Excerpted from FRP Techniques

ARE YOU READY TO DO SOME COOKING?

The third reason why you should stay away from supposedly, "primered ready to paint" parts has to do with a little bit of resin chemistry and a very important process called, 'post curing'. Not being aware of this phenomenon can spell the difference between show quality paint and a botched job the customer refuses to pay for.

This all boils down to the fact that fiberglass shrinks as it cures. A laminate shrinks up to about 5% in all directions as it cures and there are TWO distinct cure cycles for FRP.

The first is the room temperature cure that occurs in the tool, when the catalyzed resin kicks off and the laminate hardens. The second and more important cure happens after the part is removed from the tool and subjected to a much higher temperature. This is the Post Cure. Post curing has a dramatic effect on the part (see PHOTO 11). As the temperature increases so to does the molecular activity and polymeriza-



PHOTO 11 Print Through

This picture shows the effects of a thorough Post Cure. The right side of this section of a BMW hood was cured in the sun for several hours, reaching a temperature of 180 degrees, while the left side was covered. The difference in surface textures is dramatic! Imagine what the surface finish would look like if the part post cures after its been painted.



PHOTO 10 Air Bubbles Remember Photo 1? Conscientiously rubbing the round shaft of a screwdriver over all the seams and edges of a part will break out any air bubbles that are just beneath the Gel Coat. This large air bubble was found on a part from a company that offers supposedly, "primered, ready to paint", parts. Imagine what this would have looked like if it broke after the bumper was painted. Ultimately this is the installers responsibility to check for any hidden flaws. It takes less than 5 minutes to carefully check even the most complex part.

> tion becomes complete with the ester molecules, (remember polyester resin), cross linking and forming a strong resin matrix.

> Under controlled conditions the temperature can be ramped up gradually, only 5-10 degress an hour until the upper limit is reached. The maximum temperature used during a post cure is refered to as the 'HDT, the heat distortion temperature. This figure is determined by the resin manufacturer, with a good HDT of about 200 degrees F for a quality polyester resin.

> Post curing will actually make a stronger part with better high temperature characteristics.

Also during the 'cooking' process the laminate is expanding as it heats up and volatile organic compounds are evaporated. The resin, which expands many more times than the glass reinforcement, when its heated pushes the fibers out toward the surface. The resin also is shrinking as it loses some bulk. Combine the two and you get 'print through'. PHOTO 11 That ripply surface appearance where you can plainly see the tex-

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ture of the material underneath. Either the random cross hatching of chopped strand fiberglass mat or the regular patterns of woven fabric like carbon cloth. This is also refered to as the surface profile. A high profile exhibits a lot of print through while a low profile surface is relatively smooth.

The thickness of the gel coat will help control print through. Gel coat is also a polyester based resin that has several uses. It protects the mold surface. It forms the smooth outer color layer of the part and it helps reduce print through. Gel coat is applied to a thickness of 20 mils or more. Compare that to regular paint which is sprayed on at only 2-3 mils.

During the normal process of lamination many small air bubbles are trapped in the resin/glass matrix. They are usually small, less than the size of a pin head but if they were at the outer surface it would be tedious to continually fill them in each time the surface is sanded and more are uncovered. The gel coat acts as a barrier layer preventing potential blisters and other surface defects from surfacing.



PHOTO 12 Mil. thickness gauge The coarse notches on the perimeter of the guage are used to measure the thickness of the applied Gel Coat.

If the gel coat is sanded and primered before the part is post cured the laminate will print right through the primer. The preparer will then have to resand with a coarse paper, something on the order of at least 80 grit and then its back to the beginning, refill the pinholes, reprimer etc, etc.



PHOTO 13 Cooking

This photograph shows a part being heated with a small heat lamp When possible it is always best to post cure parts in place on the car. This way as the heat releases any internal stress they conform to where they are held in place. Until parts have been thoroughly post cured they should all be considered prime candidates to exhibit nasty print through at any time the surface temperature gets hot enough. Even months and years later. Time is not always the answer. An elevated temperature post cure is. Skipping this step has caused more ruined paint jobs.

Now while the correct laboratory method of post curing is to slowly increase the temperature hour by hour that is not very practical in the real world. Fortunately you can achieve a very good post cure and induce print through as easily as letting the part cook outside in the sun or inside with the help of a heat lamp. Just follow these guidelines.

I always recommend cooking parts only after they have been installed on the car. It makes sense on many levels. Remember one of the first things that should be done after unpacking the box with the new part is to check that it is what was ordered and more importantly, that it will fit the car. There is no better way to do that than by actually bolting it in place. Instead of being more work, actually bolting parts on first not only is the correct way but it turns out to be a big time saver.

Take for example a pair of doors. Hinges have to installed and the shim packs determined. The latches, the

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door handles, and maybe the window frames need to be installed. That means the doors will probably be off and on several times while the hinges and shims are sorted out. Holes will have to be cut for the latches, some amount of grinding will be necessary to fit the frames and once the doors are on and latching the best way to even up the seam around the perimeter is to run a thin disc grinder around the outside, grinding the edge of the door to perfectly match the surrounding bodywork. It takes about an hour to hang a door for the first time and you certainly don't want to try all that experimentation on a fresh paint job.

When you first start to post-cure some parts try to moderate the temperature for the first hour or so to something that you can just keep your hand on. Make sure all the surfaces get cooked and periodically check the surface profile in the surface reflections to monitor the post curing.

SURPRISE, POP QUIZ

Quick, what are the correct steps to take a part from out of the box to finish paint? Don't worry, this is an open book test so let's review.

1. Carefully unpack the box and check for any damage from shipping. If a box arrives and it looks like its been really crunched it might be best to refuse delivery. If the part has been damaged in shipping then some companies expect the customer to file a claim with the shipping company and those are very hard to collect on. Make sure to write on the freight bill that the package has been damaged.

2. Ensure that what you ordered is what has been sent.

3. Make sure it fits your car. That means bolting it in place, making all the shim adjustments just as if it was going on for the final time.

4. Post cure the part , in place, on the car if possible.

5. Check the edges and the seams for voids. Carefully examine all the surfaces to determine how much sanding will be needed.

6. Sand and prep as needed, prior to primering. We recommend FIRST sanding the entire outer surface of the part with at least #80 grit paper. This will cut through the 'printing', level surface imperfections and provide a good surface for the primer to stick to.

7. Apply a nice even coat of a high quality catalysed primer. After the primer drys go over the surface looking for small imperfections or pin holes. If the gel coat was sanded off in spots chances are there will be a lot of pin holes that the primer won't fill. Now is the time to fill these in using a small amount of filler and a razor blade as a squeegee. It only takes a few minutes and you want to do it first before any sanding dust gets in and obscures the holes.

8. Next resand and re primer as needed. Check and fill any pin holes one more time.

9. Paint.