



Metal Forming Success Story

PhygenSM
Surface Enhancement
Performance Leader

Shiroki NA uses Phygen coating to eliminate major tool galling when stamping heavy gauge HSLA parts

The Bottom Line

Shiroki NA experienced severe galling when stamping high strength, low alloy seat brackets. A special lubricant and a thermal dispersion (TD) coating provided some relief. Still, the coating broke down after only 12-15,000 parts and the tooling had to be recoated or replaced.

Phygen's FortiPhySM coating eliminated the galling problem. In addition to making 100% inspection of the brackets unnecessary, Shiroki saves a significant amount of die maintenance time, plus a tremendous amount of downtime—not only in the pressroom, but also in the just-in-time assembly operation.

The Numbers

Part rework and/or sort savings can amount to several thousand dollars per month. During the six-month period since they were coated, the tooling has produced about 120,000 pieces and is still going strong with no sign of galling. Previously the tooling had to be polished after every 6,000-piece run and needed to be recoated after only two or three runs.

The Smithville, TN, facility of Shiroki North America is a major source of high strength, low alloy steel parts used in the automotive industry. One such application is the manufacture of seating assemblies and component parts used in motor vehicles. Every year there are hundreds of thousands of front and rear brackets used in these assemblies. Brackets are stamped out of 590 high strength, low alloy (HSLA), 1.4mm – 2.0mm-thick steel using a progressive die in a 600-ton press.

According to Ernie Dunkley, Tooling Assistant General Manager and Mike Holt, Tool Room Supervisor at Shiroki North America, these seating assemblies have been in production for about five years. The brackets measure approximately 50.8mm x 101.6mm x 76.2mm and undergo a deep draw of 38.1mm to 50.8mm during a very tight forming operation. Initially this resulted in severe galling of the tooling.

"We were replacing our forms every three or four months," Dunkley explains. "We also were polishing them after every run. The results were unnecessary rework and sorting. In an effort to correct this problem, we implemented several Kaizens."

Using a Three-Step Approach

"The first step we took was to evaluate the current type of lubricant being used," Dunkley says. "We switched to an Irmco lubricant specifically formulated for high strength steel per



Ernie Dunkley & Mike Holt evaluating form tooling with corresponding stamped part.

the recommendation of Ken Heindrichs of Productive Stamping Solutions, Inc. We had some success but still focused on continuous improvements. Next, we began to evaluate the coating being used on the tools. After a couple of tries, it was in this area that we had the greatest success."

"Initially, we tried a thermal diffusion (TD) coating," Dunkley

reports. "We had prior experience using that type of coating but in this particular case it didn't work out too well. Just like the lubricant, the coating provided us with some benefit but not enough. After changing lubricant and applying a TD coating to the tooling, we saw an improvement of about 50 percent."

"We still had to inspect a percentage of the parts," says Dunkley. "The TD coating started out doing a good job but didn't hold up to expectations. We'd start out with the new coated tooling and the first one or two runs we'd hardly have any issues. But then, after two or three runs, we'd started to see galling and we had to go back to inspecting parts as before."

"We're talking about 6,000 parts per run," Dunkley explains. "So, after running about 12,000 to 18,000 parts with the TD coating, the tooling began to gall sufficiently that we had to resume reworking the parts. Our next step was to try the Phygen FortiPhySM coating."

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Attend PMA Show

Dunkley and Holt from Shiroki North America say they heard about Phygen coatings through Ken Heindrichs, but did not meet the Phy-



Shiroki NA heard about Phygen UltraEnduranceSM coatings through Ken Heindrichs (right), Productive Stamping Solutions, Inc.

introduced them at the PMA show in Nashville. “We went to the show specifically to look for other coatings that might be able to solve our problem,” Dunkley explains. “We stamp a lot of high strength steel here and we were looking to see if anyone had any new ideas on how we could solve our tooling issues. We contacted Phygen concerning our tooling issues and they had a lot of good ideas.”

“It just so happened, at that time we had a new die to produce a door part, on which we really had to expedite the lead time,” Dunkley continues. “We stamp the part here and ship it to our Georgia facility where it is used in the door assembly. We were going to coat the die with a TD coating, but this would require about a two-week (10- to 14-day) turn around. Customers wanted us to reduce the lead time and have the die ready as soon as possible. When we talked to Phygen at the show, they were able to promise us a three-to-four day turn around. They picked up the form, applied the coating, and had it back to us in three days. Best of all, the FortiPhy coating worked extremely well.”

“Based upon that experience, we decided to apply the FortiPhySM PVD coating on the bracket dies, and we had a great deal of success,” Dunkley says. “I had the forms coated and let the toolmakers in the tool room tell me if it was a success. That’s where the true measure of success comes from. They loved it. They couldn’t believe it.”

Going Strong After Six Months

“If you talk to our tooling people,” Holt says, “you’ll find they have been very impressed with the Phygen coating. It took a lot of pressure off them. We sent the form out and had it coated about six months ago, and we haven’t replaced that form yet.”

“Now, when we finish a run and send the tooling to the tool room,” he continues, “we don’t even have to polish it. We just wipe it off and send it back to the pressroom. During the six-month period since we’ve had it coated, the tooling has produced about 120,000 pieces. The coating is still in good condition and we have not had to do any rework on the brackets

produced with the FortiPhy coated dies.”

In addition to eliminating the 100% inspection of the brackets, Dunkley says they’ve also saved a significant amount of die maintenance time, plus a tremendous amount of

downtime—not only in the pressroom, but also on the assembly line. “We run on a just-in-time basis,” he explains, “so if we run a part that we have to rework and/or sort, we could be running so close that the assembly line might have to be shut down because we don’t have any parts to supply it. This means that we would have four or five people waiting for parts and the cost of this lost time adds up very quickly.”

Part rework and/or sort savings can amount to several thousand dollars per month, Dunkley estimates. “We’ve significantly reduced this cost. It used to be our number one item.”

“On the new die for the doorframe part, which Phygen coated for us in just three days, we inadvertently double stacked that form and we were all just horrified,” Holt says. “We sent a toolmaker to the press to look at it and the first words out of his mouth were ‘I think the coating broke down.’ But after the die was in the tool room and the forms were wiped off, it was just fine. So even with a double stacked part, the Phygen coating held up. A lot of coatings would have been ripped right off.”

Tool Coating Benefits

“We’ve begun to Yokoten other dies using the Phygen FortiPhy coating and we’re seeing similar results to those we’ve experienced with the bracket tooling,” Dunkley says.

“We are continually on the lookout for better ways to do things. For instance, we have a restrike station on this job and we are going to go ahead and coat that too. Overall, the benefits we’ve seen with the Phygen coating on the bracket dies include an improvement in part quality, reduced downtime on both the press and production lines, and greatly reduced tooling cost.”

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