Ply Schedules

Saturday, February 04, 2023 2:45 AM

KS5c Body

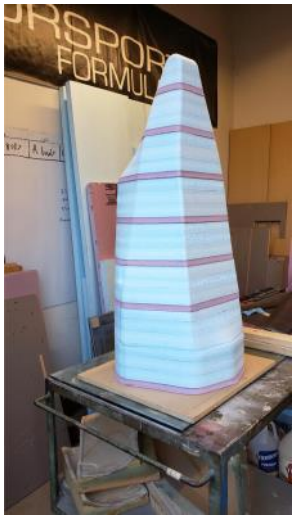
Thursday, September 24, 2020 3:41 PM

Lead by: Evan Wangenheim
Assisted by: Andrew Thomas

Introduction
This page will follow the progress of the KS5c Body and serve as a record and learning tool for the team. The KS5c body was designed to be as close to one piece as possible. It includes the nose, the top of the car, and some of the sides. The design was done with surface modeling around the frame and components of the car. The mold was decided to be made from insulation foam paneling. This mold will end up being very large, and if it was made from MDF, it would weigh around 200lbs. And I don't think you want to be lugging around a 200lb mold. It could also be done as two negative mold halves to make the surface finish a lot cleaner right off the bat, but that would require more foam and it would also end up being very difficult to layup the carbon inside the mold (unless you have 5 foot long arms??).

Step 1: Machined foam
BJ machined 7 individual stacks of foam on Architecture's 5-axis Onsrud CNC mill. This was done because the length of the bit is only so long. It will also avoid having to do 4 or 5 axis CAM work, which is an absolute headache

Step 2: Glue up
Once the chunks come off the machine, they need to be glued up. We used the same glue that was used to initially glue up the layers. It is a specialty spray adhesive made for foam. (3M 78 for Insulation and Polystyrene) As always, make sure you weigh down your parts that are gluing up.



Step 3: Initial Foam Prep
Sometimes the machine will mess up and leave marks or take chunks out of the part. The controller software sometimes gets confused and will just drop the bit into your pretty part. We don't know why, but it happens. Luckily it's foam so the tool isn't damaged and it's fairly easy to fix. We take expanding spray foam and just spray it into the holes left there. Also add some to any large cracks.
Once it is dry, rough sand the whole thing to start to get the surface closer to being smooth. 100 grit works well for this. Think of it like sculpting. Main goal is to get it close to the final shape you want.

Step 4: Prep Fiberglass/Start Designing Ply Schedule and "Maps"
This step is where you will start cutting out your fiberglass to coat the mold. The fiberglass is used here to seal the foam and create a hard, non-porous surface. This is also a good time to start planing your ply schedule and what I call, "maps." The "maps" are the individual templates for each piece that you'll put on. Since for a complex shape like this, you can't just cover it in one single piece. Either the shape is too complex and requires a computer software to "unfold" the 3d shape into a 2d template, or you just can't fit the whole thing onto one piece of carbon/glass (since rolls are only 40" or 50" wide). This also gives you a nice time to experiment and see if your "maps" will work.
You'll want to be putting at least 2 or 3 layers of fiberglass down. There is a good chance you will be adding more fiberglass later.

Questions and Answers
Post your questions below and I'll answer them. This way, everyone will be able to see the questions and answers and it will all be here on this document.

- *Question (name)*
  - *Answer*

Step 5: Applying Fiberglass

This step is fairly easy. All you're doing is coating the foam in fiberglass to create a hard shell.
Make sure to fully wet out the fabric and do your best to make sure it is laying fully flat against the foam. Goal should be for 2 to 3 layers over everything. While you will most likely need to apply more layers later, the better job you do now, the less work you'll have to put in for fixing bubbles or problem spots.
The resin used can be either the regular epoxy resin we use for layups, or fiberglass resin. The fiberglass resin is a bit cheaper however, so go with that. Make sure to mix in smallish batches however to prevent the bowl of resin from gel-ing up in a few minutes.

Amine Blush!!

When all epoxy resins dry in open air and exposed to moisture, it will form what is called an amine blush. It is a reaction that happens when the curing resin mixes with moisture in the air. Normally, when under vacuum, there is no air or moisture for it to react with. However, when doing this fiberglass shell, or any other repairs involving epoxy resin, an amine layer will form. It will create this sticky, oily, coating that will make it feel like it is permanently wet. This can be reduced by covering the resin with release film/peel-ply. This way the amine layer will hopefully form on the fabric, instead of your part. You can then remove the peel-ply afterwards.
The amine layer can create a few problems. First, it will make subsequent layers of resin, paint, adhesive, etc. not bond properly to the surface. Second, it will clog up your sandpaper within seconds if you try to sand the surface. And we will be doing a lot of sanding on this mold. Luckily, it is fairly easy to remove. Soapy water and a Scotch-brit pad will make quick work of it. And a little left will not clog your sandpaper as quickly if there was a full layer.
Link to better and fuller description by Composite Envisions:
https://compositeenvisions.com/amine-blush/

Example of peel-ply. Is a fabric that has been coated with a release agent. Sort of a porous wax paper.

Carbon fiber Tubing Shopping

Tuesday, October 04, 2022 7:46 PM

https://dragonplate.com/search?q=carbon%20fiber%20tubing&pagenumber=3

https://compositeenvisions.com/product/roll-wrapped-carbon-fiber-tube-2x2-twill-weave-gloss-finish-1m/

https://store.acpcomposites.com/carbon-fiber-twill-roll-wrapped-tubes?quantity=1&length=44

Sponsor Search

Tuesday, October 04, 2022 7:46 PM

	Status	Achieved
OReillys	In progress	Currently employee discount through Grayson
Composite Envisions	Not Started	Nathan submitted. Awaiting response.
Dragon Plate	Not Started	
ACP Composites	Not Started	
Fiberglast	Not Started	

Composite Material Buylist

Sunday, October 11, 2020 10:33 PM

Composite Material Buylist - Spreadsheet

Item	Quantity	Price per	Subtotal	Notes	url to purchase			total	$793.22			
LOW TEMP Cure Carbon Fiber Fabric 2x2 Twill PREPREG Single Sided 3k 50"/127cm 6oz/203gsm Toray T300		$ 48.99	$ -	For Evan/TJ senior design project. It is low temp. Longer cure time, but can be easily cured in our cabinet oven once it is fixed. Or be cured in any PID oven	https://compositeenvisions.com/low-temp-cure-carbon-fiber-fabric-2x2-twill-50-3k-6oz-203gsm-toray-t300-prepreg-single-sided/							
2nd Quality Commercial Grade Carbon Fiber Fabric 2x2 Twill 3k 6oz/203gsm 50"	40	$ 16.99	$ 679.60	Generic carbon our team uses and needs to operate. This year, we should only need a little extra to finish the ks5 and the ks2e	https://compositeenvisions.com/2nd-quality-commercial-grade-carbon-fiber-fabric-2x2-twill-3k-6oz-203gsm-50/							
Rexco - Partall PVA #10 Spray On Moldrelease 1 Gallon	1	$ 19.99	$ 19.99		https://compositeenvisions.com/rexco-partall-pva-10-spray-on-moldrelease-1-gallon-486.html							
Rexco - Partall Paste #2 Wax, 24oz	1	$ 15.95	$ 15.95		https://compositeenvisions.com/rexco-partall-paste-2-wax-496.html							
Bristle Roller 1" Diameter, 3" width	1	$ 8.08	$ 8.08	for prepreg. Roller to roll out airbubbles in laminates	https://compositeenvisions.com/bristle-roller-1-diameter/							
Airtech Airflow 65R 10' 450° F - High Temp Vacuum Hose	1	$ 69.60	$ 69.60	For oven/prepreg	https://compositeenvisions.com/airtech-airflow-65r-10-450-f-high-temp-vacuum-hose/							

2.5.21 Design Meeting

Friday, February 5, 2021 6:37 PM

Monocoque questions, answers, and list of research to do

- sadf
- 
  Bonding of Sandwich ...

3d print molds

Thursday, January 20, 2022 12:53 PM

40% infill really strong
30% infill survive vacuum real good
No reaction with Fiberglast System 2000 resin
Little to no prep work should be required, tight contours will be very difficult to prep

Further research needed

Firewall

Tuesday, January 31, 2023 5:10 PM

- [x] No seatbelt protecton
- [x] Axies not aligned to fit in main
- [ ] Need revit patches (break wall in to attachable sections)
- [ ] No pnumatic tank protection
- [ ] Chek Fuel protection
- [x] Chec driver healmit rule