How to Make a Simple Desk Organizer

Objective: Mill out a desk organizer from a segment of 2x4 wood.

Materials:

- 2x4 lumber

Tools:

If you are unsure about how to use a specific tool, please ask a lab advisor for assistance!

- NC Mill (⅜ inch flat end mill)
- Miter Saw
- P150 Sandpaper
- Hand file
- Saddle T Square
- Measuring Tape
- Writing Utensil
- Belt sander
- Jointer
- Router

1. Head over to the stock area and grab a piece of 2x4 lumber that is at least 10 inches long. Try to find a piece that is free of nicks, cuts, or holes. If you can't find such a piece, you can use any piece of lumber that has a 10 inch long segment with no holes or major damage in it.

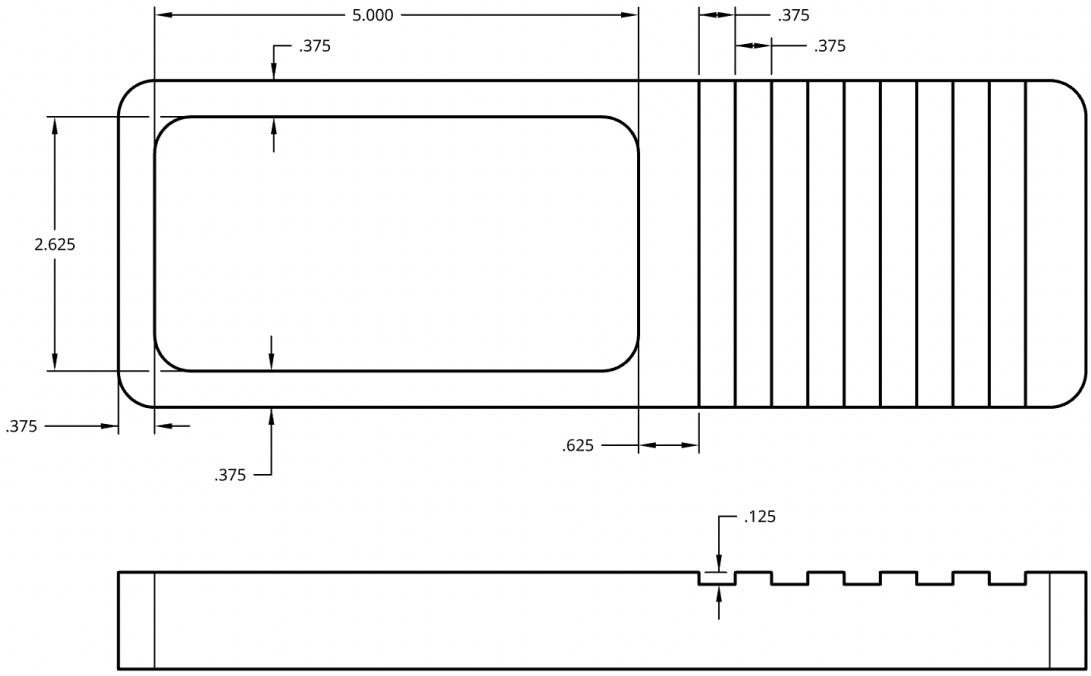
2. Use a measuring tape and writing utensil to mark out a 10 inch long segment on your lumber. If you managed to find a clean lumber piece, you can simply measure out 10 inches from the end of the lumber and make a mark at 10 inches. Otherwise, use a saddle T square to mark out a straight line on your piece and measure 10 inches from that to mark your second line. Ensure that your marks are easy to see.

3. Use the miter saw to cut along the marks that you made on your lumber piece. Make sure to support your piece with a hand as you cut it. If your overall piece is long, you can use one of the roller supports near the miter saw to support it. DO NOT LEAVE YOUR HAND NEAR OR BELOW THE SAW WHILE CUTTING

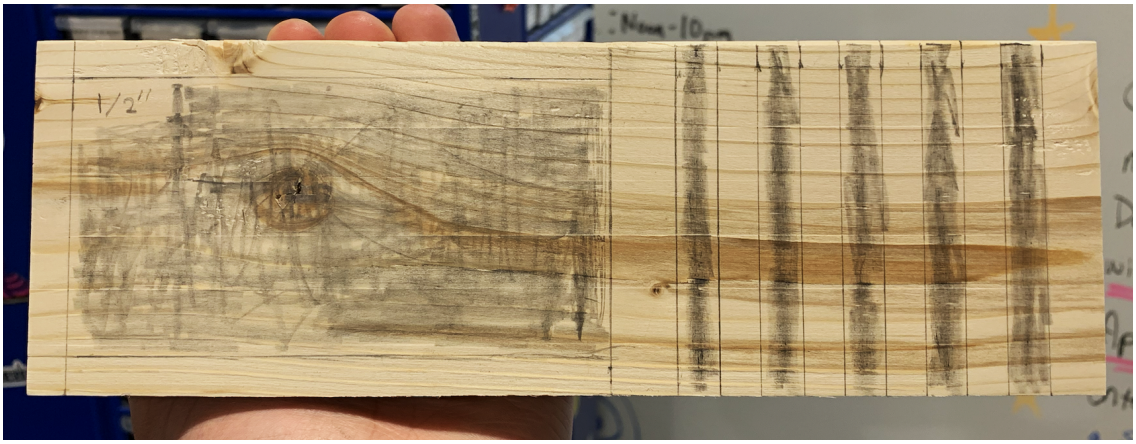
4. After cutting your piece to the correct length, use the jointer to square up all of its faces except for the faces on the ends. Usually, the jointer is set to remove 1/16 of an inch of material in a single pass. If it is not set to this, you can adjust it back to removing 1/16 of an inch. Use the pushers near the jointer to pass it along the jointer blade. Pass each face that needs to be squared along the jointer one time. If doing this did not completely remove the bevel on any of the edges of your piece, you can pass either of the faces that are adjacent to the beveled edge along the jointer again.

5. After using the jointer, sand all of the faces of your piece until they are smooth using the belt sander.

6. Use a measuring tape and/or a saddle T square to mark out lines showing where the compartment and writing utensil slots of the desk organizer are. Mark the top face of your piece according to the following diagram:



All of these measurements are in inches. The depth of the larger left compartment is ½ an inch. The writing utensil slots on the right are spaced apart by ⅜ inch and are all ⅛ inch deep. All of the rounded corners have a radius of ⅜ inch. The space between the edge of the last writing utensil slot on the right side from the outside edge of the desk organizer does not have to be anything specific. To help remind yourself of where you're supposed to mill the writing utensil slots, I recommend shading in the regions that you will mill out.



7. Use the NC mill with a ⅜ inch end mill to create the slots and compartment of the desk organizer.

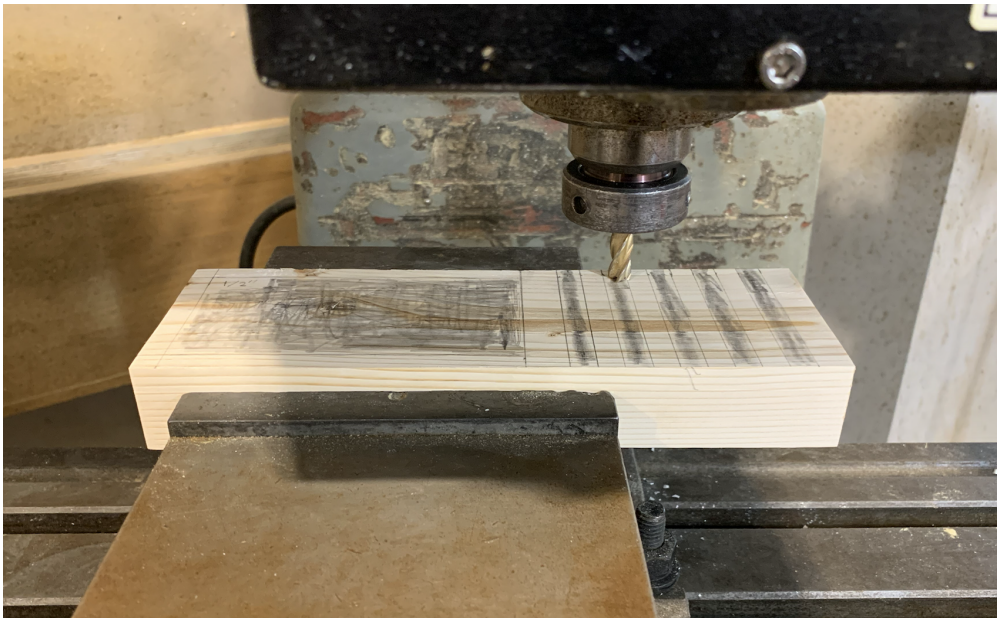
- **Preparing to mill:**
  Start by using a pair of parallel plates that will keep the top face of your piece elevated just above the top edge of the NC mill clamp.

Clamp your piece such that the markings indicating where the writing utensil slots go are mostly outside of the clamp. You may have to raise or lower the NC mill table so that it is easier to work with your material. To do this, turn the z-axis crank with the wooden handle located to the left of the y-axis crank.

Locate the ⅜ inch end mill bit in the wooden box on top of the red tool cabinet near the NC mill. You can use a bit with either two or four flutes. Both will work fine for this project. Once you have the bit, find a collet with the smallest hole diameter that fits it. The collets can be found close to the window near where you found the end mill bits. Insert the bit into the collet such that the line where the gray and yellow parts of the bit meet are aligned with the top edge of the collet hole.

Afterwards, grab a collar from inside of the top drawer of the red tool cabinet. Unscrew the threaded part and slide it over the bottom of the collet moving it towards the top. Make sure that the threads are facing the top of the collet when you put the threaded part on. Screw the top of the collar onto the threaded part and tighten it by hand.

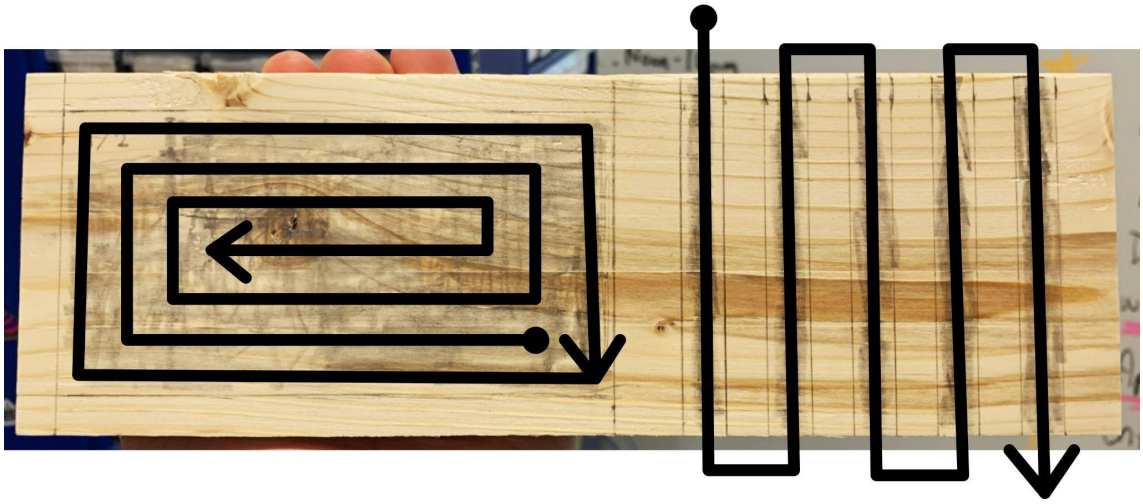
After that, place the tool into the tool holder at the corner of the NC mill closest to the red tool cabinet. Use the wrench in the top drawer of that cabinet to tighten down the collar onto the collet as much as possible. You can now insert the tool into the NC mill. **Ask a lab advisor to verify that you have done this correctly.**



To ensure that you mill at the correct depth, lower the end mill **with the machine off** down to your piece so that the tip of the end mill touches its top face. Afterwards, zero the Z-axis on the digital display of the NC mill by pressing the third gray button from the left below the display.

Before milling, ensure that the end mill rpm is set to around 1300-1400 rpm. DO NOT ADJUST THE RPM WITHOUT TURNING THE MILL ON FIRST.

- **Milling:**
  You can now begin milling out the slots to a depth of ⅛ (0.125) of an inch. Refer to the following image to see what pattern you should mill in. The rounded ends of the arrows are where you should start.

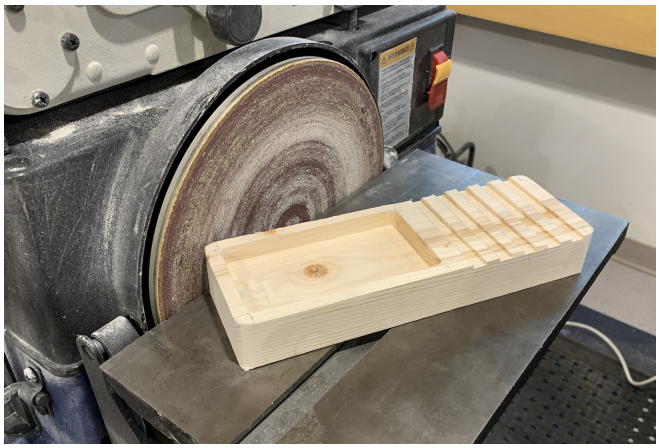


Line up the end mill with the slot markings you made and start milling at the correct depth along the path from the outside of your piece all the way through to the other end. As you start approaching the edge of the other side of your piece, move the end mill more slowly to lower the chances of splintering the wood as the mill exits your piece.
Milling the larger compartment is a similar process. Move the end mill bit to one of the corners you marked out for the compartment with the bit's outer radius lined up on the inside of the edges of the compartment. Gently lower the end mill to the surface of your piece with the machine off and zero the Z-axis again if it is not displaying zero. You may also find it useful to zero the X and Y axes at this point to ensure that you mill out the appropriate length of material before changing the direction that you mill in for the outermost part of the compartment. The option to zero these axes is just to the left of the option to zero the Z-axis on the NC mill display. You can now begin milling out the compartment starting with the outermost edges and moving inwards. Ensure that

you mill away only ¼ (0.250) inch of material in a single pass. Once you have removed a full ¼ inch layer of material from the compartment area, remove another ¼ inch layer so that you reach a total depth of ½ an inch. Afterwards, turn off the NC mill and remove your milled piece from the vise. Put back the ⅜ inch end mill and parallel plates you used. Make sure to also vacuum the wood chips off of the mill using the vacuum to the left of it.

8. Make sure to use the belt sander to get rid of the rough edges left over from milling.

9. To round the outer edges of the desk organizer, start by marking out a circular curve with a radius of roughly ⅜ of an inch. Afterwards, use the disc sander of the belt sander to round out the corner edges by sanding up to the curve you marked.



10. Use the router with a rounding over bit to round the base edges of the desk organizer. I recommend using a ⅜ inch bit, but you can use a ½ inch bit or other bit of your choice. Use clamps to ensure that your piece does not move while rounding the edges. The router bit should only stick out about as far as shown in the picture below:

11. Use a hand file to make a small chamfer along all the top edges of the desk organizer except for the edges at the top inside edge of the large compartment.

12. Finish off by sanding any unsanded parts of the desk organizer. For the inner faces of the compartment, you can use a small sheet of P150 sandpaper from inside the large blue cabinet near the stock area and sand them by hand.

Congratulations! You have now created a simple desk organizer!