Powder Finish Helps Golf Cars Survive the Links

E-Z-GO GOLF CARS have a corrosion- and scratch-resistant finish.

Golf cars get longer drives, fewer chips with powder-coated finish...

A golf car is subjected to a variety of hazards that can be detrimental to its finish. Stones chip away at the protective coating, allowing rain, mud and fertilizers to attack the base metal. Long exposure to the sun's ultraviolet rays can bleach the paint. And there is always the threat of stray golf balls and hard driving by enthusiastic golfers.

Providing a durable finish is a priority for E-Z-GO Textron, the world's largest manufacturer of golf cars. The company, located in Augusta, Georgia, produces nearly 400 gas and electric vehicles per day, of which more than 320 are golf cars. The balance is utility vehicles and personnel carriers for golf course maintenance and general industrial uses. In total, the company manufactures more than 40 types of vehicles.

To help maintain its market leadership, the company redesigned its golf car, with a planned introduction of January 1994. Richard Jefferies, team leader for process planning said, "We developed the new product from the ground up, starting with a universal frame for both gas and electric vehicles. At first, we simply were going to upgrade the finishing line to accommodate the new golf car. But we saw an opportunity to design a true world-class manufacturing operation."

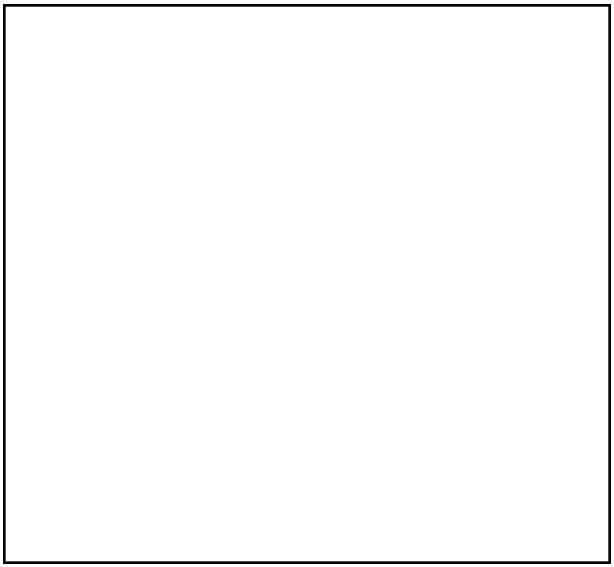
There were several reasons to change the production line. "First, said Mr. Jefferies, "we were already at our maximum production capacity. The new line could be designed to reduce material handling and speed production.

"We also wanted better corrosion protection than we were getting. And we were getting close to our VOC limits. We also needed to add capacity to paint several different vehicles. A new painting system could be designed to meet our future requirements."

After reviewing different coatings, E-Z-GO chose powder coating for both the body panels and frames. The company selected Milbank, Kansas City, Missouri, to design the production line and supply the washers and ovens, and Nordson Corporation, Amherst, Ohio, to supply the powder coating system.

Key to the new system is more than three miles of power-and-free conveyor, which snakes its way from fabrication to finishing to assembly. "Instead of manually transporting parts from the welding area to the finishing line, we now hang parts on the line, and they are conveyed directly through production. With the previous system, it took almost two days to get parts finished and to the assembly line. Now, finished parts get to the assembly line in about three hours," said Mr. Jefferies.

All parts are painted with a powder



PRIMED BODY PANELS enter the powder spray booth for color application.

primer, then a color top coat. E-Z-GO uses a new series of powder coatings developed by Evtech, a division of Eastman Chemical Company. The coatings, called the Evlast 5440 series, have an acrylic/polyester urethane chemistry. The coatings were developed to provide the flexibility and weatherability required for the demanding golf car environment.

According to Chip LaPole, E-Z-GO manufacturing engineer, the powder not only meets requirements for appearance and gloss, but gives a durable, scratch-resistant finish. The requirement for the salt-spray test is 500 hrs, and the powder exceeds 2,000 hours.

"The key to good corrosion resistance," added Mr. Jefferies, "is in the pretreatment." All galvanized and welded parts are conveyed through a Milbank seven-stage washer using zinc phosphate, chrome rinse and deionized water. Welded parts are conveyed through a pickling solution prior to entering the washer.

Five Nordson Excel 2000™ powder spray booths are located in two environmentally controlled rooms. One room contains separate booths for the primer and black paint; the second room has two reclaim booths and one non-reclaim booth for colors. The spray booths are equipped with Versa-Spray® guns and Versa-Screen™ booth and gun controls.

The booth controls monitor major operating parameters, including dew point and powder level. Controls trigger guns off between parts to minimize recycling of oversprayed powder. "The controls help us get the coverage uniformity we need for appearance and corrosion protection," said Mr. La Pole.

The company reclaims primer and black, which are used on the frames. It also reclaims the four most popular colors, which are beige, gray, white and light green. Other colors are sprayed to waste.

A typical color change takes about 20 min, but Mr. Jefferies said the

time is not a major factor. "The way the production runs, we are painting in three booths at one time. We change color in the fourth booth while we are running production in the others. This makes the color-change time insignificant to production."

E-Z-GO has realized several benefits with the new powder coating system. "Paint efficiency is 98 pct in the reclaim booths," said Mr. LaPole. "Even when we factor in the non-reclaim colors, paint efficiency is 90 pct."

The powder system and new manufacturing process have reduced the reject rate, which has translated into labor savings. With the liquid system the company had five full-time employees who reworked parts. That has been reduced to one person who spends about six hours per day on rework. This is with a 30 pct increase in the number of cars produced."

There are also labor savings on the finishing line itself. The liquid line needed 18 people to operate. The powder system needs 12 people, reducing direct labor by about 35 pct.

The new E-Z-GO golf car has been very successful in the marketplace, and the powder-coated finish is used as a selling point. Ron Skenes, manager, marketing services, says, "We have a new product and a new process. We promote our golf car's new body style, better manufacturing, and its longer lasting, more durable finish." **PF**

GOLF CARS are assembled on a production line similar to automobile manufacturing.

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