



Tool Tip...

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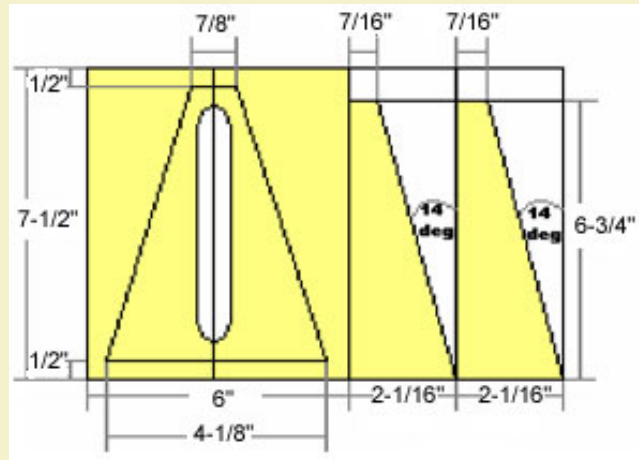
Hemisphere Center Marker

by James Hughes



Materials:

- ▶ (1) 10-1/2" by 7-1/2" wood, 3/8" to 1/2" thick
- ▶ (1) 3-1/2" by 6-3/4" acrylic or Perspex sheet, 1/8" thick
- ▶ (1) 6" long section of 1/8" brass channel
- ▶ (6) 3mm x 12mm wood screws
- ▶ (6) 3.5mm x 25mm wood screws



Introduction

Have you ever wished you had a quick and easy method of marking the centre point of a shell hemisphere for drilling the fuse hole? Especially if you have a large quantity to do! Doubtless some of you will be familiar with the problem of stars layering up out of level with the lip of the hemi when filling stars in concentric layers around a fuse that has been positioned off center. This leaves the builder no option but to leave gaps around the equator that can result in rattles and sparse areas in the burst, especially in smaller shells.

The tool I designed to overcome these problems is constructed around a hollow wedge. The hemisphere is inserted all the way into the wedge until it won't go any further, then a pen is used to mark the center point through a slot that is centered above the hemi. The jig described here can be used to find the center of all hemispheres between 1" and 3.5" in diameter. A larger jig could also be made to handle bigger hemispheres just as easily.

Construction

The top plate of the wedge is made from clear Perspex or acrylic, while the sides and base are cut from any panel wood (ply, MDF etc.)



Figure 1: Using angled block against the

guide fence to hold a side piece at 14 degrees when cutting the slope.



Figure 2: Making sure the top edges are on a level plane.



Figure 3: A temporary slot width guide for centering the plastic sheets.

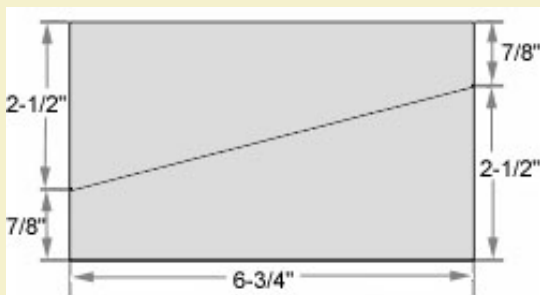


Figure 4: Dimensions for the clear plastic sheet.

approximately $\frac{3}{8}$ " to $\frac{1}{2}$ " thick. The components are first marked out on the wood and cut to size according to the dimensions shown in diagram above. Mark out the wedge shape and the position of the slot on the base.

The slot in the bottom of the base is a finger hole for fishing the hemis back out of the jig once they are marked. If you do not wish to cut this slot, a pusher stick can alternatively be used to push the marked hemis back out once marked. However, the extra time spent making the slot now will save you more time later.

The base slot is made using a router table or a hand held jig saw. When using the jig saw method, a $\frac{3}{4}$ " hole is drilled one inch from the center at both ends, then the jig saw is used to cut straight lines between them to remove the piece. When using a router table, a hole is drilled near one end of the slot to accept a $\frac{3}{4}$ " straight edge router cutter. The fence is set on the router table so that the slot is centered. If you only have a small diameter router cutter then a wider slot can be made by offsetting the center of the cutter, making the cut then turning around to cut the other side.

Two strips are now to be cut for the sides. The angle is cut on a table saw by using a right angled triangular guide block with a 14 degree angle. A small screw is driven in near the end to prevent the two pieces of wood slipping past each other, as shown in figure 1.

Once the side pieces are cut, they are aligned with the marks on the base and secured with screws that run through the bottom of the base and up into the walls.

Next a rectangular sheet of Perspex is marked out to the dimensions shown in figure 4, and the two right angled triangles cut out. The top edges of the diagonal cut should then be beveled slightly to make access with a pen easier.

It will be found that when the top Perspex sections are placed on top of the base unit, the plates will not rest parallel with the base. This will cause the Perspex sheet to become angled downward when screwed down on top, and be too low at the center point. This phenomenon will be more pronounced if the sides are made of a thicker wood. Therefore, the tops should be planed or sanded carefully so that a straight edge will lie flat across the side walls as shown in figure 2. In order to make this task easier, the top sides can be colored with a permanent marker and sanded until only a very thin line is left on the inner edge. Do not sand away any of the inner edge, if you do you can correct the error by placing washers beneath the Perspex when it is screwed down.

The final step is to attach the Perspex sections to the side walls. This must be done so that there is a sufficient gap to accept a pen nib and must be perfectly centered. The gap should be adjusted to the particular pen that is used. I have found that a fine permanent OHP marker or a fine-liner type pen that has a thin, metal, tubular section before the tip to be particularly suited to the task.

To perfectly center the gap between the two sections a wooden jig is cut so that it fits snugly in the top. A center line is marked on it and

two fine panel pins are driven in, one at each end as shown in figure 3.

Drill 3 clearance holes in each of the Perspex sections, countersink and screw them in place, with the short screws, while holding them up against the panel pins, as shown in figure 5.

The jig can now be slid out and to finish the tool a section of 1/8" brass channel can be glued across the front and back edges of the Perspex top sheet to offer added support.

To use the jig, simply insert a hemi into the wedge and push it forward until it won't go any further. Use a pen to mark the top contact point, as seen in Figure 6. You can then rotate the hemi 90 degrees and mark a second line to get the exact center point. The hemi is then ejected by using your finger through the base slot to fish it out, and you'll have a perfectly centered mark every time! 🔥



Figure 5: Attaching the two plastic guide sheets.



Figure 6: Using the finished center marking jig.