Baffled by Sticky Overspray?

Reclaim Baffle Overcomes High-Solids Problem

Paint spray booths have been around for a long time. They come in many different sizes and shapes, and suppliers claim unique advantages for each type. Essentially, a paint spray booth is a partial or complete enclosure to: (1) provide a clean area for painting, (2) prevent paint overspray from spreading throughout or outside a plant.

Traditionally, paint spray booths are categorized according to how the overspray is collected. "Dry booths" use dry filters and "waterwash booths" use various types of water-capturing methods. Dry booth advocates boast that they don't have to contend with liquid sludge cleanup and disposal; wet booth users are thankful that they don't have to change dry filters.

Various refinements have been added to booths over the years. Dry filter booth builders have incorporated the automatic roll-up filter, which they claim eliminates the labor involved with changing filters, often on an almost daily basis. Wet booth makers have designed innovative water curtains to wash paint particulates from the booth exhaust. Heat recovery has been designed into booths; the relatively warm exhaust air heats the incoming fresh makeup air by means of heat exchangers.

Now comes a new technology for paint spray booths—recovery and reuse of overspray. Only coatings that remain wet indefinitely prior to heat polymerization can be recovered, such as low-molecular-weight polyester and alkyd high-solids coatings.

The recovery system (patent pending) is built by Environmental Finishing Systems Co. of Downers Grove, IL. Recovery consists of passing the electrostatically charged overspray paint through a floor-to-ceiling and wall-to-wall grounded metal baffle. The overspray particulates collect as a liquid on the baffle's numerous vertical plates. As the overspray builds up on the plates, the coating drains downward to a collection pan.

Recovered paint is prepared for reuse by filtering and reducing with solvent to the original viscosity. Typically, a 72% by volume high-solids, low-molecular-weight polyester recovers at 93% solids by volume.

The continuous-liquid nature of the recovered coating provides a self-clean feature to the baffle plates. The plates can be in service for years without cleaning. Necessarily, a baffle must be changed when switching paint colors.
An overhead track can facilitate moving the baffles from the booth to a dust-tight storage enclosure.

When used with Environmental Finishing Systems' "Auto-Roll" booth, paint particles that manage to get through the baffle are captured by the booth's roll-up dry filter, which advances automatically when a growing vacuum in a plenum behind the filter activates a circuit to engage the filter roll drive motor. The baffle collection of overspray ahead of the filter roll dramatically reduces particulate collection on the filter roll and prolongs filter life. The recovery baffle could also be incorporated ahead of a waterwash curtain and would cut down on overspray contamination of the water.

The roll-up filter is a nonwoven, mat-type, polypropylene fabric. The booth design utilizes a double filter layer; a filter roll unwinds moving upward and returns to the windup roll moving downward in a plane closest to the sprayed work. Virtually all particulate emissions (99.75% and up) are captured by the double filter, most being trapped in the first filter plane. Back-up rollers hold the vertical filters taut to ensure good filtering efficiency.

Thorough removal of particulates keeps the stack and exhaust fans clean. Up to 80% of this clean exhaust air can be returned to an automatic booth without a human operator. Changing booth air twice per minute instead of the customary 10 times per minute saves up to $3000 a year in makeup air heat requirements. Additionally, heat exchangers can be added to pass heat from the warm exhaust air to the cold, fresh makeup air. Filtered exhaust also prevents contamination of heat exchanger surfaces.

The automatic roll-up filter reduces by 90% booth labor in changing conventional air filters. Also, the used filter can be disposed of as a solid waste in landfill sites, in contrast to liquid sludge, which must be disposed of as a hazardous waste.

Thus, overspray paint recovery adds a new dimension to paint spray booth finesse to help cut operating costs and improve printing efficiency.

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High-Solids—A Sticky Problem

A high-solids resin manufacturer says that a spray booth reclaim baffle to recover low-molecular-weight polyester and alkyd overspray could go a long way to help eliminate booth stickiness problems associated with the coatings. Richard Johnson, specialty products service manager for Cargill, Inc., a U.S. manufacturer of high-solids resins, says a large percentage of high-solids coatings are low-molecular-weight polyesters or alkyds that remain syrupy or sticky until polymerized by heat, causing serious overspray stickiness difficulties in the spray booth. "The reclaim baffle sounds like a good idea if it can recover the overspray before it reaches the booth floor or walls," says Johnson. "This stickiness is a real problem."

When painters complain about the stickiness, one remedy is to go to intermediate solids, which have some drying characteristics. "We can formulate away from low-molecular-weight coatings to eliminate the stickiness problem but only by lowering the solids," says Johnson. Such reformulation usually involves crosslinking the low-molecular-weight, air-dry high-solids resin to get a coating that will dry. "We can go to 55 to 65% volume solids this way." But chemists today are still working on a way to get around the sticky, nondrying nature of high-solids, low-molecular-weight coatings, says Johnson.

Low-molecular-weight, high-solids coatings are being formulated as high as 90% volume solids in a white baking enamel but most often are in the 65 to 75% range, he adds. The high solids are sprayed at a viscosity of 40 to 120 sec on a No. 4 Ford cup. Conventional coatings are sprayed at 18 to 25 sec on a No. 4 Ford cup.

High solids use is growing. Johnson says Cargill's high-solids resin sales in 1981 were 130% higher than in 1980 and that sales thus far in 1982 are 65% above 1981.

Low-molecular-weight, high-solids polyesters lead in popularity, followed by the alkyds. Johnson says high-solids acrylics, formulated from oligomer-type resins, can be formulated but with more difficulty. "Formulators have a tough time getting high-solids acrylics to 65% volume solids."