What is CORROSION?

PART III

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In this final segment on corrosion, we will discuss ways of both preventing corrosion and keeping existing corrosion at bay. I tend to think of corrosion control in much the same way as I think of losing weight: Once you're rid of it, you have to change your lifestyle. What was done in the past caused the problem, so change is needed.

There are a number of solutions to the corrosion-control problem, based on its type and severity, as well as how and where the airplane is operated and stored. In an ideal world, we would all be lucky enough to have airplanes with no evidence of corrosion, and occasionally, we do see ones that are as corrosion-free as the day they were manufactured. A look at the logbooks shows they've usually come from a clean, dry environment (such as the high plains or Arizona), have been stored carefully and kept clean, and have received very good maintenance.

Undoubtedly, the best way to avoid the potential for corrosion in a Bonanza-derivative aircraft is to buy one built after the late '70s when the factory routinely zinc-chromated all components prior to assembly.

To really assess the situation in an airplane you own or are considering buying, *definitely include a cabin inspection of the airframe that would require the removal of some interior panels, allowing access to the most suspect areas.* These are usually located below doors and windows where leaks have allowed water to frequently soak the insulation and interior components.

Remove insulation and glue to expose bare metal surface. If any corrosion is observed, keep looking—you'll probably find more. I suggest you do this, even if you are buying an airplane that was corrosion-proofed at the factory because it could have been exposed to corrosion-causing contaminants at some point in its history.

Corrosion prevention falls into two major categories: active and passive.

ACTIVE PREVENTION

Even if you are blessed with a corrosion-free airplane, treat it with ACF50 or Corrosion X. A good time to do this is at an annual. Make sure your shop of choice has the proper equipment and methods in place to do this treatment.

If an aircraft is located in an area where contaminants are likely, such as outside storage near an ocean or near industrial pollutants, there is a more aggressive treatment normally used for airplanes on floats. Treat with ACF50 or Corrosion X, wait about 30 days and apply LPS3. LPS3 is a spray-on treatment that when dry leaves a waxy noncorrosive coating that is a very effective moisture barrier. This medium is quite gooey and should be kept away from control cables, pulleys and other systems.

NOTE: The above-mentioned treatments make painting an aircraft very difficult. Do not corrosion-treat your airplane in the two years prior to a planned paint job. Additionally, do not treat the aircraft for at least six months after painting to allow for a good cure of the new finish.

After returning home from any trip to the ocean, wash your airplane, remove inspection panels and flush inside wings, tail cone and tail surfaces, being careful not to get moisture-sensitive components wet.

Avoid using household quick-cleaners without thoroughly rinsing. Many household spray-on, wipe-off solutions are high in corrosion-causing chemicals.

Never wash your airplane with laundry or dishwashing detergents. Use only cleaning solutions that are safe for aluminum and polyurethane paint. One I highly recommend is Carbon-X, available through Sporty's Pilot Shop. Remember to rinse thoroughly, from the top down, and always rinse lap-joint seams thoroughly from the open side.

Be diligent about keeping landing gear wells and bellies degreased and cleaned. Get the grease and oil off with an aluminum-safe solvent (such as mineral spirits), then wash with Carbon-X, which will remove the exhaust gas residue. This is sometimes not solvent-soluble and is a great source of trouble. *Exhaust gas is corrosive.*

In an airplane that has not been zinc-chromated, avoid the installation of open cell or hydroscopic sound insulation materials as they retain moisture and require glue for installation. This glue should never be applied to bare aluminum skins. Chromate your airplane first. It is important to realize that some glues retain moisture and some are chemically incompatible with aluminum, which can cause corrosion.

Pull your floorboards up and clean that mess down there. If the original Beech sound damping tar has become sticky and gooey, thoroughly remove the old tar with mineral spirits or lacquer thinner, prep and spray with zinc chromate, and apply Skandia ADC-124 skin-damping material to the belly. This is a very effective peel-and-stick, noncombustive, closed-cell sound-damping material that will keep those flat belly skins from vibrating freely and transmitting a lot of noise up through the floorboards.

Properly maintain all door and window seals in an effort to keep the airplane as water tight as possible. When the airplane is in the hangar, leave the doors and windows slightly ajar, which keeps the seals from being fully compressed. They will more fully seal later when closed tightly during travel or ramp parking.

Be sure proper drain holes are installed and kept open in the belly areas.

Be sure the battery box drain hose is open and properly installed to keep battery acid from getting near the airframe. Keep the battery properly serviced. Clean and neutralize the battery box with baking soda/water solution (alkaline) every six months or 50 hours.

Monitor the operating voltage of the charging system. If the system is allowed to operate at too high a voltage, it will cause the highly-corrosive electrolyte in the battery to boil out, possibly coming in contact with the airplane or components.

PASSIVE PREVENTION

Avoid storing the airplane, whether inside or out, near the ocean or downwind from power plants and other industrial complexes. These facilities generate airborne pollutants that settle on the airframe and, over time, increase corrosion problems.

A heated hangar is unquestionably the best storage method for corrosion control. Since a heated hangar is not a reality for most aircraft owners, insulated hangars are the next best choice for aircraft housing. They will better control the rate of temperature change and your airplane will be less affected by humidity and temperature extremes.

Free-rotating ventilator

A dry T-hangar with a cement floor can be good, provided there is proper ventilation. It is a really good idea to put free-rotating ventilators in the roof of an uninsulated hangar with a cement floor. These ventilators really help evacuate humid air.

The notion that any hangar is better than no hangar is not always true from a corrosion standpoint. A lot of T-hangars with cement floors cause corrosion because they are located next to sloping terrain that can bring water into the hangar during heavy rain, or have over the years slowly come below grade.

Standing water in a hangar, especially during warm weather, basically turns the entire building into a sauna with high levels of humidity. From a corrosion standpoint, the airplane is far better off outside, washed down by fresh rain and dried by breezy air and sunshine.

Be cautious of hangars with dirt floors. In areas of high soil-moisture content, these floors can actually bring moisture inside, causing a humidity problem. This type of hangar can be fine in an arid environment.

If the airplane is stored outside, it is better to be on a hard surface than tied on grass. However, it's a good idea in either case to stop by after a heavy rain and check for standing water under the plane.

Keep animals out of the airplane. Mice urine and feces is very corrosive (plus those mice like to chew your insulation and upholstery material). Keep birds out of the hangar for the same reasons.

Evidence of birds getting into hangar. Animal urine is very corrosive.

Be very leery of using taxiways that are shared with automobiles. During winter months, cars travel on salted roads, and you will pick up salt from those cars and sling it up into gear wells and, well, you know the rest of that story.

Never store an aircraft in a building that was once used for agricultural purposes. Livestock and fertilizers leave chemical residues in the floors or soil that can produce corrosive gases during humid periods.

If you ever notice dampness in the cabin, leave doors and windows open when in a hangar to greatly accelerate the drying out of the interior.

In is important that the roof be well-maintained on any type of hangar. Leaky roofs cause structural rusting on the hangar, and rusty water dripping on an airplane can permanently discolor the paint and add oxides to the airframe.

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MAINTENANCE AND UPGRADES

Beyond the day-to-day active and passive prevention issues, there are certain maintenance and upgrade items that must be done correctly to avoid future corrosion, namely exterior painting and interior renovation.

Painting an airplane is, in my belief, a necessary evil. The bad part of painting rests mostly with the problem of removing the paint and getting the new paint to stick.

In choosing a paint shop, it is important that they not use an acid-based stripper. One way to determine this is to personally look at the stripping bay where the chemicals are used. If the shop is using an acid-based stripper, the cement floor will be severely eroded, exposing aggregate in concrete. (The best way to describe the appearance is that of a gravel road.)

Lightening holes and control pass-throughs must be thoroughly sealed with foil tape or rubber plugs to prevent paint stripper from getting inside the aircraft. Another area needing special attention in Bonanzas is structural attachments between the leading and trailing edges of the spars where piano hinges were the means of attachment. It is imperative that paint strippers not get into these hinged areas, as it is impossible to flush out the stripper residue.

Make sure the painter knows the proper stripping techniques, prep chemicals and painting processes for both magnesium and aluminum surfaces. The best advice is to stick with a paint shop that has extensive Beech experience and a good reputation.

Regarding interiors, deal with cabin corrosion as described in this article before installing new insulation or a new interior. Avoid after-market flame treatments for upholstery materials as these treatments are likely to cause corrosion

After-market flame treatments for upholstery materials are likely to cause corrosion, as in the photo above.

if they are improperly used and allowed to come in contact with aluminum or steel components. Always follow proper insulation procedures as described earlier.

SUMMARY

Remember to *reinspect and evaluate the corrosion situation at every annual* to determine that the processes you have implemented are effective in reducing or eliminating corrosion in your airplane.

Every generation of aircraft owners has its own set of challenges during their flying careers. In the long-term, this issue of corrosion is a very important one for us to face. These airplanes are old enough for us to see problems with corrosion, but they are still new enough for us to correct them.

Our great-grandchildren will thank us for saving a real treasure.