	Aerobody-Composites	Prepared by	Valeria Neibles & Mariana Casas
		Implementation Date	Feb 22, 2020
		Revision #	0
Page #	1 of 3	Revision by	N/A
Owner	Solar Gators	Last Reviewed/Update Date	N/A

## Standard Operating Procedure (SOP): Fiberglass Molding

### 1. Purpose

A fiberglass mold is made to allow the reproduction of specific pieces of our mold. This procedure is used when trying to make a negative mold from a positive mold.

### 2. Scope

Materials:

1. Acetone
2. Partall wax
3. Veil surfacing mat
4. Chopped strand mat
5. PVA release film
6. Tooling gel coat
7. Polyester resin
8. MEKP hardener
9. Polishing compound

Tools:


1. HVLP spray gun (2.5 mm tip) (see SOP)
2. 400,600, and 1000 grit sandpaper
3. Paintbrushes
4. Fiberglass rollers
  - a. Bristle roller
  - b. Saturation roller
5. Release wedges
6. Buffing wheel (see SOP: Grinder/ Polisher)

### 3. Safety/ Hazards

- Epoxy Resin/ Hardener are used. Please refer to their safety data sheets (SDS) for the 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


7. 2 people must be present to work on this project. No one is to be working on plug preparation by themselves
8. Never work with fiberglass and resin without the proper PPE
9. SDSs must be read prior to working with any chemicals
10. SOPs for resin preparation, buffing wheel, and spray gun must be read

	Aerobody-Composites	Prepared by	Valeria Neibles & Mariana Casas
		Implementation Date	Feb 22, 2020
		Revision #	0
Page #	2 of 3	Revision by	N/A
Owner	Solar Gators	Last Reviewed/Update Date	N/A

## 5. Procedure

---

1. Wipe down the mold surface with acetone.
2. Apply and buff Partall Wax over the entirety of the mold.
  - a. Let dry for ten minutes
  - b. Repeat three times.
  - c. Ideally let sit for an hour to allow all solvents to evaporate
3. Measure out the desired amount of PVA release film and pour into spray gun (read SOP: Spray Gun)
  - a. Affix spray gun onto air compressor.
  - b. Make sure air pressure is ~22-24 psi
4. Spray an initial thin mist of PVA release film onto mold surface
  - a. Spray 12-18 inches away from surface
  - b. Let dry for 10-15 minutes.
5. Spray a "flow coat" layer of 1.5 mils of PVA onto mold surface
  - a. Let dry for 30-45 minutes
  - b. Repeat for third layer of PVA film
- i. Spray 2-4 mils total of release film onto surface
- ii. Surface finish should be smooth and glossy, otherwise wash film off with water and repeat steps 4-5.
6. Measure out the desired amount of gel coat (approximately one gallon for top body, 2-3 gallons for bottom body) and 1.5% gel coat volume of MEKP hardener.
7. Mix gel coat and hardener thoroughly and pour into spray gun
  - a. Affix spray gun onto air compressor.
  - b. Make sure air pressure is ~35-50 psi
8. Spray 20-25 mils of gel coat onto mold surface.
  - a. Working time is 20 minutes
  - b. Try to deposit 7-8 mils of gel coat with each pass
  - c. Do not allow gel coat to dry in between passes
9. Allow gel coat to cure for at least an hour; surface will be ready for lamination when tacky to touch and surface is cool to touch.
10. Prepare chopped strand mat by tearing cloth into manageable pieces.
  - a. Avoid cutting chopped strand mat with scissors.
11. Mix the desired amount of polyester resin with 2% volume resin of MEKP hardener. (See SOP: "Polyester resin preparation")
  - a. Working time is 15-20 minutes
12. Lay up the initial layer of veil surfacing mat onto the mold with polyester resin.
13. Wait until the veil surfacing mat is cool to touch before adding the rest of the reinforcement fabric.
14. Pre-wet surface with layer of polyester resin.
15. Continuously lay up chopped strand mat and polyester resin on mold surface.
  - a. Roll air out of laminate with bristle roller and compact reinforcement material with saturation roller.
- i. Roll out fiberglass at least every other layer
  - b. Lay up about seven layers of chopped strand mat; mold should be at least half an inch thick.

	Aerobody-Composites	Prepared by	Valeria Neibles & Mariana Casas
		Implementation Date	Feb 22, 2020
		Revision #	0
Page #	3 of 3	Revision by	N/A
Owner	Solar Gators	Last Reviewed/Update Date	N/A

16. Allow layup to cure for a minimum of 72 hours.
17. With the aid of release wedges and compressed air, carefully release negative mold from the plug.
18. Wash off remnants of PVA release film from the surface of the negative mold with warm water.
19. Wet sand surface of negative mold with 400, 600, and 1000 grit sandpaper.
20. Smooth out any surface irregularities by applying polishing compound and buffing with buffing wheel.

## 6. Definitions

---

**MEKP:** Methyl Ethyl Ketone Peroxide- when mixed with polyester resin or gel coats it catalyzes the reaction. The result of this reaction is the development of heat and leads to the build up of hardened resin (1)

**PVA release film:** water based liquid polymer that, when applied over a wax, prevents mold parts from sticking (2)

**Mold:** the final piece will be made from this (3)

**Positive Mold:** This is a mold that looks identical to the final piece being made

**Negative Mold:** this is a mold that consists mainly of cavities (4)

## 7. References

---

1. <https://www.fibreglassshop.co.nz/products/me kp-catalyst-for-polyester-resin>
2. <https://www.epoxyworks.com/index.php/mold-release-pva-and-hairspray/>
3. [https://www.fibreglast.com/product/molding-fiberglass/Learning\\_Center](https://www.fibreglast.com/product/molding-fiberglass/Learning_Center)
4. <http://www.waveformplastics.com/faq.shtml>