

CASE HISTORY

Air-powered vacuum helps heavyweight coating company knock out shocks

Nature abhors a vacuum and so do the operators in a powder coating area of a metal fabrication shop after they get shocked while using an electric shop vacuum during their cleanup routine. To stop the static, the company brings in an air-powered vacuum that not only gets rid of dust, but also eliminates jumpiness in the maintenance crew.

Miller Welding & Iron Works, Washington, Ill., a custom job shop fabricator and finisher, likes living large. The company manufactures parts for off-road equipment, mining machinery, oil fields and offshore oilrigs, broadcast antennas, and farm equipment. "We're pretty diversified in whom we do work for," Sam Miller, company vice president, said. The parts it manufactures and finishes weigh as much as 4,000 pounds. As if that's not heavy enough though, the shop will be coating parts that weigh in close to 15,000 pounds once a new finishing booth is installed in its paint and powder coating area.

Miller's father, Dick, started the business 35 years ago. The company has been powder coating for the past 4 years. Its plant covers more than 200,000 square feet, not counting additional storage space outside. The company employs between 70 to 75 people, with 6 to 8 of those working in the finishing area. Miller said the company does some electrostatic liquid coating; however, 99 percent of its products are sprayed with hybrid, epoxy, or polyester powder coatings, depending on their end use. "Powder is one of the things we use to sell the product," he said. "That helps because it's a pretty corrosive-resistant coverage."

For example, the company is converting its liquid paint booth into a dual-purpose booth in which operators can also apply powder coatings. Operators will soon be using the booth to spray a specially formulated

powder coating onto parts for offshore oil pumps. Miller said the specially formulated powder coating withstood 7,000 hours in a salt-spray test—results applicable to the offshore oil pumps, which have to endure salty, sandy, and windy conditions. Miller said people in the oil industry wanted a more effective coating than the liquid epoxy they had once specified; the specially formulated powder coating was the result. Operators will apply two coats of powder onto the pump parts.

Balancing the scales

The company's finishing shop is a manual operation that includes one 22-foot-long booth and three 18-foot-long application booths. The company reclaims powder in three booths and sprays to waste in one. Before they're powder-coated, parts typically get cleaned in an automatic shot-blast booth and then enter a blow-off booth that contains air knives before the parts go to the spray booths. Sometimes, however, the company powder coats parts before they're machined, especially if they can avoid masking. The powder-coated part then gets machined and sent through a wash bay before it's shipped out.



Operators wipe down and vacuum the application booth. The air-powered industrial vacuum has eliminated the potential for shocks from static electricity.

Two operators at a time spray powder in one booth. From there, parts enter a 100-foot-long convection oven. The parts make a double pass, entering one side of the oven, turning on the inside, and then exiting the same way they came in. Balancing out the lightweight products with the heavier parts requires good management skills. The heavier products usually take more time to finish than the lighter ones. Operators can adjust the line speed, Miller said. "We try to keep it running as much as possible," he said. "We have to try to organize what we put on just so we don't burn something."

Ideally, operators schedule lightweight materials that require lower cure temperatures earlier in the day, then ramp up the oven later in the day for the heavier parts. "It varies," Miller said. "I mean, sometimes it doesn't work that way. It's just a matter of what's coming up next, what there is to be done today, what kind of hot stuff's going through—by hot stuff, I mean short-delivery, short-lead-time material. There's never a dull moment." After curing, parts exit the oven and cool down. Then, they are unloaded with jib cranes and set on pallets for handlers to move to the packaging and shipping area of the plant.

Knowing how to even out lighter loads with heavier ones and figuring out ways to control the oven so that temperature adjustments are mini-

mal are challenges the company faces continually and solves daily. But the company had another situation that it didn't want to put up with on an ongoing basis.

Airing out a problem

That other problem keeping operators (literally) on their toes was static shock. Before powder coating parts, operators cleaned shot-blasting material from them with small electric shop vacuums. Operators also used the electric vacuums in the spray booths. "When we were using the electric shop vacs, sometimes there'd be a shock—a static shock," Miller said. "The guys didn't want to go in and vacuum."

He said the operators preferred to just blow out the booths and wipe them down with water, but this wasn't thorough or fast enough, and it didn't take care of the powder that settled on the floor and other areas of the finishing shop. The electric vacuums also slowed down production—and not just because operators were loathe to use them. Cleanup took as long as 2½ to 3 hours. This meant the finishing department often had to shut down the produc-

Because they were powder coating 4,000-pound parts, operators had enough weighty matters on their minds without having to worry about getting shocked by an electric vacuum during cleanup time.



Operators spray powder onto a machined piece. The company sprays parts that weigh as much as 4,000 pounds and will soon be powder coating parts that weigh as much as 15,000 pounds.



An operator blows off a part after it's been shot-blasted to ensure all areas of the part are clean before it enters the powder application booth.

tion line before the afternoon to allow enough time for maintenance. Operators also had concerns about the sparking potential among flammable products and the electric vacuums.

Keeping employees on their toes was one thing, but jolting them was another. Miller knew something had to be done; therefore, he decided to glance over a brochure that showcased names of vendors that make various equipment for powder coating lines. "I was looking for something," he said. "I just happened to be thumbing through that one day and got into the vacuum part of it." Miller called a company from the list of vendors who supplied vacuum cleaning equipment. "The guy I talked with was very, very knowledgeable," he said. "He was able to recommend a vacuum for me. I didn't know what we needed, and when he said they had an air-operated vacuum designed specifically for powder, I thought that sounded good." The company bought the 55-gallon, air-powered industrial vacuum 2½ years ago.

The air-powered industrial vacuum makes cleanup easy and painless, eliminating the shocks sparked by the electric shop vacuum. "It's not a problem to send anybody in to vacuum anymore," said the company vice president. "It's no big deal to them. They know they're not going to get bit by it."

Now, employees are no longer leery of cleaning up the finishing area. "It's not a problem to send anybody in to vacuum anymore," Miller said. "It's no big deal to them. They know they're not going to get bit by it." Miller said the air-powered vacuum picks up more material because it has better suction than the electric shop vacuum. The electric shop vacuum was also cumbersome compared with the air-powered vacuum, which deposits waste into a drum that can be easily rolled on and off. "You just pop the lid," Miller said. "You can take the whole drum and dispose of the waste powder or take a bag out of it, however you choose to use it. It's easy to empty and easy to keep clean."

Making a good thing better

Miller said employees have taken pieces of tubing and welded them to make custom nozzles for the vacuum. The custom-built nozzles make it possible for them to vacuum powder off small areas of parts before the parts get cured. "We can clean a real nice area," he said. The company can pull powder out of threads and off machined surfaces and edges that have to have welds with no powder in them.

For example, the company had a job that involved powder coating a thin part ($\frac{3}{16}$ inch). The edge of the part and a half-inch of the front and the back weren't supposed to be powder-coated. Rather than masking those areas, employees devised a fork-shaped nozzle tip that allowed them to vacuum off the powder from those areas without disturbing the areas that required the powder coating.

"We've come up with some neat ways to control where the powder doesn't get baked on," Miller said.

PC

Air-powered industrial vacuum: **Vac-U-Max, Belleville, NJ, 973/759-4600.**
www.vac-u-max.com

Powder coatings: **DuPont Powder Coatings USA, Houston, Texas, 713/939-4000.**
www.dupontpowder.com

Application equipment: **Wagner Systems, Carol Stream, Ill., 630/784-8900.**
www.wagnersystemsinc.com

Ovens: **JB I, Osseo, Wis., 715/597-3168.**
www.jbibooths.com

Editor's note

For further reading on this topic, see *Powder Coating* magazine's Web site Article Index at [www.pcoating.com].

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