

# AVIATION MAINTENANCE

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The cast metal DUX pressure gun uses laminar flow to reduce overspray.

## Puttin' On the PAINT

NEW TECHNOLOGY IN COATINGS AND APPLICATORS FOR AIRCRAFT EXTERIORS

NEW PAINTING OR REPAINTING IS NO SMALL MRO TASK, CONSIDERING IT CAN COST AN AIRLINE UP TO \$150,000 A DAY IN DOWNTIME, DEPENDING ON THE AIRCRAFT'S SIZE.

BY VICKI P. MCCONNELL, TECHNOLOGY EDITOR

One of the most labor-intensive elements of hand work MRO technicians must do is applying exterior primer paint, topcoat, livery details and clear protective coating on aircraft. Complete jobs may entail new paint or scuff and repainting the entire aircraft, large sections such as wings and tail or fuselage separately, as well as touch up repairs on smaller areas. Putting on the paint is no easy MRO task, with regulations limiting a technician's exposure to volatile organic compounds (VOCs), customers demanding stringent distinctness and depth of image (DOI) in livery and the fastest possible turn time, and more frequent use of high solid paints

requiring different techniques in mixing ratio and application.

### It's All In The Primer

Actually, the primer (which covers the aluminum or composite airframe), topcoat (which goes over the primer, and is usually white), livery colors (specific to each airline, military service, and customized for individual owners) and clear coat (to protect the other layers) each play an important role in aircraft exterior finish.

DuPont Aviation Finishes offers its trademarked Imron polyurethane enamel finishes, including single-stage topcoats in solid and metallic colors and a basecoat/clearcoat for accent colors and stripes, all providing good appearance and chemical/fluid resistance. The company's corrosion-resistant Corlar products include

high solids epoxy primer with minimal texture, a nonchromate epoxy primer, and an epoxy surfacer that provides a level, texture-free surface for single or multi-stage topcoats.

Sherwin-Williams always has new color recipes brewing at its Kansas color laboratory, though it remains best known for its Jet Glo and Acry Glo range of paints. The company's Jet Glo Express paints work with a simple two-to-one mixing ratio and use of the same catalysts as the base coat. Jet Glo Express is also buffable and highly resistant to Skydrol and chemicals, so no clear coat is required on the paint finish. Cure time has also been reduced, which often means tape time in less than eight hours.

The Airbus A380 aircraft that launched last year, which contains both metal and composite airframe

elements, “will look better longer” due to the 250 gallons of Desothane HS CA 8000 high-solid, low VOC polyurethane topcoat on the fuselage and vertical fin. Made by PPG Aerospace Coatings, this topcoat contains 55% solids by volume and 40% less solvent per volume than conventional topcoats.

PPG Aerospace/PRC-DeSoto has also qualified its chromate-free, high solids Desoprime HS CA7501 epoxy primer for the composite fuel tank on the new Boeing 787. This is the first chromate-free primer qualified at Boeing and, due to its corrosion resistance properties, it can also be applied to aluminum parts. Compatible with Desothane HS topcoats, the primer has specifically been formulated to dry quickly and maintain rigorous DOI.

Akzo Nobel Aircraft Coatings (ANAC) is another supplier for aircraft paint on the A380, both inside and out. Its low-weight, chromium-free Aviox CF primer is specified for the fuselage and vertical tail, and its flexible Aeroflex urethane wing coating covers the 239 foot wing span of the 500-plus passenger plane. ANAC is doubling the size of its color-blending facility at Sassenheim in the Netherlands to help meet the demands “of new customers every day,” states Hans Peter van Wilsem, plant manager.

With Airbus, PPG and ANAC have developed a selectively removable (SR) system for preparing and repainting aircraft that allows the chemical removal of selected coating layers using mild to neutral strippers and keeping the basic OEM-applied, anti-corrosive primer layer and pre-treatment intact (AM, April 2006). No sanding is needed, and repainting occurs through re-application of the sealer coat and finish with a compatible topcoat. Up to 20% reduction in strip and paint cycle (an estimated 48 hours) can be saved using the SR system, and the topcoat could extend the need for repainting by up to two years compared to conventional topcoats.

### Gunning for DOI

With a panoply of paints and coatings to choose from, the goal of application is to achieve a customer’s DOI

specifications, avoid as much overspray and blowback as possible, and offer superior ROI (return on investment) from the equipment.

3M’s three spray gun models in its Paint Preparation System (PPS) are touted as “designed for painters by painters.” The Compliant model combines high volume, low pressure (HVLP) technology for high transfer efficiency, with the exceptional atomization performance of conventional high pressure technology. A collapsible plastic bag and dedicated filter allow the spray gun to function at any angle, be used for both mixing and spraying, and apply paints and clear coats. According to Paul Neary, 3M market segment manager, “the flexibility of the PPS provides great precision and detailed painting of items on aircraft. Old style systems use over a quart of solvents for clean up, but the PPS requires only a few ounces. Both VOCs and disposal costs are reduced.”

In true technology transfer from Formula 1 race cars to aircraft, **DUX AREA (Advanced Research Environmental Atomization) Inc.’s** spray gun uses laminar flow, based on observations of the way laminar flow reduces fluid turbulence in racecar engines. As explained by Matt Carlson, director of Marketing, the DUX pressure feed, gravity feed and automatic spray guns are each designed with straight passages and sweeping curves that minimize air travel distance, lower operating pressures at the air cap, and use fewer overall parts. Carlson points out that most other spray guns “incorporate a rear-mounted air chamber, which forces the compressed air through a series of sharp twists and turns to go up and over the fluid needle and then back down into the air cap.”

All three models are ergonomically designed to reduce user fatigue, and the gravity and pressure feed guns are light compared to others in their class: 13.6 ounces (without fluid cup) and 14.1 ounces respectively. The spray bodies are investment cast rather than forged aluminum, have about 30% fewer parts that fit all three guns, and utilize a high-endurance fluid needle capable of tip sizes down to 0.6mm. The equipment sells for \$1,295 each. DUX began selling

its three spray guns in the last year.

DUX reports a 15% to 40% improvement in transfer efficiency compared to either electrostatic or HVLP equipment. This reduces VOCs and leads to rapid ROI (within several days for one customer applying extremely expensive coatings). Carlson tells AM that DUX guns’ drastically reduced overspray,



3M's Paint Preparation System allows the spray gun to be used at any angle.

to the point that “the DUX gun can easily be used on one side of the plane, while other repairs are occurring on the other.”

Steve Waters, appearance manager for exterior and cabin painting at Evergreen Air Center in Marana, Arizona, attests to this. Though his group at the FAA-approved FAR Part 145 repair station has been using the DUX pressure gun for just a few months to paint engine cowls, he can already tell “it will cut down on maintenance since it has fewer parts, compared to the upkeep on our electrostatic equipment, which is expensive.” Since January, the Center has completed full aircraft painting on ten Boeing 737s. “The DUX gun has low overspray (10% to 15% with consistent density in up to 90% of the fan pattern), which reduces masking time and uses less paint. Plus we can do all the finishes with one gun.”

Much lower air and fluid pressures and fewer passes with the DUX spray guns are particularly relevant to the excess air that can be trapped between the target surface and the coating during high-pressure application, and result in defects such as orange peeling or sagging. Even in operations using other types of spray guns, Carlson notes that DUX guns “can simply replace the existing gun regulator to reduce the incoming pressures.” **AM**