# CANOPY SCHMANOPY! WHAT'S THE BIG DEAL?

Is canopy molding really hocus-pocus or just child's play?
By Mike Isermann

How many times have you decided not to build an airplane because you were afraid of the canopy? Now be honest. I can remember looking through old Guillows kits trying to find a canopy that looked about right or at least like something I could trim up to make work. Sometimes I would start with a canopy and try to match it to a short list of planes I wanted to build. Talk about limiting your possibilities. It was kinda like being on a low cholesterol diet. You got chicken, fish or turkey to choose from. That's it! No bacon wrapped shrimp or mushroom smothered medium-rare ribeyes. A terrible existence indeed!

First, I want to be fair. There are at least four ways I know of to make a canopy: plunge molded, folded or wrapped, "faux painted"(for lack of a better name) and vacuformed. I'm sure there are others, I just don't know what they are. Let us take a look at each of the four techniques I am familiar with and review their pros and cons. I'll start with my least favorite:

**Folded or Wrapped Acetate**- A folded or wrapped acetate canopy is usually used on dime scale class airplanes or high wing scale airplanes. Dime scale rules prohibit the use of mechanically formed canopies leaving the builder with only two options: Folded/wrapped plastic or folded paper canopies that are painted. The folded canopy technique can often leave you cold. However, some canopies, such as the Messerschmitt Bf 109, have a substantial amount of framing that lends itself to folding. A few relief cuts placed in the right spots can create a nice finished product with little or no evidence of cutting. I like to make my cuts where framing is anticipated so that I may cover them with tissue. There are several dime scale airplanes that this techniques works well on. Although this type of canopy building is simple in theory, it can prove to be frustrating and perhaps too challenging for some. Ask my friend Scot Dobberfuhl about his Heinkel 100D dimer canopy sometime. I'm sure he can elaborate in great detail on the efforts involved. (grin)

On the other hand, most high wing monoplanes seem to have wraparound windscreens that are easy to install. It's a matter of cutting out a pattern out of bond paper and trimming it to fit. Once you are happy with the fit, all there is to do is transfer the pattern shape to a piece of acetate, cut it out and glue it in place. This type of canopy is much easier to attempt and the final product usually looks very nice.

**Folded Paper** – This technique is identical to folding plastic canopies and is a bit easier to accomplish; however, the results are not flattering to your model and the canopy can be easily damaged beyond repair. Painted canopies tend to make your plane less attractive and believable. I would discourage the use of paper canopies on any class of airplane with the exception of no-cal (ed. note: and non-scale).

**Plunge Molding** – This form of canopy forming shares a few similarities with vacuforming. Both techniques require the use of heat, a wood frame as well as a carved and sanded mold of the canopy. But that's where the similarities end. When plunge molding, heat is provided by a heat gun or oven and a second wood form or "die plate" must be cut to coax the acetate around the canopy mold as it passes through the die plate. Hence the name "plunge" molding. The die plate is a flat piece of wood a 1/4" to 1/2" thick that has a hole cut in it's center that is the shape (in plan view) of the canopy mold. The process is simple. First, the plastic material is attached to the wood frame with glue or clamps and placed in the oven or is heated with a heat gun until the plastic starts to soften or sag. Then the canopy mold is pushed through the plastic attached to the die plate. Once the plastic has cooled the newly formed canopy is cut free from the die plate and carefully removed from the canopy mold. I've even seen some people simply push the mold into heated acetate without to use of a die plate. However, the results are not what I would consider acceptable.

Plunge molding is an adequate method to form canopies but it has its drawbacks. Pushing the canopy mold through the die plate is inconsistent. One side of the plastic will stretch more than the other creating a thin wall on one side of the finished canopy. Another problem I have experienced is that there is a flare at the bottom of the finished canopy that never seems to mate up well with the fuselage. It seems like you have to cut away more of the molded canopy to get to a good vertical transition point leaving a canopy that has lost its proper height and shape. Although I have some concerns with this method, I think plunge molding is a good way to make canopies if you do not have access to a vacuum or an oven. However, in my opinion it is not the best way to make a canopy.

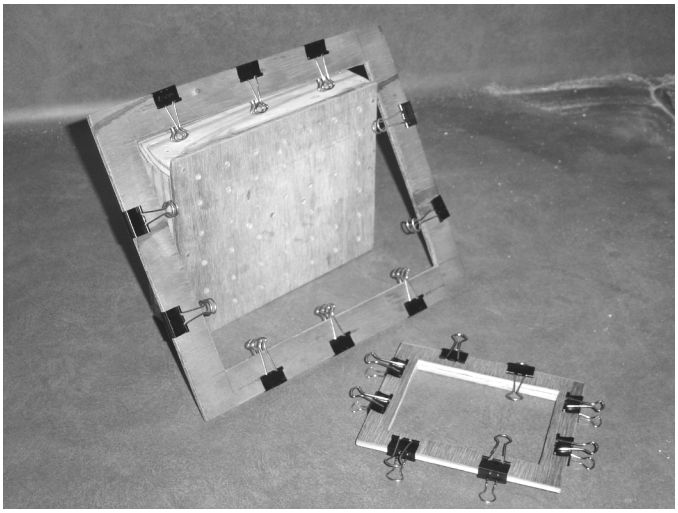
**Vacuforming** - Then I saw what has been described as "the black art of vacuforming." The first thing I said was: "Is that all there is to it!!" It was so easy I could not believe my eyes! For years I thought you had to be some sort of plastics expert with expensive tooling to make those beautiful, clear works of art. Then I found out that all it takes is a good vacuum cleaner (preferably a shopvac), a wood frame, a platen (a small wood box with holes drilled in the top) and an oven.

But, before you jump off and give vacuforming a try, there are a few things you need to know. First, you have to make sure your mold is high enough over the platen table so that wrinkles stay below the mold. This is accomplished by placing small blocks under the mold or mounting the mold on a dowel and sticking the dowel in a predrilled hole in the center of the platen. There is no magical height that works for every mold. I recommend you test mold a while to get a feel for it. Secondly, it is a good idea to use baby powder as a release agent between the mold and the finished work. It does not take much. A little dab'll do ya! And finally, do not overheat the plastic material you are using for the mold. It will pull too quickly creating thin walls and/or holes in the acetate. I recommend you take the material out of the oven as soon as it starts to sag.

Okay, here is the step by step procedure:

Carve a canopy mold to your liking and sand it as smooth as you can. I like to coat my molds with dope 7-10 times sanding between each coat to get a nice slick finish. Auto primer (in a spray can) works well to help fill pits and imperfections in the wood. It really shows the spots that need work. Wet sanding using 400 to 600 grit paper in between coats is the best method with auto primer. ***Important***: Give the dope and/or the primer a full day to cure before you mold anything.

Dust the mold with a small amount of baby power gently blowing the excess away. Place the mold in the center of the platen making sure it is at least 3/4" above the platen's surface. Preheat the oven to 375 degrees.



Clip the piece of acetate to a separate frame that has been cut to fit over the platen. I use the heavy duty black and chrome paper clips to hold the acetate in place. Use as many clips as you can. In the photo above, the smaller frame is for smaller canopies, and its use requires that you tape over the holes in the platten which would extend beyond the smaller frame so that you don't lose vacuum. Now place the frame in the oven on two coffee cups making sure the acetate has room to sag without touching the cups. (Ed. Note: Mike says he has an additional narrow balsa frame below and inboard of the clamps so that the frame will seal on the platten. However, he says that the suction is great enough that a perfect seal is really not necessary.)

Attach the shopvac to the platen ( I have and extra block of wood glued to the back of my platen with a hole drilled through the block and the back of the platen that matches the vacuum pipe diameter) and then secure the platen (with tape) to a chair, step ladder, hand rail or anything you can find that the wife will not brain you for using. Once the acetate begins to sag, turn the shopvac on and take the hot acetate out of the oven. You may need gloves because the frame will heat up a bit. My wood frame is only marginally warm so I am able to handle it without gloves. Now line yourself up over the platen and quickly, but accurately cover the platen with the hot acetate. Try to be as level as possible. If you are even halfway accurate during the molding process you will have a beautiful canopy in front of you. Just let it cool and then cut it free with a sharp #11 blade. Wipe out the baby power dust, trim the canopy to fit your fuselage and you are done. It's so simple (with close supervision) I let my 8 year old son do it for me now. He has gotten pretty good at it!

There are several ways to make canopies for stick and tissue model airplanes. Some people swear be folding and wrapping while others stand by the plunge molding technique. But for my money, vacuforming is by far the best and, in my opinion, the easiest way to make any canopy under the sun. Give it a try and I think you will agree making vacuformed canopies is child's play. Good luck –

OOS Mike