

Sport Aviation Q&A

Q: What are some considerations to keep in mind relating to corrosion (and its control) as I design and build my homebuilt airplane?

A: Corrosion has many, many aspects to it, many of which get very involved and can fill full volumes of material or be the subject of entire higher-learning courses. There are several basic things that you should keep in mind while working with your airplane, though.

The metal components of your aircraft will all be susceptible to corrosion when exposed to the environment. The rate at which they will corrode is accelerated when in a salt-water environment, such as exists in any coastal area. The easiest way to prevent this type of corrosion is to ensure that all metal components which will be exposed to the extremes of the environment have some type of protective layer on them. Some of these are described below.

Primer/Paint: This is an old, yet reliable method for corrosion control. Be sure the surface of the part to be painted is properly prepared before applying the coating. Some coating systems require a primer be applied before the paint, while others do not. The latter are known as DTM, or Direct-to-Metal. Surface preparations can range from a light sandpaper scuffing to a media blast to a chemical etch. The protection offered is a function of the quality of the paint system used and the effectiveness of the surface preparation. The classic yellow-green zinc-chromate aircraft component primer is no longer available because of its extreme health hazard. Today one can purchase its close cousin, zinc oxide, however. This and other epoxy primers can be easily applied at home.

Powder Coating: This system applies a powder fairly evenly across the surface to be coated with an electrostatic charge. The powder is then baked on and forms a very durable surface which is typically much stronger and chip-resistant than painting. Its popularity has increased greatly in the past ten years or so, and there are many commercial outfits that can usually do a good job of applying the coating in many various colors. It can be applied to steel or aluminum, however care should be exercised when applying it to aluminum as the heat used in the baking process may affect the temper of the particular alloy used.

Alodine: This is a corrosion conversion treatment which interacts with the oxidized surface of an aluminum part. It can be easily purchased and applied. It is a good coating to protect against the elements, however it will not improve the durability of the surface, which will still be susceptible to corrosion if scratched.

Anodizing: This is a process in which a layer of oxide is formed on an aluminum surface which is thicker than would naturally occur. The benefit of this treatment over alodining is that it increases the abrasion resistance of the surface of the part and is available in varying hardnesses. This treatment is usually done by a commercial coating company and can come in several nifty colors.

Alclad: This process applies a thin layer of high purity aluminum over the surface of a higher-strength alloy. This increases both the appearance and the corrosion resistance. Alclad aluminum is typically supplied on the stock material from the mill, such as on the surface of sheet aluminum. You must keep in mind when using this material that the edges do not have an inherent corrosion protection.

Plating: Many steel components can be protected after processing (drilling, bending, welding, etc.) by applying such platings as cadmium, chromium, nickel, or zinc. Once again, this process is typically done by a commercial outfit and not in the average homebuilder's shop.

Passivation: This is a chemical process done usually to stainless steels where the surface is treated with an acidic solution to increase its resistance to corrosion. For many applications, off-the-shelf alloys of stainless steel will have sufficient corrosion resistance, making this process unnecessary.

The next edition of this column will address the effect of what is known as galvanic corrosion which occurs between dissimilar materials and how to prevent it from happening on your airplane.