

Huntsville E-Coat Process

The process includes a trip through 13 different tanks and two curing ovens. The tanks were designed to accommodate 53-foot flat bed trailers and dump bodies. The tanks are 12 to 16 feet wide and 14 feet deep. The result is a series of tanks, each filled with as much as 90,000 gallons of liquids. The new system is located in a 100,000 sq. ft. addition to the original facility.

The trailers were moved through the process with a series of cranes. The cranes dipped and rocked the trailer back and forth while being submerged to eliminate trapped air. The trailers traveled on a specially designed fixture during the process.

The Process

Stage #1

Alkaline tank. The cleaning process continues by immersing the trailer frame in an alkaline solution that has been heated to 140° F.

Stage #2

Water dip/rinse. This rinses the solution from the trailer.

Stage #3

Iron phosphate bath. Shot blasting produces a rough surface. The iron phosphate pickles the surface and applies a uniform crystalline structure onto the product to enhance paint adhesion. Nozzles are located throughout the tank to maximize the circulation of the solution. Pumps force the material through nozzles at a rate of 3600 gpm. Similar flow rates are found in the other tanks.

Stage #4

Water dip/rinse. The first in a series of baths uses plain water to remove impurities.

Stage #5

Nonchrome acid seal. This solution further fills in surface irregularities generated by the shot blast process. The nonchrome sealer fills any voids that might have been left from the iron phosphate process. It also is designed to improve adhesion and corrosion protection.

Stage #6

Deionized reverse osmosis water dip/rinse. Used to attract residual impurities from the steel. The rinse can be performed at room temperature.

Stage #7

Epoxy primer. The system re-circulates the fluids in this tank at 5000 gpm. Permeate sent out from this tank is continuously run through ultra filtration systems at a rate of 10 gpm 24 hours per day. The paint is returned to this tank, and the permeate is returned to the rinse tanks.

Stage #8

Water dip/rinse. The permeate rinse uses reverse osmosis water to strip away the paint that has not been electrically charged and bonded to the steel substrate.

Stage #9

Water spray/rinse. This step is a continuation of the rinsing process, but it uses a spray of water to more aggressively remove residual paint.

Curing Oven

Oven cure to 375° F for 120 minutes depending on metal thickness.

Stage #10

Dip clean and rinse. This station, almost identical to the reverse osmosis process of Stage #6, prepares the surface for the finish coat. The primary difference between the two stations is that the second one contains chillers in the tank to cool the trailer after it leaves the oven.

Stage #11

Topcoat. The system re-circulates the fluids in this tank at 5000 gpm. Permeate sent out from this tank is continuously run through ultra filtration systems at a rate of 10 gpm 24 hours per day. The paint is returned to this tank, and the permeate is returned to the rinse tanks.

Stage #12

Water dip/rinse.

Stage #13

Water spray rinse.

Curing Oven

Oven cure to 385ø F for approximately two hours depending on metal thickness.

Once the trailer or part leaves the oven, it is cooled by being immersed again in the water bath of Stage #10. This enables it to cool to the touch as it moves down the assembly line. Trailers requiring a color other than black travel from Stage #10 to a conventional paint line to receive the specialized color.

Waste Water System

With the wastewater system emissions are reduced. A system analogous to a sewage treatment plant separates water from solid waste. Treated water can be sent to a sanitary sewer system, and solids are compressed into blocks that can be taken to the dump.

Less water usage. A closed-loop system reduces the amount of water consumed during the finishing process.

Waste from the tanks flow to a waste treatment area. The effluent goes through a multi-step process that separates the solids and cleans the remaining water sufficiently to meet wastewater guidelines.

The first step is a pH neutralizer tank, followed by a second pH neutralizer tank. From there, the liquid goes to a holding tank where the solids settle to the bottom.

When the holding tank is full, the slurry is pumped to a filter press. A hydraulic cylinder drives the slurry through a filter at a force of 4,000 psi. This results in two products: water that is sufficiently clean to be sent through the public sanitary sewer system and solid clumps of waste that are stored in bins and easily disposed.