Lathe SAFETY SHIELD

Wes Jones

The Georgia Association of Woodturners' 19th Annual Turning Southern Style Symposium had one noticeable addition—lathe safety shields. With the heightened focus on safety, our board of directors voted to build shields to help prevent missiles from flying into the crowd. I built a prototype and constructed four more shields for the symposium. The cost per shield was about $300; if I had not made some of the simpler parts, the cost would have been $100 more.

Design criteria

We borrow the lathes from club members, so I did not want to modify their lathes; however, I did want the shields to clamp to the lathe to provide stability and rigidity while not interfering with movement of the headstock, tailstock, or banjo. Our goal was to provide reasonable safety to stop any piece that might fly loose in a typical demonstration.

I wanted to design the shields with structural material that was readily available, versatile, easy to assemble, strong, and attractive. I selected model #1010 extruded aluminum struts from 80/20, Inc. The struts are 1" square in cross-section and have continuous ¼" wide T-slots on all four sides. The T-slots are perfect for holding a sheet of clear polycarbonate plastic.

Construction

The aluminum struts form a rectangle that holds the polycarbonate sheet *(Figure 1)*. Two additional struts serve as stabilizing legs and support the weight. The legs are adjusted for height with knobs and T-studs sliding in the T-slots. Two support arms attach the assembly to the lathe. These arms slide under the lathe and clamp to the back side of the lathe bed with bolts threaded into small angle brackets.

The brackets are made from 1½" × 1½" × ¼" aluminum angle, cut into 1" pieces *(Figure 2)*. To save on costs, make the brackets yourself. They are bolted to the arms and have a threaded hole for a 5⁄16" bolt that clamps the shield assembly to the lathe *(Photo 1)*. An external-tooth star washer between the angle brackets and the arms keeps the brackets from inadvertently sliding out of place *(Figure 3)*.

Cindy Drozda demonstrated at a Georgia symposium behind a sturdy shield.

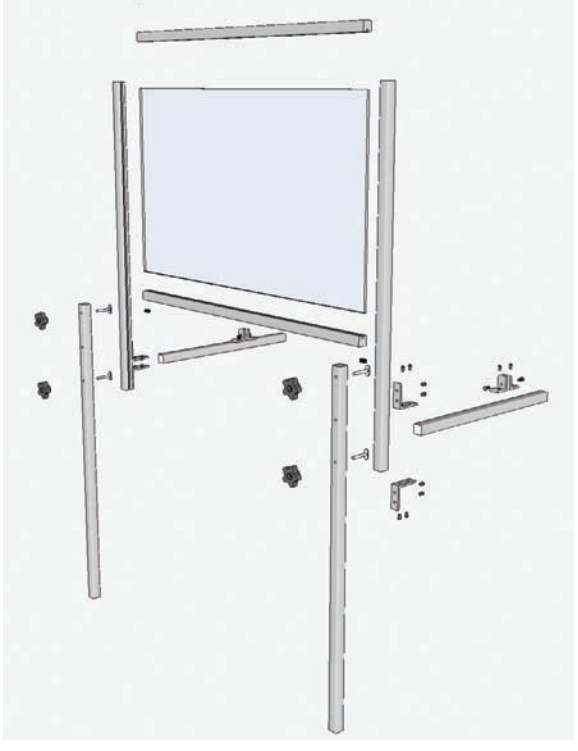

Figure 1. The shield consists of eight lengths of aluminum extrusion, a sheet of polycarbonate, and a collection of connectors and mounting hardware.

T-studs and knobs allow the legs to attach to the vertical sides of the rectangle and slide up and down *(Photo 2)*. I made the T-studs from 1/4-20 × 1¾" studs and 1/4-20 T-nuts threaded together and locked with thin cyanoacrylate (CA) adhesive. Knobs are widely available.

Tools and assembly

Only two tools are needed: A ½" hex closed-end wrench to tighten the bolts against the lathe and a 5⁄32" ball-end T-handle Allen wrench (available from Home Depot) for screws in the slots of the aluminum struts. One person can assemble the shields, but it is easier with two. A flat worktable makes the assembly easier.

Assembly

Attach arms to lathe first

Lay the arms on the table. Thread the bolts into the angle brackets so the end of the bolt is flush with the surface of the angle bracket. Slide the angle brackets into position on the arms and attach them with the 1/4 -20 × ½ screws, star washers, and T-nuts, but don't tighten them yet. Position the angle brackets so the arm is flush with the front of the lathe bed with the angle brackets inside and outside the back wall of the lathe.

For the Powermatic 3520-type lathe, the angle bracket outside the lathe bed will be 10" from the end of the arm, which is flush with the front of the lathe. The space between each pair of angle brackets is just wide enough to slide the angle brackets up onto the lathe bed wall. The arms need to be spaced 37" apart, outside to outside. Tighten the angle brackets securely to the arms. Then tighten the bolts against the lathe.

Use the #3356 hardware package to attach the #4101 corner brackets to the top and bottom surfaces of the support arms; position corner brackets flush with the ends of the ▸

Parts List

Qty.	Part	Comments
2	80/20 #1010 extrusion	35" length. Ordered with #7042 counterbore in both ends of one slot
2	80/20 #1010 extrusion	36" length
2	80/20 #1010 extrusion	36" length. Drill three ¼" holes spaced 1", 5", and 9" from one end through the extrusion.
2	80/20 #1010 extrusion	20" length
4	80/20 #3321 1/4-20 × ½" FBHSCS and T-nut hardware set	
4	80/20 #3395 anchor fastener assembly	
4	80/20 #4101 4-hole inside corner bracket	
8	80/20 #3356 double 1/4-20 × ½" FBHSCS and T-nut hardware set	
4	80/20 #3382 economy T-nut	
1	¼" thick clear polycarbonate	20½" × 35½"
4	Angle bracket	1½" × 1½" × ¼" thick × 1" wide with ¼" hole and 5/16-18 threaded hole
4	5/16-18 × ½" hex bolts	
4	5⁄16" external-tooth star washer	
4	1/4-20 × 1¾" threaded stud	McMaster Carr #98750A017
4	1/4-20 star knob (female)	Peachtree Woodworking #977
4	Endcaps (optional)	Caplugs #VSC-1000-8

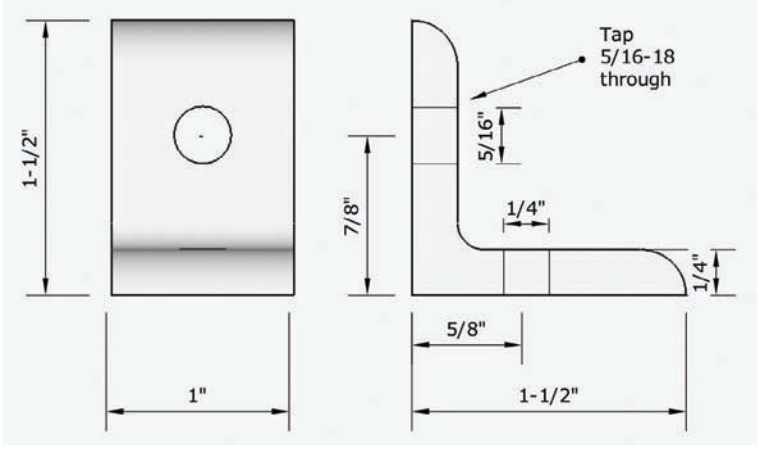

Figure 2. Dimensions for the aluminum angle brackets that clamp the shield to the lathe bed

Arms on the frame have angle brackets that hold the shield in place against the lathe bed.

Vertical support legs can be adjusted for height.

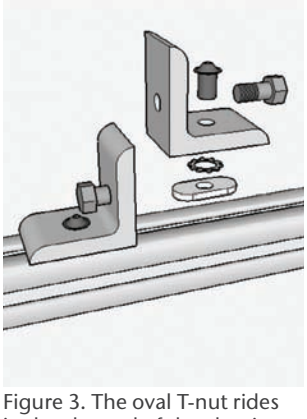

Figure 3. The oval T-nut rides in the channel of the aluminum arm. A star washer keeps the bracket from shifting.

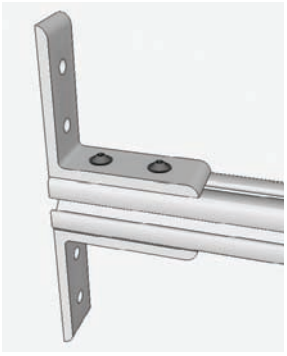

Figure 4. Be sure the angle brackets holding the support arms are flush with the ends of the arms.

arms *(Figure 4)*. Tighten the brackets securely. Also assemble the #3356 hardware on the vertical legs of the corner brackets, but leave the hardware loose so you can slide the T-nuts into their T-slots in the next step.

Assemble polycarbonate in frame

Lay the two 36" struts without holes and the two 35" struts on the table. Fasten one end of a 36" strut to one end of a 35" strut using a #3395 anchor assembly. Be sure the counterbored hole in the 35" strut faces the outside. Slide the longer end of the T-nut into the T-slot of the 36" strut and put the round section of the fastener into the counterbored hole *(Photo 3)*. Make sure the struts meet flush at the corner. Use the ball-end Allen wrench to tighten the fastener securely. Fasten the other 36" strut to the end of the 35" strut in the same manner.

Special anchors join the four pieces of the frame. Order the horizontal pieces counterbored for the round part of the anchor.

Jerry Kermode draped paper towels across the shield to protect it from splashes of finish.

Use polycarbonate for the shield—not Plexiglas acrylic or other plastic. Slide the sheet into the T-slots. Capture the polycarbonate with the other 35" strut, making sure the counterbored holes are opposite the polycarbonate. Secure with the remaining anchor assemblies. Check that corners are flush, the sheet is secure, the anchors are seated in their counterbored holes, and all the hardware is tightened securely.

Attach framed polycarbonate to arms

Stand the framed polycarbonate upright and prepare to attach it to the end of the arms. (This is where you really need two people.) Make sure the T-nuts on the corner brackets are loose so they can slide into the T-slots. Slowly slide the vertical struts into position. Be sure the struts are flush with the lower edge of the corner brackets. Tighten one of the screws on each side to hold it in place. Step back and make sure the position is right. The shield should be level and at a height the banjo can slide underneath. If everything looks good, securely tighten all screws in the corner brackets.

Attach legs

Lay the two legs onto the table and attach the knobs with the 1/4-20 T-studs. I drilled ¼" holes through the leg struts at 1", 5", and 9" from one end. The extra hole allows you to adjust the shield height for tall lathes or lathes on raised bases. For most applications, install the T-studs and knobs in the 1" and 9" locations.

Thread the knobs onto the T-studs just enough to get them started. Holding the legs vertically with the knob end up, slide the longer end of the T-studs down into the T-slots on the vertical struts. With the legs resting on the floor, lift up slightly on the shield and tighten the knobs. This will ensure that the legs, while on the floor, support the weight of the shield.

Additional details

The polycarbonate is only 0.224" thick, which allows vibration from the lathe to rattle the sheet. To prevent that, put short lengths of soft, closed-cell foam in the bottom and top T-slots. When you reinstall the top strut, push it down tightly to compress the foam. If you do not plan to disassemble the shield, you could run a bead of clear caulk into the slots during assembly.

A cap on the end of the aluminum struts is a nice addition. A 1" square vinyl cap from Caplugs works nicely, but the company only sells them by the carton.

This design is versatile and flexible and can be adapted to many lathes. The angle brackets can be slid along the T-slots to fit your needs and the legs can be easily adjusted. The angle brackets can also be mounted on the sides of the arms, instead of on the top surfaces to fit a different type of lathe.

The polycarbonate can be easily replaced. To make it last longer, when applying finishes or CA, lay several sheets of paper towel over the shield to catch any spray *(Photo 4)*.

The first day of our symposium, the shields got a real-world test when one of the demonstrators blew up a piece of mesquite. Half the piece hit the shield and bounced onto the floor; the other half hit the shield and landed behind the lathe. The shield successfully protected the crowd and no one was injured. Consider building a safety shield for your club to keep woodturning safe and fun for everyone. Send me an email with questions or suggestions at wwjones@comcast.net. ■

Drawings by David Heim.

Wes Jones is a lifelong woodturner and is known for large hollow forms. He is a past president of the Georgia Association of Woodturners and the Chattahoochee Woodturners, and a past vice president of the Peach State Woodturners. Wes demonstrates and teaches woodturning.