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APOGEE

PEAK OF FLIGHT

NEWSLETTER

Adhesives for Skill Level 5 Kits

By Tim Van Milligan

Since I've been working on the Saturn project, I've been doing a lot of building -- mostly trying to work out the techniques that are unique to these two awesome kits. In this article, I thought I'd talk about some of the adhesives that I've been using. For such complex rockets as these, you'll want to use the right adhesives for the types of materials being joined.

First, let me say something about epoxy. Most folks use it because they are looking for very very very strong rockets. But those of us that have crashed more rockets than others know that it is impossible to build a rocket that is indestructible. So some of the things that I'll be talking about in this article my pluck you objectionably. I can hear the comments now: "why don't you just use epoxy..."

There is a place in rocketry for epoxy. But I think it is vastly over-used and most often, it is used for the wrong conditions. My favorite epoxy adhesive is the epoxy-clay that I sell at:
http://www.apogeerockets.com/construction_supplies.asp

Suffice it to say that you won't find epoxy listed as one of the required building materials for the Saturn V or the Saturn 1B kits. These models are superbly engineered, so in my opinion, you won't need epoxy, nor the extra weight that comes as a penalty of using it. Even the epoxy-clay that I sell through Apogee Components won't be needed in these kits.

The first glue that I'll mention is CyA. This is an abbreviation for Cyanoacrylate ester adhesive. You may know it by its common name of "super glue." You know; the kind that glues fingers together instantly.

I don't use "thick" or "medium" viscosity CyA adhesives. These types of adhesives are great for when you have gaps between the mating surfaces of the parts being joined. But since these are Skill Level 5 kits, I have to assume that the modeler possesses the necessary building skills needed. Such as being able to sand down parts adequately so that there are no gaps -- hence, no need for gap filling glues.

I don't even own a bottle of high viscosity CyA glue. I use the "water-thin" variety for everything. Since the surfaces mate tight, it only takes a small drop of CyA to bond the parts together. So, not only do I save weight, but I save money too. The reason is that a little bottle of CyA glue lasts me a very long time.

But there is one location where I can really go through a lot of thin CyA. That is stiffening up paper transition sections. After I have the transition mated on the rocket, I'll smear thin CyA over the paper. The thin variety will wick into the fibers easily. Any glue that doesn't wick into the paper I'll quickly wipe off with a paper towel. After the glue cures, I'll end up with a very strong, stiff, and lightweight part. A little surface sanding, and it is ready for a coat of paint primer.

But my favorite adhesive of all is regular "wood glue" (Aliphatic Resin). When gluing wood products together (including paper), it is superior to even epoxy. I use it for anything wood-to-wood, or paper-to-paper. So it gets used for things like gluing centering rings inside body tubes, and bonding in tube couplers.

Only when I have plastic parts mated to paper parts do I switch to CyA adhesive. This includes things like vacuum form wraps that go around the perimeter of the rocket.

I know a lot of people like to bond vacuum form wraps with 3M's Spray 77 adhesive, but I think the stuff is messy. It also doesn't permanently stick the wraps down, so usually you end up wicking CyA along the edges anyway. Since the wraps are purely decorative (not a structural item), it doesn't matter that the whole piece be bonded tight to the tube. Bonding just along the edges will be sufficient.

Attaching the wraps is tricky; which is one of the many reasons these will be Skill Level 5 kits. It is tricky because the plastic wraps are very thin. You have to be careful not to use too much CyA glue. If you do, you could easily melt the thin plastic.

I always try to remind people about glue this way: "Glue

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is not like ice cream. When eating ice cream, the more you have, the more you feel satisfied. Glue is just the opposite -- a little bit is better than a lot."

There is a place for spray adhesives though. The kits will contain an embossed paper wrap. This wrap gives texture to the transition section behind the Service Module. This outer transition fits over the top of a structural transition piece. As I mentioned before, the paper transition underneath will be saturated with the thin CyA adhesive. As such, I no longer consider it a paper product. It is a composite material. So to affix the embossed paper wrap to the transition, I'll recommend using the 3M Spray 77 adhesive.

I won't be recommending that the embossed paper wrap be soaked with the thin CyA. Because if you put too much on, and it decides to kick-off (cure instantly) before you can wipe off the excess, you'll have a hard gloppy looking part. You probably won't be able to sand off the glop without ruining the raised detail on the wrap.

Rubber cement is another type of adhesive you'll need to build the models. Rubber cement has nearly zero strength, but it has some unique properties that make it useful in tacking parts in the proper location. If you screw it up, you can rub off the rubber cement with your finger, and easily start over.

The final type of adhesive you'll need for the Saturn kits is plastic model cement. This is used to glue styrene-to-styrene parts. The escape tower on the kit, as well as the display nozzles will be glued together using this type of glue.

Again, I like the water-thin variety of plastic model cement. I'd avoid the Testors' tube type plastic cement. It is stringy, and the excess glue oozes out between the parts. You can't wipe off the excess without marring the surface.

With the water-thin variety, you put the parts together, and then allow the glue to wick into the joint. So a little bit of adhesive will go a long way.

In conclusion, the kits are designed to be light and very strong. But that is only possible if you use the right glues in the situations where they each work best. And I use this philosophy on glues pretty much universally; even rockets that aren't works of art.

About the Author:

Tim Van Milligan is the owner of Apogee Components (http://www.apogeerockets.com) and the curator of the rocketry education web site: http://www.apogeerockets.com/education. He is also the author of the books: "*Model Rocket Design and Construction*," "*69 Simple Science Fair Projects with Model Rockets: Aeronautics*" and publisher of the FREE e-zine newsletter about model rockets. You can subscribe to the e-zine at the Apogee Components web site, or sending an email to: ezine@apogeerockets.com with "SUBSCRIBE" as the subject line of the message.

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