

Ranges Take A Powder, Naturally

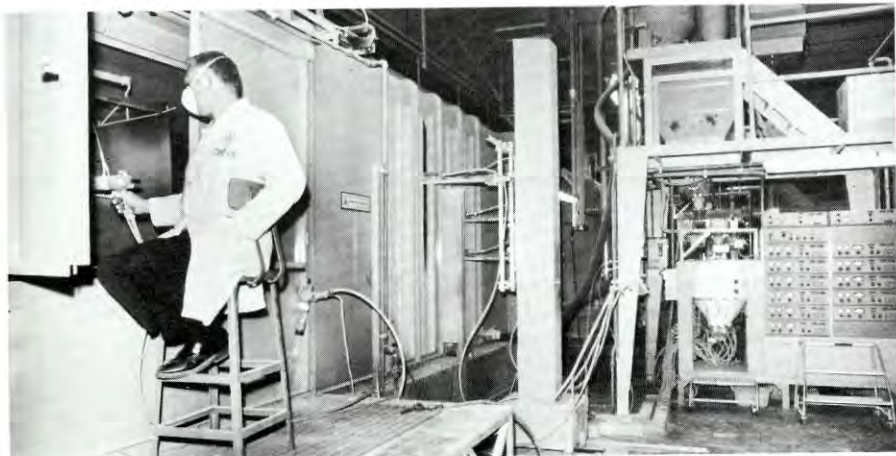
Changeover to powder coating for range bodies and range hoods at Appliance Park included a whole new set of colors

by ARNOLD P. CONSDORF, *Editor*

Like so many other manufacturers around the country, the Range Manufacturing Department at General Electric's Appliance Park complex in Louisville, Kentucky knew it was only a matter of time before they would have to make a finishing system change in order to meet growing environmental restraints. But they complicated their own situation by wanting some other extras in any change—overall finishing cost reduction and product quality improvements. If this wasn't enough of a

challenge for the project team, General Electric also was putting the final styling touches to a new set of appliance colors.

The result of what has to be viewed as an ambitious plan is in, up, and running in Building 2 at Appliance Park. It's GE's first full-scale powder coating installation for appearance parts. The system finishes range bodies (excluding tops and oven interiors, which are porcelain enameled) and range hoods. And it's probably a sign of things to come at



Each powder booth has a manual spray section and an automatic spray section. One operator sprays the interior of range bodies. By opening a second access door to the operator's left, a second manual spray position would be available. In the

background can be seen the reciprocator stand that makes up the automatic section of the booth. The automatic section can handle up to ten 100 kv guns. GE is currently using eight automatic guns, four on each side.

The air brought in is conditioned and dried (or moisture added) to keep humidity at 40 to 50 percent and temperature between 70 and 75°F.

The slightly negative pressure in the powder booth, caused by the booth's blower system, serves to keep powder confined to the booth rather than floating off into the room. Air is pulled into booth openings at the rate of 150 fpm. Air is circulated through the system at 13,500 fpm.

The powder recovery belt, acting as a filter, becomes partially impregnated with powder. This preserves proper air balance between the booth and the suction of air into the plenum.

With belt interstices partially occluded by powder, the downward air flow is modulated so that powder is drawn to the belt for pickup, but not through it. The belt acts as a damper to prevent overly-strong surges of air current.

Adequate impregnation of the belt with powder usually requires two weeks; then the system performs at top efficiency. Powder recovery belts of different materials were tried; nylon turned out to work best.

The belt is supported underneath by a nylon mesh belt. Belt life is around 2,000 hours. In addition to the powder recovery vacuum, a deep vacuum is permanently attached, also at the end of the booth, for periodically deep-cleaning the belt. This is done every couple of weeks.

The 40-foot-long booth has two automatic reciprocators, each with four guns attached. These, plus four stationary guns, coat the liner interiors. All of the spray guns operate at around 100,000 volts dc.

Automatic coverage is preceded by two manual reinforcing stations

where welded corners are sprayed. The corners, with slight "opens" in the weld beads, are caulked downstream of the spray operation to close the beads.

Metal Pre-Finish

A seven-stage spray pretreatment system was installed in what was previously a pickling system. Seven of the ten existing pickling tanks are utilized for pretreatment. The horizontal conveyor was kept in place. Liners are still laid on this for transport through the system.

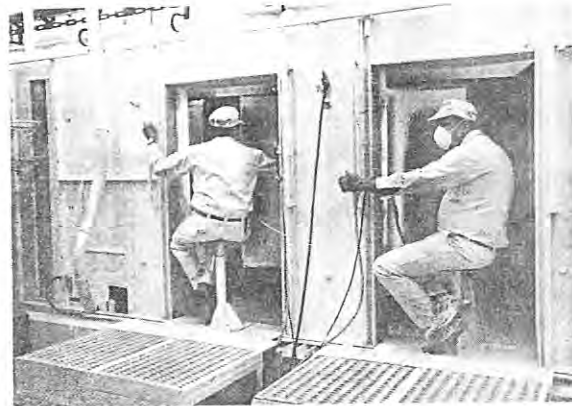
Stages consist of (1) pre-cleaning, (2) cleaner at 160°F, (3) hot water rinse at 150°F, (4) iron phosphate at 150°F, (5) cold water rinse, (6) chromic acid rinse and (7) rinse in fresh D.I. The newly cleaned and phosphated liners are dried off in a gas-fired infrared oven.

Curing of the powder coated liners is accomplished at 335°F for 50 minutes in a gas fired oven around 42 feet distant from the powder coating booth. After curing and inspection, liners go to an assembly area.

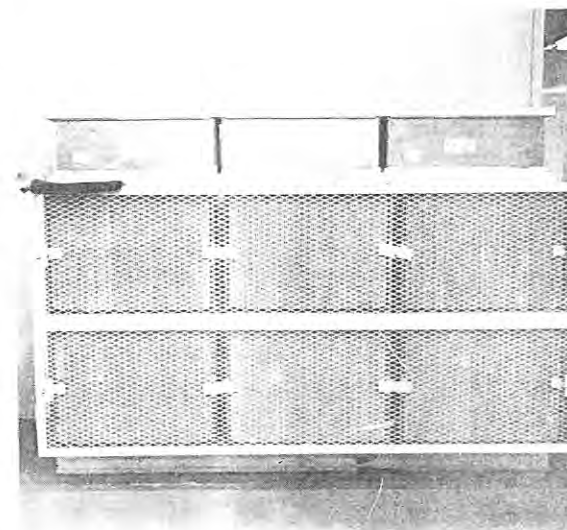
Average line speed of the powder conveyor system is 9½ fpm. For greater production, line speed is increased up to a maximum of 20 fpm. Up to 360 units an hour can be powder coated and cured.

The hanger bar on the conveyors is kept from powder buildup by booth baffles at the conveyor level, running the length of the booth. The hangers themselves are periodically stripped. Ware is hung on 20-in. centers.

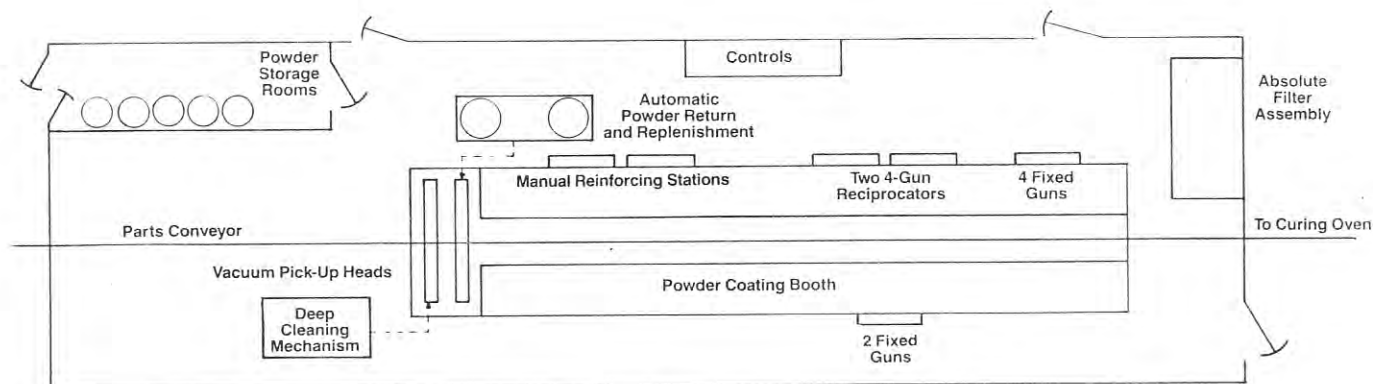
Krc reports that the non-polluting operation of the powder system is an additional benefit. Still another benefit is that the floor space employed with the previous system is now available for other use.



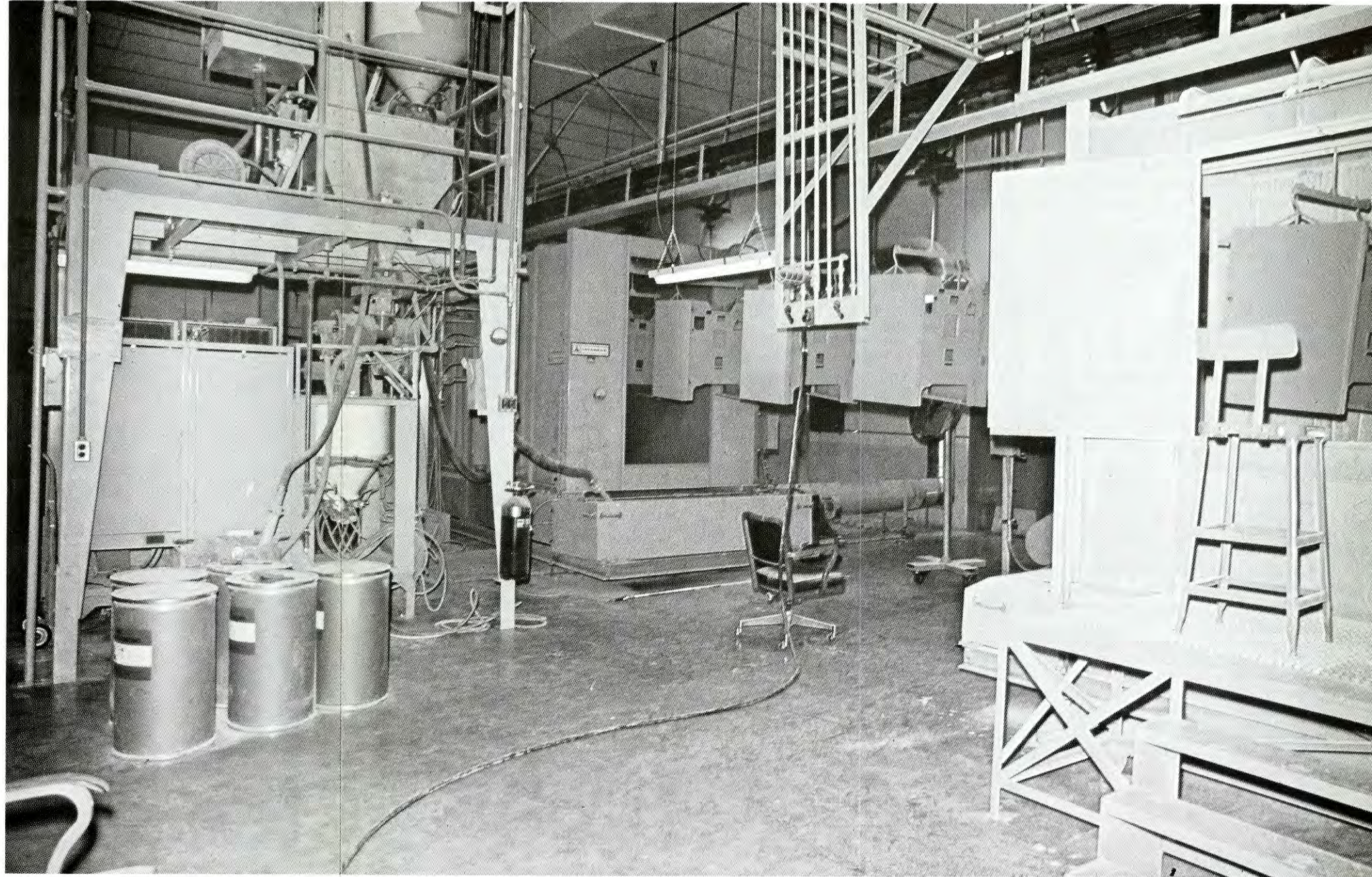
Manual touchup is applied in liner corners up stream of automatic spray guns.

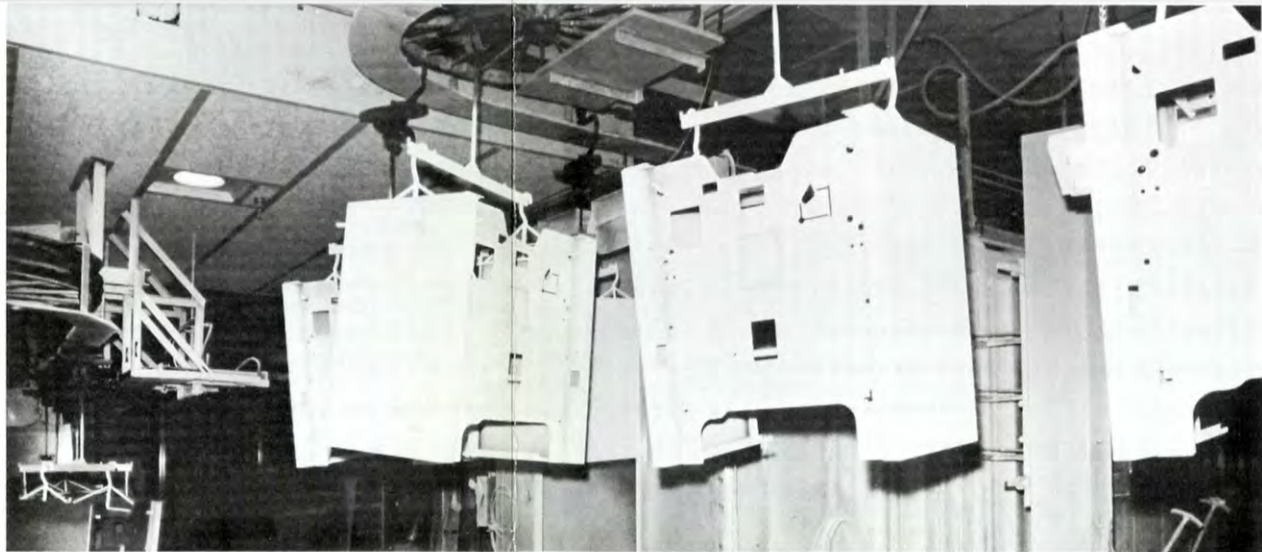


Final filter returns air to the powder coating room in which it is located.



Powder Coating Room





General view of powder booth three (Harvest Wheat) and four (Snow). Powder containers can be seen at left. Celanese delivers powder in 110-lb drums. GE encountered compaction problems when they tried 300-lb drums. And similar problems were encountered when drums were stored near vibrating equipment or in warm areas. A special powder storage room and the 110-lb drums have solved the problem. The range department uses about 1500 lb of powder a day. GE is looking to improve handling with perhaps air pumping from a central room. New containers also are being investigated.

Range bodies finished with the Snow acrylic powder exit booth on their way to the bake oven. Powders are applied at 1.2 to 1.7 mils. The coating specifications are just as tight as they were for fluid paint. Housekeeping still poses a challenge, but GE believes it can clean up the dust with better filtering of the air being recirculated inside of the finishing room.

General view of powder booth three (Harvest Wheat) and four (Snow). Powder containers can be seen at left. Celanese delivers powder in 110-lb drums. GE encountered compaction problems when they tried 300-lb drums. And similar problems were encountered when drums were stored near vibrating equipment or in warm areas. A special powder storage room and the 110-lb drums have solved the problem. The range department uses about 1500 lb of powder a day. GE is looking to improve handling with perhaps air pumping from a central room. New containers also are being investigated.

Range bodies finished with the Snow acrylic powder exit booth on their way to the bake oven. Powders are applied at 1.2 to 1.7 mils. The coating specifications are just as tight as they were for fluid paint. Housekeeping still poses a challenge, but GE believes it can clean up the dust with better filtering of the air being recirculated inside of the finishing room.