OFF WITH THE OLD

GOOD AS NEW 172

Good-bye old yellow: A high-pressure wash peels off the stripper and the softened paint.

On with a new coat of paint

BY THOMAS B. HAINES

Obviously, paint and interior are the most visual parts of an aircraft refurbishment. Sure, an overhauled engine looks nice and fresh, but with the cowling all buttoned up, about the only evidence of the effort might be a spiffed-up propeller or the hint of a newly painted cylinder peeking through the cowling inlet. When you pick up the airplane after the overhaul, you're not going to be wowed by it, except maybe when you're handed the bill. The pick-up at the paint shop is quite another experience. ■ After months of poring over paint schemes, paint chips, carpet samples, and fabric swatches, I thought I could pretty well imagine what our Good as New 172 project airplane would look like inside and out with its fresh livery and interior. After all, we even had photographs of

PHOTOGRAPHY BY SKIP CHURCHILL

a Cessna 172 in the same paint scheme and colors.

Nonetheless, I was unprepared for the sight of our once ragtag Skyhawk in all its newly painted glory. I almost needed to check the data plate to make sure that the crew at Oxford Aviation in Oxford, Maine, hadn't switched airplanes on us in the month they had it. Now, weeks later, I still find myself referring to it as "the other airplane" when discussing some part of the refurbishment before the paint job. The transformation from 19-year-old N13057 to Good-as-New N172GN is complete.

An acid etch wash (above) neutralizes surface corrosion and prepares the aluminum to receive the alodine conversion coating. New windows go in after the danger of stripper damage is past.

Go ahead and turn the page in search of some photos of the finished product. You won't find them in this issue. Yes, cruelly, we're going to wait until next month to show off the airplane in all its splendor. By the time your January issue of *AOPA Pilot* arrives, some lucky member will be about to receive the keys to the airplane in our Good as New 172 Sweepstakes. For details on entering the contest, see p. 19. Sweepstakes entries must be received by December 31.

Because the paint and interior processes are so visual, preparing for them can be the most fun of the entire refurbishment effort. The engine overhaul process is interesting but not exciting. Refurbing an avionics panel allows only limited creativity—restricted by your wallet and panel space—and something always goes wrong. ("Well, it seems the panel lights are on anytime the master switch is on. We just spent eight hours troubleshooting and can't figure out why. Must be a wire crossed in there somewhere." True story, different airplane.)

Before settling on a paint shop, it's important to first know what you want. Our 1974 172M was not unusual in that every plastic fairing except one was cracked and needed to be replaced. Twenty years of ultraviolet radiation exposure will do that to plastic. The new fairings—about $550 worth—are made of fiberglass, which lasts longer and is easier to repair. We went into the project expecting to replace the badly crazed windshield and back windows. Upon looking the airplane over before painting it, James Horowitz, president of Oxford Aviation, noted that replacing the front and back windows only makes the yellowed side windows look worse. Thus, we opted for new gray-tinted windows the whole way around—at a cost of $600, plus $715 for installation. The wonderfully scratch-free windows really do look nice and in fact have received as many compliments as the paint or interior.

You ought to get all of those airframe modifications you have been considering done before the paint job, too. Precisely matching the paint later can be very difficult. For example, we installed new wing tips with landing/recognition lights supplied by RMD Aircraft Lighting in Hillsboro, Oregon, before we sent the 172 to the paint shop. The tips with lights retail for $1,095. Some customers conduct an annual inspection of the airplane before the paint job, just to keep from having to open it up (and probably scratching the paint) for as long as possible.

A good paint shop helps you out in that regard by painting the inspection panels separately. That way, the paint does not seal the panel down, causing a rough edge when the panel is removed. Stainless-steel screws, left unpainted, also mean that cowlings and panels can be removed without leaving scratched and soon rusty fasteners behind as evidence.

Many paint shops also do interior work or are associated with an interior shop (see "An Inside Job," p. 70). Doing interior work at the same time as the paint is a good idea, if the checking account can stand it. With the interior removed, the painters can more easily paint doorframes and -jambs and replace the windows. Downtime is reduced because much of the interior work can be done in conjunction with the painting process. Regardless, expect to have the airplane out of service for about three weeks, interior work or not.

As with the windows, a new paint job will only make a worn interior look even worse, and new paint and interior only draw your eye to that cracked and dilapidated avionics panel. In fact, many interior shops include some refurbishment of the panel in their price quotes. If not, consider paying a little more to have it done, even if it means only some new plastic overlays and placards. New overlays for a 172 panel can be had for only about $200. Paint them to match the interior, and

you'll be pleased with the results.

Finding a good paint and interior shop takes some investigating. Except for those shops specializing in business jets and turboprops, aircraft painting is very much a regional thing. Few of even the more progressive paint shops advertise much. Some attract customers by direct mail, but much of a shop's business is by referrals from satisfied aircraft owners. Fixed-base operations and maintenance shops often know which shops do the best work. Likewise, other aircraft owners around the airport are a good source of information. A reputable paint shop ought to be eager to provide you with a list of references.

AN INSIDE JOB

Building the best seat in the house

While the steps an aircraft will go through during a painting process are fairly standard, varying only slightly depending on the paint manufacturer, the interior process is very much up to the individual doing the work. You can have as much or as little as you want—from leather and suede to vinyl and plastic. The only standards deal with the Federal Aviation Regulations that outline what materials may or may not be used in an aircraft interior.

FARs 23.853 and 25.853 detail the burn tests fabrics and carpets must withstand before they can be used. FAR 23 deals with aircraft with a maximum weight of less than 12,500 pounds. Aircraft over that must meet the more stringent Part 25 regs.

Materials that meet the regs will come from the factory stamped with such a notice, but that alone is not enough. Swatches from each batch of material used in an aircraft must be tested and approved by an FAA designated engineering representative. The burn test costs about $100, but many interior shops don't necessarily follow the rules exactly, according to Donald Stretch, president of Airtex Products, Incorporated, of Fallsington, Pennsylvania. Many shops just install the factory-approved materials, at least until their local FAA inspectors start nosing around. The way around doing the burn test locally is to purchase the material from a manufacturer or distributor that tests the material under the eye of a DER and has the necessary documentation and the parts manufacturing authority. Airtex is one of the few shops that has such authority for fabrics.

Most of Airtex's business over the past 45 years has been in selling replacement interior parts to aircraft owners. The company is probably the biggest provider of complete interior kits that can be installed either by an aircraft owner or a maintenance shop. Depending upon the model of the aircraft, the chair kits include not only the fabric sleeves to cover the cushions, but also the necessary foam to rebuild the seats. Also available are wall panel sets, headliners, carpets, and other interior items.

Recently, though, as the FAA has begun to more closely monitor the fabrics going into aircraft, Airtex has begun to sell more approved fabrics directly to custom interiors shops, shops that apparently find it easier to buy Airtex's approved fabrics than to do the burn tests locally.

Oxford Aviation's interior shop manager Curt Myer spins bits and pieces of fabric into a comfortable, attractive interior.

Such custom shops are an alternative to using Airtex's standard interior parts. Custom interiors offer a much wider choice of colors and fabrics. Choosing a custom job also means you've got a professional doing the completion work.

For our Good as New 172 project airplane, we enlisted the expertise of the interior shop at Oxford Aviation in Oxford, Maine. The custom interior was done in conjunction with the aircraft painting, also accomplished at Oxford. The company offers a dizzying array of fabrics and carpets. Once I had decided on the fabric and carpet, I left the design of the interior mostly up to the Oxford staff. I viewed some photographs of their previous work, noted some I liked and the sort of look I wanted, and let the professionals go at it. The result is quite impressive and a far cry from the vinyl that Cessna originally installed.

A quality custom interior costs a lot—$3,000 to $4,000 for a Cessna 172-class airplane, more for leather or if you want to add lots of extras. A standard interior from Airtex would run about $1,500, not including installation or any new plastic parts. An owner can install the interior under preventive maintenance rules outlined in FAR Part 43.

To see why a custom interior costs more, just look around inside an airplane and see all the detail work that must be done. Many plastic parts on the sidewalls, headliner, and window frames must either be replaced with new ones or at least painted to match the new interior. The seat frames must be repaired and repainted. Probably the old foam is rotten and crumbling. It may be replaced with new "memory" foams that provide much better support and durability. Take a look at the detailing of the seats and sidewalls. All of the ribbing and surging on the carpets and seats is probably handmade.

When installing a new interior, consider also upgrading the safety devices. On the 172, for example, we installed rear-seat shoulder harnesses, something that Cessna didn't offer when the airplane was built in late 1973. We also installed a stop on the pilot's seat to keep it from sliding back if the main latch fails. It's a simple and cheap addition when the interior is out.

We paint the outside of an airplane to protect it from the elements. The end result also happens to look nice. But we spend far more time looking at the interior as we drone along. It's the place to get creative.

—TBH

AOPA's Membership Services Division (800/USA-AOPA) can offer some help in finding a paint shop. Even if the aviation specialists at AOPA can't recommend a particular shop in your area, they can tell you if a shop you are considering has had any complaints reported to AOPA by other members.

It's no secret that the federal Environmental Protection Agency and the Occupational Safety and Health Administration and their state equivalents have made life more difficult for paint-shop owners in the past few years. Several well-known paint shops are no longer in business because they could not afford the cost of complying with regulations to dispose of waste products and to protect workers. Chemical strippers used to remove old paint, the old paint itself, primers, acids, and other chemicals used in the process can be highly toxic. Disposing of the waste products and protecting workers from them is expensive.

Oxford Aviation's Horowitz estimates he spends about $400 to dispose of the waste generated by stripping and repainting an aircraft the size of a Cessna 172.

Oxford's painting facility, now about two years old, is probably one of the most modern in the country. The company previously painted airplanes in what is now its maintenance hangar. Prior to starting construction on the new paint shop, Horowitz went to the EPA and applied for a permit and asked for the agency's help in designing the facility to meet federal regulations—a move that many colleagues thought only invited trouble. The EPA's involvement did add about six months to the construction time, Horowitz estimates, but now the facility and the entire waste-disposal process is run by the book—a book that the EPA helped write.

The processes used by Oxford are typical of those in most well-run shops. Plastic parts are removed and sanded separately because they can be damaged by the chemical strippers. Windows, antennas, deicing boots, and some other parts may also be damaged by the strippers and thus must be carefully masked off with special foils and tapes. All doors and inlets are sealed, and tires are covered or removed. The stripper can be brushed on, but Oxford applies it with sprayers, which is faster and provides more even coverage. The type of strip-

per used depends on the type of paint to be removed. Old lacquer paint, such as was on our 172, is easily removed and thus does not require the same strength of stripper as does an airplane with a more modern polyurethane paint.

High-pressure washes finish removing the paint bubbled up by the stripper. This is the process that generates the most toxic waste. The sludge containing the remnants of the stripper and old paint is captured and dried. Eventually it is picked up by a waste-disposal hauler and taken to an incinerator for burning. Because it costs about $2 to dispose of each gallon of contaminated water, the water is stored, filtered, and reused many times before it is taken to a waste-disposal site.

Once most of the paint is removed, workers then set out detailing the airplane. Areas around windows and rivets need special attention, sometimes further applications of strippers or sanding to remove the old paint.

Some shops have attempted to find alternatives to chemical strippers. Blasting the surfaces with plastic beads, sand, dry ice, baking soda, or other materials have all been tried with only limited acceptance by the industry. Blasting may be appropriate for larger aircraft with thicker metal skins, but the thin aluminum on most light airplanes can't take much abrasion.

The gold-colored alodine conversion coating fends offs corrosion and helps adhere the primer to the surface.

When investigating a potential paint shop, make sure it uses only aircraft-grade chemicals, which are stabilized to prevent corrosion. Otherwise, any stripper caught in seams or lap joints may cause the aluminum to corrode.

Once stripping is complete, the crew should inspect the airplane for corrosion. Most shops build a few hours of corrosion repairs into their prices. Minor corrosion can be sanded out. More extensive damage, which is rare, may require skin or control surface replacements, obviously at an additional charge.

The next step is an acid etch wash, which super-cleans the aluminum and prepares it to receive the alodine conversion coating, the gold-colored chemical that controls corrosion and allows the paint to better adhere to the aluminum. Next comes the zinc chromate primer, as many as three coats. The zinc chromate also helps prevent

future corrosion.

Finally, after much ado, comes the finish paint, usually at least two coats. After the base coats dry, the entire airplane is masked off except those areas that get a stripe color. The stripe is painted. Then that area may also be masked off to apply a stripe of a second color, if necessary, according to the customer's wants. Finally, the registration number stencils are applied and the numbers painted on.

If desired, a clear coat may be put on over the finished paint. The clear coat provides extra ultraviolet protection and adds depth and gloss to the finish. Clear coats can add about $900 or more to the cost of a paint job and, in the past, have had a reputation for yellowing or chipping off. But the processes for applying clear coats are much better than they used to be. Some shops, such as Oxford Aviation, have been getting very good results with clear coats. DuPont studies show that a properly applied clear coat can increase a paint job's life by as much as 35 percent.

We did not apply a clear coat to N172GN because the mostly white scheme held its gloss very well and because of time. It seems a strong-armed United Parcel Service delivery person folded a rudder in half that we had sent out for repair, thus delaying the painting for more than a week while we scrambled around to find another rudder. We needed the airplane completed in time to display at AOPA Expo '93 in early November.

Once the painting is complete, a shop needs at least one more day for detailing. The landing-gear areas are usually hand painted and cleaned. Bits of overspray are cleaned up, control surfaces need to be balanced and reinstalled, and wheel fairings may need to be put back on.

As you can see, painting of the aircraft takes a relatively small amount of time. Preparation is the biggest time consumer and the most important part of the process.

What do you look for in a paint shop? Find one that follows the basic steps above and that uses quality products. Oxford Aviation uses only DuPont Imron paints. A DuPont representative, who happens to be an AOPA member, read about our refurbishment project last spring and offered to supply the paint for the project. We accepted because we knew that Imron has an excellent reputation for durability and for maintaining a glossy finish. According to Horowitz, what's most important is to see that the shop personnel follow the manufacturer's recommended preparation and application procedures. Every paint shop has its preferences in paint brands or support provided by the paint manufacturers, but about any of the well-known brands of polyurethane paints for aircraft, such as Imron, Alumigrip, JetGlo, and Randolph, will provide a good, long-lasting finish when applied properly.

Before signing on with a shop, examine one of its paint jobs, preferably one done a year or so earlier. Look close. Most any recent paint job looks good from a distance. Sight along rivet lines. Rivets are a painter's nightmare, particularly if they fall along a stripe, and they always seem to. A good finish will have almost no overspray of trim color onto the base color around the rivets. Paint stripes will be straight. Windows will have no overspray and will not show damage from a stripper. Evidence of dust in the finish should be almost nonexis-

All primed and ready to go. The next step, base coat and trim colors. See these pages next month for the unveiling.

tent. Most paint shops wet the floor down while painting to keep dust to a minimum. Downdraft paint booths, such as those at Oxford, pull air from above and into vents in the floor under the airplane to help keep dust and overspray from settling on the surface.

Does the shop remove the control surfaces and paint them separately? That's the only way to get a nice finish in all the nooks and crannies. The surfaces must be rebalanced before reinstallation.

Ask about waste disposal. The shop owner or manager ought to be able to talk intelligently about the waste the shop produces and how it is disposed of. Maybe even ask to see a certificate of waste disposal. The waste is tracked at each step as it makes its way to the incinerator. The shop should have certificates that show that. A shop that offers an exceptionally low price may not be following proper procedures, which can be harmful to the environment and ultimately may cause you grief. If the EPA moves in and closes the shop a week after it finishes your airplane, you've got nowhere to go for warranty claims.

The shop you're dealing with does offer a warranty, doesn't it? Warranties vary but are usually one to three years. They normally do not cover damages from stone chips or heavy icing, and any repairs must typically be done at the paint shop. After the job, you should be supplied with small amounts of paint to do your own touch-ups later.

The price ought to be the last item you consider. It sounds trite, but consider a paint job an investment. Paint protects the airplane from the environment, makes it easier to care for, and increases the resale price. A modern, quality polyurethane paint with regular washings should maintain its shine and luster for at least 10 years under all but the worst conditions. An airplane flown often or parked outside will lose some of its gloss over the following five years and may need to be painted again after 15 or 20 years. A hangar queen ought to look good almost indefinitely. Expect to pay between $4,000 and $6,000 for a good-quality paint job on a 172-class of airplane. Shops charging the higher amounts tend to do more detailing and usually spend more time fixing small items and primping. Remember that items like new windows and fairings can easily add $2,000 to $3,000 to the bill.

But when it's time to pick up your old steed after the fact, come prepared to be bowled over. □

FOR MORE INFORMATION

Oxford Aviation, RFD 1, Box 1275, Oxford, Maine 04270; telephone 207/539-4779.

DuPont Paint, 865 Stephenson Highway, Troy, Michigan 48083; telephone 313/583-4656.

RMD Aircraft Lighting (wing-tip lights), 3648 S.E. Roanoke Court, Hillsboro, Oregon 97123; telephone 503/648-0331. □