***-Acrylic Forming:***

- Keith Spreuer EAA Southbay Chapter 96 Feb 2012:...learn how to form doubly curved acrylic here is my education... I sent my nose cone down to Todd's canopies since I heard so many good things about him. Unfortunately he did not have time for a one off item so different than his canopy products. So I took the nose cone off (mine attaches with 4 screws) and made a wooden box and filled it with plaster....waxed up the nose cone and plunged it in. ...wax does not make a good parting agent for plaster of Paris. ...saran wrap...worked with a couple minor wrinkles....good female mold but I wanted a male to drape the acrylic over.... tried a couple times with plastic wrap but the wrinkles were pretty bad......I used a layer of grease and that worked pretty well. Still had to fill a few cavities and sand it smooth but got a good male and female mold. So I tired heating the acrylic and the male mold to 275 F. Then tried to drape it over the mold. Well it would have worked fine if the mold were only curved in one plane but in two planes (bullet shape) it needs to compress a lot around the edges and I could not do it my hand. After 3 attempts with 2 thicknesses I gave up on that. So then I tried hand forming it over the hot male covering both side of the plastic with fiberglass cloth and then placing the hot female on top. I left it in the oven 4 hrs but it still didn't conform completely. So I left it in the mold for 4 more hrs and turned the over off and let it cool overnight. It was a little closer. Then I reheated it and put 20 lbs on top of it for 3 hrs then I let it cool in the mold. Voila! It worked. Difficult and this is a lens only 6x10 inches.  
  
-John Gleason Feb 2012: ...plaster of Paris as a mold you need to seal it.  Pure varnish does this very well but you need to make it up from alcohol and varnish flakes.  The premixed stuff usually has some oil in it.  Put on several coats and let it dry between coats.  Then polish and apply several coats of wax, polyvinyl alcohol, or one of the commercial mold. parting agents.  Some coat hanger wire in the plaster will also help give it some strength. For the lens application I think  I would coat the female mold with a layer or two of a plaster slurry to make the lens smaller by the thickness of the acrylic before varnishing.  A quick clamping fixture with the appropriate plumbing to let you blow the heated acrylic into the mold would probably work best.  An aray of small holes at the bottom of the mold to vent air will work better than one large vent hole.  It will probably take several tries before the right combinations of temp and time heating the acrylic, blowing pressure, and maybe even a warmed mold before a "perfect lens appears.  Orientation tick marks are a good idea.

-Christian von Delius Feb 2012: One of my contracts is with Diamond Aire where we make acrylic components for Piper Aztecs and Apaches, among many other things. From complete full one-piece windshields, to side, door, and pilot windows, to nose light lenses and wingtip position lenses. These are for certificated aircraft under PMA. For the wingtip lenses, we use either clear or red or green 1/8" acrylic cut into 12" x12" squares. The square are heated up in a household oven at 275\*ish stacked on separating layers of felt on a masonite board. The molds are fiberglass over plaster sanded very smooth. The cro-magnon system we use is four large guys or six; one gets the well heated and HOT (wear THICK gloves) and pull for all we are worth down angentially to the mold, which is mounted on a piece of 3/4" allthread on a railroad tie section. We make tick marks after it has cooled for a couple minutes(and been helped with a cold wet towel) under tension for later trimming with a bandsaw. Careful when drilling the acrylic as we have 'tinks'. The acrylic can have built in tension from forming, and after carefully drilling and countersinking holes, the last one 'tinks' and a crack forms with the associated firestorm of cursing from the A&P. The windscreens and side windows are formed after heating in a giant industrial oven in a draping process.

-Bruce Hughes Feb 2012: I did not drill my holes in the wingtip acrylic cover; I used a Dremel tool with a small ball. Works very well.

-Rich (Argoldman) Feb 2012: Another way to do it is to use an oversize piece of acrylic and make a wood frame that will tightly attach to the perimeter of the piece. Heat the entire piece (frame and all) prepare your mold as you wish. Take the frame with plastic in it and pull it over the mold (or nose). The plexi will stretch and assume the appropriate shape. then cut off the excess after cooling. The frame creates the tension that will allow the adaptation. No gravity needed.

-Thomas Mann Feb 2012:



-Dale (LongEZ.com) Feb 2012: You...can use STRETCHLON VACUUM BAG FILM available from ACS.  It is good up to 400F.   (I get really cocky now that we have a really cool vacuum system). I would be willing to bet most home-builders could use their shop vac's to get enough suction and use compressed air to cool it a little quicker.

- Christian Von Delius Feb 2012: I was thinking along the lines of this:

<http://www.youtube.com/watch?v=yhajk_IDTUo> on a more industrial scale....with 1/8" thick acrylic you would need a large vacuum reservoir (40 gallons?) and would really have to heat up the plastic because it is quite rigid even at 275\*, and above that you get deformities in the material.

On Sat, Oct 6, 2012 at 1:36 PM, marc\_zeitlin@alum.mit.edu wrote:

... Do not ever put alcohol of any type on acrylic. See: http://microadvances.com/chemicals1.htm ...

Marc J. Zeitlin