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Identifying and Minimizing Aerospace Coatings Rework: Getting Back to Basics

For aviation maintenance facilities tasked with any refinishing function, the margin for error is razor-thin. A single misstep in surface prep, paint application or environmental control can trigger costly rework, delaying delivery schedules, straining labor resources and eating into profitability. These aren't just technical setbacks — they're operational liabilities.

Facilities that consistently avoid extensive rework aren't just lucky — they're disciplined. They invest in proven coatings systems, enforce rigorous training protocols and understand the foundational causes of common paint failures. By getting back to basics, maintenance, repair and operations (MRO) teams can dramatically reduce rework incidents; protect their bottom line; and deliver flawless finishes on time, reinforcing customer trust.

Aircraft refinishing rework is the process of modifying or correcting the refinishing of an aircraft's exterior to meet specifications. Rework to correct defects of a newly applied coating is inevitable and a crucial part of quality control.

It's a common misconception that if the paint finish looks flawed, the paint itself must be the root cause. The coatings themselves are rarely the culprit. Most rework issues stem from process controls, whether in surface preparation, application technique, environmental or equipment condition. These foundational elements play a critical role in achieving a durable, high-quality finish and when they're overlooked or inconsistently executed, the results can be costly.

So, in the grand scheme of things, what does it cost an aviation paint shop when it comes to rework? Plenty.

Aerospace coatings rework requires more than just additional materials. The biggest costs involve wasted time and increased labor. These are practically hidden among other operational inefficiencies, as rework and reactive maintenance issues aren't factored into most paint job schedules and budgets. Rework can disrupt schedules, cause budget overruns, and increase stress among management and the workforce.

The need for rework can arise from various issues, such as:

- Surface contamination: Dust, dirt or other particles can become embedded in the paint during application, requiring a re-sanding and repainting of the affected area.
- Inconsistent paint application: Improper technique can lead to uneven application, known as "orange peel," a wavy surface that must be sanded down and recoated, or over- or under-sprayed areas.
- Adhesion problems: If the paint does not properly adhere to the underlying surface or primer, it can flake or peel. This requires removing the paint and re-prepping the surface.
- Masking errors or bleed-through: Mistakes in painting stripes, logos or registration numbers require a precise re-masking and repainting of those sections or correcting where paint seeps under the masking tape.
- Cleanliness: Taking the time to clean the booth and aircraft thoroughly before the painting process starts can help avoid rework. That should be a part of a disciplined process, including regularly changing out paint booth filters, having strict entry protocols and scheduling deep cleaning.
- Minor damage: Small scratches or chips that occur during or after the refinishing process may need to be touched up.

Or … It Could Simply Be an Issue with the Paint Area Environment

Sometimes, even when all the hands-on processes are followed to the letter, Mother Nature steps in and causes an issue. The paint crew needs to be aware of, and deal with, the presence of unfavorable environmental conditions. Subsequently, a controlled environment is advantageous for a high-quality paint job.

Efficient and effective ventilation is an absolute must. Inadequate airflow in the paint booth or hangar can allow airborne dust and debris to contaminate the wet paint.

Refinishers need to be mindful of high humidity. Excessive moisture in the air can cause blushing, a cloudy or milky appearance caused by moisture trapped in the paint film. It can also slow drying time and increase the risk of paint runs.

There could be issues with improper temperature. Temperatures that are too hot, or too cold, can affect wet edge, dry times, and paint flow and levelling consistency.

And finally, there's even static electricity. Static on a panel can attract dust and other airborne particles, leading to more contamination in the paint finish. Grounding of aircraft is essential.

Training Teaches and Reinforces Proper Techniques and Process Knowledge

Why does rework occur?

It's not done maliciously, but in the course of every aircraft paint job, errors can occur — even with the most seasoned painting teams. Often, the paint job is the final part of an aircraft's MRO journey and there's a rush to get back into the field and start making revenue for its owner or brand, especially if it's a commercial plane that has been out of commission for weeks or months.

This can cause even established paint teams to skip steps, take minor shortcuts or overlook standard maintenance required to produce a flawless finish.

Proper training prevents aircraft refinishing rework by ensuring technicians have the knowledge, skills and discipline to complete the job right the first time. It minimizes common errors that lead to defects, enhances efficiency and ensures compliance with strict aviation safety standards.

When it comes to avoiding rework, following best practices is imperative. Adhering to established application guidelines can help prevent rework by ensuring the correct surface preparation, paint application techniques and post-paint inspection procedures.

Rework occurs due to a lack of training, limited shop resources and consistent mentoring in the paint shop. Thorough training courses (for both novice and seasoned refinishers) focus on the specifics of the aircraft refinishing process, allowing technicians to avoid common pitfalls and reinforcing best practices for every paint job:

- Surface preparation: Trainees learn to properly clean, strip, mask and sand surfaces to ensure optimal paint adhesion and a smooth finish. Without correct surface preparation, paint can peel, flake or fail prematurely.
- Corrosion prevention: Technicians are trained to identify, remove and treat corrosion before painting. Since improperly treated corrosion will grow under the new paint, this step is crucial for avoiding costly future repairs.

- Equipment use: Training covers the correct setup, operation and maintenance of specialized spray equipment. This ensures a uniform coating and avoids issues like improper thickness, which can lead to runs, drips or insufficient coverage.
- Application techniques: Proper training teaches the best methods for applying paint to the complex curves and surfaces of an aircraft. This minimizes defects such as "orange peel," uneven layers and other visible flaws.

Human Factors and Error Reduction

Training addresses the human element of aircraft maintenance, which is a major contributor to rework and incidents. It also reinforces best practice adherence, which should reduce rework issues and minimize the mistakes. Regular and updated training assists in many ways:

- Attention to detail: Repetitive tasks can lead to complacency. Training emphasizes mindfulness and attention to detail during every step of the process to catch and correct mistakes early.
- Adherence to procedures: Aviation regulations require that all maintenance follow standardized, approved procedures. Training instills the discipline to follow these strict protocols without taking shortcuts.
- Identifying issues: A well-trained refinisher can quickly identify problems — such as dust inclusions, sagging paint or an uneven coating — and rectify them before a new layer is applied, which avoids more extensive rework later.

Operational Efficiency and Cost Savings

Investing in training is a proactive strategy that offers significant returns by avoiding unproductive labor activity and the high costs of rework. Better workforce and cost efficiencies include:

- Reduced downtime: Rework requires taking an aircraft out of service a second time. Getting it right the first time minimizes delays and gets the aircraft back into operation faster. It also assists in significant labor savings — the most expensive part of any aircraft repair or overall job.

- Lower material costs: Fixing a flawed paint job means using additional strippers, primers and topcoats. Proper training reduces wasted materials, contributing to cost savings.
- Increased throughput: When a team is highly skilled and consistently keeps rework to the absolute minimum, it can move on to new projects which increases the shop's overall capacity.
- Enhanced reputation: A reputation for high-quality work and on-time delivery attracts more business and builds customer confidence.

Since aerospace coating technologies and regulations are always evolving, ongoing training is essential. Recurrent training with refresher courses ensures that technicians remain proficient and up to date with current best and repetitive practices. They can introduce and help refinishers become proficient with new technologies, as well as the latest products and application techniques. And in some cases, they can even provide certifications, which validate a technician's or the whole team's competence, offering assurance to employers and customers.

Why You Need to Avoid Rework

The rework process is time consuming, costly and frustrating to all involved. In addition to confirming each day's paint shop assignment, paint teams should "huddle" every shift before performing tasks to assure all procedures are in place and followed.

As pointed out, consistency breeds good results. MRO maintenance directors and managers need to look closely for preventive maintenance savings and training opportunities to better produce consistent and quality work.

MRO directors of maintenance can learn more about the latest aerospace coatings products, service and training opportunities by contacting their Sherwin-Williams Aerospace representative or its product distributors in their area. To learn more, visit *https://industrial.sherwin-williams.com/na/us/en/aerospace/contact-us.html*.