

# Corrosion Protection

## From the Tech' Desk . . .

### EAA'S HOMEBUILT AIRCRAFT COUNCIL REPORT, Nov., 2005

#### CORROSION PROTECTION

**“Corrode:** 1. to eat away gradually as if by gnawing, especially by chemical action; 2. to impair, deteriorate; . . . 3. gnaw, eat, consume, erode; canker, rust, crumble.”

**“Corrosion:** 1. the act or process of corroding; condition of being corroded; 2. a product of corroding, as rust.”

The above definitions are as listed in the Randon House Dictionary. I like to think of the process of corrosion as nature's way of returning a metal or an alloy to its original state as found in ore.

To ensure a long life to your aircraft project, as well as to ensure ongoing airworthiness and safety, corrosion protection is an issue you will want to explore. This topic has many varying proponents, and each approach has its own supporters. When I built my RV4 back in the late 90's, Van's instructed builders to pay a great deal of attention to corrosion protection. We were encouraged to apply a good corrosion protective substance to each mating part of an assembly, and there was even talk about submersing solid rivets in this substance before driving them.

Today, the emphasis has shifted almost 180 degrees, and builders are saying that their aircraft have been flying in the Northwest USA for over ten years, without any corrosion protection and without any problems. Sonex is using a 6061 alloy, and is suggesting that no additional corrosion protection is needed.

I have restored a pre-war Luscombe 8C that never had any corrosion protection applied during manufacture, and today little signs of corrosion are visible. However!

#### A Caveat:

Be aware that under the Canadian MD-RA

Inspections Checklist, Question #6, 'Sub-assembly Inspections' asks: "Are interiors of box sections treated against deterioration (eg. Zinc-chromate, varnish, etc.)?" And this same question is repeated for the fuselage, wings, control surfaces, and empennage. How you would square having no corrosion treatment with your airworthiness inspector, is open to question.

#### My Approach:

Being from the old school, I know that if you place any two dissimilar metals together, and introduce an electrolyte such as salt water to come into contact between them, you have an effective battery with chemical action taking place. Even if you place two similar sheets of aluminum together in the presence of moisture, you will see oxidization and deterioration of the metal. Consequently, I want a protective coating between any assembled pieces of my homebuilt aircraft.

#### Which Product or Process to Use?

Let's examine the various products and processes that are available. Each builder can then select his/her appropriate choice.

**Alodine:** is an electro/chemical conversion coating that leaves a conductive aluminum/chromium phosphate coating on the aluminum. It is actually a proprietary process, but because of its use in industrial and military applications, specifications; MIL-A-8625 and MIL-C-5541, have been developed covering its use and application. Both are informative. Alodine provides an excellent base for painting.

**Anodize:** is an acid treatment that forms a nonconductive aluminum oxide layer on the part. The anodizing process causes the part to grow, and if dimensional tolerances are important, they need to be taken into consideration. It can be done by yourself in your own shop.

Both alodining and anodizing add a degree

of hardness to the base metal. This will increase its susceptibility to fatigue, but reports that I have seen suggest that the life cycle reduction of such treatment would not effect the normal life span for a homebuilt aircraft.

**Zinc Chromate Primer:** A long-time standard in the aircraft industry, Zinc Chromate has come into disuse because of its health hazard. It is still used commercially under controlled conditions including ventilated spray booths and operator respiratory gear. It is virtually impossible to purchase this primer in the familiar spray-can form in retail outlets. If you choose to use this product be aware of its chemical hazards to your health and follow proper safety procedures.

**Urethane Paints:** A good one-part primer with excellent results. Again follow the manufacturer's safety instructions in its application.

**Two-part Epoxy Primers:** probably offer the best corrosion protection you can achieve. Very dangerous to use, and proper use of equipment with outside respiratory air is an absolute requirement. Do not rely on charcoal masks for protection. This stuff will kill you if you don't observe safety precautions.



**Fig. 1**  
A Typical HVLP Paint Spraying System includes Dual Compressor with Ventilation Air to the Operator's Face Mask. The Compressor is located outside of the building thereby ensuring only fresh air to the operator.

## From the Tech' Desk . . . Corrosion Protection - *con't*

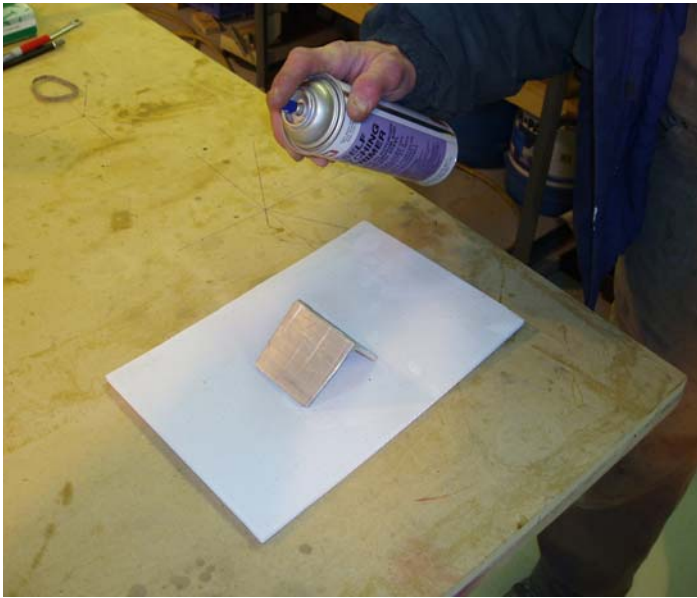


Fig. 2. One-part Self Etching Primer being applied to a Component

**One-part Self Etching Primer:** I have used two different products that fall into this category:

**Marhyde**, Single-stage Self Etching Primer  
Bond Corporation (An RPM Company)  
3700 Atlanta Industrial Parkway NW  
Atlanta, Georgia 30331  
[www.bondo.com](http://www.bondo.com)

and

**ESM**, Self Etching Primer  
(Steel, Aluminum, and Stainless Steel)  
SEM Products Inc.  
Charlotte, NC 28217-1546

Both of these products are available in a grey colour, (but they do not match, so stay with whichever one you choose). Both are also available in a good quality 15 oz. Spray can.

### So where does this leave us?

If you choose to use some form of corrosion protection in the assembly of your aircraft components, you have the above choices available. Your considerations might be:

- If I use a specific product, do I have the appropriate equipment and facilities available, especially with regards to my safety in its application?
- How much financial and human resources am I prepared to give?
- How much time am I prepared to allot to this process?
- How much weight does this add to my project?

I use the self etching primer for several reasons: I want to have good corrosion protection, and this product satisfies this requirement. I like the ease of a spray-can application; its simple, fast, and no clean-up is required. I like its coverage; it gives a pleasing 'finished' look to components. It dries fast, within seconds, if you apply a little heat with a heat gun, thereby allowing me to assemble parts immediately. It is almost odor free, and I don't have any after effects from its use.

I prime all component parts before assembly. I also prime the

entire inside of my aircraft, tail surfaces, wings, fuselage, and control surfaces. This requires about a dozen 15 oz spray cans, and if the actual paint component in a can represents 50% of its weight, this would add less than 6 pounds of weight in total.

I do not prime any of the outside surfaces, however, some primer will be visible, where skin components overlap. My final priming and sealing prior to painting the aircraft, will depend on the paint and scheme chosen, appropriate to the product used.

A final word of caution: Always follow the manufacturer's guidelines and instructions for safety in the use of their product. Safety is not accidental. It is an attitudinal commitment to be followed religiously.

Jack Dueck, EAAHAC