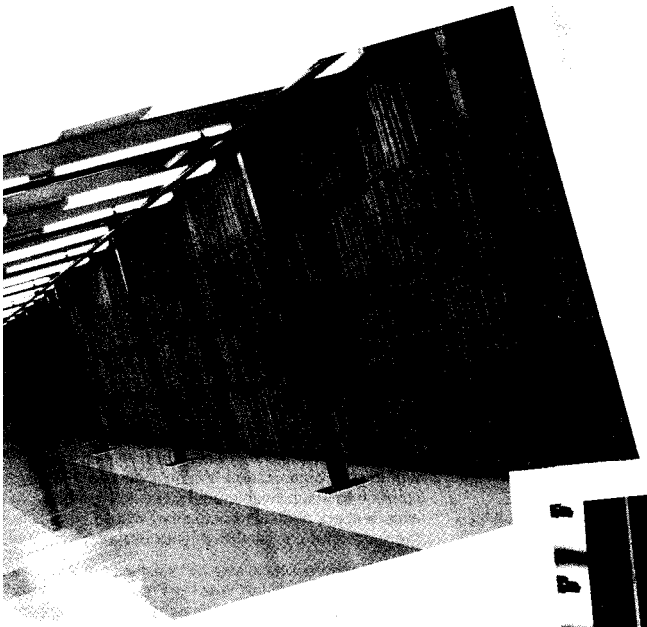
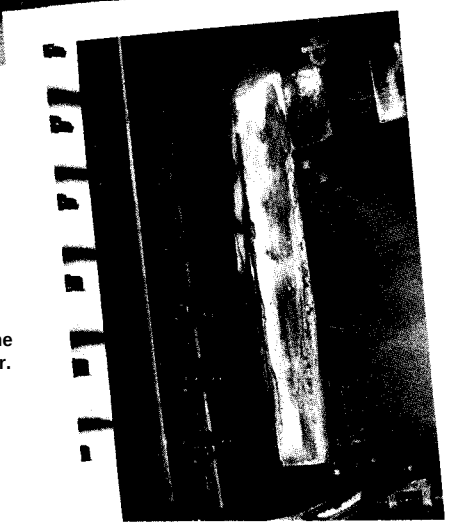
Painting Plastics: Clean is the Key

Clean air, clean water and a spotless facility provide a painting advantage . . .

By **Beverly** A. **Graves**
Associate Editor



THE 50-FT LONG plenum filters incoming air and helps maintain a constant pressure in the clean room.



PARTS ENTER the five-stage power washer.

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You could eat off the floor at Plasti-Paint, Inc., St. Louis, Michigan, but chances are President Robert Kniss won't let you. Clean is the key at this facility where all types of plastics are painted, including ABS, EHA, polycarbonate, polypropylene, nylon, Bexloy, TPU, TPO, RIM and most other paintable thermoplastic or thermoset materials. Mr. Kniss designed and built the plant two years ago with an eye toward parts that require a power wash and clean room environment.

Pretreatment. Not only must the air, water and facility be clean, but parts must be thoroughly cleaned before painting. Plasti-Paint uses a five-stage power washer. The first stage is a 140F detergent wash from DuBois Chemicals, Cincinnati, Ohio. ISW 32 is a liquid acid cleaner designed for cleaning plastic parts in a power spray wash. It also contains a surfactant system to remove surface contaminants. An ambient rinse follows.

The third stage is a 1OOF rinse containing Parco plastic rinse aids from Parker+Amchem, Madison Heights, Michigan. The rinse aid causes water to sheet off, eliminating water spotting.

The fourth and fifth stages are DI rinses. Water is deionized using a reverse osmosis system from Interlake Continental Water, Hazel Park, Michigan. The fifth stage is a virgin DI rinse that is recirculated to the fourth stage. Water in the fourth stage goes to drain.

Eliminating Static. After pretreatment, parts run through an automated turbulent, heated power blow off. The heated air comes from the dry-off oven. Following the power blow off, parts are

PARTS MOVE through the four booths in the clean room and flash off for at least three min between each booth.

dried in the oven for 15 min. Oven temperature depends on the substrate. From the oven parts travel through a destaticizer. "It is not an air blower," Mr. Kniss contends. "It is an ionizing unit."

A meter monitors the charge on the surface of the parts. If the charge is not neutral the system bombards the part with positive or negative ions, whichever is needed. "There is no moving air," stated Mr. Kniss. "It is the same as the units used in hospital surgery rooms for destaticizing."

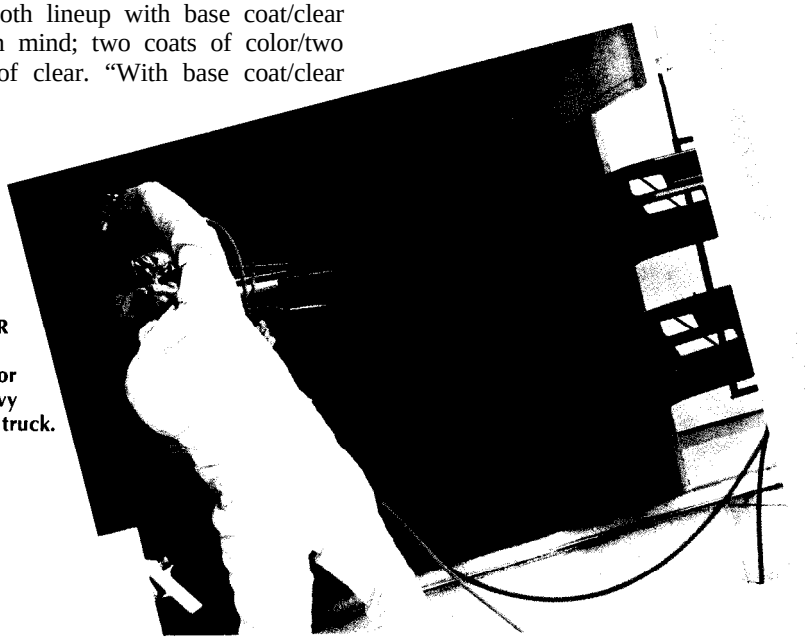
The destaticizer marks the entrance to the clean room. All painting at Plasti-Paint is done in a certified Class 100 clean room, designed and built by Mr. Kniss.

Clean Room. Four water-wash paint booths are on line in the clean room. There is a minimum of three min flash between booths. Mr. Kniss designed the booth lineup with base coat/clear coat in mind; two coats of color/two coats of clear. "With base coat/clear coat you have to build the coating slowly. There is a lot of paint going on the parts, and you do not want it to sag," stated Mr. Kniss.

If a part requires primer, the primer is first baked, cooled and then topcoated.

All paints are applied manually using either an HVLP turbine system from Turbospray Midwest, Farmington Hills, Michigan, or a Binks Mach 1 HVLP gun supplied by Universal Spray Technology, Redford, Michigan. When applying metallics a Binks 2001 gun is used. "This is necessary because the HVLP systems will not break up the metallics," Mr. Kniss noted.

Double coalescent filters and an air dryer are used on the compressors to eliminate oil and water from the air going to the guns. Drops in each booth have a ten-micron coalescent filter followed by a one micron filter. Air then



PAINTER PAINTS PARTS for the Chevy Syclone truck.

passes to the regulator, which also has a filter.

No paint is ever taken into the clean room. All mixing and measuring is done in a separate room. Pressure pots are set up outside the clean room at the back of each booth. Booths are set into the wall of the clean room.

Four fluid lines run to each booth. All lines, connectors and valves are stainless steel. This is necessary because Plasti-Paint uses a lot of catalyzed, isocyanate, acid-catalyst waterborne paints. Bee Chemical paints are used on automotive trim work and other components. PPG paints are used on most exterior automotive pieces.

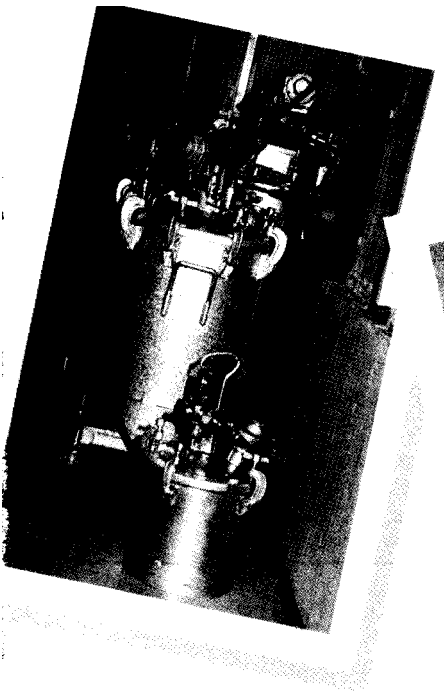
"Because we are a custom shop, we do not have long runs. We have a lot of changes. So we will leave a gap in the line of a few feet and the painter will hang up one gun and pick another and keep painting," Mr. Kniss explained.

Painted parts have a flash time of at least eight min before entering the oven. The oven is in the clean room as well. This ensures that any time a part is wet or tacky, it is in the clean room. Oven temperature and bake times depend on the substrates and the amount of catalyst (if any) in the paint.

Filtering. The clean room has apressurized air makeup system. "Most systems run wild. What I mean by wild," Mr. Kniss explained, "is that X number of cfm is just dumped into a room uncontrolled. Our system does not do that; it is monitored. We set the pressure we want to maintain in the room."

If a booth is cut off, automatic dampers on the air makeup system close to compensate for the increased air. If a

PRESSURE POTS are kept outside the clean room.



PRESIDENT ROBERT KNISS (left), Plant Manager Dave Bacon and Office Manager Glenda Kniss display some of the parts painted at Plasti-Paint.

door is open or air is lost somewhere else, dampers open. The clean room has as much as 50,000 cfm of air. It is designed to pass air by the painter at 120 fpm.

When the air enters the clean room it is distributed through an eight-ft-high by 50-ft-long air plenum, which contains bag filters. There are filters on the air makeup and prefilters on the plenum before the bag filters. The bag filters filter down to 0.05 micron. "We don't have a dirt problem when we paint," Mr. Kniss contended.

Static Control. People entering the room must first enter an air-lock change room. Everyone entering must wear static-free smocks except painters who wear complete coveralls, hair bonnets and boots. All the static-free clothing worn in the room is laundered in a clean room. The fabric is impregnated with carbon so painters' movements don't build up static.

Inspection. Plasti-Paint checks all parts at an on-line, lighted inspection site. It also performs initial adhesion and 24 and 96 hr water immersion tests. Color, gloss, film thickness and wet/dry film builds are also examined.

Keeping It Clean. How does the plant stay so clean and functional? Every night the midnight shift checks the pH and chemical content of the tanks on the washer line. The Uni Spray nozzles are checked and cleaned or replaced if necessary. Weekly the crew breaks down one or more stages in the cleaning system and cleans the tank. Stage four is cleaned and dumped most frequently.

Every night the oven is wiped down on the inside, as are the ducts, sprinklers and any other place where dust collects. Floors are wet mopped every night. The conveyor chain is blown out every night as well. A chain cleaner continuously cleans the conveyor as it runs during the day. Also, each gun is broken down and cleaned. Booths are broken down and cleaned weekly.

You have to be finicky when painting on plastics, especially if you want the smoothest, cleanest and most durable finish possible. Clean air, water, facility and parts all contribute to the quality finish. At Plasti-Paint the commitment to clean is a commitment to quality. **PF**

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