

# In-Die Hydraulics to Manage Force Distribution

All-hydraulic force-management systems for use in the die give metalformers flexibility—the ability to run dies in any press, with or without a cushion—as well as high tonnage in a small space and, of course, controllable pad delay.

BY BRAD F. KUVIN, EDITOR



Adding a programmable hydraulic cushion to this die, which stamps a stainless-steel range top, eliminated the need to use a press equipped with a programmable cushion.



Technology enhancements designed to manage press force inside the die are enabling metalformers to gain much more capacity, productivity and quality from their presses than ever before. Consider the recent case of an automotive OEM faced with having to run a die that resulted in a 60-percent force increase as the ram returned after a first-station draw. Described to us by Hyson director of sales and marketing Jeanne Bogre, the first attempt at building this particular die called for a set of 10-ton gas springs for the first-station draw and a 200-mm stroke length. Upon tryout, the massive force rise exceeded press tonnage capacity, threat-

ening the structural integrity of the press. While once upon a time the company might have gone out and purchased a new press, in this case it redesigned the die and replaced the gas springs with a hydraulic pressure system. The system eliminated the pressure rise and reverse tonnage, so there was no need for a new press.

“The ability of all-hydraulic systems to manage in-die force distribution,” says Bogre, “has led to a surge in the use of these systems, from a relatively low installed base just a few years ago to where the systems now have become industry-acceptable.” Suppliers of hydraulic in-die force-management sys-

tems, including Hyson (Brecksville, OH), have developed products that generate as much as 4500 PSI while managing the amount of heat generated during stamping.

## Next-Gen Hydraulic Components

“All-hydraulic pressure systems now are more robust than previous generations of products,” says Steve Reilly, Hyson’s manager of product engineering. “Cylinder and valve designs

have been optimized, including the cylinder's ability to flex under load should die alignment become less than perfect. Previous generations of hydraulic systems used more rigid cylinders that restricted motion and required precise die alignment. Not so today."

Also, state-of-the-art hydraulic systems are more self contained than their predecessors, making them more user-friendly. The packages are much simpler to retrofit to existing dies.

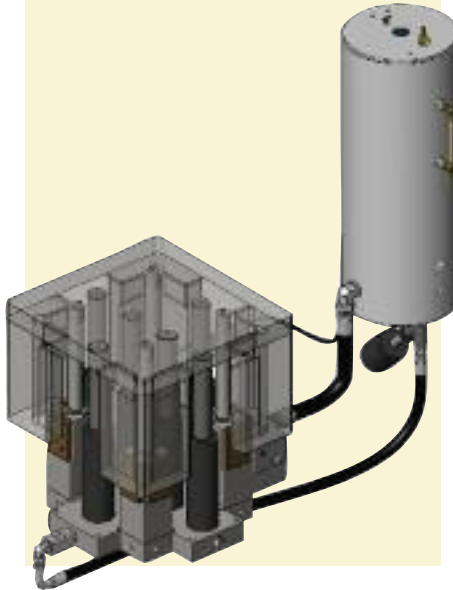
"Metalformers can retrofit the self-contained hydraulic system to add tonnage to an existing die," says Bogre. "Or, consider the case of a stamper that must move a die from a press with a locking cushion to a press lacking such a cushion. To maintain the locking capability for the die, a hydraulic-system retrofit to eliminate the need for a locking press cushion offers the perfect solution. Having that delay technology as part of the die, rather than the press, provides additional flexibility. Otherwise, the work might have to be outsourced to another stamper that has time on a press with a hydraulic cushion. Keep the force-control technology in the die, and any press can do the job."

### Benefiting New Die Builds

More significant benefits come from using the systems in new-die construction, for those applications where "stampers want to be able to help their customers leverage opportunities to improve their part designs but may be limited in press tonnage," says Hyson's general manager Hank Kelm.

"We're seeing increased interest in the technology from stampers dealing with advanced high-strength steels," Kelm adds, "and for complex stampings that require controllable pad delay, with higher force requirement in a smaller space. This allows metalformers to help their customers push the envelope of product design, adding unique features that might not have been possible just a couple of years ago."

"Hydraulic systems for managing force in the die," adds Reilly, "help stam-



**When a metalformer recently purchased a refurbished press to stamp truck components, it opted to replace the broken air cushion with three of these 84-ton, 12-in.-stroke hydraulic units, at a substantially lower cost than that required to repair the air cushion.**

pers reduce costs in die designs, add value by improving their part designs, and, in many cases, take stations out of the die or maybe even avoid having to buy a new press.

"Yet one more trend," Reilly continues, "lies with companies that operate more than one stamping facility and look to move work among their plants. Keeping the delay technology with the die gives them the flexibility to do this. We recently experienced this with an appliance OEM that took a stove-top design developed and initially stamped in Italy. When the market for this product expanded into the United States, engineers studied best practices and determined that a pad delay was required. However, the U.S. supplier lacked available press time on its cushion-equipped presses, so, it added a delay system to the die using an all-hydraulic setup."

### Also Popular with HVAC OEMs

In addition to automotive and appliance stampers, HVAC OEMs and their suppliers have taken to using in-die

hydraulic systems to manage the force profile in the die.

"The new SEER ratings (Seasonal Energy-Efficiency Rating) handed down a few years ago," says Kelm, "led to the development of thousands of new dies, many of which required delays due to complex part features and forms. Many of these new dies incorporated hydraulic force-control systems—in one case an OEM was able to significantly reduce blank size by 20 percent, resulting in a return on investment for the hydraulic system much quicker than anticipated."

Summarizing the benefits of recent developments that have made all-hydraulic control in the die accepted practice in stamping shops, Bogre says: "This is technology that allows the stamper to say 'yes' to product designers looking to gain an edge on their competition, and 'yes' to OEMs specifying the use of advanced high-strength steels."

"And we're not stopping there," adds Kelm, describing continued development efforts underway to help stampers become more efficient and improve productivity. One of the more recent introductions is a press cushion that removes the variability of running dies on different presses.

"For example," explains Kelm, "consider the common case of a die that's been developed and tried out in one press, then is expected to run production on another press. Production presses likely have a lot of wear and tear, guidance issues and other mechanical variations that can require the stamper to spend a lot of time tweaking a die that ran perfectly in tryout to get it to run in production. Next-generation press cushions will take that variability out of the equation, by being able to provide the identical force-distribution pattern regardless of the press the die runs in. This will ensure that dies will run perfectly in production immediately after moving from tryout, significantly reducing time to market and providing OEMs in any industry yet another competitive edge."

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