

# Electrocoat Meets Challenges of Unusual Parts

All electrocoating tanks do not have to be large, and all pretreatment does not have to follow standard formats...

By LYLE GILBERT MetoKote Corp. Lima, Ohio

Electrocoating tanks do not have to be large to get the job done. Pretreatment does not have to follow the "standard" procedures. Systems can be customized to meet customer specifications. All it takes is a little ingenuity.

**CASE of the "XCALIPER":** Machined brake caliper with masked bore and threaded holes.

*The Situation:* The customer did not want the brake caliper casting coated before machining. Some external and machined areas required corrosion protection. However, there was a fear of contaminating the brake fluid and causing failure in some of the small hydraulic fluid passages. Therefore, no coating could be allowed inside the brake cylinder bore or the threaded holes entering the bore. Powder coating was considered, but the masking requirements made it uneconomical. Liquid paints had been tried, but none passed the brakefluid resistance tests. Cathodic epoxy electrocoating passed the brakefluid resistance tests, but was not considered possible because of the masking requirements. Autophoretic was also eliminated because of the masking requirements and concerns about passing the brake-fluid resistance tests.

*The Solution:* A square, transferstyle electrocoating system was modified so that compressed air was available to the carriers and racking fixtures. We designed special racking fixtures with mushroom-type supports. They fit snugly in the entry area of the brake cylinder bore of the caliper both to hold the part in place and mask the bore. Special fasteners plugged and masked the threaded holes. Compressed air was injected into the bore cavity and positive pressure was maintained in the cavity during the entire process. After coating, the bare bores received a rust inhibitor.

Production requirements of more than 30,000 per day were satisfied, and the total applied cost was just over 10 pct of the lowest powder coating estimate previously received. **Case of the Giga Dipper:** Special pretreatment and electrocoating of computer parts.

The Situation: A computer manufacturer searched the nation for a coating source that could handle the coating requirements for a main-framecomputer drive housing and many of its internal components. The aluminum parts needed pretreatment with a proprietary chromate and then coating with a "tin free" cathodic electrocoating material. The mission was complicated because the housings had to be blasted and thermally stabilized by heating then freezing prior to electrocoating. The only approved sources for these services were far from our facilities.

*The Solution:* Working with the OEM customer, we used the "total systems approach" and centered all the special operations in one plant. A Wheelabrator rotary blasting cabinet was installed to deburr and surface condition the drive-housings. Special top-loading ovens heat soaked the drive housing castings at 500F. Two top-loading freezer cabinets cold soaked the castings at -70F. A station

was provided for the castings to defrost and dry off. A square transfer electrocoating line was dedicated to this program. The pretreatment tanks were charged with an Alodine (Parker Amchem) pretreatment system. The paint tank was filled with a "tin-free" electrocoating material specially formulated by PPG to meet the customer's requirements. More than 20 additional aluminum internal-drive parts were also directed to this system for special processing. This system is now entering its sixth year of production.

The Case of the Raw Bar Dipper: Marriage of shot blasting and electrocoating.

The Situation: The product is a forged and hot-formed automobile stabilizer bar. Prior to coating, the bar required shot-blasting to remove slag left over from forging. When the project first started, an outside source handled the blasting operations and sent the parts to us for electrocoating. To improve the logistics, inventory control and quality, we installed a blasting machine next to the electrocoating line. However, there was still concern over parts handling between the blasting operation and the coating line. There was also the possibility that some bars might be blasted and have the opportunity to flash rust if not coated immediately.

The Solution: The obvious solution was to eliminate material handling. The possibility of a delay in processing after blasting and before coating could be handled administratively with an edict that no bars were to be blasted or that all blasted bars

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must be coated before shutting down for a weekend or long holiday. The administrative option had been used and worked, but it was not considered totally reliable.

Again, we proposed an overall systems approach and developed a processing system that eliminated both major concerns. A square transfer line was designed to incorporate the blasting operation on-line. The racking mechanisms were designed with the option to rotate within process tanks or stations as selected. Rotation allowed complete coverage during shot blasting and better chemical circulation during pretreatment.

Personnel no longer handle the bars between the shot blasting and coating, eliminating a possible source of surface contamination. The parts are cleaned and dried prior to entering the blaster, which prevents the blast media from being contaminated. The freshly blasted and clean, raw surface enters the pretreatment and coating stations immediately after blasting.

**The Case of the Heavy-Duty Dipper:** Extra-heavy castings with yellow electrocoating.

The Situation: A major manufacturer of construction equipment was facing foreign competition that provided a higher performance finish on its products. Specifications allowed castings to be furnished with a wide range of liquid primer materials. Castings were purchased from more than 40 foundries in 11 states. Preparation and application methods and paints used varied. It was not unusual for parts on the shipping dock to be several shades of yellow. There were different priming materials used, and some were purchased without primer. The uncontrolled pretreatment and variable primers were affecting topcoat performance and concerned the manufacturer.

The company needed one approved process for pretreatment and highperformance primer coating. The coating system had to be capable of handling production castings as large as four-ft wide, four-ft deep and eightft long, while weighing up to 10,000 lbs each. The company also needed a centralized receiving and distribution center.

*The Solution:* Working with the customer's corporate paint logistics team, we proposed a "Purchased Paint Supply Center." The plan competed against several internal facility options, as well as other competitive proposals. It included a facility strategically located to service all of the using plants. The plan established a strategic alliance to develop and implement the most appropriate specifications for pretreatment and prime coating materials to provide the desired "high-performance painting system."

The facility was designed to provide space for the electrocoating system and parts handling for this program and several other customers. Electronic data interchange systems, compatible with those used by the customer, were installed. Now when parts arrive for coating, they are entered into the customer's inventory system and controlled as the customer's property. The customer electronically schedules and directs parts from the coating operation to the using plants.

The Case of the Mini Dipper: Small parts requiring tight thickness controls.

The Situation: The parts were mating fuel-injector housing components. One was made from powdered metal and the other a machined steel part. They were so small they fit into a one-inch cube with room left over. The parts had to fit together precisely, and coating thickness had to be 0.4 to 0.5 mil with good film integrity. The parts also had to look good. After inspection, parts were conveyed into automatic assembly equipment where high-speed operations demanded precision dimensions after coating. A coating thickness defect could cause a "jam up" of the customer's assembly equipment.

The Solution: Considerable sampling and testing confirmed that electrocoating could meet the design parameters, but the process would have to be closely controlled. The powder metal dictated its own agenda of process parameters and pretreatment considerations. Because of the thickness-control specifications, we set up a small set of tanks with special monitoring, controls and sophisticated metering devices.

The small system was a version of a larger monorail electrocoating system. It was equipped with the necessary devices to satisfy the process and control specifications. The system applies electrocoating to more than 12,000,000 parts per year, with full capability to match production schedules at a cost below expected targets.

**The Case of the Super Dipper:** Electrocoating oversized components.

The Situation: Automotive manufacturers have a difficult time finding a way to electrocoat prototype car, van and truck bodies and cabs on high-production assembly lines. Makers of low-volume specialty vehicles find it difficult to justify investment in an electrocoating system that also includes waste treatment and support equipment. There are also large military vehicle components that require a CARC (Chemical Agent Resistant Coating) their as primer. Electrocoating satisfies the CARC requirement, but there are few systems available that can handle components the size of truck beds and truck frames. Those systems that are available are not convenient to the R & D operations and low-volume special-vehicle manufacturing in the Detroit area.

The Solution: We purchased a coating facility in Grand Blanc, Michigan, that added the "huge" part capability we needed. After modifications to the large electrocoating system in that plant, we were able to electrocoat components as large as an extended van body. The carrier system allowed the pretreatment chemicals and electrocoating materials to reach all recessed areas and pockets. To ensure complete draining after coating, the carrier rotates the part 360 deg while in the tanks and above the tanks after they are removed. The "Super Dipper" is used for a variety

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of prototype and low-production space frames (inner bodies) for cars and vans as well as truck cabs and beds.

The electrocoating process is somewhat fixed once it is put in place. However, all tanks do not have to be 25,000 gal and up. All pretreatments do not have to follow the standard automotive format. And a11 electrocoating materials do not have to be black. Most of us tend to "box" in our thinking to those parameters, unless the volume or the severity of the need dictates a fresh new look. It is important to "break out of the box" and do some real possibility thinking. It can be surprising how many variables are available if one is able and willing to start with a clean sheet of paper. PF

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#### 1.

THE AVERAGE WEIGHT of the brake caliper prevents the part from floating away during immersion, even though there is air pressure inside the brake cylinder chamber.

#### 2.

CARRIERS have devices that tilt the computerdrive housings back and forth to fill recesses and provide for complete drainage.

#### 3.

THE SINGLE-POST rack design for these automobile stabilizer bars provides rotation during each step.

#### 4.

NINE-THOUSAND-LB CASTINGS are prepared for electrocoating.