

# Corrosion III



By Dennis Wolter

In this final segment on corrosion, we will discuss ways of preventing corrosion as well as keeping existing corrosion at bay. Dealing with corrosion and losing weight have a lot in common. Once you slim down, you have to change your lifestyle or the weight will come back. Once you've cleaned your airplane's corrosion, you'll have to change what was done in the past that caused the problem, or it will return.

There are a number of solutions to the corrosion-control problem, based on the type and severity of corrosion, as well as how and where the airplane is operated and stored. In an ideal world, we would all be lucky enough to have an airplane with no evidence of corrosion, and occasionally we do see airplanes that are as corrosion-free as the day they were manufactured. Looking at the logbooks of such an aircraft, we often find that they've 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 reduce the potential for corrosion in a Cessna is to buy one that was corrosion-proofed at the factory.

To really assess the corrosion situation in your airplane (or one you are considering buying), along with an airframe inspection you need to conduct a cabin inspection that would involve the removal of some interior panels, allowing access to those suspect areas mentioned in the previous two corrosion articles. Pay close attention to areas below doors and windows where leaks can allow water to soak the insulation and interior components. Remove insulation and glue to expose the bare metal surface.

If you see any corrosion, keep looking, you'll probably find more. I suggest doing this even if you're buying an airplane that was corrosion-proofed at the factory, as 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, I would treat it with ACF50 or Corrosion X. A good time to

ture barrier. This medium is quite goeey and should be kept away from control cables, pulleys and other systems.

One side 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. The mission here is to get dried salt mist crystals out of the airframe.

Avoid using household quick cleaners without thoroughly rinsing. Many household spray-on, wipe-off solutions are high in corrosion-causing chemicals. They are great on counter tops, stainless steel and porcelain, but can be devastating when it comes to aluminum aircraft structures.

Never wash your airplane with laundry or dishwashing detergents. Use only cleaning solutions that are safe for aluminum and polyurethane paint. One that I highly recommend is a product called Carbon-X, available through Sporty's Pilot Shop (800-543-8633). 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 de-greased 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 which is sometimes not solvent-soluble and is a great source of trouble.



*I just had to show another picture of the lead-vinyl/corrosion problem.*

do this is at an annual. Make sure that your shop of choice has the proper equipment and methods in place to do this treatment. Note: the most overlooked and often corroded part of Cessna airplanes is the cabin top.

If an aircraft is located in an area where contaminants are likely, such as outside storage near an ocean or 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 non-corrosive coating which is a very effective mois-

**EXHAUST GAS IS VERY 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. If your airplane has those factory lead vinyl skin damping panels and glue, remove them IMMEDIATELY.



*Dow Corning non-corrosive 732 silicon caulk seals the wing and fuselage seams.*

Pull your floor inspection panels up and clean that mess down there. If the original Cessna sound damping tar has become sticky and gooey, remove that old tar with mineral spirits or lacquer thinner, prep and spray with zinc chromate, and apply Skandia Inc (815-393-4600) ADC124 skin damping material to the belly. This is a very effective

peel-and-stick, non-combustible, 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. Remember that the gooey mess of tar, dirt, oil, and hydraulic fluid is quite flammable. Need I say more?

Properly maintain all door and window seals in an effort to keep the airplane as water tight as possible. When in a hangar, do not close the aircraft's doors and windows tightly. The seals do not assume a fully compressed set when the doors and windows aren't tightly closed, allowing them to more fully seal when closed tightly during travel or ramp parking.

Check the caulking between the wing and fuselage tops on Cardinals and 210s. Water often leaks into the cabin at this joint. Seal the removable gap seals on strut-braced Cessnas. We use a soft urethane foam 1/4" x 1/2" self-stick weather-striping, available at home building supply stores.

Be sure that proper drain holes are installed and kept open in the belly areas of the aircraft. Water pooling in the belly can cause all kinds of problems.

Be certain that the battery box drain hose is open and properly installed so as to keep acid from getting near the airframe. Keep the battery properly serviced. Clean and neutralize the battery box with a baking soda (alkaline) & water solution 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

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*Soft foam weatherstrip seal applied to removable wingroot fairings.*

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 which 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. They will better control the rate of temperature change and your airplane will be less affected by humidity and tem-



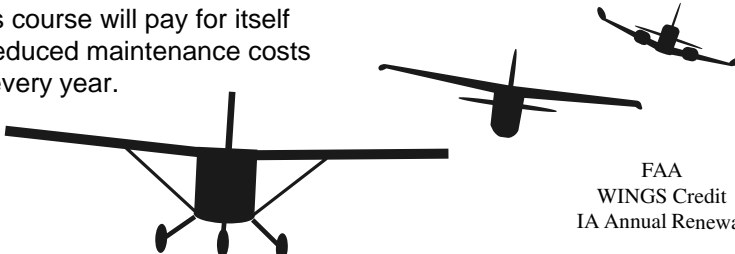
*Roof ventilators are an inexpensive but effective way to remove humidity from a hangar - any hangar!*

perature extremes. 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 un-insulated hangar with a cement floor. These ventilators go a long way to evacuate humidity.

The notion that any hangar is better than no hangar is not always true from a corrosion standpoint. A lot of T-hangars (even with cement floors) cause corrosion because they are located next to sloping terrain that can bring water into the hangar during heavy rain. Some T-hangars will slowly sink below grade over the years. 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. Never store an airplane in a building with a dirt floor that once housed animals or agricultural fertilizers. Residual chemistry from animal waste or fertilizers is the kiss of death to an aluminum airplane.

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*A storm drain located between high ground and T-hangar. Check it out before you rent.*

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.

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

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

It 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.

Moving beyond active and passive prevention issues, there are certain maintenance and upgrade items which must be done correctly in order 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 an airplane rests most 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 the floor

will look like the surface of a gravel road).

It is important that lightning holes and control pass-throughs are thoroughly sealed with foil tape or rubber plugs to prevent paint stripper from getting inside the aircraft. The best advice is to stick with a paint shop that has extensive Cessna 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 if they are allowed to come in contact with aluminum or steel components. Always follow proper insulation procedures as described earlier. Remember, never apply glue to a bare aluminum surface!

For those who are fortunate enough to have a new or nearly new Cessna, you should still be concerned with potential corrosion issues. We install a new interior in several new or almost new airplanes every year. We often find wet insulation



*Sloping ramp indicates the hangar is definitely above grade.*

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Bird droppings are signs of a serious bird problem in this hangar.

or other evidence of water leaking into these cabins. Keeping an airplane cabin (any airplane cabin) dry is an ongoing challenge that starts on day one and continues until you sell the airplane.

In closing, remember to re-inspect and evaluate the corrosion situation at every annual to determine that the processes you have implemented are effective in controlling or eliminating corrosion in your airplane. Every generation of aircraft owners has its own set of challenges. In the long-term, the issue of corrosion is a very important one for us to face. These airplanes are old enough for us to see problems but still new enough for us to correct them. Our great-grandchildren will thank us for saving a real treasure.





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