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**Brief Description of Observations
Of Air Force Spray Booths**

The following are some basic descriptions of observations made by Ron Joseph over the past 6 years visiting Air Force painting facilities.

Design (cross draft, downdraft, semi-downdraft)

The design of some booths appear to be inappropriate for the type of painting that is being conducted. In some cases cross draft designs are not efficiently removing the particulates from the air.

In downdraft spray booths some openings in the floor of the booths are too small or they are inappropriately positioned for the size of equipment being painted.

Air velocity and turbulence

In a large number of spray booths air flow rates are well below the minimum recommended standards set by OSHA or NFPA 33.

Air velocity profiles taken parallel to the filter banks are often erratic and are caused by air turbulence. In many booths there are dead spots in which there is no movement of air at all.

In most of the spray booths that have air makeup systems the incoming and outgoing air volume flow rates are unbalanced and turbulence is prevalent. In some of these booths the air pressure inside the booths are excessively positive or negative. Both extremes are detrimental to the results of painting jobs and often require that major paint reworks be undertaken.

Design of filter banks

Numerous deficiencies have been observed. Low efficiency filters are often used, and this cause excessive overspray to settle inside the ducts of the exhaust plenums or on the impellers of the blowers. Some of the overspray contains inorganic HAPs.

Metal frames are inappropriately designed for the types of filters that have been selected.

Roll filters can often be used instead of modular filters. This can enhance both compliance and P2.

Filters are often poorly placed into filter frames and are violations of NESHAP and perhaps even state regulations. In most cases there are no clear guidelines for how to change multi-stage filters, and some facilities replace more filters than they need to, resulting in unnecessary hazardous waste.

Selection of filters for compliance and P2

There do not appear to be clear guidelines for facilities on how to select the most appropriate filters for both compliance and P2.

Use of Manometers vs Magnahelic Gauges

In facilities where regulatory compliance requires filters to be changed at specified pressure drops, simple inexpensive manometers are often used rather than more sophisticated, yet affordable Magnahelic gauges. When the liquid level in manometers are incorrect, or when the liquid has dried up altogether, such spray booths are in violation of regulations.

Compressors

In many facilities a compressor is used for several functions, such as powering pneumatic tools, sanding, painting. When several operations go on simultaneously there is insufficient air to atomize high solids coatings.

Compressed air plumbing

Piping leading from the main spray facility compressors to the walls of the spray booths are frequently undersized, or travel over very long distances. Observations have shown that such pipes often go through more than one size (diameter) reduction, and/or have too many elbows. The pressure losses between the compressors and the pressure regulators on the walls of the spray booths are often so excessive that there is insufficient air to atomize paint through HVLP spray guns.

Quality of compressed air

In several facilities the air is moist and inadequate driers are provided, either at the compressors or at the regulators to remove the moisture before the air is used to atomize polyurethane coatings. (Moisture in polyurethanes can lead to early paint failures, and can severely shorten pot-lives. Both situations result in additional VOC/HAP emissions and extra hazardous waste.

Availability of sufficient compressed air to feed more than one HVLP spray gun

In many facilities pressure drops between the regulators on the walls of the spray booths and the HVLP gun are so high¹ that high solids coatings have an orange peel effect. Customers frequently require the work to be redone.

Equipment and fittings such as air/oil filters, regulators, moisture traps and drainage

Several facilities do not have any pressure regulators at all. Others are fitted with regulators that are inappropriate for the job. Yet others have input and output ports that are too small.

Some regulators are easier to maintain than others.

Moisture traps are not universally employed within the Air Force, and even when they are present, many are never emptied or maintained.

Compressed air plumbing often encourages collection of condensed moisture at spray booth regulators.

As was pointed out in an earlier paragraph, polyurethanes are extremely sensitive to moisture in the atomizing air, and several types of coating defects can occur.

Evaluation and guidelines for spray booth lighting in terms of both brightness and reflectance

One of the most prevalent problems concerns lighting. Brightness inside many booths is inadequate for several reasons: There may be too few light fixtures, maintenance may be poor and burned out lamps are not being replaced, too much overspray is collecting on the lamp housings.

Regardless of the cause(s) painters are often unable to see what they are painting, and in many cases they cannot see their coverage or overlaps. This leads to appearance problems and rework.

Even in well-lit booths reflectance is generally poor and painters cannot see their coverage or overlaps. This can lead to voids (too little paint), excessive paint, runs, sags, orange peel, color differences at overlaps, etc. Any of these problems can require painter to perform rework.

¹ The pressure loss is such that the operating pressure at the handle of the spray gun is too low to allow for proper atomization of the high solids coating.

Location of ancillary equipment within the booth

Ancillary equipment inside spray booths, such as mixing tables, hazardous waste drums, paint shakers, solvent washers, etc. are located inappropriately. Inevitably they collect much of the overspray, which in turn eventually deposits on freshly painted surfaces and causes defects.

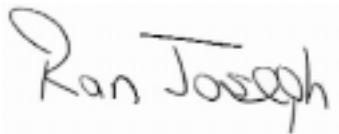
Keeping dust out of the booth

In spray booths that are used for the application of high gloss coatings, such as are used on training aircraft, some AGE equipment and transportation vehicles, dust inside the booth is a major problem and frequently leads to reworks.

There are several causes for dust in booths, including, but not limited to inappropriate selection of air inlet filters, gaps in the doors, gaps between filter frames, and overspray on walls ceilings and floors of the booths.

Evaluation of noise levels

Some spray booths are operating at noise levels that are well above OSHA recommendations.

A handwritten signature in black ink that reads "Ron Joseph". The signature is written in a cursive, slightly slanted style.

Ron Joseph
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