Skill Development: Sharpening a Chisel and Cutting Lap Joints with a Chisel

Lee Valley x WOULD WORKS

MAKE IT YOURSELF

PLANT STAND

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Skill Development: Sharpening a Chisel and Cutting Lap Joints with a Chisel

Sharpening a chisel and cutting lap joints with a chisel are two fundamental woodworking skills to develop. For this project, we've collaborated with Would Works, a non-profit social enterprise that offers woodworking training to people experiencing homelessness. When we asked them, "What would you be inspired to make to apply these skills?", they came up with this chic-looking plant stand that can fit in just about anywhere. The instructions cover how to make a stand for a 6 1/2" diameter by 6" tall pot, but with a little math, it's easy to adjust the dimensions to accommodate other container sizes (up to 14 3/4" diameter). As you build the plant stand, you will also learn how to keep your chisel sharp with a few basic accessories, as well as how to cut cross-lap and T-lap joints with a 3/4" chisel. What favorite houseplant will you choose for this plant stand?

Skill Level: Beginner to intermediate, ages 14+.

Time to Complete: 5 to 8 hours, plus drying time for the glue and finish.

About Would Works

"I would work if I could."

Would Works is an LA-based non-profit social enterprise that employs and trains people experiencing homelessness in the craft of woodworking. Through hands-on work with tangible outcomes, artisans build confidence and community while forging a pathway to self-sufficiency.

For more information about Would Works, watch our **5-part video series** on our website or visit **wouldworks.com**.

CONTENTS

- ○ 6 Pieces of clear pine, 18″ × 1 1/4″ × 1 1/4″
- ○ Baltic birch plywood block, 8″ × 3″ × 3/4″
- ○ Vise-type honing guide
- ○ 3/4″ Narex chisel
- ○ 2 C-clamps
- ○ 6″ Steel square
- ○ Pencil
- ○ 12″ Ruler
- ○ Japanese utility saw
- ○ Water-resistant PVA glue, 150 g
- ○ 3 Sandpaper sheets (120x, 180x and 220x)
- ○ 2 Lapping films (3 and 15 micron)
- ○ 4 Bumper feet
- ○ Walrus Oil furniture finish, 2 oz
- ○ Cotton rags
- ○ Vinyl gloves

Note: *Components may not be exactly as shown, depending on supply.*

Other items you will need (not included):

- ○ Pencil sharpener
- ○ Mallet (preferred; but a hammer will also do)
- ○ Safety goggles and mask
- ○ Small bowl of water
- ○ Small stick to serve as a glue applicator
- ○ Masking tape
- ○ Nail polish remover (acetone)

1 SETTING UP YOUR WORKSPACE

TIME TO COMPLETE: 15 MINUTES

a. Select a clean, open work area, as well as a sturdy table, bench or desk.

b. Remove the contents of the kit from the box and set them aside, but nearby. Unfold the box and use it to protect your work surface.

c. If you haven't done so already, read all the product instructions to familiarize yourself with how each product is to be used.

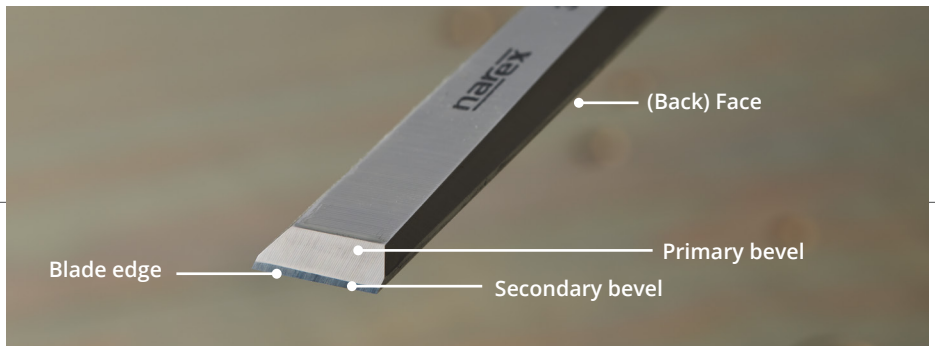
2 SHARPENING THE CHISEL

TIME TO COMPLETE: 15 TO 30 MINUTES

Caution: *Careless handling of the chisel can result in injury. Always wear proper eye protection. Always work with the chisel blade pointing away from your body and keep your hands behind the cutting edge.*

A new chisel does not come sharp, ready for use from the manufacturer. It will need to be sharpened to be used safely and effectively. A utility edge that has been lapped, honed and polished will be adequately sharp for the purposes of this project. However, keep in mind that sharpening is not one and done. Since re-sharpening will be necessary, it is important for every woodworker to establish a good sharpening routine to ensure edge tools are always performing at their best.

There are several ways to achieve a sharp edge. The sharpening method presented here uses a minimum of tools. When the lapping film is applied onto a substrate, such as the included plywood block, it offers an inexpensive yet efficient sharpening set-up that produces excellent results on blade edges.



a. Ensure the plywood block is clean and free of debris.

b. Apply a piece of the 15 micron lapping film (orange) on one side of the block, and a piece of the 3 micron lapping film (pink) on the other.

c. The first step in sharpening a chisel blade is to ensure the back face is properly prepared. This lapping step provides the reference surface for the bevel. Apply a few drops of water onto the 15 micron side. Place the back of the chisel flat on the lapping film and take several back-and-forth strokes. This process flattens the back face and removes any coarse grinding marks. It isn't necessary to lap the entire face of the chisel; however, you do want to completely remove the grinding marks across the face of the chisel right to the edge. Continue lapping until you reach this result.

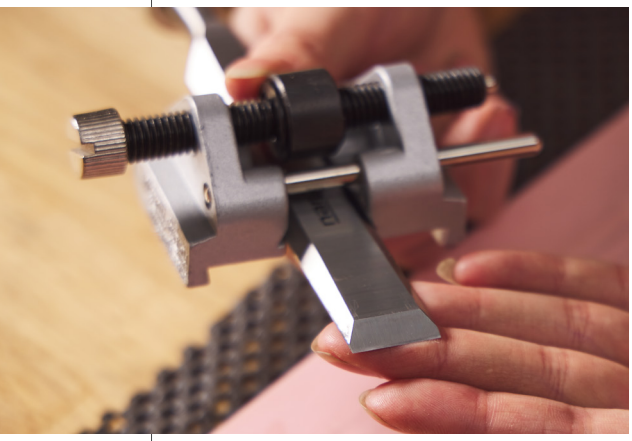
Tip: *The simple but effective honing guide included in your kit clamps and guides the chisel at the desired angle while you hone the cutting edge. It relies on the projection of the blade to set the bevel angle. The chisel is ground at a 25° angle, and this angle is known as the primary bevel. Since it takes a lot of effort to abrade the whole surface of the bevel, honing a secondary bevel (or micro-bevel) of a couple of degrees will speed up the sharpening process and get you working wood as quickly as possible.*

d. Install the chisel face up (bevel down) in the honing guide and use the ruler to set the blade edge projection to 1 5/8". Measure off the leading edge of the guide to the tip of the chisel's cutting edge.

e. Apply some water to the 15 micron lapping film's surface and place the guide on the lapping film before depositing the chisel's edge on the film. Draw the guide and chisel towards you a few times. This is important, as taking a forward stroke is likely to cut the lapping film. Keep the pressure well forward on the blade so the guide rolls smoothly and easily.

f. The second step in sharpening a chisel blade is to hone a secondary bevel. Reduce the projection of the blade by a small amount – about 1/16". Apply some water to the lapping film's surface, and proceed as in the previous step, again drawing the guide and chisel towards you a few times. Stop honing when there is a narrow secondary bevel right at the tip of the chisel's edge.

g. The third step in sharpening a chisel blade is to polish the secondary bevel. Switch to the 3 micron side of the sharpening block. Apply some water to the film's surface and once again draw the guide and chisel toward you a few times. When you're satisfied there is an even polish across the blade's edge, remove the chisel from the guide.



Tip: *If you run your finger underneath the blade, the edge will feel a little rough from the steel that has folded over. This is called a burr and needs to be removed after the secondary bevel has been polished. However, don't worry if you can't feel this burr.*

If you have followed the steps, you can test the edge by taking a shaving off the end grain of one of the pieces of wood.

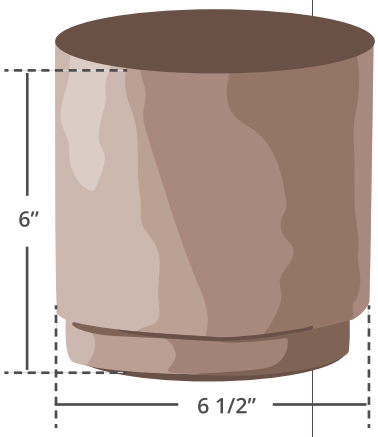
h. The final step is to remove the burr on the face of the chisel blade. Apply a bit of water onto the 3 micron film, place the face of the chisel flat on the lapping film and take a couple of lapping strokes to remove the burr.

Learn more about sharpening

3 CALCULATING YOUR STAND'S DIMENSIONS

TIME TO COMPLETE: 15 MINUTES

a. Measure the height of your plant pot as well as its widest diameter. Jot these dimensions on a piece of paper; these will be used to calculate the width of the base as well as the height of the legs. The example shown in our instructions are for a planter that is 6 1/2" diameter by 6" tall.



b. To calculate the width of the two base pieces, add twice the thickness of the material to the diameter of your pot, then add 3/4" for good measure. In our example, since our pot diameter is 6 1/2" and twice our material thickness is 2 1/2", each base piece will need to be 9 3/4".

Base width formula

pot diameter + 2 (material thickness) + 3/4" = base width

e.g., 6 1/2" + 2(1 1/4") + 3/4" = 9 3/4"

c. For the legs, we chose to make a stand using the wood at the length provided (18"), but don't feel obligated to copy our example.

Tip: *To adjust the leg length to suit your plant's requirements, consider the following factors: pot height off ground, material thickness and pot height. However, you don't necessarily need to use the full pot height in your calculation of the leg length. You could, for example, decide that you want the leg to come up half the height of your planter and raise the planter to accommodate a trailing plant.*

4 CUTTING THE PARTS TO SIZE

TIME TO COMPLETE: 20 TO 45 MINUTES

a. Now that you have the math portion out of the way, use a freshly sharpened pencil to mark the width of the base on two pieces of wood. Take a minute to label them as “base”. (You can use a piece of masking tape to label the pieces.)

b. On the remaining four pieces of wood, mark the leg length as needed for your plant stand.

c. Mark the other end of each piece of wood to identify it as your reference edge.

> ***Tip:*** *Always measure from the same square end to ensure the pieces remain square. By marking which end is which, it’s easy to remember from which end to measure. And keep your pencil sharp. A fine pencil line will go a long way towards accurately laying out the joint.*

d. Starting with one of the base pieces, place the square’s blade on the sizing mark, such that the square’s body is flush with the long edge of the workpiece. Draw a line across the width of the face, reposition the square and extend the line all the way around the piece. This will be your cut line when sawing the parts to length.

e. Mark an X on the remaining portion of wood to indicate the part that will be “waste”.

f. Mark all the pieces of wood in the same manner.

> ***Tip:*** *You can group the pieces that are going to be the same length, align the ends and mark them all at once.*

g. Position one of the pieces such that the section to be cut overhangs your work surface. Use a clamp to secure it horizontally.

> ***Tip:*** *Place a cardboard shim between the wood and the clamp to prevent bruising the wood. Should the wood show compressed marks after clamping, you can use a damp cloth and a hot iron to raise the fibers.*

h. Use the saw to cut on the waste side of the line. Unclamp the wood, set it aside and cut the remaining pieces to size in the same manner.

> ***Tip:*** *The Japanese utility saw cuts on the pull stroke, which refers to the direction of the cutting action. When you pull the saw towards you, the saw is cutting wood. When you push the saw away from you, the saw is not cutting any wood. The motion of pulling the saw towards you rather than pushing it away gives you more control over each upward stroke of the saw, thereby making it easier to cut in a straight line.*
>
> *When starting a cut, use your thumb's knuckle on your non-dominant hand to guide the blade on the line, and bring the saw down so it comes into contact with the wood. Make five to ten slow downward strokes until you create a small grooved starting point. If the saw keeps slipping or binding, use less pressure, not more. Move your thumb out of the way and take long strokes to cut along the line. When you are nearing the end of a cut, be sure to support the waste wood for a clean finish.*

5 PREPARING THE WOOD SURFACES

TIME TO COMPLETE: 30 TO 45 MINUTES

Caution: *Be sure to wear a mask when sanding to reduce the risk of developing respiratory problems.*

> ***Tip:*** *Each of the three sheets of sandpaper included in the kit have different grits, or surface roughness, labelled as 120x, 180x or 220x. The 120x sandpaper is the coarsest of the three; use it first for rough sanding. Continue sanding with progressively finer grits (180x then 220x) to clear away scratches from the previous grit.*

a. To ensure the lap joints will fit snugly, it is best to prepare the wood surfaces before chiselling any joints. Sanding the wood afterwards may change the fit of the joint. Begin by using 120x sandpaper to sand the wood in the direction of the grain and using light pressure. This step will also clean up any saw whiskers.

> ***Tip:*** *A sanding block distributes sanding pressure more evenly and maintains a flatter surface. The piece of plywood you used to sharpen the chisel makes an excellent sanding block. Wrap the piece of sandpaper around it.*

b. Use a dry piece of the cotton rag to remove the sanding dust.

c. Repeat the sanding step using 180x sandpaper, then wipe all the pieces with a lightly dampened cotton rag. This will expand the fibers and raise the grain slightly. Let the water evaporate for 10 to 15 minutes.

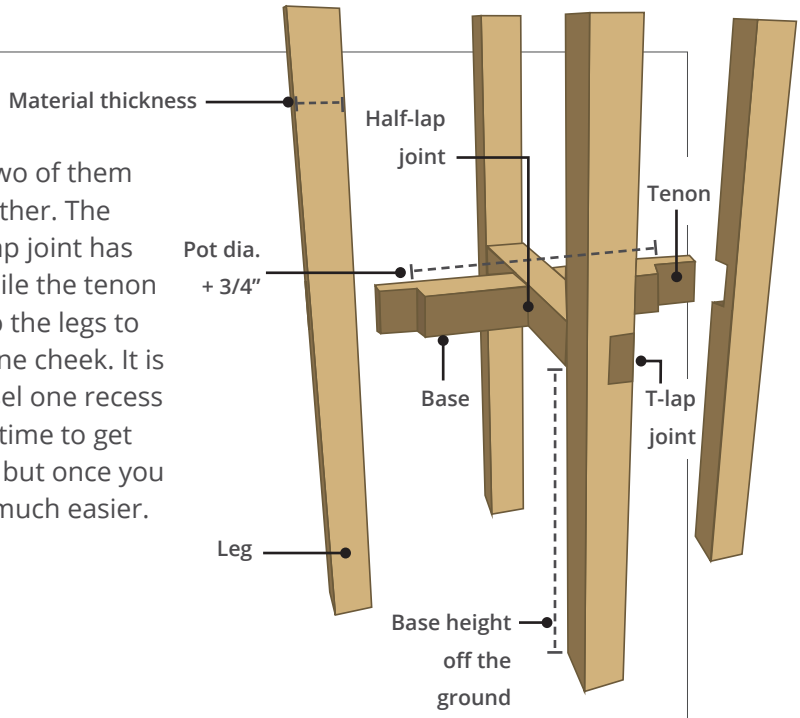
d. When all the pieces are dry to the touch, sand them with 220x sandpaper. Use a dry piece of the cotton rag to remove the sanding dust.

e. Number each leg with a piece of masking tape for later reference.

6 PREPARING THE CROSS-LAP JOINT

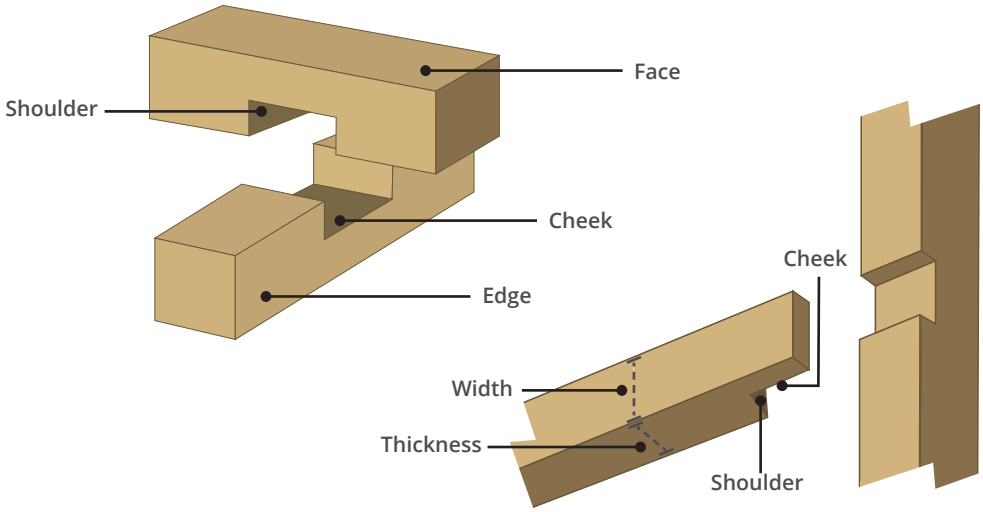
TIME TO COMPLETE: 40 TO 60 MINUTES

The two base pieces are joined together with a cross half-lap joint to form a plus sign. The base is then joined to the legs with T-lap joints. For these joints, half of the material thickness is removed from each



piece of wood so that when the two of them overlap, they sit flush with each other. The resultant recess for a cross half-lap joint has two shoulders and one cheek, while the tenon ends of the base, where it joins to the legs to form a T, has one shoulder and one cheek. It is important that you mark and chisel one recess at a time. It may take you a bit of time to get through the first part of the joint, but once you complete one, the others will be much easier.

Cross-lap joint and T-lap joint



Tip: *It is widely accepted that the accuracy of the layout will directly affect the outcome of the overall project. For best results, it is important to take your time during the layout phase. Make sure your piece fits between the lines you have established. Too narrow won't be the worst cause of ill-fitting joints since you can always remove more material, but too wide will make it impossible for the joint to come together securely. Now, for many aspects of woodworking, it is easier to simply fit parts to each other rather than carefully measure each part and presume they'll fit together. By transferring dimensions of one part directly onto another, without converting it into numbers, you avoid a primary source of error.*

a. To ensure that the joint will be centered, start by finding the center of each base piece.

b. From the center mark, measure and make a slight pencil mark equal to half the material thickness (e.g., half of 1 1/4“ is 5/8”). Place the square’s blade on the mark, such that the square’s body is flush with the long edge of the workpiece. Draw a line across the width of the face.

c. Overlay the second base piece on top of and perpendicular to the other, such that its right edge aligns with the line you marked on the face of the first piece.

d. Referencing the left edge of the second piece, make a slight pencil mark, and then set that second piece of wood aside. Place the square’s blade on the mark and draw a line across the width of the face.

e. Mark an X between the two pencil lines to indicate the waste area where you will remove material to form the recess.

f. To lay out the shoulder lines of the joint, use the square to transfer the two reference lines from the face onto the side edges of the piece, carrying each line halfway down (5/8”). Do this on both edges of the first base piece.

g. To layout the depth of the joint, draw a horizontal line between the shoulder lines to connect these two points. Do this on both edges.

h. Use both clamps to secure the base piece face up so you can see the X mark indicating the waste area.

i. Set the cutting edge of the chisel slightly inside the line, such that the bevel points toward the waste area. Tap on the chisel handle with a mallet to get a nice, evenly incised shoulder line across the piece of wood.

> ***Tip:*** *A mallet is preferred for tapping on the chisel handle, as it won't mushroom the end of the handle in long-term use. For a single project with only a few joints, if a mallet isn't available, a hammer will be fine, but tap gently.*

j. Set the cutting edge of the chisel bevel up against the incised line. Pare across the grain, toward the incised line, to make a V-shaped stop cut.

k. Place the saw along the incised shoulder line and saw down across the width to make an accurate cut to the depth marked on the side edges, being careful not to overcut them.

l. Unclamp the piece of wood, turn it end for end and re-clamp it. Repeat the previous steps to incise and cut the shoulder line on the other side of the waste area.

> ***Tip:*** *One way to prevent tear-out when chiselling joints, especially as a beginner woodworker, is to saw one or two relief cuts between the incised lines. Should the chisel encounter difficult grain, relief cuts will limit the amount of wood that will tear ahead of the chisel's cutting edge.*

m. Once the shoulder lines are cut, keep the piece of wood clamped. Remove the waste with the chisel (bevel up) in your dominant hand. Begin to pare down adjacent to each shoulder cut and partway across the width, leaving a high spot in the middle. Pinch the blade with your non-dominant hand then brace that hand against the wood to control the side-to-side forward motion while taking light shavings.

> ***Tip:*** *Chisel down to the baseline by paring across the grain, about halfway across the width of the piece. If you cut all the way across the workpiece, there is a chance that you will experience tear-out. Pay attention to the direction of the grain; you may need to take slightly angled cuts in the direction of the grain if it runs out.*

n. Turn the piece of wood end for end, clamp it, and pare the other side of the recess.

o. Turn the piece of wood end for end again, and even out the cheek.

> ***Tip:*** *To check for high spots, place the edge of the square in the cheek. If the square rocks a bit, this indicates that there are some high spots. Continue to pare out the cheek until there are no high spots.*

p. Test the fit of the recess by pressing it onto the other base piece. If the crosspiece is too tight, remove a slight amount of material from one of the shoulders by paring vertically against the shoulder. Test the fit again. If more paring is needed, work on the other shoulder; removing equal amounts will help keep the joint centered, though that isn't critical.

q. Once you are satisfied with the fit, proceed to mark and chisel the second base piece.

> ***Tip:*** *Re-sharpen the chisel as necessary throughout, especially when you notice a change in performance.*

r. As with the first piece, measure and make a slight pencil mark equal to half the material thickness from the center mark on the second base piece. Place the square's blade on that mark and draw a line across the width of the face.

s. This time, overlay the first base piece (with the recess facing down) such that its right edge aligns with the line you marked on the face of the second base piece.

t. Referencing the left edge of that first piece, make a slight pencil mark, then set it aside. Place the square's blade on the mark and draw a line across the width of the face.

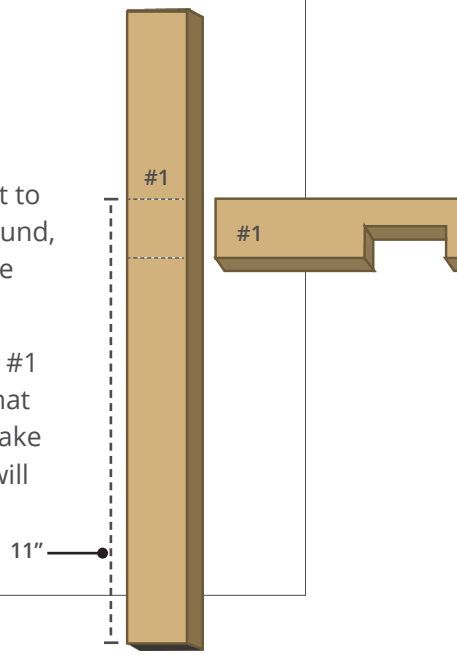
u. Chisel the recess in the second base piece following the same procedure as with the first base piece.

7 PREPARING THE LEGS

TIME TO COMPLETE: 30 TO 45 MINUTES

a. Measure each leg from the bottom up to where you want the pot to sit. In our example, since we wanted the pot to sit 11" off the ground, we made a mark at 11". Use the square at the mark to draw a line across the width of the face.

b. Overlay a base piece (recess facing down) below the mark on leg #1 so that the top edge is at the line. Transfer the bottom edge of that base piece to mark the material thickness on the leg. This time, take a moment to mark the end of that base piece with a #1 (so you will remember which end of the base piece mates with what leg).



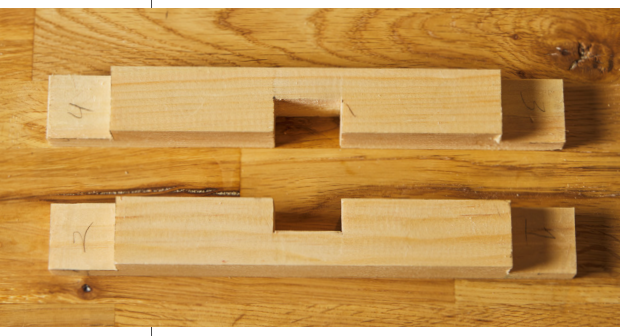
c. Mark the joint for each leg the same way as you did for the cross-lap joint.

d. For leg #2, label the opposite end of the base piece with a #2. For legs #3 and #4, overlay the base piece such that the recess is facing up, and mark each end of that base piece with a corresponding #3 and #4.

e. Clamp one leg, incise the shoulder line, make a V-shaped stop cut, and chisel out the waste. Test the fit of the recess and check for high spots. Do this for all four legs.

8 PREPARING THE TENONS

TIME TO COMPLETE: 30 TO 45 MINUTES



a. Transfer and mark the thickness of the leg pieces on the ends of the corresponding base pieces, keeping the orientation of the base pieces in mind. (The base pieces should be mirrored images of each other, with the recess of the center joint facing down on one piece and facing up on the other.)

b. As before, mark and incise the shoulder line and make a V-shaped stop cut.

c. To cut the cheek portion of the tenon, you can either chisel out the waste (the same way as for the previous pieces) or use the saw.

> ***Tip:*** *As noted earlier, you can cut one or two relief cuts between the incised line and the end of the piece to reduce tear-out as you chisel out the waste.*

d. Test the fit of the joint. Use the chisel bevel up to pare any remaining protrusions, taking small, controlled slices to prevent tear-out.

9 PERSONALIZING YOUR PLANT STAND

TIME TO COMPLETE: 30 TO 60 MINUTES

Before gluing the pieces together, take a moment to think about how you want to personalize your stand. Do you want to keep the leg ends square or cut inside or outside bevels on the legs? If you choose to bevel the legs, do this now, keeping the orientation of each piece in mind.

10 GLUING THE JOINTS

TIME TO COMPLETE: 15 TO 30 MINUTES (PLUS GLUE DRYING TIME)

Tip: *Glue-ups are inherently stressful as you only have so much time to apply glue, fit the pieces together and get the clamps on. To help you gauge how much time you will need, practice assembling the pieces without glue. This is called a dry-fit assembly. This step also gives you a chance to double check that all the joints will fit the way you want. Practice putting on the clamps and checking for square. Depending on the humidity and temperature, you will have approximately 5 minutes to apply the glue and another 5 minutes to make any adjustments for square and get the clamps in position. Trying to adjust beyond this point may prove difficult as the glue will have begun to set.*

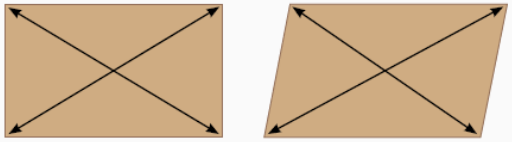
a. Glue one H frame at a time. Apply a thin even coat of glue onto the contact surfaces of the shoulders and cheek on legs #1 and #2 and the corresponding base piece, keeping in mind the orientation of the pieces.

> ***Tip:*** *Apply and spread the glue with a stick or your finger. There should be a thin film on the face grain. Don't worry about glue on the end grain as that is not the structural part of this joint. You should see glue bubble out, but if it flows out, you are using more glue than you need. Too much glue will cause the joint to shift as pressure is applied.*

b. Press fit the leg pieces to the base.

c. Clamp the H assembly together, making sure that the joints are flush, straight and square.

> ***Tip:*** *To check for square, measure the diagonals. If they are equal, then the assembly is square.*



d. If the joints are not square, remove the clamps, adjust as needed, then reposition the clamps. Wipe away any glue squeeze-out with a damp cloth.

e. Repeat the gluing operation for legs #3 and #4 and the second base piece.

f. Let the glue dry for about 1 hour.

g. To glue the two H frames together, apply glue onto the remaining recesses for the cross-lap joint and press fit the H frames together. Wipe any glue squeeze-out with a damp cloth.

h. Depending on how tight the joinery is, you may or may not have to check for square. If it is loose, get it as square as you can.

> ***Tip:*** *Place the stand upright on its legs and check for any wobble. If you need to make any adjustments, you can gently ease the legs in place before the glue dries.*

i. Clamp the planter stand and let the glue dry for at least 1 hour.

> ***Tip:*** *In case your joints are not as tight as you would have liked, you can make your own wood filler to fill any voids. Simply mix some sawdust and glue until you have a cookie dough-like texture. Immediately scrape it where needed, let it dry, then sand the excess.*

11 FINAL SANDING

TIME TO COMPLETE: 40 TO 60 MINUTES

> ***Tip:*** *If there are any pencil marks remaining on the wood, you can wipe these off with a bit of nail polish remover on a piece of the cotton rag rather than try to erase these with an eraser or sandpaper.*

a. Use 220x sandpaper to do your final sanding on any parts that you haven't yet sanded, such as the end grain (bottom/top of the legs and the tenon).

b. Break any sharp edges (that is, rounding the sharp edges) along the long grain, and add a light chamfer on the bottom (and top) of the legs to prevent the legs from splintering in use. How much rounding of the sharp edges you do is up to you.

c. When you have completed sanding, wipe the wood with a damp cloth, and let the plant stand dry for about 30 minutes. This will raise the grain of the wood.

d. Sand the surfaces one more time with 220x sandpaper to make them as smooth as possible for applying the finish.

12 APPLYING THE FINISH

TIME TO COMPLETE: 20 TO 30 MINUTES

⚠ ***Caution:*** *Make sure to properly discard the rags as indicated in the product instructions to prevent spontaneous combustion.*

a. Wipe the plant stand with a clean, dry rag to remove any wood dust.

> ***Tip:*** *If you want to further personalize your plant stand, such as with stain, paint or pyrography, do this before you apply the furniture finish.*

b. Slip a pair of vinyl gloves on and use another clean rag to apply a thin coat of the furniture finish all over the plant stand.

c. Allow the finish to penetrate for 24 hours, then buff the plant stand the direction of the grain with another clean cotton rag.

   Note: *Depending on temperature and humidity it may take up to a week for the finish to dry to the touch completely and up to 4 weeks to cure fully.*

d. **Optional:** To protect hardwood flooring, mount the included bumper feet on the ends of each leg.

CREATED BY LEE VALLEY. MADE BY ME.

We hope that you will be inspired to make more projects where you can continue to practice your sharpening and joinery skills with the hand tools provided.

Have your “look what I made” moment. Share your journey and your completed plant stand. Tell us about your experience. Tag #LVMadeByMe #LVLetsDoSomething

MK112 Plant Stand

Lee Valley Tools Ltd. Ottawa ON K2H 1C2 Canada leevalley.com