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WHEEL PANTS / WING TIPS

All items from Wicks Aircraft Supply...

Item # F100-040, Polyurethane Foam 1 sheet
List Price \$42.48 (Quantity Discount Available)

Item # B23/500-G, Micro Balloons 1 bag
List Price \$11.04 (Quantity Discount Available)

Item # RA5277, Bid Fiberglass RA5277 about 6 yds
List Price \$8.15 (Quantity Discount Available)

Item # 105-B, 105 Epoxy Resin
List Price \$99.73

Item # 205-B, 205 Fast Hardener
List Price \$47.44

Item # 300, 300 Mini Pump Set
List Price \$16.16

Item # 150-WPS-1, Disposable Brushes
List Price \$0.48 (Quantity Discount Available)

Tongue Depressors. Probably a hundred

Disposable gloves a box will do

Disposable non wax cups....I use cleaned plastic butter containers.

Tools. Old butcher knife, a sureform plane is nice but an old cheese grater works also, 36 grit sandpaper....not much sandpaper is needed. A hot glue gun is a must. And remember, hot glue is not warm.

Please do not make this rocket science. I have done these on my Long Eze and my Jet Eze and a One Design. These wheel pants will get you 7 to 12 knots speed increase over no pants on average.

Level your plane in all 3 axis, plus 1.5 to 2.0 degrees nose up.....this would be the normal pitch attitude in flight. Glue it to the floor so it can't move.

General aerodynamic rule is 4 to 1. So a 1 inch wide something requires a 4 inch long fairing so the Air does do see it. Measure your wheel and brake width. Times 4. This is how long your wheel pants need to be to be aerodynamic. Remember to think like an air molecule.

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About 25% of your tire should be out the bottom of the pant. Any less will cause you to leave part of the wheel pant bottom on the hangar floor track when you roll across it..ask me how I know.

It will be easier for the first timer to start rather 2 dimensional with this. Draw a full scale side view of your desired wheel pant and a top view. A rounded nose will work better in all respects. The thickest point of the wheel pant should be in the middle of the pant, this is where your wheel will be. Draw a line with a magic marker from the center of the nose of the pant to the center trailing edge. This is your level line.

I prefer to use 2" thick foam for this. Use your side view drawing as a template and cut enough pieces to make the thickness you need plus a little. You can cut the foam with a butcher knife or a hacksaw blade. I use a band saw. For the piece going over your wheel cut a hole for the tire so you can slide the pieces in place. Put "something, anything" .25" thick on top of your tire top center. Hot glue it in place. This is your go no further point. You want .25" minimum between your tire and inside bottom of your wheel pant to avoid tire rub or a slightly different tire size (think the difference between Goodyear and Brand X). .75" on the sides of the tire.

Now put your center piece of foam in place, the piece over the tire. You should have a rather round hole cut in this piece to match your tire. The line on the side of the pant needs to be 0 degrees for level to your normal flight attitude. Hot glue it in place by using scrap blocks at the front and rear of the foam at the tire. Glue to the tire, foam and floor. Now put the pieces in place either side of this center piece in the same way also checking their 0 degree line. Dish out the foam to clear the tire and brake with a wire brush, sureform, sandpaper or what ever you want. Only put glue on the bottom of the foam blocks attaching them to scraps and the floor and as close to the tire as possible on the foam around the perimeter of the tire. If you put glue further out on the foam block it will be a bear to sand thru. Also cut foam out so your gear leg strut can pass thru.

So now you you have a rather large mass of foam rounded at the nose and trailing edge, when viewed from the side. Lay your top view template on top and draw around it using a magic marker a bit outside the template. Leave some to sand off. Now cut off the parts outside the lines when viewed from above using a butcher knife. When you get close go to the sureform file then 36 grit sandpaper. Don't worry about the joint at the gear strut right now. Just make it a good fit. .25 will work out fine. You will see why later.

Once you have the shape you desire draw a line vertically near the back 1/3 of the tire all the way around the wheel pant. This is where you will take the wheel pant apart to get it off and back on when you get finished. Sand a slot 2.5" wide on this line and about .15" deep. Round the edges of this slot so it's a gentle slope from the side of the pant to the slot you have made. It is important to note bumps (glue or foam) will not be acceptable. You can fill and sand dips in the glass later and make it smooth, not so much with bumps. Say no to bumps. Re draw your dark magic marker line in the center of the slot again.

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You will need to put on 3 plies (layers) of Bi Directional cloth. Cut this on a 45 degree line to the edge of the cloth. You will notice the fibers in the cloth run in 2 directions, hence bi-directional. As viewed from above the pant facing rear, these fibers should run 45 degrees to the centerline of the pant the centerline being nose center to trailing edge center. Cut off the salvage edge of the cloth. This stuff will go around corners really well so cut 3 pieces long and wide enough to cover from the back edge of your slot to the front of the wheel pant and 3 pieces long and wide enough to go from the front of the slot all the way to the back of the wheel pant.....so yes, they overlap in the slot, hence the reason it's cut deeper. It will end up with a total of 6 plies in the slot. You will need this thickness later.

Fiberglass time. WEAR GLOVES!!! If you use the epoxy pumps start with three full shots each of resin and harder. Mix for a couple minutes. Use a scoop and put micro balloons in this. You are looking for the consistency of thin honey (this is called micro slurry). This gets brushed onto from into the slot forward using a 1" brush. Lay on your first ply from the back edge of the slot all the way around to the front. Cut off what you do not need and a 1" overlap onto itself is desired on the front bottom of the pant. Use straight epoxy, no micro added, to wet out this cloth. The micro gives the adhesion from the cloth to the foam. This is bad glass to glass. So when you will be putting glass over something glass, no micro just epoxy. Wet out means no white flecks of cloth showing. The surface should look dull not shiney.

Now glass the back part from the front of the slot to the trailing end the same way except only use straight epoxy on the slot.....micro slurry on the foam for the back part. Next ply goes from the back of the slot to the nose using only epoxy, you are finished with the micro. Then from the front of the slot aft, repeat. One wheel pant glassed. Give it 2 days at 74 degrees to cure nicely.

Cured glass is what we call lethal. Tiny, sometimes not tiny shards of cured glass just looking to nail you. So I suggest de-lethalizing it with 36 grit sand paper especially along any edges before you try the next step unless you have some blood you want to offer as a sacrifice. It's your blood. Oh yea, it hurts.

Draw a line around your tire about .5" away to mark the tire opening on the bottom of the pant. Take a hacksaw blade and cut along your dark line so you have a front and back parts of the pant. Cut thru the glass and foam. You might want to stop at the tire and brake. Pull the parts apart. Make a nice tire hole opening, give yourself at least .5" around the tire. Clean out ALL the foam from inside the parts. Sand the inside of the pant with 36 grit.

Lay up 4 plies where your strut will pass thru out 3 inches. Also glass 2 plies around the inside of your tire opening. Let cure.

Re assemble your wheel pants off the airplane. Use tongue depressors and hot glue on the outside of the pant to hold the parts together. Cut glass 2" wide and enough for 3 plies to go from the bottom of the pant, along the inside of it to the bottom again along your cut line. Put 2 plies of duct tape (using it as a release agent) on the back part of the pant along your cut line inside the pant. Lay up 3 plies on the tape

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and laying across to the front part on the glass on a 45 degree cloth cut. Always cut your bid on a 45. When this cures the glass you just laid up will be attached to the front part permanently and with a pudgy knife pry glass away from the tape and you will release the back part. After cure trim the resulting flange to 1 inch wide and de-lethalize.

Put the two parts together and mark where you want screws to hold the parts together. Drill and cleco the parts together. Install nut plates on the flange. During all the plies you have installed enough depth to use counter sunk rivets and screws. I would think 5 or 6 would be enough. Drill a hole in the pant where you need the bolt for the wheel pant to be attached to the axle. Local reinforcement inside the pant of 3 plies would be enough.

You have wheel pants.....probably not smooth, but we will cover this later.

Wing tips. Hot glue foam to the wing. Remember the nose is up 1.5 to 2 degrees. The outboard centerline of the tip needs to be 0. Draw a line on the outboard edge and sand to a pleasing shape using this line as center. Personally I would glass these using 4 plys of bid.....they will get hit. Your outboard edge line is a good reference to lay the cloth across it on a 45 degree line. Above all you do not want the fibers running straight fore and aft.

After removal remove the foam and sand the edges inside the tip with 36 grit. Lay up 2 more plies 2" wide all the way around the inside edge. Now you can do your aluminum voodoo to make attachments inside the tip to skin.

Making pretty:

Sand the entire outside of all parts with 80 grit. Put on a LIGHT coat of straight epoxy. I suggest using a squeegee for this, it keeps you from using so much material. Then mix micro. Mix epoxy and micro until you reach a consistency of very thick peanut butter. Using your squeegee spread the micro over the entire surface no deeper than .1 inch. 99% of this will end up on the floor anyway. When you are sanding and you reach glass, stop sanding. Use 80 grit to start then go to 180 once you break the surface. If the low points are really deep, add more micro by wetting the area first then applying micro as above, re sand.

Now, using PPG K38 primer, roll on 3 coats of primer. 90% of this will end up on the floor. Sand this with 100 grit to break the surface then 180 to finish. If you have low spots you can use glazing compound then reprime using a sprayer. Sand these 3 coats with 180 to break the surface then 240 or 320 to finish. Do not go higher than 320 or your paint will not stick.

Try the pants and tips back on for size and admire your work. Notice the joint between the pants and strut? You need a cuff. Get the duct tape back out and tape the top of the pant. Put foam on it with hot

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glue and sand to a pleasing shape. Glass with 4 plies at least....I use 6 plies step graduating down from the strut as to not have a abrupt bump on the strut.

Once cured remove the wheel pant and the cuff will stay on the strut. Remember the extra plies I had you put where the strut goes thru the pant? Put nutplates there. Fill and sand and prime the cuff and you are done.

When viewed from the front the tire will not appear to be in the middle of the pant, it's not. But the Air will think it is an this is what is important.

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