

Adding Value

Metal Fabricator Powder Coats its Way to the Top

One of four paint-spray operators at Metcam applies powder coating to a sheetmetal cabinet component. In 2001, Metcam employed six painters and coated 19,000 to 23,000 sq. ft. of steel per month, primarily with liquid paint. Now, its four painters powder-coat an average of 50,000 to 60,000 sq. ft. per month, a productivity boost credited primarily to transition to the quicker and easier powder-coat process.

Having gone from an entry on the Georgia EPA list of large-quantity generators of hazardous waste in 2001 to winning the 2002 Governor's Award for Pollution Prevention from the Georgia Department of Natural Resources speaks volumes of the efforts made at Metcam, a \$10-million-per-year metal fabricator in Alpharetta, GA (near Atlanta). Metal finishing means a lot to Metcam, setting it apart from competitors that outsource finishing operations. In-house coating—powder coating of steel and conversion coating

of aluminum—means quicker turnaround for its customers, better quality control and reduced costs.

But, operating paint booths comes with environmental responsibility and its own set of costs and challenges. The firm, buoyed by the efforts of its environmental, health and safety manager Mary Beth Schwefel, has its coating situation well in hand—so much so that it's on its way to earning exempt status from the Georgia EPA, leaving Metcam president Bruce Hagenau beaming with pride.

Offering in-house environmentally friendly powder coating as part of its value-added operations delivers business to the doorstep of metal fabricator Metcam, Inc., and makes the firm a good corporate citizen too.

BY BRAD F. KUVIN, EDITOR



Metcam's new ultrafiltration membrane system installed on Metcam's five-stage pretreatment line continuously removes oil and grease from Stage 1, and ultimately reduces wastewater at Stages 1 and 2. Adding this system and a rinse crossflow system that ties Stages 1 and Stage 2 together reduces wastewater production by more than 76,000 gal./yr. and yields net cost savings for wastewater processing of more than \$29,000/yr.

ance, to minimize our wastewater generation and ultimately reduce our costs related to wastewater."

Schwefel turned to the Georgia EPA and its nonregulatory arm, the Pollution Prevention Assistance Division (P²AD) for help with a wastewater-reduction plan. The resulting project, undertaken from January to June 2003, now saves Metcam thousands of dollars every month. In addition, rejection of coated parts due to pretreatment problems has dropped by 51 percent.

Wastewater Treatment Soaks Up Big Bucks

As Metcam diversified away from its concentration in the telecommunications industry, it's taken on more and more work that requires painting. In 2001, it coated an average of 19,000 to 23,000 sq. ft. per month—less than half what it coats today.

Along with its growing customer base for painted metal fabrications comes quality-system surveys and high expectations. Schwefel cites one recent example: "We had managers from a prospective customer, Kobelco (heavy

equipment), in here last October, 2003, to audit our coating processes and our environmental-management system. They said that they had been in five other shops and none of them, besides us, could meet their coating standards. Since that time, we've taken on a lot of fabrication and coating for them, on relatively heavy-gauge (to ¼ in. thick) heavy-equipment parts."

The Kobelco story offers one example of how Metcam's coating operations bring customers to its door. Metcam expects more of that as it pursues ISO 14000 registration late this year.

A cornerstone to its ISO 14000 efforts is the P²AD project, to prove the effectiveness of its proactive environmental-management approach. Metcam operates a five-stage iron-phosphate spray washer to clean and treat steel parts prior to powder coating. The wash line consists of a 1250-gal. Stage 1 alkaline cleaner; Stage 2, 750-gal. static rinse; Stage 3, 900-gal. iron-phosphate treatment, for corrosion resistance; Stage 4, 750-gal. static rinse; and Stage 5, 1100-gal. non-chrome seal, for under-paint corrosion resistance.

Powder Coating

"We can fit 4-by-5-in. parts to 109 in. long in our washer," says Schwefel, "and still make the turns in our conveyORIZED three-booth paint line. Parts larger than that must be shorter in length to turn the corners."

Prior to its P²AD project to reduce clean-and-rinse wastewater generation from its treatment line, Metcam dumped its Stage 2 waste to an on-site evaporator, to prevent oil and grease from contaminating Stage 3 treatment. Costs for evaporation and waste dump totaled \$1.20/gal. Total annual costs for wastewater generation, including tank dump and cleanout, came to \$33,500 (\$6400 for Stage 1, \$27,100 for Stage 2).

A Better Mousetrap

Working with P²AD and its project manager/engineer Colin Kiefer, Schwefel and her Metcam team evaluated the addition of an ultrafiltration (UF) membrane system for continuous removal of oil and grease from Stage 1 of the pretreatment line, and a counterflow system for reuse of Stage 2 rinse-water in Stage 1. Results from the system changes include a wastewater reduction of more than 76,000 gal./yr.; reduction in chemical use of 234 gal./yr.; and a net cost savings of

more than \$29,000/yr.

The UF membrane system installed on Stage 1, a crossflow unit from Arbortech Corp., McHenry, IL, reduces wastewater at Stages 1 and 2. In operation, contaminated cleaner solution is pumped across the membrane—crossflow filtration prevents filter-cake buildup common to traditional filtration designs that tend to clog and foul relatively quickly, driving up maintenance and operating costs.

The new rinse-counterflow system that ties Stages 1 and 2 together, for reuse of Stage 2 water as make up for Stage 1 evaporation losses, was designed and built by Metcam engineers and technicians. Since the UF membrane system continuously removes much of the contaminants from Stage 1, the counterflow system merely returns city water and an alkaline cleaner back to Stage 1 while maintaining the cleanliness of Stage 2.



A laser-cut and press-brake-formed sheetmetal-cabinet component leaves the Metcam five-stage pretreatment line ready to enter the firm's three-booth conveyORIZED paint line.

Coated-Part Quality Also Improved

Metcam's coated parts increasingly have to withstand severe environments, "more now than ever," says Hagenau, "as we've expanded into more outdoor applications, such as Kobelco's parts. Corrosion resistance and toughness—chip resistance—are critical," he adds.

Coated parts can be rejected upon visual examination at Metcam for problems linked to pretreatment, coating and curing operations. Blistered coatings hint at oil, water or other contaminants trapped between the part base material and the coating, causing poor adhesion—a direct cause of inadequate cleaning and phosphate application.

Prior to the P²AD washer projects, Metcam averaged 4 sq. ft. of washer rejects per 1000 sq. ft. coated. Since installing the membrane and counterflow systems, rejects have dropped by half, to 2.02 sq. ft. per 1000 sq. ft. coated.

Advantages of Powder Coating

Source: The Powder Coating Institute, Alexandria, VA

- Contains no solvents—emits negligible if any polluting volatile organic compounds
- Requires no venting, filtering nor solvent-recovery systems
- Exhaust air can be safely returned to the coating room and less oven air is exhausted to the outside
- Most overspray (as much as 98 percent) can be readily retrieved and reused
- Resulting waste is negligible and can be easily and economically disposed of
- Requires no drying or flash-off time, allowing close racking of parts on a conveyor
- Coatings do not run, drip or sag, reducing reject rates
- Requires minimal operator training and supervision
- Minimum contamination of clothing
- Easier compliance with federal and state regulations

A Snapshot of Metcam

Metcam operates a 100,000-sq.-ft. metal-fabrication facility in Alpharetta, GA, 25 miles north of Atlanta. It was formed in 1989 following the purchase of the assets of Mowtron Corp., a fabricator that had half of its sales tied to a line of outdoor payphone enclosures, the sales of which blossomed in the early 1980s following deregulation of the telecommunications industry. Metcam sold that line in 1997, and has continued to diversify ever since. Now about half of its work is for the telecom industry, the rest spread among heavy equipment (Kobelco earth-moving equipment is a new customer), HVAC, food service, aerospace and electronics. Metcam processed 1.2 million lb. of sheetmetal in 2003, 66 percent of that mild steel, 11.5 percent galvaneal, 10.5 percent stainless steel, 6 percent aluminum and 5.5 percent galvanized steel.

Among its arsenal of metal-fabricating equipment:

- Two flexible manufacturing systems (FMS) that feature automatic sheet nesting, load and unload. One FMS includes two Bystronic laser-cutting machines (3000 and 4000 W), purchased in April 1998, the other an Amada turret punch press and right-angle shear combo;
- Seven press brakes, to 130 ton by 10-ft. bed;
- Four Haeger insertion presses, three of which include automatic feed;
- An array of arc- and resistance-welding equipment;
- Machining equipment to drill, tap, counterbore, turn and saw;
- Deburring equipment;
- Six paint booths and a five-stage phosphate paint pretreatment line.

“We’ve also far exceeded our salt-spray testing requirements,” adds Schwefel.

All told, the upgrade pretreatment line has made Metcam more cost efficient and environmentally sound. Payback for the new equipment should take less than one year.

Not Done Yet—P²AD Part 2

Part of Metcam’s growth plan focuses on the aerospace industry and generally growing its aluminum-fabrication business. “Some 5 to 10 percent of what we process here is aluminum,” says Hagenau. “Conversion coating of aluminum using a hexavalent-chromium compound is a main reason we’ve been labeled a large-quantity hazardous-waste generator. It costs us a lot of money, and in some cases limits our competitiveness on aluminum work.”

Phase 2 of its efforts with P²AD is improving its aluminum conversion-coating process by switching to a non-chrome aluminum pretreatment, eliminating the use of hexavalent chromium, a highly toxic and cancer-suspect agent. OSHA and EPA regulations motivate facilities to identify, evaluate and implement technically and financially accept-

able alternatives to chromate conversion coatings. During the last half of 2003, Metcam collected baseline data while conversion-coating aluminum with a non-chrome chemical, and will publish results in August 2004.

“We conversion-coat an average of 6500 sq. ft. of aluminum per month,” shares Schwefel. We expect that a chemical switch will dramatically reduce our costs, for disposal and other line items related to use of hexavalent chrome, and allow us to grow share in aluminum markets such as structural/architectural and aerospace.

“We also hope to prove out use of this new chemical on our steel-processing paint line, too,” continues Schwefel, “allowing us to run aluminum through our conveyORIZED line and further improve productivity. The chemical we’re looking at performs well as a pretreatment for steel, perhaps replacing our iron-phosphate pretreatment. Our hope is to run the new chemical in Stage 4, switch Stage 3 to a rinse, and then also rinse in Stage 5 instead of applying the chrome seal coat. Therefore, we would replace two chemical stages and a rinse with one chemical stage and two rinses.”

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