

Using glass cloth and epoxy as a surface finish on large models is the choice of the majority of large model builders. It has many benefits over the more conventional finishing systems, firstly, the large amount of strength it gives the airframe, not only to withstand flight loads, but also the dreaded 'hanger rash'. As we all know to our cost, larger models are harder to move and transport around, and the odd scrape is inevitable. Secondly, the tough smooth surface finish is ideal when we want to represent a smooth metal skinned airplane, the smooth finish will also readily accept all kinds of added surface details, including rivets, panel lines and hatches. Lastly, glass and epoxy should be no heavier than a more traditional fabric and dope finish is carried out properly.

Many articles have been written in the modelling press about 'How to' glass skin an airframe, some good, some bad, some just too complicated! If this is your first attempt at glassing, please get rid of any ideas or horror stories your club mates may have told you, this process really is easy, and not that time consuming once you have an airframe or two behind you.

The key to a good final result is good preparation of the airframe, a clean tidy work place to do the job, and the right product to apply to your model. I'll mention the products to use first and get to the preparation etc....later. If this is your first attempt, I would seriously recommend that you use a cloth/resin system that gives known results. Don't be tempted to go down to your local car repair shop and buy some surface tissue and resin. These are industrial products, and not really suitable for use on lightweight models, believe me. I did this the first time round, and paid the price, having to use a Wolf power sander to remove excess resin and get a usable smooth lightweight finish.

The Products - The resin system I recommend is the 'L285 Epoxy Skinning Resin' available from Fighteraces. This resin offers numerous advantages over several other 'modelling' resins available from your local shop. Firstly.....this resin requires no additional thinning and will work and wet out the cloth very easily, even in cool workshop temperatures. Secondly, when cured, it does not produce the wax residue so many other resins do.....this makes application of the 2nd coat, as well as primers and paints much easier. Thirdly.....this resin cures VERY hard making rubbing down easy producing a fine dust unlike other resins which cure slightly rubbery, causing clogging of abrasive papers.



Several makes & weights of cloth are available, but the 2 we recommend are 25g sq/m and 48g/sq m, both available by the meter from Fighteraces. The lighter 25g cloth is more commonly used on smaller model, up to around 70" wingspan. The heavier 48g cloth is the cloth of choice for all larger models giving a slightly tougher surface finish for a very minimal

weight gain. This is the cloth we use on the majority of all of our 'Customer Build' projects, including the giant 180" span Douglas Skyraider completed back in 2008.



The other 'must have' items that you'll need for the job are...

- A good supply of mixing vessels, the plastic 60ml graduated mixing cups from Fighteraces are useful, as all resins require careful 'ratio' mixing.
- Mixing sticks, the wooden spatulas again from Fighteraces are ideal.
- Latex type gloves as epoxy can be nasty stuff, especially the catalysts, so it's best to avoid skin contact.
- Paint brushes (about 1/2" - 1" wide is best) ...but don't bother buying expensive ones, cheap ones from your local DIY store will be fine as epoxy tends to kill brushes & once the model is skinned, the brush will often be thrown away.
- Acetone for brush cleaning
- A facemask for use when rubbing down. Epoxy and glass fibre dust is not good for the lungs....hence after the initial course 'dry' rub down, fine rubbing down is best performed with wet and dry paper used wet.

Preparation - As I mentioned earlier, preparation, both of the airframe and in the workshop is the key to a good final result. First off, the airframe **MUST** be smooth, any small gaps and knocks must be filled, wing skins must be flat and free of steps between sheets etc. If the airframe is not flat, once the model is glassed, you will not be able to sand these imperfections away or you'll go through the glass, the only way to even out the surface will be with filler, this is both time consuming, and can add a lot of unwanted weight.

To prepare the workshop, simple **TIDY UP !!**, put as much stuff away as possible to leave a large enough area to work in with only the bits and pieces you need to hand. It's a good idea to Hoover your work bench too, any small bits of wood bust/chippings etc.....that get under the glass cloth will dry in place and require work to remove them later on.

Getting Started - I'd always recommend you start on some smaller pieces first; tail planes, elevators etc.....are a good starting point if this is your first attempt. It is also perfectly acceptable to skin individual components prior to final assembly. Skinning a tail plane and fin can be made a lot easier if the fuselage isn't attached. Attaching them later, leaving yourself just the joining filllets to do is fine, epoxy can be used here to bond everything firmly in place with no fear of it parting company later on in it's life due to a poor joint. Always skin control surfaces prior to gluing the hinges as well, life can get very fiddly if you don't.

Always glass one side at a time, never try and do one side, then wrap the cloth round a tight radius (Leading or trailing edge). Even though the cloth is very thin, once wetted out, it becomes quite stiff, and will not accept tight radii. For instance, when skinning a rudder, do one side at a time, and the epoxy will soak into the wood at the thin trailing edge and harden it, therefore, there is no need to try and get the cloth around the tight trailing edge. For wings

and tails, wrap the cloth just over half way around the leading edge and stop. Once cured, repeat on the reverse side, once complete, the centre of the leading edge will actually have two layers of cloth on it.

Once you have the airframe finished and you're happy with the surface finish, it's a good idea to support the model off the board whilst you apply the cloth. I always try and produce a blue foam cradle for the fuselage; this can also be a useful flying field aid for assembling the model as well. For wings and smaller parts, raise the part of the board using foam blocks, the last thing we want is to damage the model on the board half way through the glassing process. Next comes cloth cutting. Don't try and be too exact here, it's best to leave about 1 inch of excess all the way round the part, this will give you enough to get hold of to pull any creases out when applying the epoxy.

When mixing the resin, don't be tempted to mix one big batch that you think will be enough to complete the whole job in 1 go. This process doesn't use as much resin as you think; chances are you'll end up with some left over which will just go to waste. Once mixed, always decant the mixed resin out into a container with as large a surface area as possible to create a pool of resin of minimum depth. A deep pot of resin with minimal surface area can start to generate a lot of heat and speed up the cure.....if the resin is spread out with plenty of surface area, this heat build up does not happen and the working pot life of the resin will be extended considerably. Only mix small quantities of resin at a time. If you run out part way through, simply mix some more; the area you've already done won't have started to cure as the L285 resin has a long working pot life of at least 45 minutes

As mentioned earlier, epoxy resins require accurate ratio mixes; this must be achieved for the resin to cure correctly. Don't be tempted to add a little more than the recommended amount of catalyst to speed up the cure time; epoxy doesn't work like that (its polyester resin that does). The resin will not cure correctly, leaving you with a slightly rubbery mess that's impossible to rub down to a nice smooth finish. L285 resin required mixing by weight, so if you have a set of digital kitchen scales that will measure down to 1g, use them. Once measured and thoroughly mixed, the resin will be full of tiny air bubbles, once decanted out into a flat container, it's a good idea to let the pot stand for a few minutes to let the bubbles rise to the surface and dissipate, this just produces a smoother mix that's better to work with.

Applying the resin - The purpose of the first coat of resin is simply to wet the cloth out & stick it to the airframe, nothing more. With the cloth laid out over the part to be skinned and smoother out by hand (lightly rubbing the cloth to build up a little static helps to stick it to the surface), pour a SMALL puddle of resin onto the surface in the centre of the part. The next bit sounds crazy, but it works a treat. Using a small rubber pad as a squeegee, (3M Stopper Rubbers available from Fighteraces) scrape the resin out over the part from the centre outwards. Why a rubber squeegee?...well, it's flexible enough to bend to the contour of the surface its running over, and it has nice smooth edges that won't dig into the cloth, ideal!!



Keep scraping the resin over the surface until the cloth is wetted out and goes translucent. If you have an area that is glossy, then there is too much resin there (keep scraping until it's gone). If an area is slightly white, then it's not wetted enough and more resin is required. What we're looking for is a finish that is smooth and satin in appearance; this is the sign that we have just the right amount of resin to stick the cloth to the model. Glossy means too much resin, too much weight, and a lot more rubbing down later. When it comes to corners etc, it's best to use your paint brush to apply the resin, and stipple the cloth round the edge in the same sort of way as you would apply tissue and dope. With the part at this stage, leave it alone to cure for at least 24 hours before carrying on to the next stage.



Second coat - Once the resin is thoroughly cured, the excess over hanging cloth can be trimmed off. I have found the easiest way to do this is using course grade abrasive paper to run along the edge of the surface, removing the cloth where the resin finishes. This also serves the purpose of feathering the edge slightly ready for the cloth on the other side to overlap slightly. The glassed surface can also be rubbed back very slightly at this point. Don't try and get it super smooth yet, just knock off any high or rough spots. Use a good quality course paper for this (I find 80 grit aluminium oxide paper ideal) preferably on a sanding block as any flat surface deserves to be block sanded.

With this is done, continue skinning the other side / half / top / bottom until the airframe is completely skinned and rubbed back as described. We are now ready to apply the second coat of resin, the purpose of which is to fill the weave of the cloth, so giving us a surface to rub down to. We only want enough resin to rub down to a smooth finish, too much will mean more time spent rubbing down and probably too much weight, too little will mean we rub down into the cloth below before we get a smooth enough finish. This coat can be applied in two ways; squeegee'd on like the first coat, or brushed on. The brushing option (as I do myself) must be done carefully though so as not to apply too much resin.....remember, fill the weave and no more.



This is the time to coat any exposed areas of un-skinned wood as well, engine bays, wheel wells, fuel tank bays etc.

Rub Down and Finishing - With the resin thoroughly cured, take your 80-grit paper, and remove the shine from the surface, pay particular attention to any uneven overlaps, lump and bumps. Having a single point light source is handy here to pick up on any areas that need work. Once the bulk of the work is done dry, use 'Wet and Dry' (used wet) to get down to a smooth surface, remembering to wear a mask all the time. Warm water with a little washing up liquid in it help as well. 120 grit paper is all that is required at this stage, there is no need to go any finer for now. Once the complete model has been rubbed down with 80 then 120 and all obvious imperfections have been flattened back, the surface is ready for the initial primer coat.

Primer coats - A coat of primer is now required to highlight any small imperfections in the surface prior to final finishing. A 'High Build' primer is preferable...my choice being an automotive cellulose type applied with a mini spray gun & compressor. If you do not have access to full spraying equipment, the filler primers in aerosol format from the likes of Halfords are also ideal for this purpose. With a reasonable coat applied over the entire model, inspect the surface for further defects. Small imperfection, dents, pinholes and deeper scratched can be filled with a surface putty such as 3M Acryl Red (also available from Fighteraces)



This is an acrylic putty intended for filling small imperfections rather than larger/deeper defects and is very easy to rub down to a smooth finish. For larger problem areas (with a depth of anything over about 1mm) an automotive body filler such as Isopon P38 is preferable. With the filling done, the entire surface can be rubbed down, removing the majority of the primer. All we want is for the remaining primer & filler to be sitting in any low spots and small imperfections. The 2nd rub down can also be carried out with 120 grit wet & dry used wet. Again, use a block on any flat areas wherever possible.



With the models rubbed down, and all imperfections filled, a second primer coat can be applied. This one doesn't need to be a 'filler' primer; a normal 'grey' will do fine. This coat can be a little heavier, as we want to cover all of the exposed glass and the filler primer/coloured fillers, to give a nice even base coat over which to apply the colour coats. Leave this coat to harden thoroughly over night, as we don't want to damage soft paint. This 2nd primer coat can now be flatted back with 4/600 grade wet & dry to leave a surface ready for detailing and/or final colour application.