Building the Ultimate Workbench

By Brendan Mathews

I realize the concept of building the ultimate workbench will mean many different things to woodworkers, depending on the type of projects being built and the operations that will be facilitated by the workbench. In my shop, I was looking for a large, perfectly flat surface that could be adjusted in height to suit a variety of situations. I feel that the solutions that I chose, while not cheap, will provide me with fantastic solutions to help me produce better cabinetry with greater accuracy and reduce fatigue and potential back injuries.

For the foundation of my bench, I was looking for a system that would adequately support all the work that would be done as well as provide an easy adjustment in the height, even while loaded. I had long considered what it would take to engineer a height adjustable system and I was relieved to find a system that was being manufactured that would meet all of my requirements. The Southworth Products Corporation has been building hydraulic lifts for industry for many years, and I was fortunate to become aware of their product at the Anaheim Woodworking show in 2003. The Southworth model LS4-36 Backsaver lift has a 4,000 pound capacity, a 36”x48” table and an adjustment range of 6 ¾” to 42” in height with a 1hp, 115v. lift motor. Of course the price ($3900.00 delivered) for this may be an obstacle for some, but if you analyze the improvement in production, quality, and the big factor of preventing injury, it was easily worth it to me.

My next challenge was to build a work surface that was perfectly flat, had strength to support all of the woodworking operations and also be cantilevered over the end of the lift table by two feet on each end. For assembling cabinets, perfect flatness is essential, otherwise is becomes necessary to constantly fuss with our cabinet parts to get good alignment of our joints. To achieve the twofold goal of strength and accuracy, I decided to build a torsion box bench.

Relying on expert advice from Bill Brennen and a Fine Woodworking article on torsion boxes written by Ian Kirby, I set out to design a super strong torsion box that would be 4'x 10' and 6" thick, thus providing me with a large flat work surface that would allow sufficient space for assembly of large cabinets and two assemblers to work in the same proximity on smaller cabinets. I will briefly outline the steps taken in the construction of the box in the following paragraphs.

Since a torsion box will maintain the same flatness as the surface on which it is constructed, it was necessary to develop a perfectly flat table to reference our assembly from. Since that was something that did not exist in my shop, this presented an interesting challenge. I started with my current workbench as a platform and using a laser level as a reference, a series of pads were set on the surface to create a perfectly level base on which I set a ¾" sheet of white 4' x 10' melamine.

The melamine would serve as an assembly surface for the torsion box, as well as be the bottom half of a vacuum box, which would be used to clamp the torsion box while the glue cured. (more details later)

The box would have ½" 4'x10' veneer core plywood for its skin and we would use the same plywood to manufacture the core grid. The grid was built on 6" centers (see photo). Long strips were cut to 5"x 118 ½" and the short members were cut to 5"x 5 7/16". The end pieces were cut to 5" x 48". The grid was assembled using butt joints and a wide crown stapler. The strength of the torsion box is derived from the glue bond between the core and the grid, so it has tremendous strength, once it is cured.

Since I intended to use a vacuum box for clamping, it was necessary to develop a strategy for the air to be removed from the grid. Each end of the short core pieces was notched using a dado set to achieve a ¾" x ½" notch. All of the long members of grid were drilled with ¾" holes. This system of holes and notches would allow the air to escape from the torsion grid so a vacuum could be created to provide clamping force.

The skin was set on to the grid and the assembly was squared up, using the skin as a reference. I tacked a few brads at strategic locations to hold the skin in place while it was flipped over, to allow the other skin to be attached.

Once both skins had been glued in place, it was necessary to clamp the box for a minimum of one hour, preferably longer.

Since I had a vacuum pump, I chose to fabricate a vacuum box, which would allow me to achieve consistent clamping pressure on both sides of the torsion box, simultaneously. This greatly simplified the clamping process and eliminated the need for cauls and large quantities of clamps.

The top and bottom of the vacuum box were sheets of ¾" melamine, as indicated earlier, and the sides were ½" melamine cut to 5 7/8" wide strips. Since the torsion box was 6" thick, the narrower width of the vacuum box sides allowed space for the top and bottom of the box to provide clamping force when the vacuum was created. In one end of the vacuum box assembly, a quick release fitting was fixed to allow for the attachment of the pump. The entire vacuum box was taped at all of the joints using a 3" wide packing tape. Once the taping was completed, the pump was started and joints were inspected for leaks. The assembly was left in the vacuum box for 3 hours and then removed.

With the torsion box completed, I wanted to attach a solid wood lip, for easy clamping around the perimeter of the bench. I milled some 8/4 maple stock up and formed an L shape assembly to allow for attachment to the box with bolts and glue and provide a 1 ½" x 3" lip.

With the lip installed flush to the surface of the box, I was ready to skin the surface of the bench with white plastic laminate. Laminate would provide a surface that is durable, easy to clean, and can also be used for full size sketches or drawings, if necessary. 3M waterbase contact cement was used to attach the laminate skin. Once the laminate was trimmed to size, a small chamfer was routed into the edge of the bench to help protect it from dings.

I estimate that around 40 hours of shop time were spent on this project and about $4500.00. ($3900.00 for the lift). This makes for a fairly expensive assembly table/ workbench, but I am very happy with the result of our labors.

About the author…

Brendan Mathews is the owner of Foothill Cabinetworks in Vista, CA.