

R5 STYRENE HEAD BUILD

Tools:

Steel Rulers
Olfa L-1 Heavy duty cutter
Swivel knife
Router
Removable spray adhesive
Tungsten tipped scribe or small centre punch
Hammer
3mm, 6mm, (16mm or step drill) drill bits
½ inch holesaw
Masking tape
File

Technique:

You may cut the paper plans up if it makes it easier to make best use of the plastic you have available. Don't cut around the actual part lines yet as it will make cutting the plastic harder later.

I spray the back of the paper with a removable spray adhesive, let it dry then stick the paper to the plastic. Don't use a permanent adhesive unless you like picking off tiny pieces of paper.

After cutting out the parts, you may find the paper wants to fall off, if so then pencil the name of the part onto the plastic for later reference.

All straight edges are cut using an OLFA L-1 heavy duty cutter or OLFA P-Cutter 800. The Olfa L-1 has snap off blades and is superior to Stanley or other brands. I found Stanley knives wanted to ride across the surface, where the Olfa would properly cut into the plastic.

The P-Cutter 800 is a scoring tool and works even better than the L-1 but is only useable where parts are not butted up against each other on a sheet. I have nested parts next to each other to minimise cutting, so any part that shares an edge with another will have to be cut with the L-1. Parts that are not nested can be cut with the P-cutter 800. The P-cutter scores a channel into the plastic which gives a quicker result and a cleaner, squarer edge.

To cut using the L-1, place a steel rule along the line to cut so it can be clearly seen. Run the knife along with very light pressure, you only want to cut the paper at this stage. Keep your cutting speed slow and against the rule, make 3 to 5 cuts this way all with only your own arm weight as pressure on the knife.

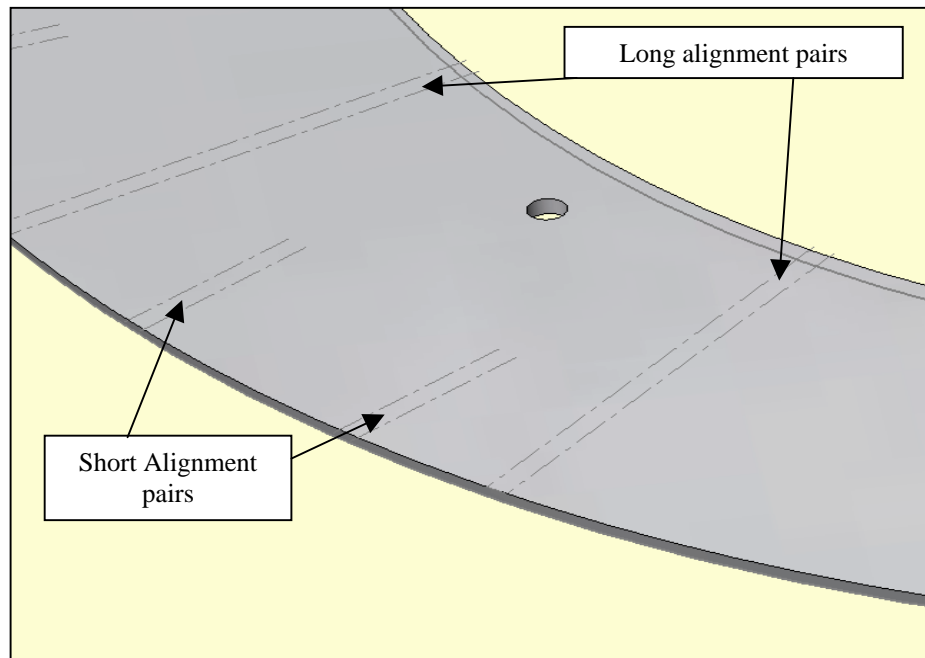
Curve cuts for the 1mm parts are made with a swivel knife. You can get a good swivel knife from your local hobby store. Again, use very light pressure to ensure your cut is accurate and to avoid breaking the blades. You will find that if you fold the plastic up against the cut then back down, the part will snap out cleanly.

Circular cuts for the rings are created using a small router. They need to be accurate as the skins need to fit on the final skeleton.

Solid lines on the drawings should be cut until the part can be snapped off. Dotted lines indicate alignment marks, which should be cut lightly into the plastic for aligning other parts later on.

Special Notes

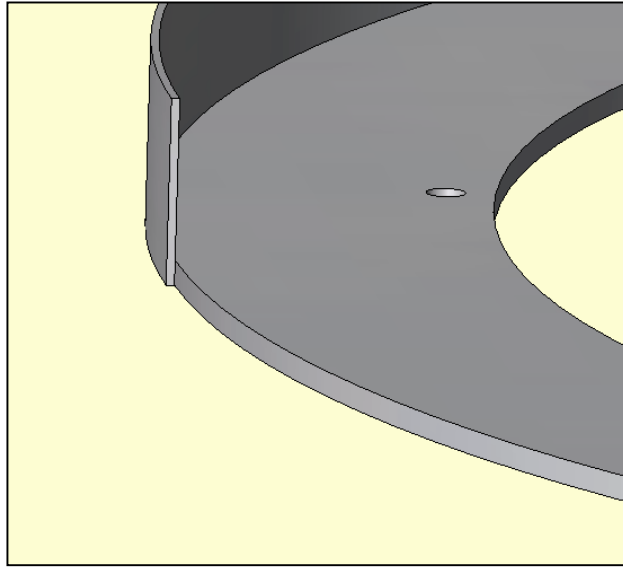
When marking the slope ring alignments, Mark short alignment pairs on the chamfered side and long alignment pairs to the non-chamfered side.



Similarly, on the TOP RING, make the long alignment pairs on the chamfered side and the short alignment pairs on the non-chamfered side.

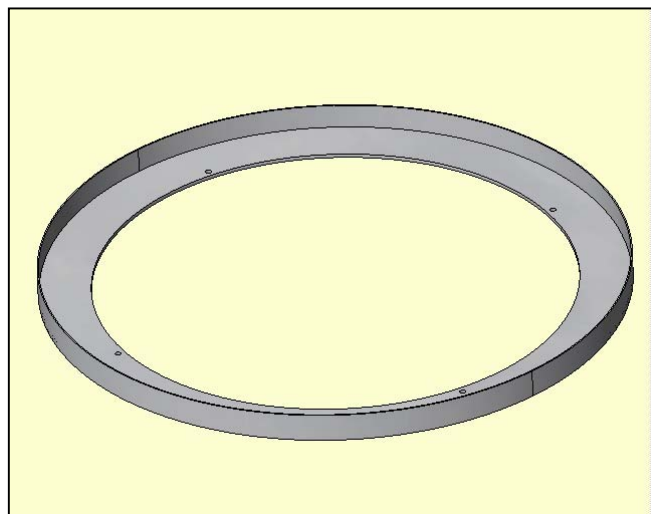
Construction

1. Begin with the LOWEST ANGLE RING. Make sure all alignments are marked and drill out the holes to 6mm.
2. Turn the ring upside down and place it on a flat surface (you may want to protect the surface with a sheet of sacrificial MDF as the gluing process may damage a table top). The alignment marks should now be facing down.
3. Have a DOME RING WRAP 1 HALF ready. Put a small dab of glue onto the ring edge and push the

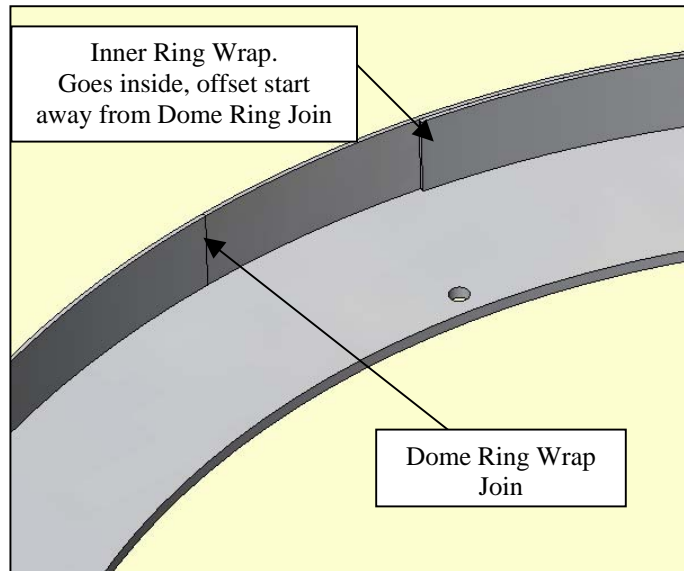


WRAP into it so the wrap also sits flat against the flat surface. Pull the WRAP around to check it is not sloping up or down, otherwise when you reach the end it will not be sitting against the flat surface.

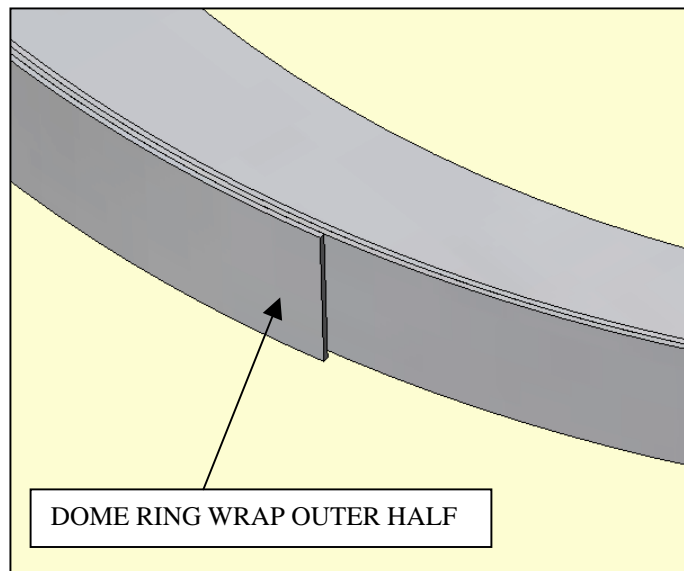
4. Once the glue is set sufficiently, use your fingers to keep pressure as you stretch the WRAP around the ring an inch at a time, putting glue into the point where the 2 parts join.
5. Keep going around until you reach the end. Then connect the other DOME RING WRAP HALF 1 to the end of the first and repeat the procedure until the ends join. Use a piece of masking tape to secure them together for now.



6. Once the glue has set you may continue with the 2 DOME WRAP INNER HALF pieces. Make sure the join line does not coincide with the join lines on the first wrap pieces otherwise it may come apart when you are gluing.

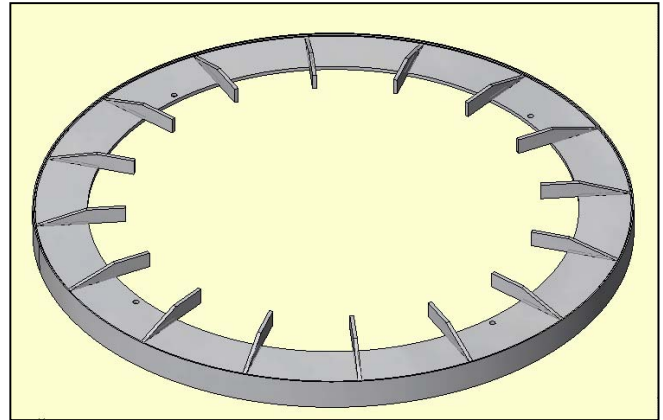
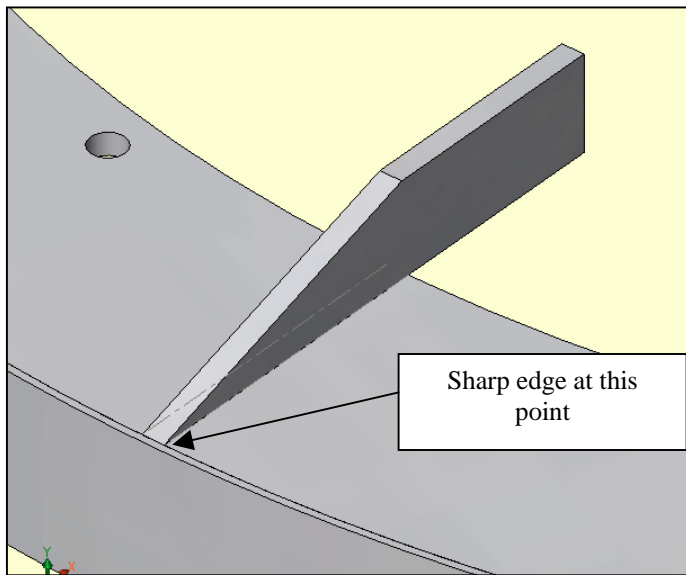


7. Once complete, glue the DOME RING WRAP OUTER HALF pieces on.

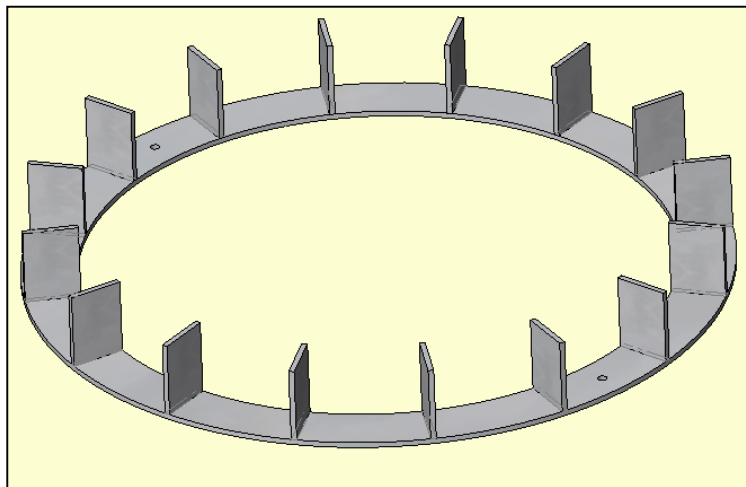


8. Let the glue setup for about an hour before continuing.
9. Turn over the dome. You'll find the dome ring is very strong.
10. Begin gluing on the LOWEST ANGLE UPRIGHT pieces. They go inside the alignment lines you marked earlier and the sharp edge goes against the point where the LOWEST ANGLE RING and DOME RING OUTER WRAP meet.

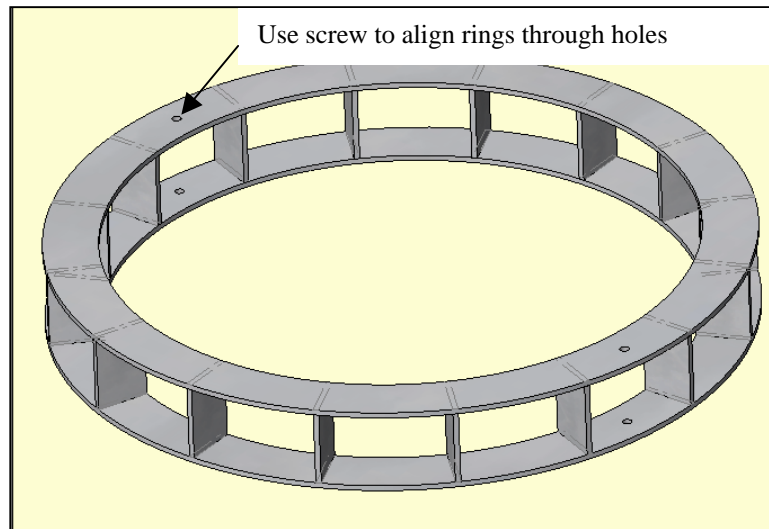
11. Glue on all 16 pieces. Make sure they are square to the ring, use a set square or similar.



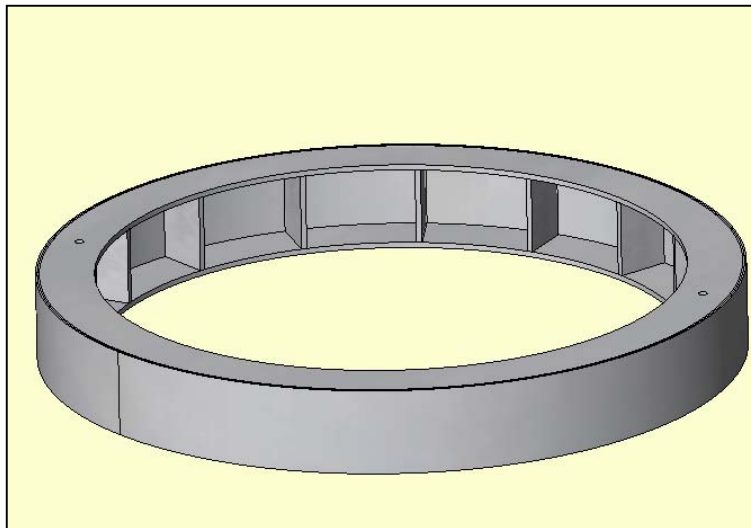
12. Now we construct the Reflector ring Assembly. Start by placing a REFLECTOR RING on the work area with the alignments facing up. Glue all 16 NECK UPRIGHT pieces to the ring. If you are unsure which way around the UPRIGHT pieces go, they are as wide as the ring itself.



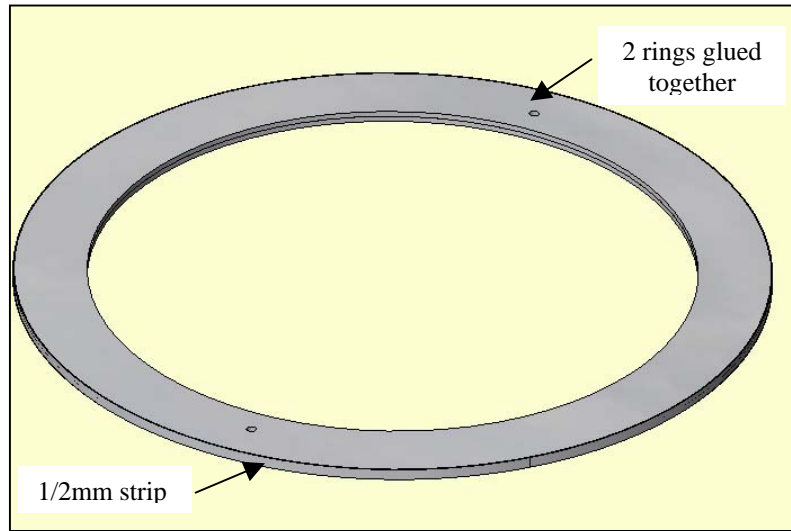
13. Glue on the other REFLECTOR RING piece. You can use some long M6 screws to align the 2 rings through the holes.



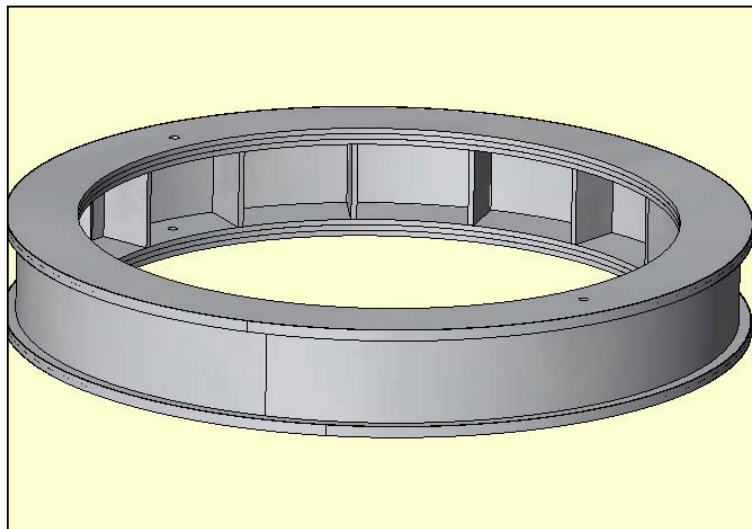
14. Glue on the REFLECTOR WRAP HALF INNER and REFLECTOR WRAP OUTER HALF pieces to complete the Reflector. This gives the ring a 2mm skin.



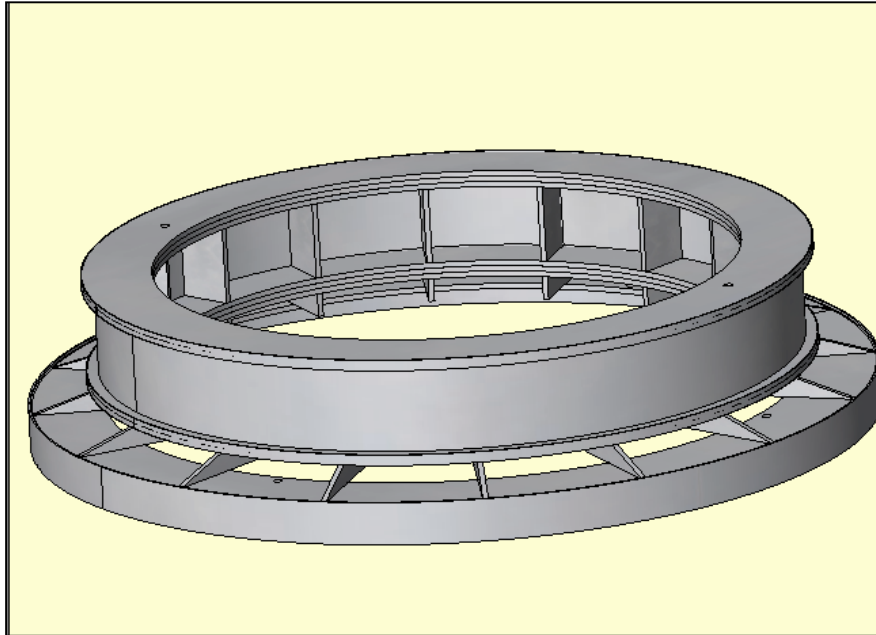
15. Make up a NECK RING assemblies by gluing 2 NECK RINGS together and finishing off the outside edge with a strip of 1/2mm styrene.



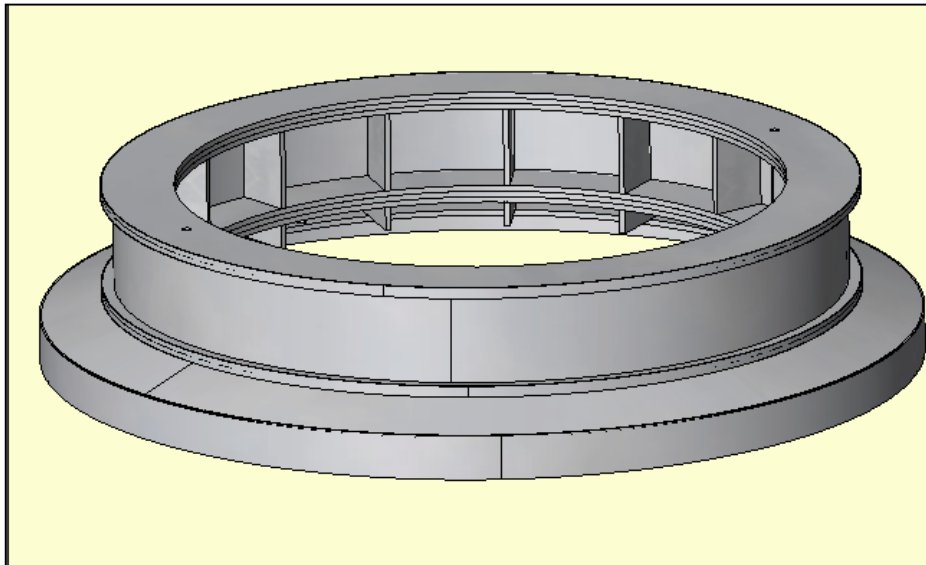
16. Make up another NECK RING assembly as in step 15
17. Glue a NECK RING assembly to the top and bottom of the Reflector Ring assembly using the screw holes for alignment.



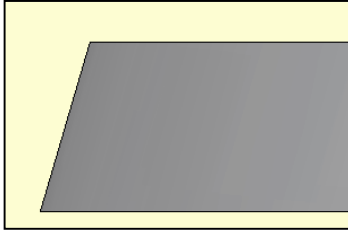
18. Glue the Reflector assembly to the lower assembly using the ALIGNMENT BAR to hold everything square. M6 screws bolt through until the glue is set.



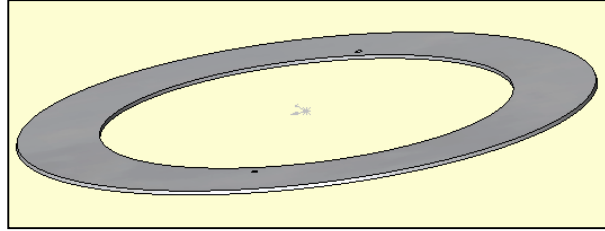
19. Glue in the LOWER ANGLE WRAP INNER piece now. Then follow with the LOWER ANGLE WRAP OUTER. The OUTER can over hang the dome ring slightly to make chamfering and finishing easier.



20. Now take the SLOPE RING and chamfer the edge all the way around. You will need to file from the outside line to the line just inside that to make a suitable surface for gluing the outer skins on later.

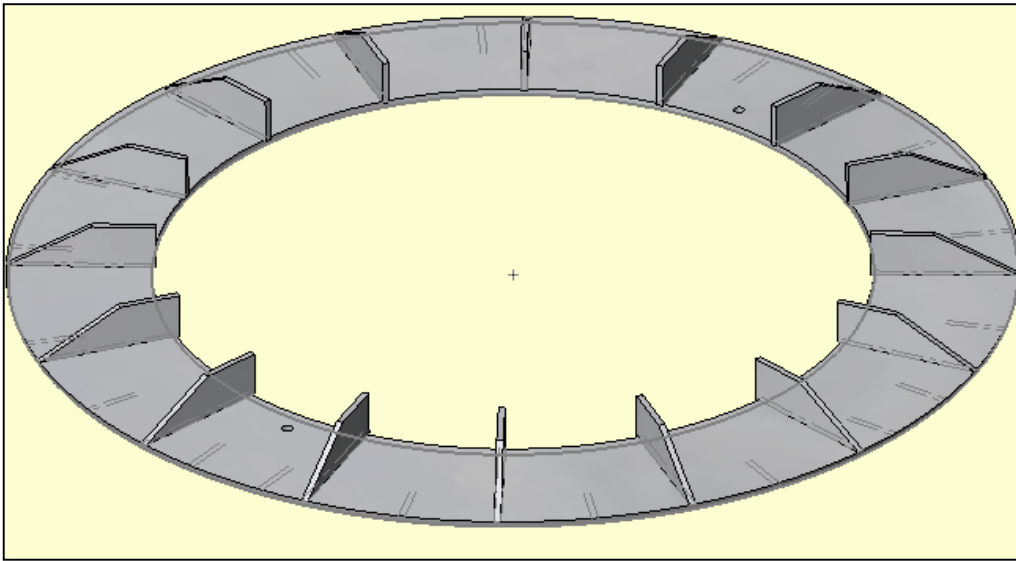


Chamfer edge

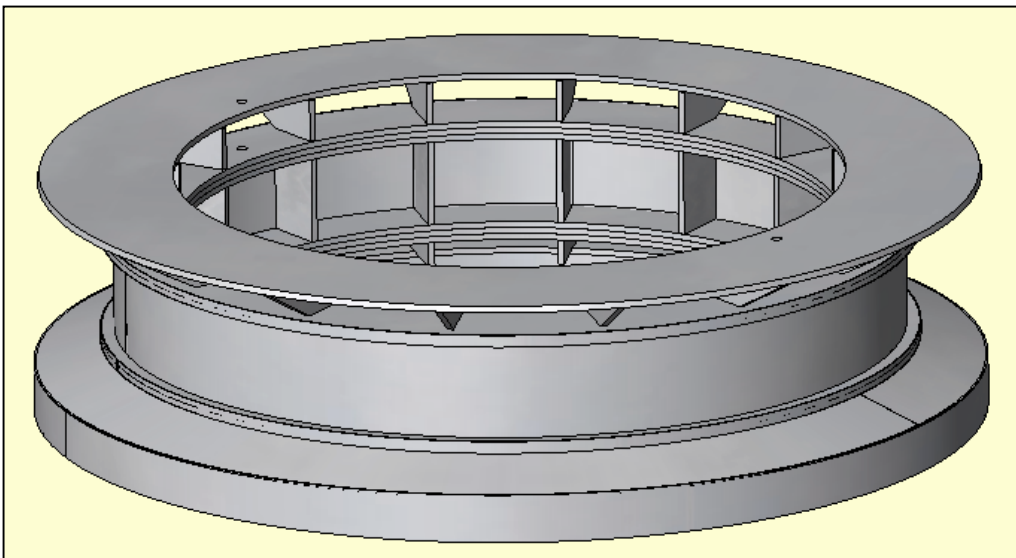


Slope Ring

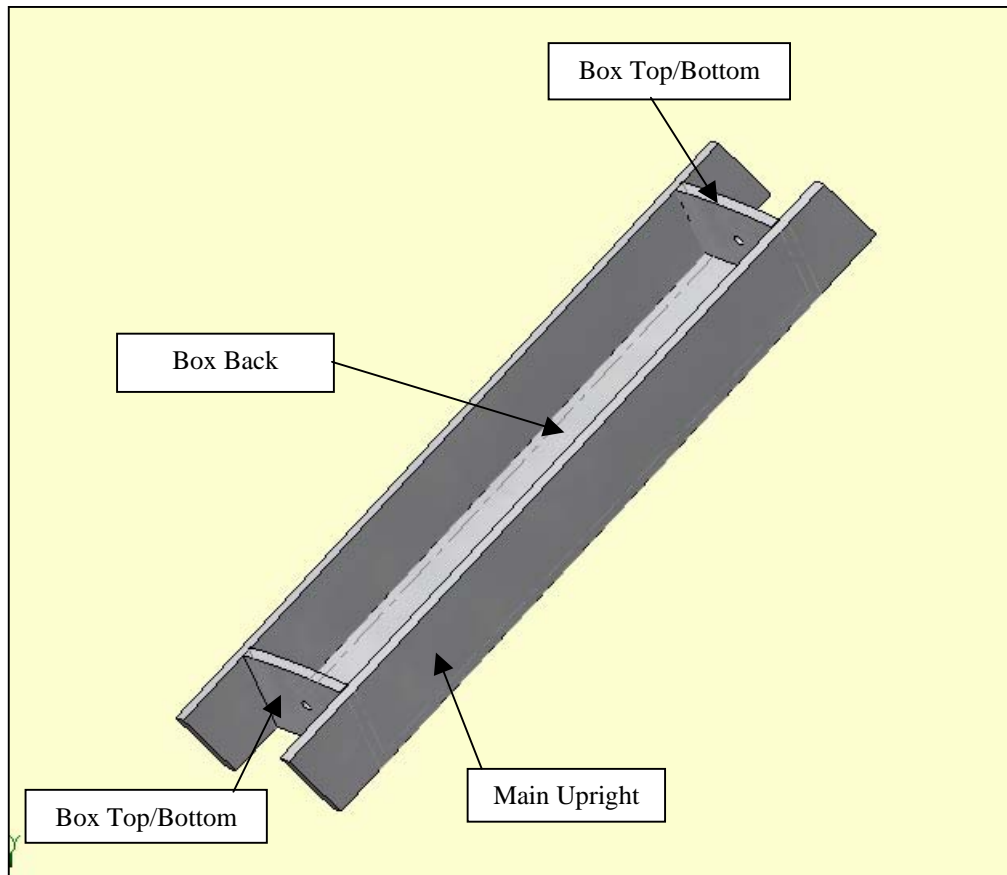
21. Turn the SLOPE RING upside down and glue on all 16 UPPER ANGLE UPRIGHTS. They are aligned on the alignments that go the full width of the ring.



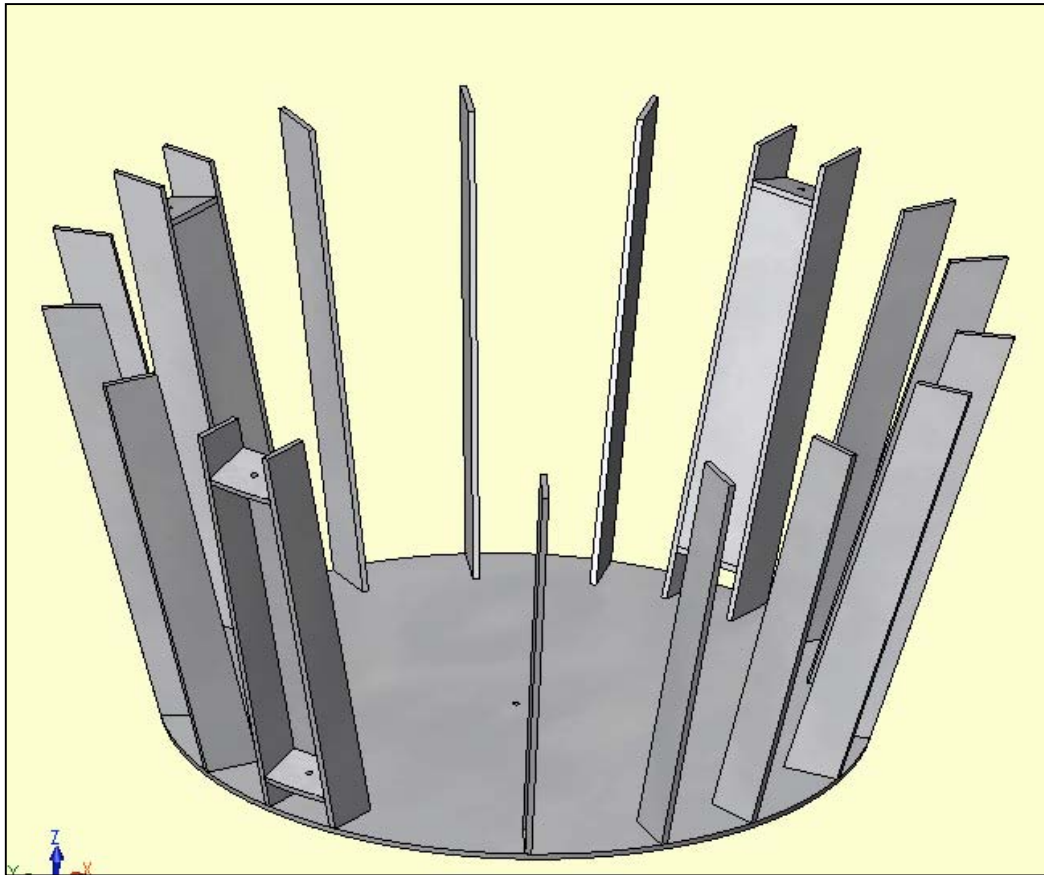
22. Now turn the piece over and glue to the Dome skeleton as it stand now, using the alignment holes to get it concentric.



23. Construct the 3 boxes using the marked MAIN UPRIGHTS, BOX BACKS AND BOX TOP/BOTTOMS.



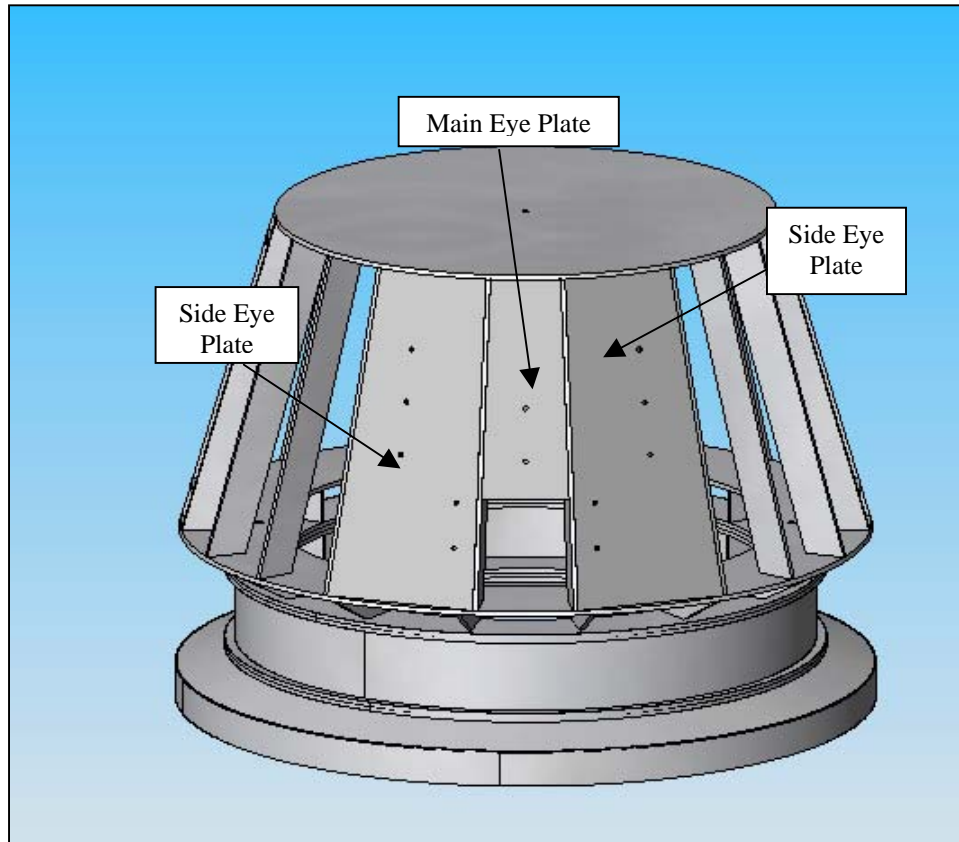
24. Chamfer TOP RING, alignments should be on NON-chamfered side.



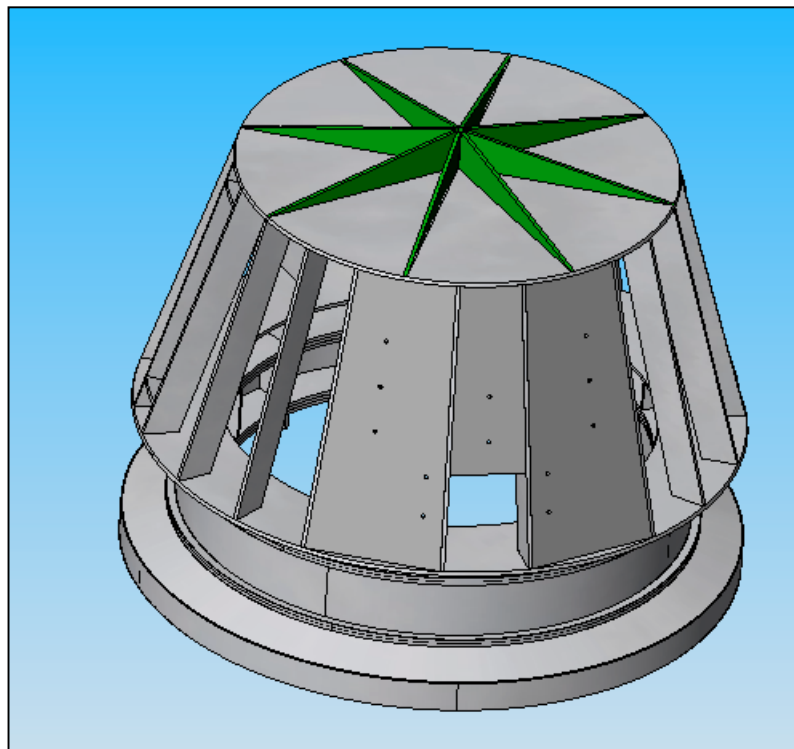
25. Glue constructed boxes and remaining MAIN UPRIGHTS to TOP RING. Turn the whole thing upside down and glue to the rest of skeleton.



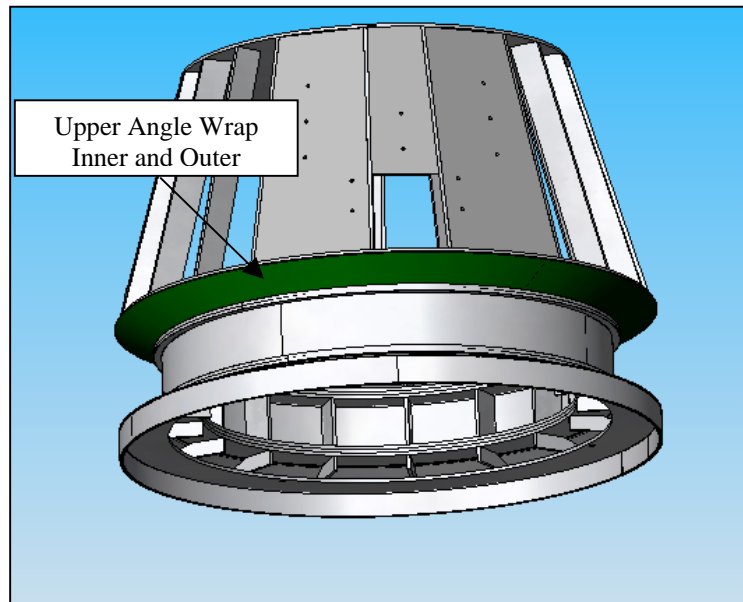
26. Now glue in the eye support plates.



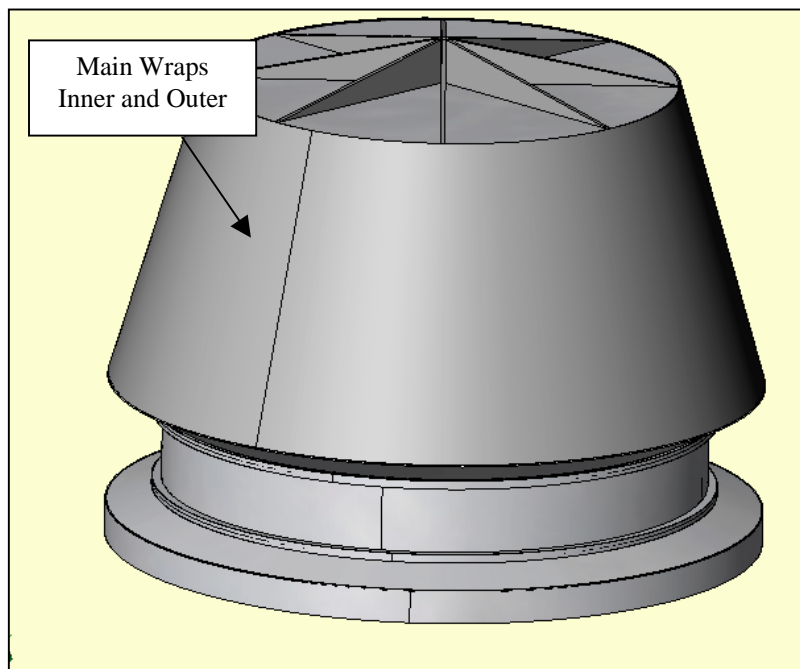
27. And glue on the TOP SUPPORT pieces



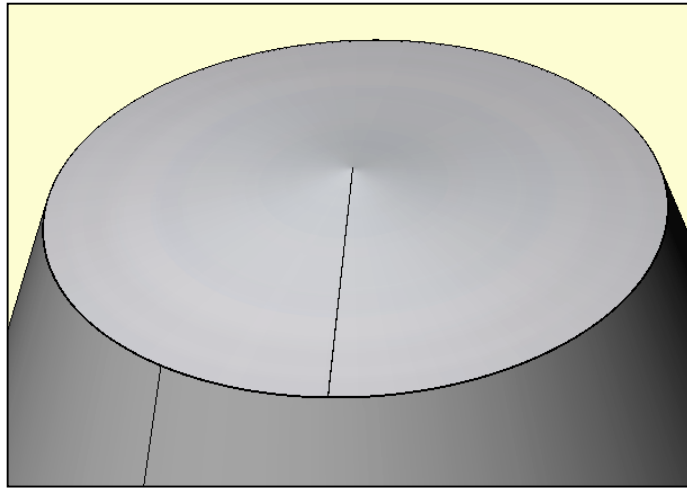
28. Now glue in the UPPER ANGLE WRAP INNER and UPPER ANGLE WRAP OUTER



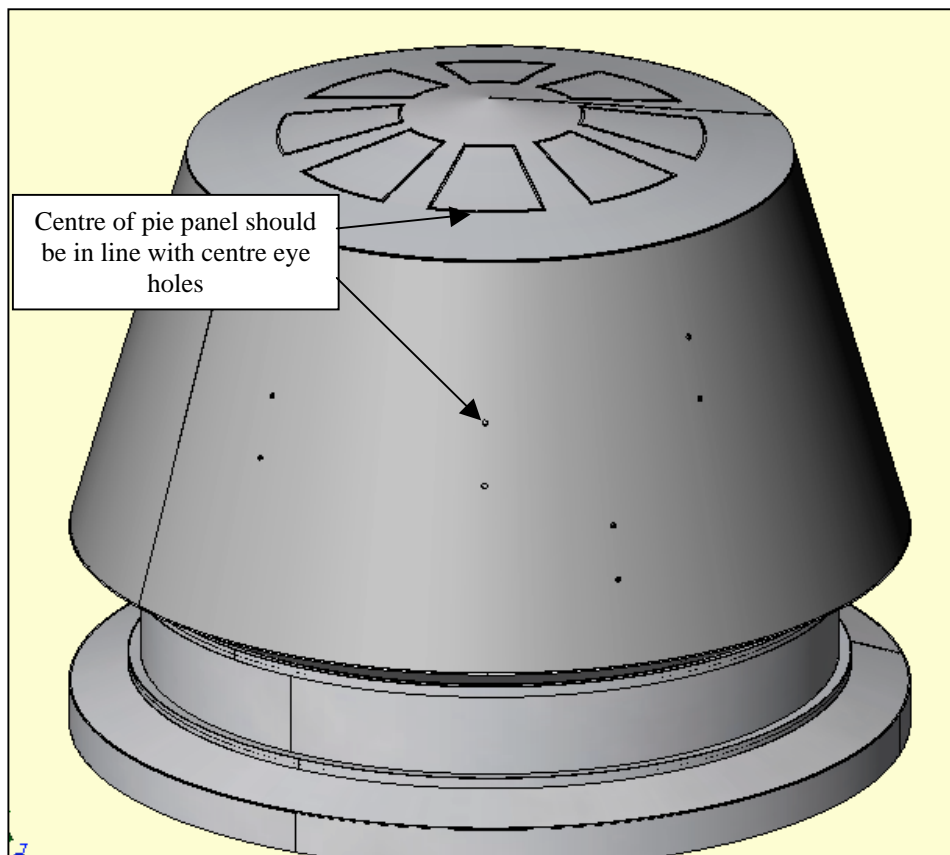
29. Glue on the MAIN WRAP INNER HALVES AND MAIN WRAP OUTER HALVES, using the same overlapping method as for the dome rings. Try and use half of the edge of an upright to start the inner wrap as it will give you a solid edge to work with. I found I had to file the skin edge at the top and bottom to make a smooth surface where other skins join. When the skin is set, drill through the relevant holes in the eye and details support plates where appropriate with a 3mm drill bit.



30. Glue on the TOP CONE INNER using an edge of a TOP CONE SUPPORT to provide a sold edge to work from. Once the edge is set, put glue on all TOP CONE SUPPORTS and pull in the TOPCONE INNER in one go as there is no way to glue a bit at a time with this part.



31. Now for the Last skin piece, TOP CONE OUTER.



32. Now work around the skin joins, filing and sanding until they meet neatly. Any gaps should be filled with small pieces of styrene and glue, as filler is not structural. Tiny join gaps should be filled with a good bonding filler like Milliputt.
33. Now you can drill the holes for the Dome Eyes. On the outside, use a holesaw of 1 inch to cut through the skin only. Don't let the holesaw go into the support plate. Then drill out the support plate behind to 16mm. This will allow the eye to sit into the skin and give you a good surface to glue the eye to the support plate. I put some 360deg PIR sensors behind my eyes to finish off the look.
34. The smaller front details have a 6mm diameter so cut into the skin with a 6mm bit. Try and find a sheet metal cutting bit as a standard drill bit may tear the skin rather than cut through it.
35. Give the finished head a sand with a very fine paper (1200) and get all the dust off before painting the head. Use a lacquer based paint as nothing else will key into styrene. I spent 100s of dollars on paint finding out this important fact
36. Fit the reflector details you intend to use, and place small uprights to break up the reflector into segments. I used rectangular rod styrene from a hobby shop. Apply masking tape to the reflector details so you don't paint over it.

