

Chromium Emission System exceeds environmental requirement

Pollution Prevention for Finishers

When Goodrich's Aerospace Landing Gear Division changed its chromium emissions control system from a wet-pack scrubbing system to dry mist eliminators, it wanted to be certain it met Environmental Protection Agency (EPA) requirements. The system designer/supplier provided two separate systems for Goodrich, each serving half of the company's chromium processing lines with the capability of changing from one to the other in the event of an emergency. The company designed a system well below the MACT standard of 0.015 mg/cu meter. The two systems were installed in December, 1995 and January, 1996. When independent test data was collected and tabulated in July, 1996 both systems were at least 10 times better than the designer's criteria and even lower than the 0.015 mg/cu meter required by the MACT standard. The Goodrich facility in Cleveland Ohio - USA, specializes in finishing large, heavy components weighing as much as two tons. Its primary activity is chromium plating aircraft landing gear and other components for the aerospace industry. It also handles plating of such items as crankshafts for railroad engines. Most of the landing gear components are manufactured at the company's machining facility and shipped to the landing gear facility for final finishing, plating, shot peening and non-destructive testing.

FROM WET TO DRY: GOODRICH'S SOLUTION TO SATISFY MACT STANDARD.

"We had a wet-pack scrubbing system in here before," Thomas M. Wolf, Goodrich's senior electroplating engineer, pointed out. "When it came time for us to meet the MACT standard, it seemed a good time to make a change." Goodrich had learned that multiple-stage, dry mist eliminators were proving most efficient in meeting the new requirements for lower emissions. In such units, particles are generally trapped by successive media pads or "stages," each with progressively smaller openings to trap increasingly smaller particles by impingement. The pads are periodically washed down to prevent plugging. "When we decided to change over, we surveyed areas in California since they have some of the most stringent emission laws. We found companies doing work in southern California that could meet the required regulations, and from those firms we requested price quotations," Mr. Wolf said. The successful price quotation

was from KCH Services Inc., and they recommended the dry-type, multiple-stage mist eliminators as the solution.

LARGEST CORZAN® CPVC SYSTEM BUILT TO DATE.

Based on prior corrosion experience, Goodrich engineers knew they wanted steel hoods for their new system. They specified the steel thickness and the coating desired on both the inside and outside of the hoods. "Other than the hoods, the new system is constructed of Corzan® CPVC up to the designer's Spectra mist eliminator, at which point it is PVC", Mr. Wolf stated. "To our knowledge, this is the largest Corzan® CPVC system in North America. It has the largest extruded Corzan® CPVC duct work (24-inch or 600 mm extruded duct up to 52 inches or 1321 mm on the cans), which was hand fabricated from CPVC sheet. All phases of construction were monitored by Lubrizol's Corzan Group, specialists in Corzan® CPVC production and fabrication for corrosionresistant duct systems." The new chromium emissions control system goes right from the chromium plating tanks to the roof, approximately one third of the total plating area retrofit, with a price tag of slightly more than \$1,000,000. Included in the project was refinishing the floors for corrosion resistance, repainting the tanks and repairing and replacing certain tanks. There's good reason why the designer's system is divided into two sections, each rated at 40,000 cfm, to service eight chromium plating tanks, two strip tanks and one sulfuric/hydrofluoric tank ranging from 1,000 to 4,000 gal. "Our plating operation runs 24 hours, seven days a week," Mr. Wolf explained. "With the system divided into two sections, we avoid any work interruptions."

"Our operators could not believe what a change in the atmosphere the new system provided"





This is important. If one section goes down, we simply shift our work to the other section and then bring it back on line." In the system's operations, air is drawn off the top of each plating tank by the 40,000-cfm fans into the vertical, in-line mist eliminator (VME). This first and second stage removes approximately 99% of the 0.05 to 0.1 micron or less particles. The air stream is then turned over to a third stage, the coalescing stage, where it takes 0.3 micron or less particles and condenses these particles which are then removed.

WASHER SYSTEM MEANS LESS CHROMIUM, LESS WASTE WATER.

"When analyzing our old system," Mr. Wolf said, "we felt it contained a lot of chromium just sitting in it making the system heavier than normal. We requested the designer to design a duct and hood washing system along with the pad and mist eliminator washing systems. All of this is controlled by a simple PLC in cabinet. It's self-monitoring, has its own warning lights and automatically washes itself down on a timed cycle." According to Mr. Wolf, the system is activated once or twice daily. The pads are washed down every eight hours in the first stage.



The last three stages are in cycles. The first two stages in the unit (on the roof) are washed down once every hour. Goodrich Aerospace, however, has increased cycle times from the original settings of the designer since its highly efficient wastewater treatment system is capable of handling a greater throughput. As a result, Goodrich

Aerospace anticipates being able to recycle as much as 90% of the treated water. This is an additional benefit that they did not anticipate when installing the designer's system. "Now, with each tank having its own mist eliminator, we are removing about 90% of the chromium, and we can even feed our processed water back into the tank or put it into a holding tank, as we presently do, and draw from it when needed." In addition to greatly exceeding required environmental requirements, Mr. Wolf proudly points

out that the new system provides improved shop-cleanliness and a better environment for workers. "Our operators could not believe what a change in the atmosphere the new system provided," Mr. Wolf observed.

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