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## *Essick Cleans Up*

Essick Air Products, Inc. is a manufacturer of evaporative coolers for residential and industrial applications, which range in size from a small 300 CFM portable unit to a 36,000 CFM commercial unit. By the very nature of the cooling process, all evaporative coolers are exposed to water with varying degrees of minerals and other corrosive substances. Corrosion protection, therefore, is essential. A breakdown in this protection leads to premature failure of the entire unit. For this reason, most metal components are powder coated inside and out to deliver corrosion protection and finish quality.

The company operated one of the oldest powder spray booths in the industry in its Little Rock, AR, U.S. facility. The booth was gigantic, and featured a remotely positioned powder reclamation unit packed with horizontally positioned cartridge filters. The reclaim unit was connected to the spray booth by a long duct. The company used to have to change filters at least every 3 months, as powder from the upper rows of filters would accumulate on those below, resulting in quick filter clogging. Every time the company replaced filters it threw away about 30 lb of powder with each filter. Due to the age of the booth, its construction, and quick filter blinding, the company had problems with powder containment, and there used to be powder throughout the room.

The powder spray system had seen better days as well. The efficiency was low and the company had difficulties with film thickness control. The company coats a wide variety of components, ranging in sizes from 4-ft deep cooler housings to 1-in deep louver panels. It was difficult to reposition spray guns in the old system, so the company never used to have optimal gun positioning. In addition to automatic guns, most of the parts had to be touched-up by two manual operators. Film thickness control was a challenge, and the applied coating cost was high.

Another major source of powder waste was an old sieve assembly. Due to improper sizing of air vents, the sieve would become pressurized. Excessive pressure would drive powder into a scrap bucket that would fill to the brim every few hours.

Additionally, the former system had a long duct connecting the booth with the powder recovery system. New fire protection and explosion prevention regulations require that systems with remotely positioned powder collection/recovery systems be equipped with slide gates and an explosion venting or suppression system. The former system did not meet these modern safety requirements.

Due to the age, inflexibility of setup, and inefficiency of its former system, operating and applied finish costs were high. "Although we had a very capable crew running the line, things were gradually getting out of control," admits Jim Brock, vice president of Engineering. "We upgraded our pretreatment systems and dry-off oven a year earlier, and realized how much technology has improved since the original system was installed. The upgrade of the pretreatment system resulted in significant improvements to the durability of the finish and reduction in chemical consumption. We were looking forward to realizing further



*By replacing an old powder spray system, Essick Air Products achieved a cleaner spraying area and made other improvements in the coating process, while cutting powder use.*

reductions in operating cost and improvements in product quality from the upgrade to our powder application and recovery system."

Early last year the company was ready for a powder coating system upgrade. It contacted three companies on system design and quotations. It also requested that all three potential vendors provide plant-tours of their existing customers, so that Essick could ask people who actually run the equipment about their degree of satisfaction with equipment quality and after-sale customer service.

"Going on plant tours was a very important part of the vendor-selection process," says Mr. Brock. "Our team saw some unique system features that we thought were important to incorporate into the new system design. Technology has advanced so much since the original system installation that we thought it would be unwise to make an important investment decision based only on sales presentations."

Based on the vendor evaluation, Nordson Corporation (Amherst, OH, U.S.) was chosen. Powder coating system installation took 1 wk. The new system was running by the middle of September 2002. Nordson had an experienced field engineer onsite, along with a factory-direct customer service representative and a local powder systems specialist. Even the vendor's new local distributor participated in the installation. The whole crew worked long hours, but all the equipment was delivered and installed on time.

The Excel 2003 powder spray booth is capable of handling products up to 4-ft, 4-in wide by 4-ft, 4-in high. The system features a cartridge-based powder recovery system closely coupled to the booth, eliminating ductwork. Despite the significant size of products processed through the system, the overall footprint is much smaller than that of the former system. Vertically mounted cartridge filters are a major improvement—the pressure drop on the cartridges is virtually the same today as it was the day the company turned on the new system.

Remembering the troubles with reclaimed powder sieving, Essick paid particular attention to how quickly the scrap bucket attached to the new AZO sieve would fill. It now finds just a couple of cups of powder in it after 1 wk of operation.

To accommodate a wide range of product sizes and to ensure optimum spray equipment positioning, a PLC-controlled gun triggering system with in/out gun positioning was implemented. The parts are automatically scanned as they enter the spray booth, and automatic guns are positioned to provide for the optimum gun-to-part distance on all parts. The automatic gun positioning system is said to significantly contribute to coating thickness uniformity and spray system efficiency.

The booth canopy is designed with extensions around automatic guns. The extensions allow maintenance of optimal gun-to-part distance, even on the widest products, and still have the guns well inside the booth, away from booth walls. Additionally, the automatic gun extensions are made of clear plastic, allowing operators to easily observe the coating process from outside the booth. Plastic also does not attract powder, contributing to high powder deposition efficiency on products.

In the former system, manual operators used to be inside the booth wearing protective suits and hoods with a clean air supply. Now, about 80 percent of the products are powder coated automatically. Whenever touch-up is required, one operator positioned outside the booth can perform most of it. To make it convenient for the operator to touch-up the tops and bottoms or the largest parts, the new booth has high and low manual openings on one

of its sides. An operator can touch-up the top of the part and then, without entering the booth, walk 3 steps down from the “high” platform and easily coat the bottom of the part without crouching. The company found that making it convenient for the operator to do his/her job paid off in reduced reject rates and tighter coating thickness control.

System maintenance is simplified as well. “When we had powder all over our paint room, we would not even know where to start cleaning,” says Mr. Brock. “We have a great crew of people running the line, and our paint line supervisor takes full ownership of the system. Call it an extreme, but we now have a feather duster hanging near our powder feed system. Every tiny powder spill is cleaned as soon as it occurs.”

The implementation of an automatic gun purge function reduces spray system maintenance and ensures consistent charging performance. A PLC system automatically monitors line gaps, and not only turns the spray guns off during line gaps to avoid powder waste, but also purges the guns with compressed air to ensure there is no powder accumulation inside nozzles and on charging electrodes.

“The main benefits are powder savings and much tighter control of applied coating uniformity,” reports Mr. Brock. “Our powder coating consumption is reduced by approximately 33 percent compared to the old system. Applied paint coating thickness used to vary from 1 to 4 mils, where we now have a very uniform 1.5 mils coverage.

“In any finishing system, manual touch-up introduces a major process variable,” he adds. “Even a highly skilled operator often applies too much coating to the part. Significant reduction in required manual touch-up saves us coating material and reduces rejects that in our old system often could be attributed to an operator error.

“Although we operate the system 7.5 hours per day, so far we have replaced very few wear components,” Mr. Brock says. “The system design here combines with good maintenance practices to reduce our operating cost. And the cartridge and final filters are still as good as new—those were a major replacement item on our old system.”



Nordson Corporation • Powder Coating Systems • 300 Nordson Drive • Amherst, Ohio 44001  
800.626.8303 • powder@nordson.com  
www.nordson.com/powder