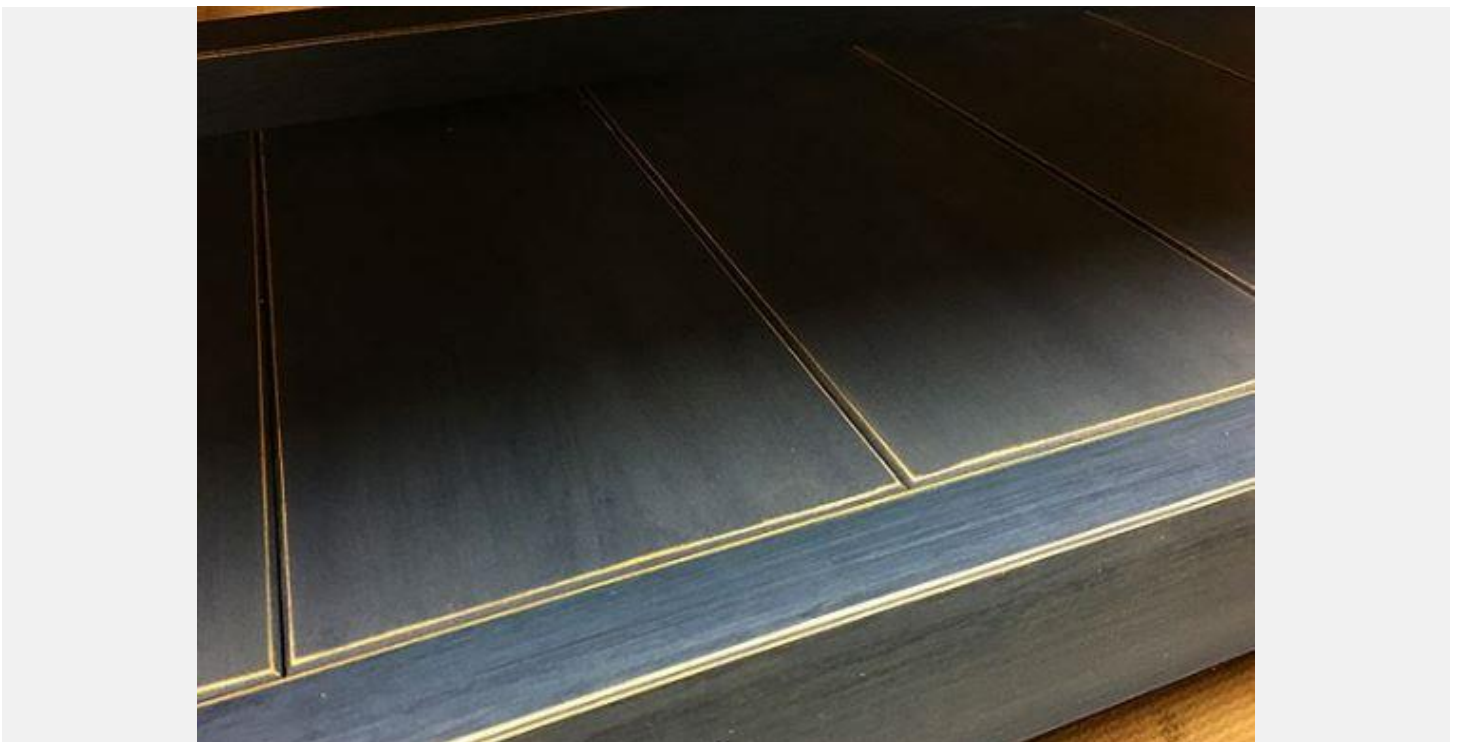


Base and vise nearly finished.

Finally everything got assembled, the lower shelf boards (which are tongue-and-grooved) were added, and the bench now sits next to my own where my 3 daughters can use it whenever they like. This was easily one of my favorite builds to date for obvious reasons and for those of you considering something similar for your kids, I hope this provides some inspiration. And for more pictures and info, you can look up the #kiddwrckbench on Instagram. Cheers.



The completed bench



Lower shelving details



Finished bench in action.