



The hand dial on Komatsu's servo press allows the operator to watch die function and part processing throughout the entire stroke; fine-tuning timing for tooling and tweaking forming profiles.



TOP: Tonnard formed this muffler tip from 0.036 in. cold-rolled steel for a 1930s antique motorcycle.

BOTTOM: This 0.060 in. cold-rolled steel drawn cup is formed in two hits, trimmed and pierced. Prior to servo the Tonnard part required three draws.

PLUMBING the depths

Manufacturers find multiple advantages with servo presses

As manufacturers grapple with harder-to-form metals, more complex parts and shorter turnarounds, some might wish to glimpse into the proverbial crystal ball to see what changes the future will bring to metal fabrication and parts requirements. Two early adopters of servoforming are finding the technology's unlimited flexibility could make the need to see ahead moot. Komatsu America Industries LLC's mechanical servo presses helped Waukesha Metal Products and Tonnard Manufacturing Corp. sustain growth, explore fresh opportunities and handle new work relatively worry-free. Yet despite years of use, engineers at both companies feel they have barely scratched the technology's surface.

It's complicated

"You don't realize the machine's potential until you start experimenting with it," says Rob Bauer, engineering manager for Waukesha. He's referring to slide accuracy in microns, an adjustable stroke and a fully programmable slide velocity. Waukesha

uses a wide range of materials from low carbon and high-strength low alloy steel to exotic coated and painted materials to support metal stamping, sheet metal fabrication, tool design and build services for industries from solar, aerospace and military to dental equipment, agriculture and automotive. Headquartered in Sussex, Wis., Waukesha has a fabrication facility in Grafton, Wis., and recently opened a third location in San Luis Potosí, Mexico.

FFJournal first covered the company in 2012 after it purchased a Komatsu 330-ton servo press in 2009. Five years later, Bauer says the machine's multiple advantages are more relevant than ever, in some cases shouldering out standard mechanical presses, as part complexity grows. "Automotive applications for example, are requiring more features and technology in a smaller footprint," he says. "That means more intricate parts. We use formability software early in the quoting process to evaluate part feasibility, which helps us develop a flat blank for estimation and gain insight on press size and tonnage as well as degree of difficulty.

With servo in our back pocket, we know we have the capability of running these parts."

Higher strength steels and draw dies with complex shapes typically require slower draw speeds. With its servo press, Waukesha finds it also can make parts while generating less heat. The company's patented Sta-Collar, a solid, one-piece annular shaft flange that prevents lateral movement of a vehicle's stabilizer bar, is produced from draw quality steel and requires heavy coin and extrusion processes. "We're taking material 0.12 in. thick and ironing it down to 0.08 in. thick," says Bauer. "It's a high-heat, high-wear process. If we run the part in a mechanical press, the die has to be continually flooded with coolant. And you can only run it so fast, even with lubricant, or the punch will seize up and you'll experience galling. "We've proven the servo press generates less heat by running this same part dry. The ability to slow the ram speed during the working portion of the stroke while maintaining strokes per minute gives us good parts that come out cool to the touch."

Making a difference

The manufacturer runs over 100 different part numbers in its servo press with approx-

Servo Presses

imately two dozen dedicated “servo only” due to the required ram speed profile.

“The biggest advantage by far is our ability to adjust ram speed,” says Bauer. “We shifted a part we were running on a mechanical to the servo press without making any die changes. We went from 42 spm [mechanical] to 49 spm [servo] to 57 spm [servo with pendulum slide profile]. That’s a 36 percent increase in production just from switching the job to servo and fine-tuning the profile.”

“It used to be that if you had a bad part, the argument centered on whether it was the die or the press,” says Jim Landowski, vice president for Komatsu. Based in Rolling Meadows, Ill., Komatsu America, a division of Komatsu America Corp., engineers forming, fabricating and cutting solutions for a diverse customer base. “With Komatsu servo you have a press that repeats in microns and parallelism that is automatically checked and maintained. We’ve taken the press out of that equation.”

The hand dial on the servo press allows the operator to visualize what is happening with the die and part forming throughout the entire stroke. “If we have a complicated die with lots of forms and cam slides, we can switch to the hand dial function and watch the ram come down and the die perform its work,” says Bauer. “It allows us to tweak critical timing issues. In a mechanical press you have to inch down in segments and you can’t really see what’s happening.”

“Customers have saved thousands in rework time on dies because they can see exactly what is happening in the die in real time,” adds Landowski. “Exact digital technology has taken the black magic out of die design and set up.”

Waukesha is continuing to grow and take on more jobs. “Basically we’re running around the clock,” says Bauer. “The servo press is booked solid, which is a good place to be.”

The real challenge

Tonnard Manufacturing Corp., armed with two Komatsu 110-ton servos [one recently outfitted with a Hyson servo cushion] purchased in 2009 and two Komatsu 35-ton servo presses purchased in 2010, also is using the technology to tackle complex forms and tighter tolerances. The



Waukesha reduced ram speed through the draw process to shape this stainless steel fan cover.

short-run stamper, based in Corry, Pa., specializes in metal stamping and a range of other services using stainless steel, cold-rolled steel of all tempers, hot-rolled steel, aluminum, AKDQ, HSLA, INX-50, all red metals, Inconel, Monel and other exotics. The company produces components soup to nuts for more than 45 different industries from aerospace to antique parts for cars and motorcycles.

“We’re a very broad-based company,” says Aaron Horwood, form tool engineer for Tonnard. “We have our hands in almost every market. That’s the nice thing about servo: It fits the bill for most anything.” Producing anywhere from five parts to 100,000 a year, Horwood adds that the biggest challenge has been to tap into what the servo presses can really do.

The servo’s ability to slow its speed during actual forming and then return to full speed for the nonworking portion of the ram cycle allows Tonnard to take on difficult blanking and piercing jobs. Working primarily with material thicknesses of 0.015 in. to 0.375 in. thick, the fabricator recently turned to its servo press to produce a complex drawn part from thin stainless steel. “It fought us pretty good,” says Horwood. “We did quite a bit of experimentation. We used servo’s programmability to decelerate the ram and stop on contact with the die’s binder or pressure platform to keep it from bouncing, then slowly accelerate through the forming portion, picking up speed in the nonworking portion of the stroke to maintain production rates.

“With that part, stroking at full speed would have caused a reaction similar to the dynamics of a car wreck,” says Horwood. “If a driver hits your car from behind, the two vehicles don’t move together. The same thing happens when the press makes con-

tact with the binder at a rapid rate causing it to bounce. With a very thin, stainless part you have a very narrow margin between a wrinkle and a tear. Servo eliminates the bounce and prevents material from wrinkling and tearing.”

Eliminating the unknowns

Tonnard also finds servo’s ability to dwell on bottom achieves a nicer surface design for its embossing applications. “In a mechanical, the force of the ram has nearly the same effect as whacking a part,” Horwood says. “Stainless is notoriously tough on tooling. We design, build and maintain all our tooling in-house. This is an area with servo where we’ve experienced unexpected benefits because we find we aren’t replacing punches all the time.”

Komatsu’s servo technology allows Tonnard to handle complex profiles, hard-to-form and exotic materials with ease. “We wanted a press that was capable of forming parts we have yet to see come through the door,” says Horwood. “We take on such a wide variety of work we can’t tell what type of job we’ll be doing next week or next year. Servo eliminates the unknowns and gives us the freedom to bid on all sorts of jobs.”

If asked about the secret behind their successes, both Bauer and Horwood would agree it’s largely due to experimentation and the education and training provided by Komatsu. “This is still a new technology to most stampers,” says Landowski. “Our goal is to team up with a customer long after the point of sale to help him think outside the box for his unique applications. A good place to start with a machine this flexible is to ask yourself, ‘How can I apply this to the work I have right now? How will the press better suit the jobs I have today?’” **FFJ**

Komatsu America Industries LLC, Rolling Meadows, Ill., 847/437-3888, fax: 847/437-1811, www.komatsupress.com.

Tonnard Manufacturing, Corry, Pa., 814/664-7794, fax: 814/664-8947, www.tonnard.com.

Waukesha Metal Products, Sussex, Wis., 262/820-9000, fax: 262/820-8750, www.waukeshametal.com.