PUTTING PROFIT INTO PAINTING PLANES

I was visiting my old friend, Kevin Corrigan. We had played high school ball together and hadn't seen each other for a few years. "Kevin, you are always 'poor-mouthing' me about how you can't make money painting aircraft. This is nonsense. What are you doing in your operation that is costing so much money?" Kevin and I were discussing the painting of singles and light twins in his office. Outside in the hangar was a beautifully refinished Extra EA-400 racing plane that had a finish you could see your reflection in. It was just gorgeous. The skill and professionalism that was incorporated into that finish was something that was amazing to see.

In the aircraft refinishing business you can't afford not to have a paint spray booth to compete competitively

"I paint the planes and get the colors and finish just right, but I have a lot of re-work. It takes a lot of time to buff it correctly and get the imperfections out of the surface. If you get just one little dust particle in the surface, you can see it from a long way off and it just has to be fixed," said Kevin, fidgeting with his deskpad and pencils.

"Maybe we should look at your operation," I said and we went into his hangar. It was typical of most airplane paint hangars in this industry, having a small exhaust filter chamber along the rear wall. Air was drawn in through the hangar door opening and was unheated. The building was a pole building with metal siding and metal ceiling rafters and roof purlins. The booth was lighted by 8 metal halide pendant fixtures and was very dimly lit.

"Kevin, we have to talk," I said as I made a few notes. "I see several areas of improvement that you should make. The first is to reduce the risk of fire by changing your lights to explosion-proof lights, which is going to be costly, but will probably save you the loss of an aircraft by fire. The second is to ventilate better. The exhaust filter and fan are good, but they are way undersized. I am afraid you will build up vapor concentrations that may be within the flammable limits. With more exhaust, you will reduce that risk."

Looking further, I said, "The air replacement is natural draft and it comes into the building through cracks and door openings and brings with it all the outdoor dust and pollen and such things as bugs and birds. None of these help you reduce re-work. The best way to be sure your painting environment is clean is to install an air replacement unit that will bring in filtered and heated air directly into the painting space."

"That's fine, but how much air do I need to exhaust to be safe from explosion?" he wondered.

That is a good question, of course, and much study has been put into the special needs of aircraft booths. There are actually two considerations. The first is to reduce explosive concentration to prevent risk of fire. NFPA-33 says to keep the concentrations below 25% of the Lower Flammable Limit (LFL). The second is to have enough airflow to remove overspray and filter out contaminants. The second always requires more air than the first.

Let's look at standard paint booths. These facilities are designed for objects that fill the booth space. If you look at trucks, buses, construction machinery and the like, you see that the booth is just 3-4 ft wider and higher than the object to be painted. This extra space allows a painter free range of movement. The object itself sitting inside a standard heavy equipment paint booth fills about 80% of the available booth cross-section, whether downdraft or crossdraft.

In contrast, an airplane, when viewed nose-on, occupies about 15-20% of the booth cross-sectional area if the booth is designed in a rectangular layout, which is typical. This is an immediate problem with booth airflow, since the acceleration of air that you get as air moves around a bus, for instance, aids in the removal of overspray. Because of the relatively slow movement of air, overspray hanging in the air falls on the plane surfaces and makes an imperfection in the surface. The best way to reduce buff and rework time is to control the overspray. Airflow is the only way to control overspray, but you need to remove more air to control overspray than you would to just control risk of fire.

Generally, about 70-100 fpm in cross flow booths will get good removal of overspray. In downdraft booths, about 40-50 fpm is needed to do the same job. It is less in downdraft booths because gravity is helping out. Kevin had airflow speeds of 15-20 fpm average in his booth. This is probably not enough airflow to be "fire department legal," and it certainly is not enough to remove overspray particles. This was clearly evident by the huge cloud of paint overspray surrounding the painter as he painted the aircraft.

As I was talking to Kevin, a spot appeared in the concrete floor and looking up, I noticed a contented pigeon looking back. I wondered what that might look like when dropped onto a freshly painted aircraft.

PROFIT

"So, what is the answer?" asked Kevin. "I am not an engineer. Is there anyway to build a properly designed spray booth that will decrease my rework?" I told Kevin about Global Finishing Solutions and their newly patented "Shamrock" design.

The "Shamrock" is a crossdraft paint booth that when viewed from a pigeon's perch looks like the shape of home plate.

The tail of the aircraft is placed near the exhaust chamber at the rear of the booth. Airflow is nose-to-tail and because of the shape of the booth, the airflow accelerates from the air entry point in the front of the booth to the rear wall exhaust chamber. It is this acceleration that causes the most efficient capture of overspray. The reduction in cross sectional area also occurs at a point where the maximum amount of paint is being applied (wings and wing roots).

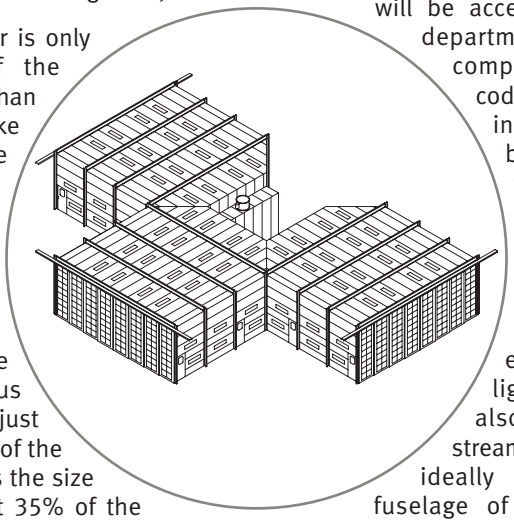
The exhaust chamber is only about one-third of the booth width, rather than wingtip to wingtip like many booths are designed. If you look at the pigeon-eye view of an aircraft, you will notice that the fuselage and tail represent about 70% of the paintable airplane surface. Thus the filter is located just behind this segment of the aircraft. This reduces the size of the filter to about 35% of the size designed by the conventional wingtip-to-wingtip design.

By reducing the airflow to one-third of the usual method, you reduce the energy needed to heat the air and make heating for your booth a budget-friendly item. It also produces enough airflow velocity to remove the threat of fire and to remove the overspray. The reduced cross section means the air will accelerate at the most critical point (the point where most paint is being applied).

A paint spray booth is a "must have" piece of equipment to turn out top quality aircraft finishes with minimal rework for bottom line profitability.

- ✈ Are you in compliance with all applicable codes?
- ✈ Are you in compliance with Local Fire Marshall?
- ✈ Does your facility have an automatic fire suppression system?
- ✈ Are all electrical fixtures and appliances in your hangar explosion proof?
- ✈ Does your facility have 100 Ft Candles of light 3' above the floor for shadow free lighting?
- ✈ Do you have liability insurance as an aircraft refinisher?
- ✈ Has your insurance carrier properly identified and assessed your operational risk?
- ✈ Are your insurance premiums satisfactory?
- ✈ Can you afford an out-of-pocket claim?
- ✈ Are you pleased with low re-work and re-painting costs?
- ✈ Does your facility have all the required monitoring and safety equipment in place for worker and environmental safety?

If you answered NO to any of the questions you need a paint spray booth.
A properly installed, operated and maintained paint spray booth can solve these issues.
Let your Global Finishing Solutions representative show you how!



The steel (non-flammable) canopy over the painting area separates the high-hazard area from the hangar space and will be acceptable to the fire department, since it complies with NFPA-33 codes. Installing lights in the skin of the booth means that they can be low cost Class 1 Division 2 lights (enclosed and gasketed) and are 20% the cost of explosion proof lights. The canopy also trains the streamlines of the air to ideally flow around the fuselage of the aircraft. The sidewalls of the envelope allow for installation of more lights to give a high level of lighting to the painting area without shadows.

"That already sounds better than the 8 HID lights I have in the paint bay," said Kevin.

"Exactly! The usual design lighting level is 100 footcandles at 36 inches above the floor. More is better, as long as it doesn't produce shadows," I mentioned. The extra cost of more explosion-proof HID fixtures to get 100 footcandles of light is cost-prohibitive.

The front door of the paint booth is a bottom rolling filter door similar to the outer hangar doors but with filters mounted in the door frames. With this arrangement, it is possible to allow air to come through the filter door in a horizontal streamline and enter the booth and still get a final cleaning.

The "Shamrock" design allows multiple booths to be clustered around a central storage area and from above, it looks like a shamrock cloverleaf. The booths can also be arranged in T-hangar formation to make use of conventional T-hangars.

You will need about 5' around the sides and in the front for access, so the hangar should be 10' wider than the booth and 5' longer. It is amazing how clean this booth maintains the painter's environment and the reduction in rework is incredible. With a Shamrock booth you won't be complaining about unprofitable paint jobs. You will also be able to price your painting more competitively and take some business from that airpark across the county or across the state.

"Then we won't hear so much 'poor-mouthing' from you about not making money," I suggested.

"Yeah" said Kevin, "then it will be something else."

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