What Lies Beneath: Interior Renovation of Aging Piper Aircraft

By Dennis Wolter

Renovating an aircraft interior is a prime opportunity to see what's really underneath all that ugly old upholstery. Whether you do it yourself, hire it out, or choose a combination of the two, you want to make informed decisions. Industrial designer and airplane interior expert Dennis Wolter is here with a series of articles to help you.

What a difference 50 years can make. During my college days back in the late 1960s, I had a job where I would occasionally be sent to ferry a new airplane from the distributor back to Lunken Field (KLUK, now Cincinnati Municipal) for delivery to its new owner. To this day, I can remember the look, feel and smell of a new, ferry-time-only airplane.

Very few of us have the opportunity to own a brand-new airplane, but there are obviously many older airplanes out there in need of upgrades that can in many ways elevate them to exceed the design, comfort, performance and safety of a new airplane.

After graduating from the University of Cincinnati as a newly-minted industrial designer, I tried two "real" jobs before deciding to pursue my true passion of renovating airplanes. The key word here is passion; I believe it is the glue that holds the General Aviation community together.

Folks who own, fly and maintain these wonderful machines do it primarily out of love of flying. I am committed to helping save these irreplaceable machines. In coming months, I will submit a series of articles that will cover in detail the work required to truly renovate an entire cabin, from the firewall to the aft bulkhead.

I plan to walk readers through each step in the process, with photos showing all of the tricks we've learned over the past 44 years—including the tools and supplies required—to thoroughly execute the job.

Common issues in aging aircraft

I often mention in seminars that the time has come in this world of General Aviation to either save these airplanes for future generations of pilots, or let them slowly deteriorate and end up in a salvage yard, where their corroded airframes will be picked clean of usable parts to support the dwindling number of still-airworthy airframes.

Some readers may feel that this is an overly pessimistic comment, but in my business, I see far too many airplanes that are deteriorating before our eyes. Various aging-airplane problems seem to apply to all makes and models of older airplanes, no matter the value of the airframe. High-dollar Senecas are as susceptible as Cherokee 140s.

Installing a new interior in a Piper presents a great opportunity to really see into every nook and cranny of the cabin area with all interior components and insulation removed.

About 15 years ago, I realized we were dealing with an increasing number of non-upholstery issues, such as corrosion (Photo 01, Page 55); questionable wiring (Photo 02, Page 55), leaking windows (Photo 03, Page 55), degraded static and fuel lines, and so on.

These problems were becoming almost commonplace in the majority of airplanes going through our shop, so I decided to make it standard practice to invest the time necessary to repair all of the technical issues we discovered.

To address corrosion, we started with antiseptically cleaning all floors, bulkheads and cabin skins, followed by a thorough application of corrosion-controlling zinc chromate. *(The corrosion mitigation process will be covered in-depth in a future article. —Ed.)*

Corrosion isn't the only aging airplane issue that must be addressed, however. We often encounter other problems such as neglected or poorly-executed maintenance and carelessly-installed upgrades.

Addressing problems takes time

This total approach to renovation has made a very pronounced change in both the time required as well as the cost involved in fully renovating the interior of a 40-plus-year-old Piper. When Air Mod first opened its doors in 1973, the scope of work required to renovate an aircraft interior was much less than the task we face today.

I remember one of the first interiors we did in a six-place 1964 Aztec. Working 12-hour days, a part-time assistant and I completed the job in two weeks. This turnaround time was possible for a number of reasons.

First and foremost was the fact that the airplane was only 10 years old, and it certainly did not present many of the issues we would see today in the same, now 54-year-old airplane.

A second factor was that, at the time, our customers typically did not add items beyond what we included in a full interior renovation. Today, an extensive list of upgrade items can bring airplanes up to 21st century standards.

These optional upgrades include safety-enhancing four-point inertia reel shoulder harnesses; more efficient, quieter ventilation systems; LED lighting; super sound-proofing; thicker glass; fully-articulating seats; composite side panels with recessed armrests (see Photo 04, Page 56); and custom instrument panels with exotic wood trim, to mention a few.

A third issue adding to today's longer downtimes involves avionics installations and maintenance. Our company partners with two companies located at Clermont County Airport (I69), and coordinating these projects while the interior is being renovated makes it convenient for a customer.

But the bottom line is this: the Aztec interior that took two weeks to complete in 1974 has become an eight- to 10-week project in 2018.

Proper intervention is key

Here's the good news. For most of the airplanes in the fleet, the level of degradation is at a point where it can be stopped with proper intervention, saving these airframes for the future.

The other good news is that 95 percent

of what is required to mitigate corrosion and upgrade an interior can legally be done by an owner under the FAA guidelines of preventive maintenance, FAR Part 43, Appendix A(c).

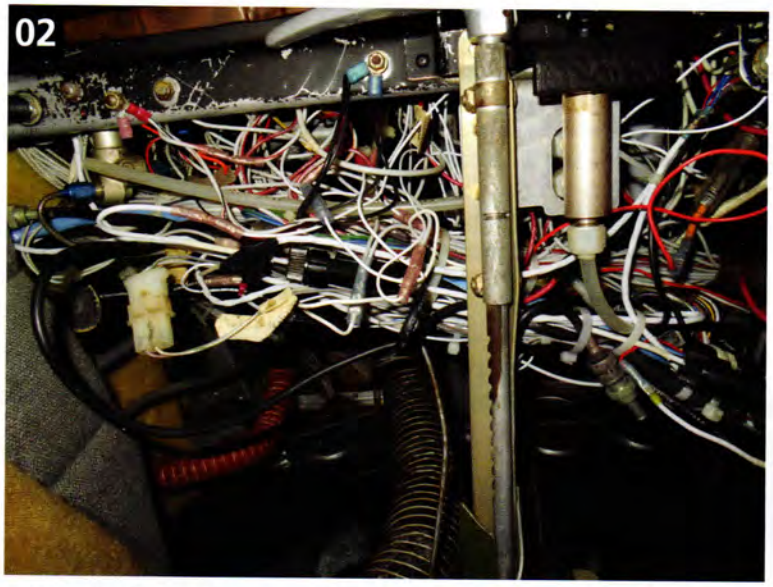
AC 43.13-1B is an excellent "how-to" manual from the FAA, and a must for every handy aircraft owner to have. Armed with this great resource, you will have concise and clear guidance as to how to properly perform many of the tasks that are required to keep your airplane in tip-top shape.

Steps in a cabin and interior renovation project

The following is a list of the steps we take during a typical renovation of cabin and interior in a 40-year-old airplane. In upcoming months, I will work my way through the major items on this list, with descriptions of processes accompanied by photographs.

1. Remove and secure all documents and personal items.
2. Perform an ergonomic study of the pilot seating station.
3. Test radios, intercom, autopilot, electrical components and lights for function. Report findings and recommendations.
4. Remove and evaluate existing side panels, seats, headliner, carpet, insulation, floor inspection panels and window trim.
5. Inspect all structures and skins for corrosion. Remove corrosion and glue from inner cabin skins, spar carry-through and related components. Treat all inner surfaces and appropriate components with corrosion-control materials.
6. Clean exposed antenna connections and inspect all systems and controls.
7. Strip seats to bare frames to perform a complete mechanical and structural inspection. Repair as required.
8. Install heavy sling reinforcement straps on seat frames and install a new seat sling. The reinforcement keeps the sling from stretching or coming loose from the frame and prevents future sagging.
9. If requested, build the height of the seat back structure to accommodate the stature of the pilot. Many of our customers choose this option as an alternative to a headrest. (Note: this requires appropriate FAA approval and a Form 337.)
10. Build new seat foam, shaping with several densities of flame retardant urethane foam. The new foam is contoured to fit the customer as determined by measurements taken earlier.
11. Clean, mask, prime and paint all seat frames to match the new interior color scheme.
12. Sew and fit the new seat upholstery. Shaping is done with hidden sewn-in rods

Many older airframes exhibit corrosion, but it often can be mitigated.



A tangle of wires from years of incremental instrument panel "upgrades."

Leaking windows is another non-upholstery issue common to aging Pipers.

and pulls to insure long-lasting structural integrity, eliminating sagging and shifting. All seams are double-lock stitched to prevent seam failure. All seat panels have backing foam and backing fabric to insure proper fill.

13. Strip side panels to bare metal. Factory cardboard panels are replaced with new aluminum panels; existing metal panels are repaired to be in like-new condition or made new.

14. Temporarily install the non-upholstered panels. Check for fit and layout of the new design; modify as necessary to ensure ease of installation and removal when upholstered. Fill in ashtray holes if requested.

15. Sew and mount side panels using new high-density, flame retardant backing foam and upholstery material of choice.

16. Prep, paint and placard plastic trim, door and window trim, and cabin components.

17. Clean, mask, sand, fill and paint all door frames and related interior airframe trim with custom-matched interior paint.

18. Install new insulation behind side panels, in doors and behind headliner.

19. Clean below floors and behind rudder panels as required.

20. Clean all seat tracks. Buff or paint heater outlets and similar components.

Composite side panels with recessed armrests are one of many optional upgrades available when renovating a Piper interior.

21. Install new windlace cord on doors; install reupholstered side panels using new hardware.

22. Strip headliner panels and repair or replace as required. Plastic headliners are re-formed and reinforced with aluminum as necessary to prevent future sagging or warping.

23. Fit, sew and install new headliner and reupholstered sunvisors, if applicable.

24. Cut and fit new carpets for cabin floor, baggage compartment and related surfaces. Special attention is made to allow for future removal and reinstallation without removing seats.

25. Serge all carpet edges; sew on Velcro and heel pads. Insulate the underside of the floor carpets with heavy density, flame-retardant foam. Bond Velcro to floors and install the new carpet.

26. Reinstall existing lap belts and shoulder harnesses, or install new and/or re-webbed components.

27. Install cabin seats. Lubricate all door and seat latches.

28. Perform a safety and function check on the interior, radios, flight controls and electrical components.

29. An A&P mechanic will make all necessary logbook entries and weight and balance changes, and check that all placards are in place.

30. Wash and ground-run aircraft to prepare for customer delivery.

Other items that may be addressed

Some additional items that may be addressed during a renovation include: reinforcement and repair of aluminum and plastic cabin components; replacement parts; painting and placarding of instrument panel, pedestal and circuit breaker panels.

Other items might include installation of special composite insulation and soundproofing; glareshield modification, repair and upholstery; repairs to or replacement of side panel components and repair or replacement of damaged floor boards.

In addition, the owner may choose to add extra map cases, storage boxes, cup holders and gooseneck maplights and install a new windshield and/or windows.

Things to consider

Some owners will read through this list and realize that some of the work is beyond their ability. (Sewing seats and headliners come to mind.) Fortunately, there are companies who can provide quality interior kits and components with good product support for those wanting to install a mail-order interior.

I highly recommend that any owner undertaking interior renovation work seek the advice of his or her A&P mechanic and arrange for that mechanic to inspect the stripped-out cabin structure, systems and seat frames for signs of any airworthiness issues. These areas can be hidden from view during routine maintenance when interior components and insulation remain in place.

Many owners may choose to renovate their airplanes incrementally, removing one side panel at a time and cleaning, chromating and insulating the exposed structure of that one area. I have mentored a number of people through this process over the years.

Whether you are planning to have a professional shop renovate your airplane, or you plan to do part or all of it yourself, stay tuned. Upcoming articles should help guide you in your decision-making.

Until next time, fly safe! PF

Industrial designer and aviation enthusiast Dennis Wolter is well-known for giving countless seminars and contributing his expertise about all phases of aircraft renovation in various publications. Wolter founded Air Mod in 1973 in order to offer private aircraft owners the same professional, high-quality work then only offered to corporate jet operators. Send questions or comments to editor@piperflyer.org.