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Powder Lights Up Sunroof Finishes

New in-house system, including 15-stage pretreatment and E-coat, reduces reject rate to 1%

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When American Sunroof Co. landed an exclusive contract to coat sunroofs for Honda Motor two years ago, ASC decided it was time to stop outsourcing the coating of its products and build an in-house finishing operation to maintain control of finished-product quality. ASC is an original equipment supplier to BMW, Chrysler, Ford, General Motors, Porsche, Toyota, Saab and 14 other manufacturers.

The company is also a leading direct marketer of sunroofs and interior trim products.

The new 115,000-sq-ft finishing plant, located outside Columbus, OH, is now the largest division of ASC. In less than a year, the division increased from 35 to 250 employees who work two shifts to produce sunroof and open-air products on a just-in-time basis. Each shift, some 10,000 to 12,000 Class A, B and C parts are coated by a new finishing system. That translates to more than one million parts per shift per year.

ASC's finishing system had to meet several special requirements. First, the goal was to achieve a Class-A finish on all parts. The durability of the finish had to be tested with an aggressive, 1,000-hour salt-spray resistance test. Second, part of the cost justification called for the system to be large enough to support job shops with special finishing requirements or overflow work. Third, the system would have to accommodate a bi-metal line (steel and aluminum) with multiple colors throughout, and function as an integral part of ASC's plant-wide statistical process control (SPC) program.

When deciding what kind of coatings to use, the company tried to balance its finishing needs with environmental concerns. The system at ASC allows just about any coating combination: E-coat and powder, or E-coat and high-solids solventborne topcoat.



Automatic corona-charging guns apply powder coatings to parts. The system automatically recycles and reuses all powder that does not go onto the parts, boosting overall efficiency.



The Nordson booth has a translucent polypropylene canopy that diffuses ambient light and is nonconductive.

From prep to finish

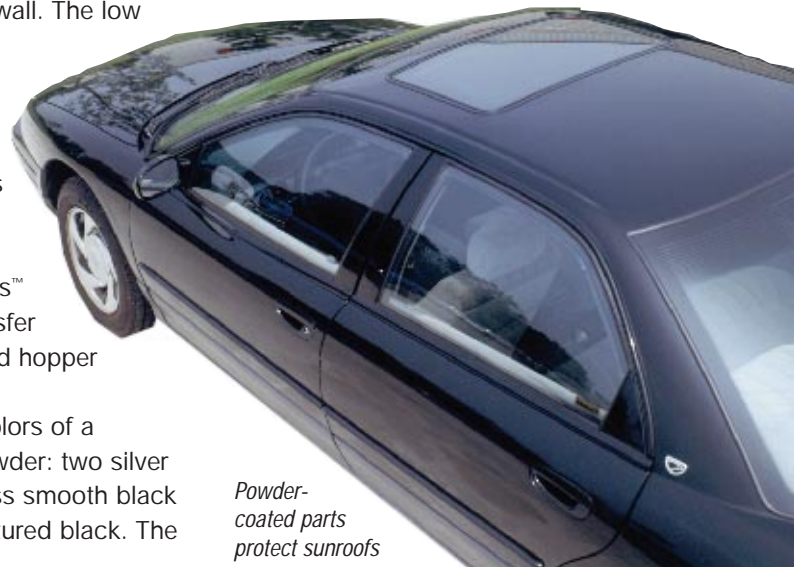
Preparing the surface is no simple process at ASC. The company uses a 15-stage pretreatment system: 1) immersion cleaner; 2) spray cleaner; 3) immersion cleaner; 4-5) city water spray rinse; 6) virgin city water rinse; 7) conditioner; 8) zinc phosphate; 9) city water spray rinse; 10) city water immersion rinse; 11) virgin city water rinse; 12) chrome sealer; 13) dionized (DI) water spray rinse; 14) DI immersion rinse; 15) virgin DI rinse. Pretreatment chemicals are supplied by Parker Amchem (Madison Heights, MI).

After 6- to 7-min dry-off, parts move to the next appropriate step: either E-coat or powder. The 12,000-gal E-coat line applies a cathodic E-coat from PPG Industries (Springdale, PA). The stages are: E-coat, two spray permeate rinses, DI postrinse and virgin DI rinse, followed by a dehydration tunnel and then 385°F oven for about 30 min. The E-coat serves as a primer for some parts. Other parts

go straight from pretreatment to powder coating process.

The powder coating process begins at the model 518 sidedraft 9,000 cfm collector booth from Nordson Corp. (Amherst, OH). The booth has a translucent polypropylene canopy that diffuses ambient light and is nonconductive. This enhances system efficiency because the charged particles are attracted to the grounded substrate rather than a metal wall. The low conductivity also minimizes over-sprayed powder on the walls, which makes color changes faster and easier. Inside the booth, 10 Nordson 100-Plus™ powder pumps transfer powder from the feed hopper to the guns.

ASC uses four colors of a polyester hybrid powder: two silver metallics, a low-gloss smooth black and a low-gloss textured black. The



Powder-coated parts protect sunroofs from corrosion.

The system virtually eliminates any runs or sags, so the reject rate is down from as high as 30% to 1%

powder is applied at line speeds from 6 to 18 fpm. Powder suppliers include Ferro (Cleveland); Morton Powder Coatings (Reading, PA); O'Brien Powder Products (Houston); PPG Industries (Strongsville, OH); and Pratt & Lambert (Buffalo, NY).

Eight Nordson automatic corona-charging guns coat the parts. Two manual touch-up guns are used for part recesses. Since the booth is designed to roll on and off line, parts not needing powder coating can still pass through the system to avoid interrupting production.

As a closed-loop process, the powder system automatically recycles and reuses all material that does not go onto the parts, boosting operating efficiencies.

In some cases, the powder serves as a topcoat. Other parts receive a silver high-solids polyurethane topcoat, supplied by Pratt & Lambert. The liquid coating is manually applied using high-volume low-pressure (HVLV) equipment from DeVilbiss Industrial Coating Equipment (Maumee, OH).



Before parts exit the booth, an operator uses manual touch-up guns for part recesses. (Photos courtesy of Nordson Corp.)

One oven serves both the paint and powder topcoat lines. Parts cure for 35 min at temperatures from 350 to 400°F, depending on the part. George Koch Sons (Evansville, IN) engineered, built and installed the finishing line, including the oven.

Total quality control

The key benefit of the new powder coating system is total quality control, according to Dave Graf, lead topcoat technician. "We can set and maintain our own standards," he says. "The system virtually

eliminates any runs or sags, so the reject rate is down from as high as 30% to 1%. Costs have decreased since we've reduced the packaging and shipping associated with outsourced painting, and we have reduced our in-process inventory to accommodate just-in-time demands."

ASC is planning to purchase more manual and automatic powder coating equipment to expand capabilities to meet rising market demand for Class-A finish quality.

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