reasearch on waterproof materials for boat cover

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1 Waterproofing options

1. Paint
2. Electronic Epoxy Adhesive Glue
   - link: `https://medium.com/@epoxyglue/everything-you-need-to-know-about-electronic-epoxy-adhesive`
   - Does not protect connectors from water.
   - Shouldn't be used with high voltage boards.
   - Shouldn't be used on pins, switches, buttons that have to be used.
   - Components like power transistors, amplifiers etc. may become hot due to being insulated by Epoxy. Which wold effect on them being less affective at dissipating heat, shortening the components life span.
   - There are different kinds of Epoxy. Some have metal in them, other ones are thermally conductive.
   - Epoxy is setting in about 5 min. Therefore, the apllying procedure has to be fast.
   - It is commonly used with silicon. Mostly silicon is put on mouting points or connectors where Eproxy is likely to crack. Also on the buttons.
   - It work process is that it is chemically bonding the two parts together.
   - It adhesies to a variety of material,like metals, plastics, ceramics, glass.
   - It provides a bond that withstands stress, vibration and shock.
   - It is resistant to chemicals, heat, moisture.
   - It can be applied to small and large areas
   - It has a long curing time, so it might take several hours to fully cure.
   - It's not suitable for use on flexible materials.
   - The two parts of the adhesive must be mixed in the correct ratio for optimal results.
   - It cannot be undone.
3. Silicone
   - link: `https://www.thomasnet.com/articles/chemicals/Silicon-Electronics-Casting-Applications/`
   - It can withstand mechanical damage.
   - It is messy and hard to use while applying.
   - The heat transfer is all right.
   - Hides the whole item that is covered by it.
4. Nail polish
   - Easy to use.

- Work sufficient with small surfaces.
- Not good to use on elastic surfaces.
- Leaves the visibility of the items.
- Costs about 20 krones for a bottle.

5. Polyurethane

   - Moisture and solvent resistance.
   - Class F temp. rating.
   - Good dielectric properties.
   - Abrasion resistant.
   - Flexible.
   - Fungicidal.
   - It can be done in three ways: dip, spray, brush.
   - Single-component urethane coatings are easy to apply; the trade-off, however, is that they have a long cure cycle (up to several days). Two-component urethane coatings have a shorter cure cycle (1-3 days) but are more difficult to apply.

6. Acryclic

   - Quick-drying nature.
   - Easy to remove.
   - Hihly resistant to humidity.
   - Does not give off a lot of heat while it dries and doesn't shrink as it cures.

7. Para-xylylene

   - Or Parylene, a chemical coating done by Chemical Vapor Deposition (CVD) in an atmosphere of Para-xylylene or its derivative. The thin film is generated by the chemical vapor adhering to the part to be coated and polymerized at a threshold temperature of 700C. Within the referenced text, the CVD process is described as followed:
   - The part is placed inside a container that allows easy access for possible adjustments and retrievals. Temperature probes need to be placed in more than one location inside the reaction chamber to measure and model the temperature and pressure gradient to ensure homogeneous temperature and pressure distribution along the part. This is done to ensure an even coating of material and the eventual polymerization of the final coating. Polymerization can happen at different temperatures depending on n the technique, but the chamber needs to be able to achieve a maximum temperature of 700 degrees. Due to the corrosive properties of the precursor vapor, the chamber needs to be lined with quartz, so that the usual stainless-steel chamber stays intact. The recommended shape for the chamber is a bell-shaped chamber, of relatively small size to ensure isothermal and isobaric internal properties.
   - While being extremely interesting and possessing highly robust properties such as anti-abrasion, beyond the waterproofing abilities, the method is too expensive and complex for our current project.

8. Fluoropolymer

   - Similar to the previous method, Fluoropolymers are generally applied as a coating. Some of the more commonly known applications of Fluoropolymers are cookware and clothes, and one of its most known varieties is Teflon. Due to the complexity of application and difficulty acquiring the correct chemical for the project's purposes, the option is eliminated.

9. Waterproof container

- As a secondary waterproofing measure, a waterproof container is an excellent form of waterproofing, being both inexpensive and easy to modify. The setup is easily sealed and unsealed and provide many configurations options.

10. Marine grease

    - Marine grease, like other grease, are used for their adhesive properties as well as their ability to lubricate moving machineries. In this application, the adhesive property of grease is needed, but not its ability to lubricate mechanical components, since the only moving components will be the two already lubricated motors. In addition, Marine grease is hard to work with and increases difficulty to modify and repair the project.

11. How to? `https://www.nextpcb.com/blog/waterproof-pcb--nextpcb`