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Cutting-Edge Solution

Using the right chemistries from the start allows for more effective parts cleaning.

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Worldwide, manufacturing produces an endless array of parts that require varying degrees of cleanliness, based on the application for which the part is needed. Companies face a constant challenge to meet these cleanliness requirements in the most efficient way possible. To find this efficiency, many companies rely on their equipment and chemical suppliers to guide them through trials that determine the best solution.

Fisher-Barton South Carolina Inc., specializing in the production of lawn mower blades, along with additional specialty stamping operations for lawn and garden, railroad, construction, material handling and other applications, is one such company that, forced by fire regulations, faced an urgent need to adjust its processes. But because the change was directly driven by the rust inhibitor it was using, the company's approach to its cleaning needs took an interesting twist.

Although horizontal racking of lawn mower blades has created the need for new cleaning procedures, Gary Schoviak, operations manager for blades at Fisher-Barton, says it has contributed to considerable increases in production rates.

Addressing the Issues

In 2008, the company installed a new furnace to handle the annealing process for the blades, but a conflict with the rust inhibitor was quickly apparent. After the blades come out of annealing, they go through a rust-preventive oil treatment. The inhibitor in use at the time had a flash point of 140°, consisting of about 73 percent volatile solvents like mineral spirits. During application, these mineral spirits would evaporate into the atmosphere, and the rust inhibitor would shrink in volume to adhere to the surface, eliminating runs and drips. But the new furnace could not handle the flammable rust inhibitors.

Dave Schoviak, operations manager at the time, contacted Doug Simon, technical sales manager at Chemetall. Mr. Simon devised a unique process for applying the new product, Ryconox 20M. This process allows the product film to lay down evenly and is followed by a heated air blow-off. The final result is a superior protective film remaining on the blades.

Mr. Simon says that finding the right product for this type of application is 50 percent technology and 50 percent art. "Just as in most areas of manufacturing, you often need a feel for

The water soluble stamping oil was first tested on this progressive stamping machine. It was important that it could remain stable and effective through each step. The inset photo shows multiple stages of a typical part run on this machine.

how to do things, which comes with experience, before you can find the best way," he says. "We were in a bind because the fire marshall said we couldn't run the new line. We had to think outside the box to come up with a way." Finding an inhibitor with a high enough flash point was simple enough, but finding one that came clean off the parts without leaving oil throughout the rest of the plant was another story. And once that situation was under control, Mr. Simon had in mind other ways to make the plant cleaner, greener and more efficient.

Another Oil Replacement

The rust inhibitor was not the only source of concern regarding excessive oil. Given the number of stamping operations performed at the plant, lubricants from these processes were causing housecleaning nightmares.

Dave Schoviak explains, "We were using pure oil, and it was a mess. It worked great, but it was not environmentally friendly. We had also tried several water solubles, but they didn't work well for us, particularly in the shearing and forming operations. At one point we were using three different oils, but we knew the ultimate goal was to find one that could be efficient and effective throughout the plant."

Riding the success of the rust inhibitor, Mr. Simon suggested GardoCool C9179, a water-soluble compound that could be mixed at varying concentrations to attain the desired results. He explains, "When they would put a straight oil on these parts, not only were they ending up with a mess from the finished parts, but a lot of times, the oil, over time, would crosslink and harden, becoming more difficult to clean off. We agreed to try a semi-

The company tripled production while using only a third the amount of cleaner.

Mower Blades and More

Fisher-Barton South Carolina is one of five divisions of the Fisher-Barton group. Fisher Barton started manufacturing lawn mower blades in 1973 at its Blades division in Watertown, Wis. The South Carolina facility was founded in 1995 to meet the increasing demands of the numerous lawn and garden manufacturers in the Southeast.

According to Jeff Mazzola, business development manager, the company has grown substantially in the past two years. "Our blade capacity has gone up close to 400 percent, not to mention other areas of our production capabilities," he says. "Automation has allowed us to increase our blade production while utilizing the same number of people or fewer."

This automation has allowed the company to significantly limit part handling for its blades. Only about three and a half people man each production line, with two of them focused only on loading and unloading. On the front end, blanks are loaded in the press. They then run through three different milling processes before they are touched again. The blades are racked to go through heat treat, inspection and balancing before an employee unracks them for shipping.

The company has grown to the point where it is producing about 45,000 lawn mower blades a day. It serves such large companies as Husqvarna, Honda and John Deere. It is also expanding into laser cutting applications, currently in the process of investing close to $1 million on equipment. Mr. Mazzola says, "We've landed a job that will bring in about $2 million worth of laser and fabrication business, while these new capabilities, including prototyping, are opening a lot of doors for us with existing customers as well. We're in an aggressive growth mode throughout the Fisher-Barton organization, including three new acquisitions in the coming months."

These days, it's nice to see a company experiencing such heavy growth. The company had its best year in 2009. Although Fisher-Barton stretches well beyond the limits of lawn and garden, a point to consider is that regardless of the economy, people's grass continues to grow.

The blades go through a precleaning process and alkaline rinse to prepare them for heat treat. Coming out of heat treat, which attains temperatures of 1,540°, the blades are red hot and return to the quench tank for hardening.

synthetic and eventually determined the best mix to be 20 percent oil, 80 percent water. This mixture is easily removed with an alkaline cleaner to prepare the parts for annealing. They're only cleaning off 20 percent oil now—there's less to dispose of and it consumes less cleaner."

The annealing process includes a brine bath that is heated to 1,540°. Any oils remaining on the part would flash off, making smoke, and burning and creating problems with contamination. The preceding alkaline cleaning process removes these oils. Since switching to the new oil compound, the company has been able to triple production while using only a third the original amount of cleaner.

The oil has proven effective in other areas of the plant as well. Some parts are stamped out 200,000 at a time, with the finished products immediately loaded into giant cardboard boxes. When these parts are covered in thick oil, the oil leaks out of the box, leaving traces throughout the plant, on the truck floors and at the customers' sites. The excessive oil was also causing dermatitis issues with employees. The water-based compound resolved both of these substantial issues.

Positive Results

The initial tests on the product were fairly easy. The company first tested it on one of the most challenging stamping operations on the floor. The mower blades are typically formed with one stamp, but this particular part transitions through five different dies in a set, each one making a different feature on the part. The machines are fed with a coil of steel, and the die is stamped into the material to punch the desired shape. If the material is not lubed properly, the part could have defects or burrs or it could break.

For testing, the compound could be applied as easily as with a paint roller, just for a few parts or whatever it would take to satisfy the test. Mr. Simon says, "With a progressive stamping operation such as this, you apply the lubricant at the front end, and it needs to continue to be effective through all five steps.

The company produces about 45,000 mower blades a day. As are most of the company's stamped parts, the blades are boxed in large cardboard crates to be shipped to the customer. Before bringing in the new stamping oil and rust inhibitor, these boxes would often drip oil all the way to the customer.

You have to control the oil droplet size so that you put enough of a film on to keep it stable."

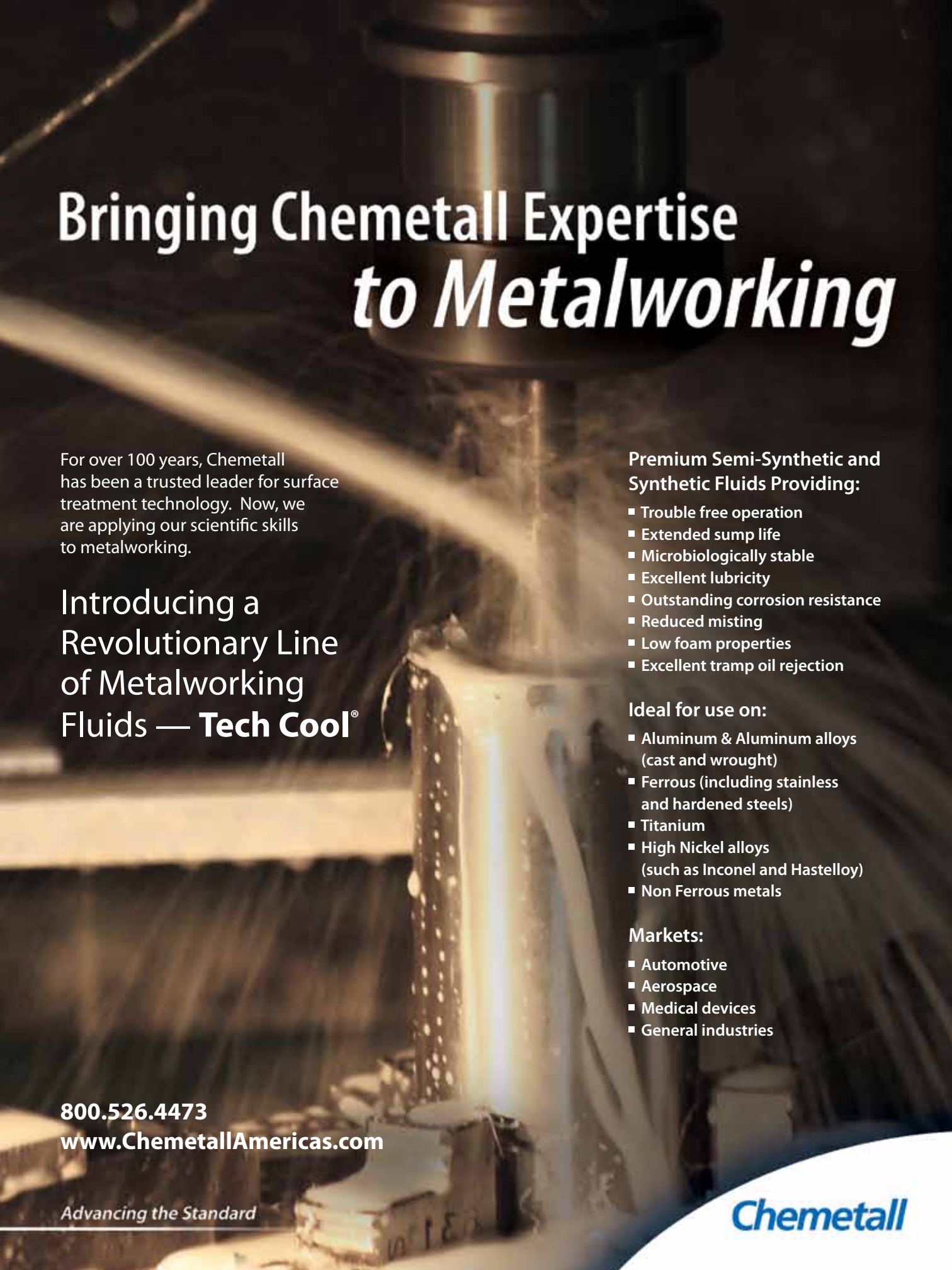
As the process continues for a long period of time, the dies have a tendency to heat up and swell. But the water-based products help to alleviate the swelling by keeping the dies cooler. According to Mr. Simon, "It's a known fact in metal-working, the cooler you keep the working surface, the sharper the tool is going to stay and the longer the tool life will be."

Once the product was tested and confirmed that it would work, the transition was immediate and practically seamless. Dave Schoviak explains, "Our Shearsharp (string trimmer blade) product line was the last one that we proved it out on. We started out at 10 percent oil mixture but needed to go up to 20 percent to cover these. The Shearsharps require a separate milling operation and it's really tough on the tools." It is now the only lubricating oil used throughout the plant.

"We've been on the stamping and drawing lubes with the 9179 for about a year now," says Dave. "The die life numbers are great. Tool performance on the form parts has increased by about 40 percent over the old oil. On the Shearsharps it's gone up about 25 percent. That's a significant improvement for us."

Gary Schoviak, blades operations manager, stresses the cleaning benefits. "When we were using 100-percent oil, we'd try to filter the excess out, but it still ended up everywhere," he says. "Now we're using 80 percent less on the part and there's so little left after stamping, cleanup and disposal are easy. The plant is so much cleaner." He also points out the cost savings, saying, "The water soluble oil is roughly the same per gallon as what we previously used, but it's lasting five times as long."

"Doug (Simon) was instrumental in this change," says Dave. "He was the one who was persistent enough to convince us to try it, and his customer service is what got us to where we are now. He was willing to work with us. He didn't just send in one trial; he continued to provide options until we found something that would work to our satisfaction."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The Right Mix

When Fisher-Barton South Carolina considered the switch to water soluble stamping oil, one of Dave Schoviak's prerequisites was that it could be used in every stamping operation throughout the plant. Consistency was a key.

The company was successful with its trials of GardoCool C9179, but personnel on the floor needed a way to get the same percentage mix in their operations every time—20 percent oil, 80 percent water.

"The material is pretty thick and it needs to be mixed down," says Mr. Simon of Chemetall. "We came up with a make-down system that has an electric heater built into a blanket that is wrapped around the drum. It heats to 100 degrees, which thins the oil, changing the viscosity. An aspirator allows adjustment of the concentration, but Fisher-Barton pretty much keeps it at 80/20."

Fisher-Barton uses a dispensing station to provide consistent mixtures of oil and water for each operation throughout the plant.

To get the product, the operator brings over a bucket, puts the hose in and opens the valve and turns on the water. As water passes through the valve, it creates a vacuum that draws the oil up. The reservoirs on some of the stamping machines hold only a couple of gallons, so operators need to fill them every few hours.

"The oil used to be mixed manually," says Gary Schoviak. "It would take a while and the mixtures were inconsistent from one operator to the next. This system has kept things uniform throughout the plant and saves oil by preventing overmixing."

Cleaning it Up

For the lawn mower blades, the change in oils had a more significant impact on the annealing process. The annealing furnaces, where all of the blades are heat treated, are completely automated. There is a precleaning process that removes the stamping oil, but not a lot needs to be removed anymore. The blades come in on racks and go through an alkaline rinse in the first station to get off any of the stamping oil. Then a water rinse tank removes the remaining alkaline.

The blades then go to a preheat process that quickly dries off the water and brings the blades up to about 500 degrees to accelerate the heat treat process. The blades then go all the way to the back to the hot pot, which gets up to 1,540°. The blades come out of there red hot to return them to their natural form. They then go back to the quench tank, which hardens them. Two water rinse tanks then remove any excess salt. The blades then go to the rust inhibitor, and then a blowoff station to remove the excess. The cycle time is 80 minutes, with a takt time of 8 minutes.

"When you're doing 45,000 blades a day, you have to have something in annealing at all times," says Mr. Simon. But given the large quantity, positioning of the blades becomes somewhat of a challenge.

"The old system had all of the blades lined up vertically," explains Mr. Simon. "To run more parts through, they decided to position them horizontally. But because of the curves in the blades, they tend to cup the oil. A heated air blowoff is used to drive off the surplus, but just the right heat level and duration are needed to leave the appropriate coating for rust prevention without it dripping all over the floor."

The air blowoff is actually a new addition to the process. It was designed to accommodate the shapes of the blades. The savings it has created through recaptured rust inhibitor has covered its cost in about six months. **PC**