BACKGROUND:
Several years ago I had been storing tools in a 5 gallon bucket, and decided that I needed a better way to hold all of my turning tools. I had seen some made from PVC tubing with turned stops down inside them, but that presented construction challenges too, and looked expensive. There were some bins built by drilling holes in a flat plate, but I didn't think it protected the tool shanks very well. I saw several tool racks built from particleboard, with the cells made using a half-notch technique, that was a better end product, but it looked like a lot of trouble to build and I didn't really like the finished product.

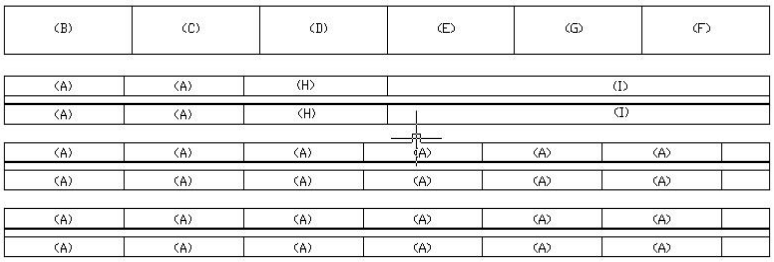
I wanted a bunch of long skinny tubes or boxes with a stop a few inches down to keep the tool from resting on the cutting edge. Before beginning the project, I started looking at the dimensions of tools that I owned or wanted to own. The largest commercially available handle is about 18 inches long and is about 2 inches in diameter; the smallest is about half that size. The shank of the tools are generally half the length of the handle; 4 to 9 inches in length. Only a few scrapers exceed 2 inches wide, so that a cell 2-1/4 inches square would be adequate. Only a few roughing gouges exceed ¾" deep, so the stop should have a ¾" deep opening by the width of the cell. Since the shortest tools have handles about 9 inches long, placing the stop 4 inches down in the cell would leave enough to grab easily and yet be sufficient for the longest handles. The longest shanks are about 9 inches long, so the cells needed to be at least 13 inches in total depth to protect the tip of the tools.

The particle board rack was almost right, but rather than use the half-notch technique, I wanted to use individual strips of ¾" lumber as the dividers. It would be difficult to nail the dividers onto each other in a straight line; it would be necessary to either drive through the 2-1/4 inch width or toe nail them in place. I didn't like either method and decided to stagger the dividers instead; it takes some forethought, but it's easier to accomplish. Soon after I built the first bin, I realized that it needed some wheels, a shelf and some reinforcing.

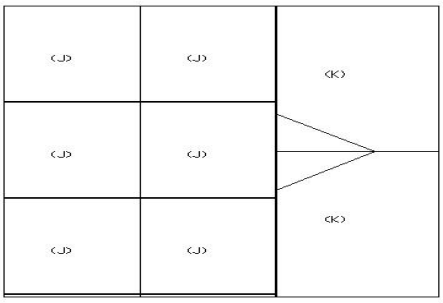
The 2-1/4 inch dimension isn't a common lumber size, so I needed to rip lumber to the width. By cutting the dividers from a 1 x 4, there would be a lot of waste, but I could get two 2-1/4 wide strips from a plus a strip about ¾" square that could be used for stops. I also picked 1 x 6 lumber for making the reinforcing, shelving and wheel platform. I chose thin paneling for most of the rest of bin because it was lighter and because there was cheap edging to cover the raw edges; also, I had a lot of scrap pieces that I could use.

CONSTRUCTION:
Start by using a table saw to rip the three 1 x 6's into 2-1/4" wide strips and hang onto the ¾" wide strip too. Then cut them into 28 pieces 15 inches long, two 18 inches long and two 48 inches long. There will be minor variations in the width of the 28 pieces, so sort them into 3 groups of 6 and 2 groups of 5, so that all of the pieces in each group are as close to the same width as possible. Cut the ¾" wide strips into 15-3/4" long pieces for the tool stops. You can also cut the remaining 1 x 6 into 15-3/4" long pieces at this time.

Next cut the notch on either side of the 28 cell dividers. A router would probably be the best tool to use, but since we're at the table saw, it can be used. Clamp a group together at one end. Bring the blade up to cut a ¾" depth and set the fence to 4 inches plus the height of the narrow strips made from the 1 x 6's that will be used for the tool stops. Place a mark 4 inches down on the cell dividers and using the T-bar slider, nibble out the notches on both sides of all 5 groups. Also, cut a shallow saw kerf in the top of each divider to clear the plywood edging strips.



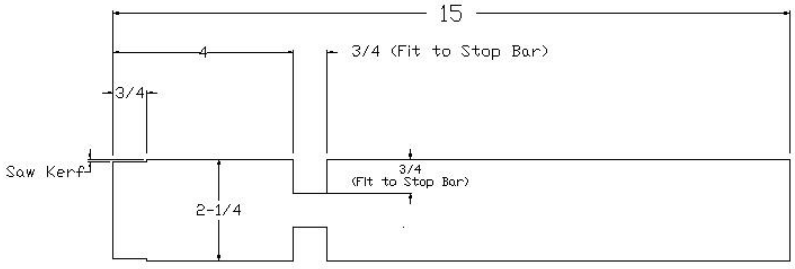
1"x 6" Cutting Layout



Plywood Cutting Layout
From 4' x 4' Sheet

From a 48" x 48" piece of ¼" plywood, cut one 18" wide strip and two 15 inch wide strips. Then cut the 18" piece into two 24" lengths and cut the 15" pieces into six 15"x 15-3/4" pieces. I used odd size pieces of thinner plywood for both of the bins that I built.

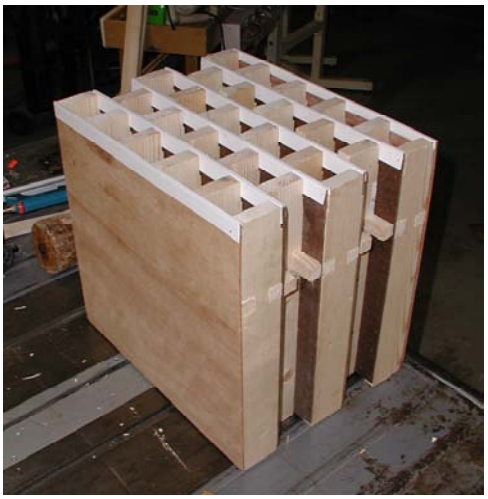
Cut one of the plastic edging strips into 6 pieces 15-3/4" long and put them across the top edge of the 15"x 15-3/4" pieces. Just glue and nail or screw a set of six dividers to the first plate starting flush with one edge and ending flush at the opposite end. Before you drive any nails of screws, put one of the ¾" wide strips in the notches. Since the cells have the



Divider (part A) Detail
28 Required

same width and depth, dividers can be used to provide spacing and you won't have to measure everything. Make 3 sets this way, using the groups of 6 dividers. Next, take a plate and glue and nail or screw a set of 5 dividers to it so that they will be in the center of the openings in first three sets.

Assemble the cell-block by taking one of the 6 divider sets, placing a ¾" wide strip in the empty notches and glue and nail or screw one of the 5 divider sets on top of the assembly. By repeating the process several times, we get the finished cell-block. It will be necessary to use a carpenters square to assure that the final assembly is properly aligned.



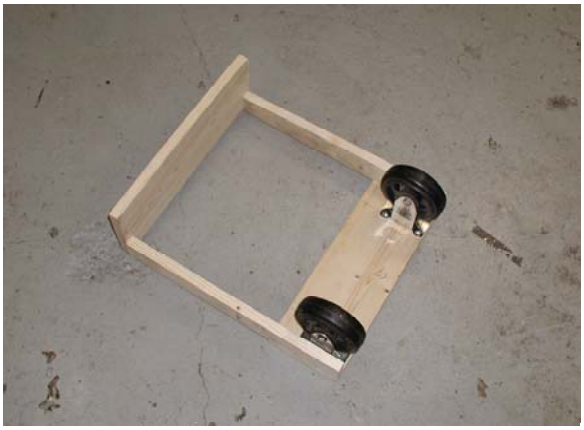
Place one of the 18" wide side pieces face down and set the cell-block on top of it with an upper back corner flush with the top edge, the lower back corner flush with the back edge and the upper front corner flush with the front edge. Using the cell-block as a guide, mark and then cut the triangle from the top front corner of the pieces. This allows the cell-block to be tilted forward for easier access.

Use the remaining plastic strip to cover the raw cut edge along the tops and fronts of both side pieces. Glue and screw one side-piece in place on the cell-block. Brads or nails can be used to hold the side in place, but don't count on them for lasting strength. Set the assembly on its back, then glue and screw the other side-piece in place, making sure that everything is aligned.

There are a lot of ways that wheels can be installed, one way is to use a steel rod as an axle for a pair of wheels or using non-castering wheels assemblies as shown. Harbor Freight was

selling some 4” wheel assemblies for $3.00, which was cheaper and easier than the axle rod method. The bill of materials lists two ¾ x 2-1/4 x 18 pieces, which I had to shorten to 17-1/4 inches to make the wheel assembly. One of the 15-3/4” long 1 x 6 pieces was screwed across the top of the rear ends of the two shortened pieces. Before getting any farther along, check to insure that the rest of the bin assembly will fit over the wheel assembly.

The two wheels were attached to the top piece using ¼ inch by 1 inch long screws. The wheels need to be placed so that the finished bin can be backed up to a wall with the wheels barely touching the wall. Another 15-3/4” long 1 x 6 piece can now be screwed vertically across the front of the wheel carrier assembly. This piece is the front kick-plate and is positioned so that it holds the wheel assembly level. A third 15-3/4” long 1 x 6 piece can be screwed across the bottom to form the bottom shelf. A fourth 15-3/4” long 1 x 6 piece will need to be trimmed for use as backboard for the shelf. In the final assembly pictures, it was cut lengthwise to 2-1/4” wide to make match the side pieces.



Place the bin assembly over the wheel assembly. Use scrap wood blocks to elevate the bin to the proper level. When everything is lined up properly, drive at least 6 screws though the plywood sides into the sides of the wheel assembly. It won’t hurt to drive screws into the plate that the wheels are attached to.

Another 15-3/4” long 1 x 6 piece was cut lengthwise at a 30 degree angle for use as the top shelf. In the pictures, the cut-off from the lower shelf back was used as the back for the top shelf, saving one 15-3/4” long 1 x 6 piece. All that’s left is boring a hole in the long side pieces for the 1” dowel, and attaching them to the sides with the dowel as a handle.

The bin in the pictures is the second that I’ve built. The first is about 5 years old, is a bit beat up and has gone through several alterations. There are a few things that I’ll do differently next time. In the pictures, you can tell that we used a brad nailer, without any glue. Although the nailer is fast, the heads pull out easily and there are problems getting the brads to go in straight. Next time I’ll use drywall screws and glue.

BILL OF MATERIALS:

Letter	Qty	Dimensions	Material	Description
A	28	3/4 x 2-1/4 x 15	1 x 6 x 8’	Cell Dividers
B	1	3/4 x 5-1/2 x 15-3/4	1 x 6 x 8’	Kick Plate
C	1	3/4 x 5-1/2 x 15-3/4	1 x 6 x 8’	Wheel Plate
D	1	3/4 x 5-1/2 x 15-3/4	1 x 6 x 8’	Shelf Plate
E	2	3/4 x 5-1/2 x 15-3/4	1 x 6 x 8’	Shelf Back
F	2	3/4 x 2-1/4 x 18	1 x 6 x 8’	Base Reinforcing
G	2	3/4 x 2-1/4 x 48	1 x 6 x 8’	Handle Arms
H	6	1/4 x 15-1/2 x 15	1/4 Plywood	Cell Caps
I	2	1/4 x 18 x 24	1/4 Plywood	End Plates
	10	3/4 x 3/4 x 15-1/2	1 x 6 x 96	Cell Stops
	1	3/4" Dia x 17	3/4" Dowel	Handle
	2	3" to 6" wheels		
	2	8 Foot Plastic edging		