

# NO MORE Rework

*A one-step non-aqueous pretreatment process works for this Bridgeport, Mich., powder coater. Rework is now a part of his past. Could it be right for your process?*

EDITED BY SHARON SPIELMAN

Steve Boehm, owner of Bridgeport Powder Works in Bridgeport, Mich., did not start out as a powder coater. He had been a patrolman on the Bridgeport police force for roughly 20 years and was in the process of changing to another job in the same field when he was involved in a motorcycle accident that severed one arm and partially paralyzed the other. After being placed on permanent disability, he was offered re-training and took up computer science and mechanical design. While re-training and studying, he also began to “dabble” in powder coating.

Over time, his powder coating business grew, and he found the need for additional personnel and more space. He used his mechanical design training to design a larger oven, which he used for several years before again outgrowing his facilities.

By this time, Boehm also had become aware of his need for improved pretreatment, because from time to time he ran into coverage and adhesion problems that caused him to spend significant time



*From patrolman to powder coater: Steve Boehm, owner of Bridgeport Powder Works in Bridgeport, Mich., was a patrolman on the Bridgeport police force for roughly 20 years before a motorcycle accident forced Steve to look at other career options.*

and effort reworking parts.

When researching the pretreatment process, Boehm says he learned about two-, three-, five-, seven- and nine-step processes, with tanks for each step. “I also discovered that some [pretreatments] were heated and all were monitored and sampled continuously,” he says. “There were cleaners, acids, alkalines, iron or zinc phosphates, and plenty of water rinses in between. And the tanks would

eventually have to be dumped, cleaned and refilled, and the old solutions placed in approved containers to be shipped to approved locations by approved personnel.”

Boehm says all of this seemed to be confusing and costly, but then during an online search, he discovered a one-step organic phosphating process which, he says, claimed to be a truly one-step, no-rinse process that didn’t need heating or changing (see sidebar). “This all seemed too good to be true,” he says.

Boehm requested a sample and ran tests, and then worked with TriMech Finishing Solutions, an area representative, to design and fabricate a system. “It turned out to be a snap to put everything together,” Boehm says.

Although a one-step system is simple in design, because it is single-stage and ambient temperature, it is important to understand that there are differences in equipment and design, and it is important to work with someone who knows the equipment requirements. Differences include an ample freeboard to keep

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the vapors in the tank; minimal exhaust to avoid extracting (and thus wasting) chemical; and the tank, pumps and fans must be constructed of stainless steel or polypropylene, which are not affected by the chemical. Pumps and fans are smaller because of the lesser system requirements, and they should be variable speed.

Boehm says his decision-making was driven not only



*Bridgeport Powder Works treats thousands of parts, such as those seen here, using a one-step organic phosphating process.*

by product performance but also by the simplicity of the process and the limited amount of investment it took to get into pretreatment.

He started with a small dip tank rather than the multi-stage systems he had been reading about, and it took up very little floor space. He did not need conveyors or automatic operation.

### The Process

This one-step organic phosphating process\* is based not on water but on environmentally friendly solvents, which have extremely low emission of volatile organic compounds (VOCs). Because it is based on a different philosophy and chemistry than conventional water-based systems, the process itself is completely different as well.

The system cleans, phosphates and seals in a single stage, by either dip or spray.

No water is used and it is not rinsed. The buying and treating or disposing of water is eliminated, and water permitting and water pollution issues are avoided entirely.

The process does not create sludge, so it only requires filtering out the fines that come in on the parts, and does away with the environmental issue of sludge dumping. Oils that come in on the parts are not treated as waste, so there is no oil dumping. Instead, the oils are captured in the sealant and used as a plasticizer to lend flexibility to the seal and protect against chipping and cracking of the topcoat.

The seal provides weeks to months of protection against flash rust. Parts can be coated or painted at leisure, avoiding the downtime during breaks or at the end of the day. The seal also creates flexibility in permitting storage of treated parts until orders are

processed for particular topcoat colors, for example.

The system is completely unheated so it avoids all the costs of natural gas, which are very significant now and rising.

It is very stable, because the bath elements are used up in proportion, and the bath therefore never needs to be dumped. More of the same fluids are added as the bath is used. And it is very simple to operate, saving labor costs and producing stable finished part performance as well.

Using the one-step organic process, a part is treated for one minute to clean, phosphate and seal. Then it is dripped/blown off and dried, and it is ready to be painted or stored for top coating at a later date.

What does "environmentally friendly" mean as applied to this process? As noted, the VOCs emitted are very minimal because of the very high flashpoints and boiling points of the products and because of their extremely low vapor pressures. Moreover, the fluids contain no carcinogens, mutagens, halogenated compounds or ozone-depleting compounds. They are easy to use from a fire safety point of view, having flashpoints in the 168° to >212° F. range.

\*The process is offered by Carpenter Chemicals LC, Alexandria, Va., under the trade name *PlafORIZATION*™.



through a bag filter to collect metal fines, dirt, etc., and adding to it every so often to keep the level up. The parts are immersed in the solution, with agitation provided by a pump, for about 60 seconds. He then pulls them out to drip or air blow dry. Boehm says, "We have had independent salt spray testing done, and the [one-step chemical] passed everything."

Steve works on both large and small orders, including cars, motorcycles, household and kitchen items, sports and hobby items, machine and fabricating shop parts, and industrial manufacturing parts. Given his own disability, Steve says the company is especially proud to service Amigo Mobility International Inc. and to be part of the work they do for the disabled.

*After installing the one-step pretreatment process, Boehm reports that he no longer has to rework any parts. The powder bonds tightly to the surface for a fine finish like the one seen on this engine block (above) and these wheels (right).*



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Also, the need for electricity was almost non-existent because there is only a pump and filter, plus very limited exhaust. A several-stage water-based system would have been far out of the company's budgetary range, Boehm says.

After installing the one-step process, Boehm reports that he no longer has to rework any parts. In addition, the powder bonds so tightly to the surface that its removal was

extremely difficult even with a stripper. Boehm adds that the coating didn't chip off when parts were once accidentally dropped on a cement floor.

In September 2006, Boehm moved to a larger location, and he says that he will be growing again soon. Bridgeport Powder Works now treats thousands of parts in a somewhat larger dip tank.

Boehm says that the only maintenance involves running the solution

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### Right for Your Process?

Because no process is appropriate for every application, here is a list of benefits and limitations of this one-step process.

#### Benefits

- ✓ Simplicity and stability.
- ✓ Overall cost savings. (An ROI calculator is available to assist in determining what levels of savings can be achieved for a given user.)
- ✓ Small footprint.
- ✓ Ease of maintenance and operation.
- ✓ No heat required.
- ✓ Protection against flash rust.
- ✓ Friendly to the environment.

#### Limitations

- ✓ Because there is no heat and low pressure, it does not remove high melting point waxes and stearates that are only effectively eliminated with high heat and heavy impingement.
- ✓ Not designed as a scale or rust remover.
- ✓ Does not provide corrosion resistance at the level of chrome.



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