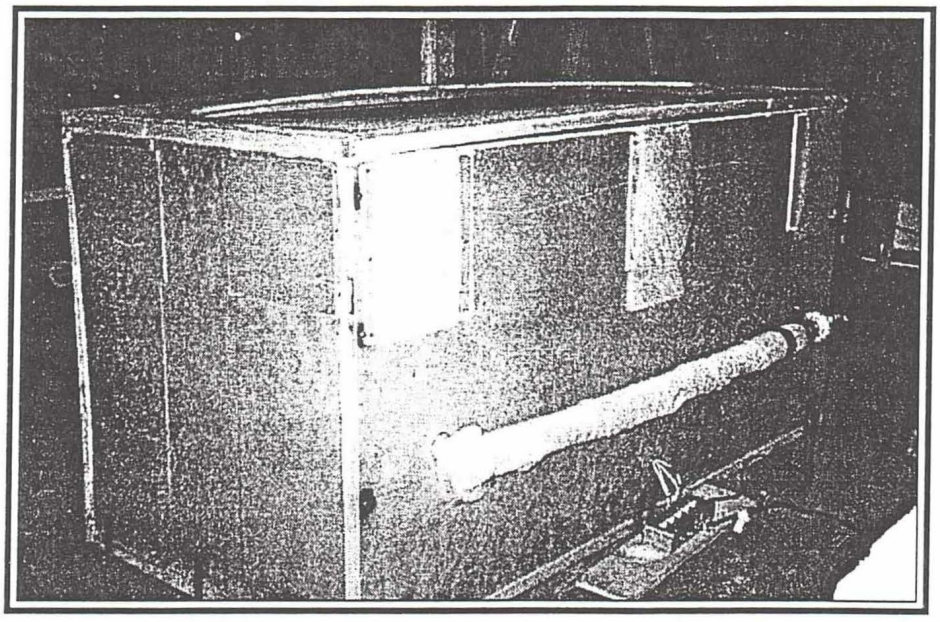
Free Form Custom Canopy

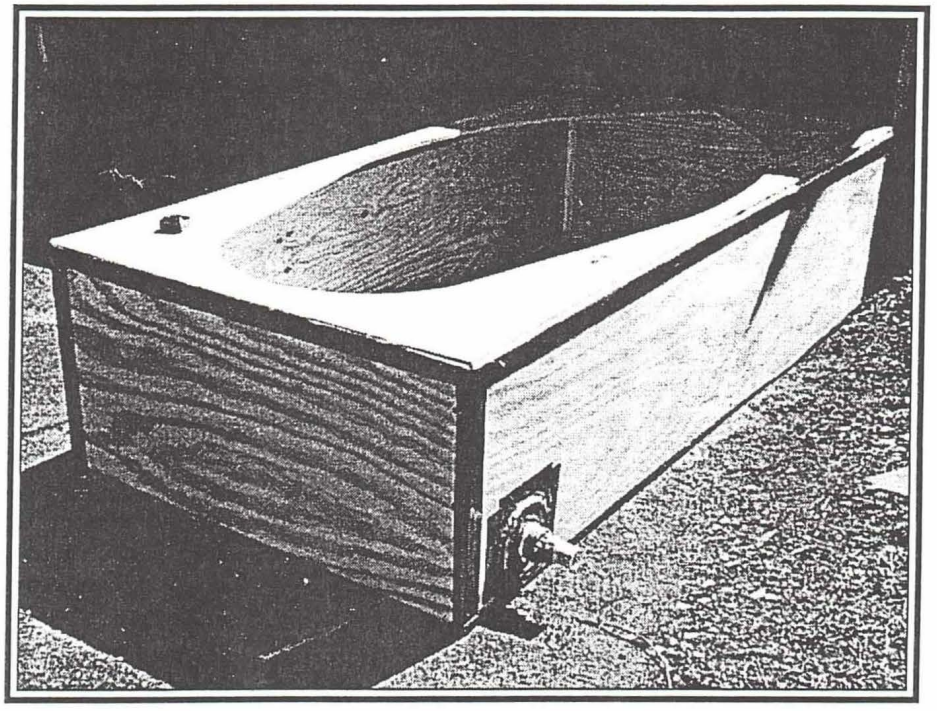
Alan Borman (MN) - Since necessity is the mother of invention, when I needed a canopy for my Cozy 3 I decide to make my own. I wanted a custom bubble so a standard Cozy canopy would not work. After several months of R & D, I had all the information I needed to attempt making my own canopy.

First, I constructed the oven box using 2 X 2s and Masonite panels on both sides with insulation between the walls. It was 4' x 4' x 8' with removable insulated cover. Tempered glass viewing windows were used to check on the Plexiglas and look for fires. (We had a fire because the metal heat shields were not high enough.) 4 oven burners from residential type electric stoves were used and controlled manually by switches. All heating elements combined used 46 amps so a 60 amp breaker was used. Galvanized heat shields were placed under the heat elements and up the side walls. A small blower motor circulated the air inside the box to prevent hot spots. The Plexiglas needed to be at a uniform temperature when formed.



4' x 4' x 8' insulated oven box

A separate box was formed as a vacuum chamber and the predetermined canopy shape was cut out of the top as a template. The shape determines the canopy height. The edge of the template was lined with closed cell rubber (pick up truck topper sealing foam) for a tight seal of the Plexiglas to the vacuum box lid. This box was placed on folding tables and a standard shop vac with a 2" ball valve was used to maintain and control a vacuum.



vacuum camber box with canopy shape cut out

The Plexiglas was screwed down to a 2 x 2 frame using long thin strips on top of the Plexiglas to keep it from pulling away from the frame during the vacuum process. We used metal rails like you find in kitchen cabinets that hold the little clips that the shelf rests on. It was formed like a channel and worked well. A cross member was used in the center of the frame to keep the sides from pulling in when the bubble got pulled down.

The Plexiglas with the frame was placed on top of the oven box lying horizontally and the lid was placed over the Plexiglas. Metal tape was used to seal the box and reduce heat loss. It removes easily and doesn't shrink like duct tape does when heated. The oven was slowly brought up to 325 degrees F. We measured temperatures with a digital thermometer and meat thermometers above and below the glass. The forming temperature was between 275 and 350 degrees F.

At that temperature, the Plexiglas sagged about 8-10". We let it cook about 20 minutes then came the moment of truth. Actually, it was the 5th moment of truth because we ruined the previous four moments of truth. We removed the tape, flipped off the lid, moved the frame off the oven box and on to the vacuum box, hit the vacuum and watched as the laws of physics did the rest. The Plexiglas was sucked down into the vacuum box within 20 seconds, to the amazement of all in attendance. The Plexiglas cools very quickly and you

have only about 90 seconds until it starts to get hard.

To check the depth of the plastic canopy we used a Q-tip, taped to string that was attached to a 2 x 2 and bridged over the canopy. The string was cut to a pre determined length before the process. The Plexiglas is very soft and a tape measure or other marking device will make marks. The vacuum was controlled by modulating the 2" ball valve and watching the Q-tip for depth indication until the Plexiglas cooled. We waited until it was warm to the touch and removed the screws to prevent any stress cracking that might result from the cooling of the Plexiglas.

The end result was a perfect custom bubble well worth the blood, sweat, tears and money spent. Several times during the process I wondered why I didn't take up stamp collecting.

The most important items are:

Make sure the Plexiglas is clean as any plastic or metal slivers will cause that area to heat unevenly and cause a small deformation.

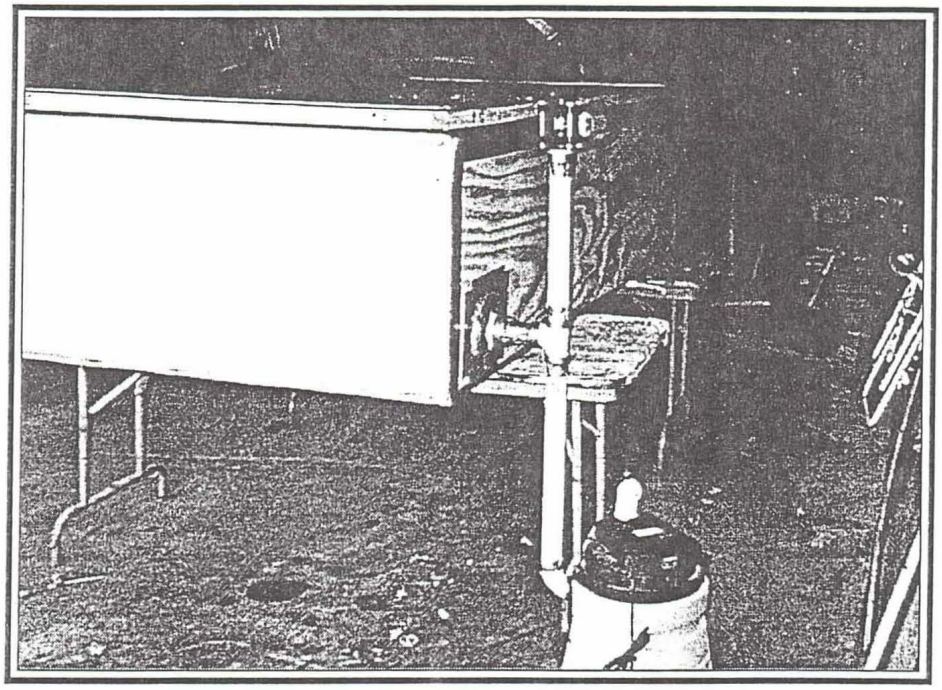
Screw the Plexiglas down every 4" using a wood or metal reinforcing bar. The edges of the Plexiglas will get soft, creep, curl and might pull away from the screws if they are not tight.

Do not get the Plexiglas too hot. It sags down too far and will not seal uniformly on the foam edges. If it is too cold it will only form down half-way.

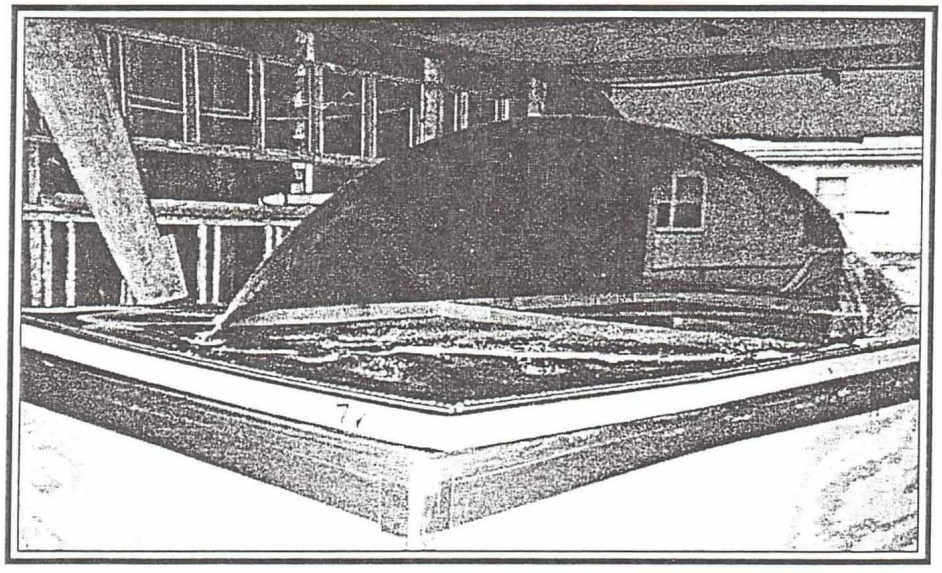
The vacuum box must be sturdy. We used ¼" plywood and it was bowing in on the sides and the bottom from vacuum pressure. Use at least ½" plywood and caulk all wood to the 2 x 2s before screwing. We used duct tape and it still leaked. Tape the seal of the shop vacuum lid to the container.

The learning curve goes straight up when you go into unknown territory, but the project was rewarding and can be done at home. I learned a lot along the way and now have the canopy I needed. If you have any questions feel free to give me a call.

612-455-5356.



Shop Vac creates vacuum which is controlled by a ball valve



The finished canopy is worth all the effort!

Wheel Vibration
<Canard.Com>

Solution to the on going wheel shimmy problem has been centered on wheel balance and brake disc alignment. Many builders have been frustrated when such attention did not fix the problem. The following seems worth checking out.

Greg Bordelon - I've built and worked on RV series aircraft. When we experienced wheel shimmy, Van recommended accurately balancing the wheels. If that did not cure the problem, you were instructed to balance the wheel pant on the axle axis. There may be too much weight in the trailing edge of the wheel pant. Don't laugh! Wheel pants are like a dart or elevators or ailerons. If there is too much weight behind the pivot point It will wobble or shimmy.

Balancing was accomplished by gluing lead shot inside the nose of the pant then laying two layers of cloth. This fixed the shimmy. The out of balance wheel pant changes the resonant frequency of the gear assembly.