



Metal Forming Success Story



Cowles Stamping Relies on Phygen FortiPhySM UltraEnduranceSM Coating to Eliminate Premature Punch Failure and Increase Production Runs

The Bottom Line

Cowles Stamping, Inc. relied on Phygen Coatings' FortiPhySM chromium-nitride coating with high abrasive-wear resistance to help solve premature punch failure, saving hours of downtime and the expense of replacing punches, while increasing productivity.

The Numbers

With titanium-nitride coating:

Average of 3,000 pieces for punch life with broken punches causing a week of downtime.

With FortiPhy coating:

Average of 16,000 pieces for punch life, reduced downtime after solving premature punch failure.

Cowles Stamping, Inc. of New Haven, CT, a Tier Two automotive supplier and subsidiary of C. Cowles & Company, experienced punch breakage on a progressive-die job after only a couple thousand hits as the punches caught in material. Severe galling on the sides of the punches also caused premature failure as the punch ends would rip off after welding to the press. After trying other stamping tool coatings with little or no success, Cowles turned to Phygen Coatings' FortiPhySM UltraEnduranceSM coatings for up to seven times longer punch life, reduced tool wear and greater productivity.



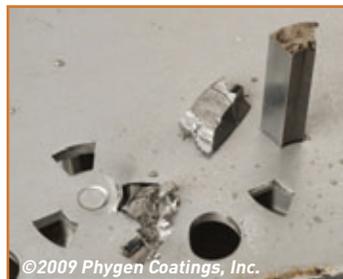
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Whyn Pelkey and Steven Couture examine a stamped part from the Phygen-coated punch.

"The punches could not be sharpened due to the punch breakage," recalls **Steven Couture, Cowles manufacturing design engineer**. Now with the Phygen FortiPhy coating the punch edges stay sharp throughout production without the need for re-sharpening. By completing the production run without shutting down the press, removing tooling or replacing broken punches, the company saves hours of downtime since the tooling is complicated and calls for lengthy setup time. The broken punches caused six to seven stoppages per run. "Producing a new punch consumes 9 hours just on the wire EDM, then a couple of days to send the punches out for coating and receive them back," Pelkey says. "Essentially we would lose a week every time the punches broke. That does not happen now."

Punch Failure and Lengthy Downtime

As an automotive-parts supplier, Cowles provides complex metal stampings and subassemblies to bearing, seals and shields industries, as well as

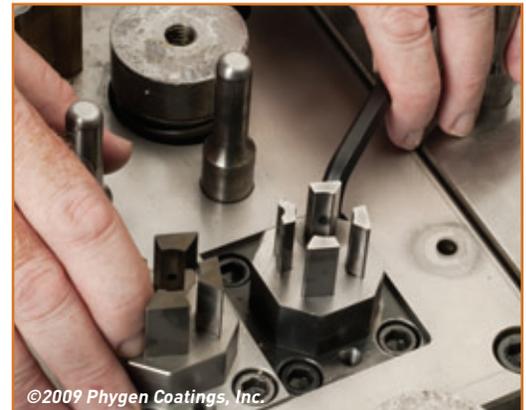


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Punch breakage and premature failure caused lengthy downtime and lost production for Cowles Stamping Inc.

other non-automotive businesses. The company's mechanical press capacities range from 35 to 250 tons for small- and medium-sized stampings with other in-house capabilities also available.

Problems arose for the company while stamping a 20,000-run progressive-die job of 0.157-in. thick SAE-J1392 070XLF high-strength low-alloy using the small specially shaped punches with sharp corners. Using a 250-ton press at 35 strokes/min, the punch would break after a few thousand hits. "After 3,000 pieces, the punches — employing titanium-nitride coating — actually pulled apart," explains **Whyn Pelkey, engineering manager at Cowles**.



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A change in tool coatings at Cowles Stamping increased punch life from 3,000 to 16,000 hits between sharpenings when stamping HSLA-steel automotive parts.



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Benefits of PVD Coating

"The lubricity from the new coating is spectacular. We no longer have problems with the material catching the punches and breaking them," says Couture. Phygen FortiPhySM coating uses the physical vapor deposition (PVD) coating technology, based on principles of plasma acceleration, for higher plasma density and an intense, low-energy ion bombardment during coating deposition. Unprecedented toughness, lubricity and outstanding uniformity are a few benefits of coatings formed by this process, state Phygen officials.

Phygen's FortiPhy chromium-nitride coating offers the high abrasive-wear resistance needed to help solve premature punch failure at Cowles Stamping, saving the company hours of downtime and the expense of replacing punches, while increasing productivity. "This coating improved our production runs from an average of only 3,000 pieces for punch life to where we now average 16,000 pieces per run between sharpenings," says Pelkey.

FortiPhySM Coatings vs. CVD and TD Coatings

The FortiPhy coating applied to the punches at Cowles Stamping, Inc. uses a special high-adhesion process, state Phygen officials, while chemical-vapor-deposition (CVD) and thermal-diffusion (TD) coatings combine with carbon molecules within the substrate to form a hard layer. Typical CVD and TD coatings are applied at temperatures above 1800°F where carbon atoms move to the surface and combine with the coating material to form a third compound. While a hard coating is created, only a limited amount of carbon is available and as the tooling and coating begins to wear there is less carbon to combine with coating material during the recoating process. The second application lasts about 70% as long as the first, while the third lasts around 30%. By the third application the free carbon is "used up", say Phygen officials. Decarburization also becomes a problem as the material near the surface weakens and the likelihood of chipping increases.

Unlike other stamping tool coatings, FortiPhy UltraEnduranceSM coating from Phygen applies a layer of nano-sized particles onto the surface of the tooling, taking no carbon or other molecules from the substrate. By leaving the chemical composition of the substrate intact, decarburization is eliminated and there is no weakening of the substrate. In addition, each recoat is as strong and long lasting as the first.

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Phygen-coated punches do not catch in the material. "The lubricity is spectacular," says Couture. "We don't have any problems with material catching the punches and breaking them."



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Parts stamped from punches coated in Phygen's FortiPhySM UltraEnduranceSM coating.

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Surface Enhancement
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