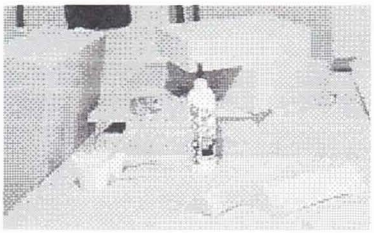
Cheap Tricks

A Collection of Things I have found to Keep Costs to a Minimum

Foam

Man, I hate buying urethane foam. I know that it sands well, and it cuts easy, and all that crap, but I always feel like I'm getting ripped off. The stuff is light and starts to fall apart when you touch it (that's why it's so good for building airplanes.) But the price of the stuff is unbelievable. Wick's sells a piece of 2"x48"x120" foam for almost $70. Then you will pay another $60 just to get it on the back of a truck. If you do the math it comes out to almost $10 a pound !

So, I got thinking about things. The "urethane" foam that Wicks and Aircraft Spruce sells is actually a cyanurate (polyurethane) foam. Years ago it was used extensively in the building industry for insulation. Well as times change, products have to change as well. Today, virtually nobody uses this type of foam anymore. The newer and improved foam is polyisocyanurate. The largest manufacturer of this is Dow Chemical. They sell it as a product called Trymer. It is available as Trymer 1600, 1800, and 2000, in densities of 1.6, 1.8, and 2.0 lbs/ft^3. Heavier densities are available as well. The stuff you want is the Trymer 2000, which also happens to be the easiest to come by.



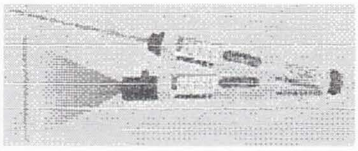
The brown stuff in the photo above is the standard urethane and the pink stuff is the Trymer 2000. That big block on the left is standing on the floor and leaning on the table, I think it cost me $1.50.

So why is this stuff so good? Several reasons. First of all it has better properties for fiberglassing than the standard polyurethane foam including a slightly smaller cell size. This means that you will use a little bit less micro to fill the cells before you apply the fiberglass (less weight). Additionally, the compressive strength of this foam is improved (23 psi). Now the best thing of all you can find it locally, and if you deal a bit, the stuff is dirt cheap. I found a local insulation company that buys this in bunstock (2'x4'x8') and then saws it down to dimensions that they commonly use in the insulation business. A couple of things happen when they saw it up. First, they cut off the nasty outside layer. This means they have a 2"x4'x8' piece with a rough face that they are going to throw away. My local company will sell these pieces for next to nothing, and they are glad to have them gone. That rough face can be sanded off in about 2 minutes. But, they also have odd sized, big-ass blocks laying around which are the left overs from custom cuts. These they will part with very reasonably. For custom cuts they charge me $0.65 per board foot and for standard cuts $0.50. That's not bad, and the shipping consists of tossing it in the back of the truck and hauling it home. My last load filled the back of the truck, and it cost me $28.00.

I don't recommend this, but if you go to http://www.extolohio.com/MSDS/Dow-Chemical/try2000.html you will find the Material Data Safety Sheet. In the middle of the MSDS they mention that this material can be hotwire cut, but that it must be done in a well ventilated area, and not to breath the fumes. Myself, I won't do it. Don't need to since the stuff sands so well. I get an excellent result without having to worry about the fumes.

The ProBond that you also see in the picture is very useful for attaching the foam to wooden structures, but be careful - don't let the glue line extend into an area that you intend to sand. The hardened glue is much harder than the foam, and therefore creates a ridge when sanding. This is a polyurethane-based adhesive which is activated by water. I found that by adding a little water to the glue in a small cup starts the curing process, this also makes the glue foam up a bit and applies easier to the foam. It also cures much faster this way.

Lasers



This is one of the slickest little things I picked up for working on the airplane. I clamp it to an old camera tripod so that I can easily adjust it. This Laser shoots the regular line (dot) but also comes with a beam spreader which makes a straight line. In fact the line is accurate to 1mm every 10m. It has, built into the top a small bubble level. I don't find this all that useful, rather I use internal references for the line. For example; if I want to draw an absolutely straight line (such as the centerline for the fuselage) I make two marks on the table and then align the laser such that the beam hits both lines. I then make several (10-12) marks along the laser line and connect with a straight edge.

For all of you banana boat builders - Easy way to mark the level line along the entire length of the fuse. Works good for spars, tail - you name it . The thing costs roughly $50 which a lot cheaper than the rotary type lasers. The only downside is that it isn't all that bright when you are trying to make long lines. Several times I have found it necessary to dim the lights to see things. A big-time rotary laser such as the kind that contractors use to hang ceilings etc. can be rented for a day or two inexpensively. These are very helpful for mounting the tail sections and wings.

Syringes

What else would you expect I use? I mix all of my epoxy with a syringe. I use a 60 ml Toomi (catheter type) syringe for the resin and a 20 ml syringe for the hardener. Since the ratio is 3:1 by volume, I can easily adjust the amount that I am preparing. This is much easier than trying to pour the right amount of resin into a cup sitting on the scale. I just happen to know of a place that will sell you these things cheaper then anywhere else. Go to Trailing Edge Technologies

Wrecked Airplanes

I put something about this on KRNet several months ago about this. I still think it is a good idea, and so I will put a copy of part of that posting here.

One of the things that I strongly considered (and still am) is buying a wrecked cert plane. I wanted one that had been flipped in a wind storm or damaged by some other disaster that happened while the engine wasn't running (no prop strike.) This way, with a little work, you get the engine and all of the accessories, plus the instruments and avionics for not a lot of money. Example; a couple of months ago I bid on a wrecked 150 with a O-200 that was damaged by a tornado - airframe was totaled. I lost the bid, but I called the guy who won it, and asked him what he paid (why not?) It turned out that he got the whole thing for $3200 ($150 more than what I bid.) So, you take the parts you want, sell the parts you don't (but that are undamaged) and turn the rest of it into scrap aluminum. - I bet you have less than $2000 into a complete engine and most of the panel! Even if you had to pay $5000, it would still be a deal. One of the guys in my EAA chapter bought a wrecked Long-EZ with a O-235 with less than 100 hours TSMO and a beautiful IFR dash for $2000. Think about all of the parts on a certified airplane that you could use - holy man! I'm not just talking about the dash and engine. Bolts, nuts, switches, wiring, hinges, fuel lines, lights, antennas, push rod ends, etc, etc, etc. And the stuff you don't need - sell it! It will help pay for the parts you do need. Things like props, spinners, tires, brakes, motor mounts, control surfaces, seats - they bring a fairly good dollar, 'cause all of the certified guys need them. Do you know what scrap aluminum is selling for - check it out. I did, and found that I could pay to have the airplane shipped to me for what I could get for the aluminum alone.

Tools

I Have been asked more than once "what tools do you recommend." Well here is a list of the best ones and why.

1. Delta combination Disc and Belt Sander. This thing is great, worth 3 times what you pay for it. When it comes to getting all of those little gussets just right - it's perfect. I have also used it to scarf plywood, angle spars, fine tune a dimension, fine tune an angle, finish my sawn aluminum edges, and remove huge quantities of foam in a very short time, just to name a few things. Best tool I ever bought. When it dies, I'll buy another exactly like it.

2. Flush Cut Saw. This is like the saw that Mike Mims describes on his web page. Very handy little tool, especially when it comes to cutting foam.

3. Band Saw. Mine is a cheap one, but it gets the job done. I have cut more than a little wood and a lot of aluminum with this. (When cutting aluminum, make sure you keep the inside of the saw clean.) Can't beat it for cutting out templates (in wood or aluminum.)

4. Palm Sander. Mine is a DeWalt. Despite the torture that I have tried to inflict on this tool it just keeps on working. It's amazing. The nice thing about the palm sander is that it is light weight. You can sand with it for a long time - your brain goes numb before your hands do. It's also small enough that it gets into areas that a full sized random orbit sander won't go.

5. Calipers. Come on, it's an airplane, the least that you can do is try to build it as accurately as possible.

Along with this is a Compass. These are cheap to say the least, and they are useful for more than making circles. I set a dimension as best I can against the ruler and then mark the dimension from a center line. You can't get better symmetry.

6. Shop Vac. Get a good one. The amount of saw dust, and especially the foam dust will amaze you.

7. Power Miter Saw. A compound saw is even better, but more expensive. This just plain makes life easier. All of those gussets have to be cut somehow, not to mention all of the uprights, etc.

8. Table Saw and Drill Press. If you don't have them, don't rush out to get them. There are a few times that the table saw is really needed, but if you have a friend with one, you can probably get by. The same thing holds true for the drill press.

9. Dremel Tool. Can't build an airplane without one. I am always cutting or grinding on something with this. For $50, how can you go wrong.

10. Clamps. God ain't made enough clamps yet. There is no such thing as too many. One of the best I found was these little clamps sold at Home Depot. They are spring-type clamps made by Woldcroft (?) They cost me about $1.50 each - so I have about 16 of them. They will open a full 2 inches and the jaws are adjustable - which works nice with not perfectly flat surfaces. I also have a large assortment of C-clamps and other things - all of which I have used more than once.

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