	Aerobody-Composites	Prepared by	Valeria Niebles & Mariana Casas
		Implementation Date	Feb 19, 2020
		Revision #	0
Page #	1 of 3	Revision by	N/A
Owner	Solar Gators	Last Reviewed/Update Date	N/A

Standard Operating Procedure (SOP): Plug Preparation

1. Purpose

“A plug for a fiberglass or composite mold is typically a representation of the finished part, and can be an actual part or a mockup of a part.” (ref 1) This SOP outlines the steps taken to prepare our body plug that will later be used as a mold to set our final body shape.

2. Scope

Materials

1. Acetone
2. Epoxy Resin/Hardener
3. 4-6 oz. fiberglass cloth
4. Polyester fairing compound (or any polyester-based putty)
5. BPO hardener
6. Duratec Styroshield Primer
7. MEKP hardener

Tools


1. Metal scraper
2. Hard/soft plastic squeegees
3. 80, 240, 600, 800, and 1000 grit sandpaper
4. HVLP spray gun (2.5 mm tip) (see SOP)
5. Steel spiral mixing arm
6. Paintbrushes
7. Mixing cups (preferably 32 oz.)
8. Weight scale

3. Safety/ Hazards

- Epoxy Resin/ Hardener are used. Please refer to their safety data sheets (SDS) for personal protective equipment (PPE) needed
- Fumes and dust will be produced. A dust mask provided by the University of Florida is required to be worn. If any further respiration equipment is preferred a physical signed by a doctor must be provided.
- Nitrile gloves must be worn
- Hair must be tied back
- Close toe shoes and long pants must be worn


4. Control

- 2 people must be present to work on this project. No one is to be working on plug preparation by themselves
- Never work with fiberglass and resin without the proper PPE
- SDSs must be read prior to working with any chemicals
- SOPs for resin preparation and the spray gun must be read

	Aerobody-Composites	Prepared by	Valeria Niebles & Mariana Casas
		Implementation Date	Feb 19, 2020
		Revision #	0
Page #	2 of 3	Revision by	N/A
Owner	Solar Gators	Last Reviewed/Update Date	N/A

5. Procedure

1. Cut out/fit 4-6 oz. fiberglass cloth to contours of plug
 - a. Lay piece of fiberglass cloth large enough to drape over the entirety of part
 - b. Cut darts into cloth in areas of excessive fabric in order to maximize conformity to part
2. Measure out and mix five parts of epoxy resin to one part hardener (see SOP: Epoxy Resin Preparation)
3. Begin applying resin to fabric using paintbrush
 - a. Use short, firm strokes to wet out fabric while minimizing fabric distortion and creation of air bubbles
 - b. Apply enough resin to completely saturate fabric with resin
 - c. Working time for epoxy resin is 45 minutes
4. Leave fiberglass/epoxy resin to cure for 48-72 hours.
5. Cut out off any excess fiberglass/air bubbles with a razor knife
6. Sand down surface using 80 grit sandpaper
 - a. Work in a cross-hatch pattern along the fiberglass' weave direction
7. Mix equal parts polyester fairing compound and BPO hardener.
8. Apply fairing compound using soft squeegee over any surface irregularities or "low" (relative to dimensional tolerances) areas in the part.
 - a. Working time is 8-10 minutes.
9. Allow fairing compound to cure for 15-30 minutes.
10. Sand down the plug surface again with 80-120 grit sandpaper.
 - a. Clean with acetone before applying primer.
11. Attach steel spiral mixing arm to drill and mix Duratec Styroshield Primer **thoroughly** to ensure insulative microspheres are distributed throughout primer.
12. Equip the HVLP spray gun with 2.5mm (100 mil) or larger tip. (see SOP: Spray Gun)
13. Measure out desired amount of primer and 2% primer volume of MEKP hardener
14. Mix primer and hardener thoroughly using paint blender; pour into spray gun.
 - a. Affix spray gun onto air compressor.
 - b. Make sure air pressure is ~35-50 psi
15. Spray Duratec Primer onto the plug surface.
 - a. Spray initial "tack coat" and let dry for two minutes
 - b. Spray a layer of 10 mils (450 microns) of primer
- i. Use gel coat thickness gauge to measure layer thickness throughout plug and ensure an even coating
 - c. Drag mold surface with paintbrush or metal squeegee to force primer into voids of surface (if necessary)
 - d. Spray additional primer as needed (until foam surface's pits/voids are no longer visible)
- i. Spray at least 20 mils total of primer on surface
 16. Leave Duratec Primer to cure for at least 24 hours.
 17. Dry sand surface with 80-120 grit sandpaper and wipe down with acetone.
 - a. Repeat steps 5-7 as needed until desired surface finish is attained.

	Aerobody-Composites	Prepared by	Valeria Niebles & Mariana Casas
		Implementation Date	Feb 19, 2020
		Revision #	0
Page #	3 of 3	Revision by	N/A
Owner	Solar Gators	Last Reviewed/Update Date	N/A

18. Sand down plug surface to Class A finish beginning with 240 grit and successively increasing grit up to 1000 grit sandpaper.

a. Clean mold surface with acetone between each grit in order to prevent scratches from more coarse grit particles remaining on plug surface.

6. Definitions

Plug: typically a representation of the finished part, and can be an actual part or a mockup of a part

7. References

1. http://www.fiberglasssupply.com/Miscellaneous/How_To_Resources/Fiberglass_Mold_Making_an_Intr/fiberglass_mold_making_an_introduction_to_plugs.html