

CASE HISTORY

Furniture manufacturer gauges film thickness before getting burned

A leading office furniture manufacturer switches from a postcure to a precure film thickness gauge, allowing thinner film builds, reduced reworks and materials costs, and greater system control.

Steelcase stands as a giant in the office furniture industry. Its global macrocosm contains 49 manufacturing locations, approximately 21,000 employees, 540 product lines, and more than 800 affiliated dealers. Grand Rapids, Mich., serves as company headquarters with 8,000 employees and about 5 million square feet of manufacturing.

Each product line has its own plant. The systems plant manufactures a modular line of components that can be used to make overhead bins and desks. The modular parts can be used exclusively to construct an office or can be incorporated with the company's other furniture lines. All major manufacturing is performed here, from coil to packaged product. Coat-

ing falls in this area and Mark Mol, a 23-year company veteran, currently serves as finishing engineer. The company applies a combination of liquid and powder. However, Steelcase's corporate vision and environmental concerns have the company leaning more toward powder.

The systems plant houses three different powder lines. Each line handles a specific part group—bin, desk,



A lead sprayer calculates the cured film thickness of a part as it exits the powder booth. This precure film thickness gauge measures uncured powder coatings and then displays predicted thickness of the cured coating with an accuracy of ± 0.2 mil.

or top—and ends at that part's particular assembly area. The lines differ according to the part processed. For example, the top line uses only automatic powder guns while the other lines use a combination of automatic and manuals. Each line has a prehang area where workers put product on the line. Next, parts go through a seven-stage wash system that imparts an iron phosphate. From pretreatment, parts enter the powder booth, and from application, they enter a gas-convection cure oven. Upon exiting the oven, parts enter the inspection area and then proceed to the take-off area.

Getting burned with posture inspection

Previously, workers measured gloss and film thickness in the inspection area. On average, the lines run at about 22 feet per minute, meaning that a substantial amount of parts pass through the line. About an

hour passes from the time parts exit the powder booth until they arrive in the inspection area. "So, if the product's finish is out of specification, either heavy or light, we've already lost an hour's worth of product," Mol said.

The company knew that the lag from powder coating to film measurement needed to be eliminated. To this end, the company began exploring methods of precure film thickness measurement. The company came across a precure measuring system that used lasers and isotopes to take film thickness readings and was mounted on a robotic arm. The unit needed to be stationary to take readings. For Steelcase to effectively take measurements, it would need to mount an instrument on each booth. This wasn't very cost effective. The mounted units could only take readings in a limited area of the coated part. Riddled with

Before workers started using the precure gauge, they measured film thickness on cured parts in the inspection area. About an hour passes from the time parts exit the powder booth until they arrive in the inspection area. "If the product's finish is out of specification, either heavy or light, we've already lost an hour's worth of product," said the plant's finishing engineer.



Mark Mol (foreground), finishing engineer, introduced the precure film thickness gauge to Steelcase. Initially, the gauge was used at the systems plant. The gauge proved so successful that the plant added another gauge. Eventually, Steelcase ordered gauges for all its plants applying powder.

these shortcomings, these instruments didn't seem feasible. They were also very expensive.

After looking at several precure gauges that didn't fit, Mol found a viable precure thickness gauge at the Powder Coating 2000 trade show. The exhibiting supplier gave a demonstration. Mol returned to Grand Rapids and discussed the precure gauge with the superinten-

dent of the paint and powder plant. Mol received approval to contact the supplier and arrange an on-site trial. He then ran a battery of tests with the unit. "I wanted to make sure the unit was as accurate as what they stated in their specifications," he said. "And it was."

Gaining a glimpse of the future

As a result, the systems plant became the first at Steelcase to use



The lead sprayer calibrates the gauge at the beginning of the shift. Steelcase fabricated these containers, located at the end of the powder line, to house the gauge.

this gauge. The handheld unit offers portability. The sprayer can go from booth to booth with the gauge to take readings. In turn, the unit's portability provides measuring flexibility. "If I've got a drawer coming down the line, I can measure the head, I can measure the inside, and I can measure the sides," Mol said. "You can take a number of measurements with this. The ones that weren't portable couldn't do this."

The noncontact powder thickness gauge uses an ultrasonic transducer to measure uncured powder coatings on a range of substrates. When the measurement is completed, the display shows the predicted thickness of the cured coating in microns or mils. The gauge measures thicknesses ranging from 1.2 to 4.3 mils with an accuracy of ± 0.2 mil. Measurements account for powder shrinkage during cure.

The company set up an area for the gauge to be housed out on the floor. In the morning, sprayers calibrate the unit and then take it to the booth where they are spraying powder. The company currently uses the precure gauge on the line that has five different powder booths. Basically, they'll run a color through the booth, and they'll do the checks. Originally, Mol thought the sprayers would just check the first part coming through to verify the guns' settings. But the gauge actually has gone over better than anticipated.

Sprayers will check each part configuration (flat, drawer, bin) running through on a specific color run. And when the next color comes up, the worker will take the gauge to the next booth and take readings on coated parts exiting the booth.

The line workers welcomed the new gauge. After a half-hour training session with the line leads, workers were ready to use the gauge. The gauge has increased sprayer awareness because the lead man is taking the measurements outside of the booth, allowing instant feedback. "The sprayers do work on an incentive program, and this gives them a better way of controlling the amount of powder that's put on the product," Mol said.

Gauging success in many ways

Steelcase didn't have to wait long to see that they made a sound choice by incorporating this precure film thickness gauge. As far as the cost justification, the gauge paid for itself within 3 months because the company reduced applied film thickness, which yielded materials savings. In fact, the systems plant saves about \$16,000 quarterly on one line.

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Part of the savings comes from increased first pass transfer efficiency. The ability to measure film thickness just outside the booth allows the company to have more control of its system. What's more, taking film thickness readings before cure reduces reworks. "If you wanted to put on 1.5 to 1.8 mils of powder coating, you can actually put 2 or 3 mils on, and it will still pass specification for color and gloss," Mol said. "There's always a leaning toward putting more powder on." By using this unit, however, the com-

pany applies less powder and remains within its stringent specifications. The precure gauge has another benefit: It reduces light-coating issues.

Going from a beta unit to a company standard

The company offers 30 standard and 80 special finishes. Recently, it introduced some textures and metallics. With these coatings, the sprayers

find it useful to be able to focus on the application because each coating reacts differently. "If I were running the same color and the same technology everyday, it would make it a lot easier," Mol said. "But we're constantly going after the demands of the market. The coatings all have different specifications for film thickness, and this gauge really helps with the different types of technologies that we spray."

Initially, the systems plant ordered one gauge to be used on two of the three lines. But workers used it so much that it was very difficult to go back and forth between lines. However, Mol said he likes the idea that the lead person checks all the different part configurations within one color. With the material savings and the payoff afforded by the gauge, it wasn't hard to get approval to buy a second gauge. "The information I had—the testing, the cost savings—I shared with the corporate finishing technology group," he said. "Since then, all of our powder coating plants now have these gauges."

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