

Programmable processing

Contract manufacturer boosts throughput, solves HSS processing problems and quotes new work with servoforming technology



In the 1500s, the term lifeblood referred to “blood necessary for life.” Since then, the word has come to mean “the element most important to the continuing success of something.” Both definitions could apply to Engel Diversified Industries Inc. The Jordan, Minnesota-based Tier 1 and Tier 2 contract manufacturer supplies manufacturing sectors from automotive and fluid handling, to energy data transmission, defense, medical equipment and, most recently, bike racks and bakeware.

Steady growth has taken the company from 5,000 sq. ft. to 55,000 sq. ft. of combined manufacturing and office space. Part development, in-house tooling and design, fabrication and aftermarket support are part of Engel Diversified’s value-added services. But stamping remains the heart of the business.

“Stamping is our lifeblood,” says Stuart Rubin, president of Engel Diversified. “We have a lot of different skill sets but, at the end of the day, we’re metal stampers.”

The shop designs and builds multi-station progressive dies to support deep drawing, blanking and forming operations using aluminum, mild and high-strength



The DSF Direct Drive 330-ton servo press allowed Engel Diversified to reshape tooling philosophy, boost throughput and overcome challenges with high-strength steel.



IR dewar housing, drawn from 24-gauge grade 304 stainless steel, for a scientific testing equipment manufacturer.

carbon steel, stainless and a range of specialty metals. Its production floor is stocked with 35 presses, 35 tons to 600 tons. Historically, Engel Diversified purchased used equipment and rebuilt controls and other critical components. When one 250-ton press approached the end of its useful life, Engel Diversified wanted to replace it but rising costs associated with reconditioning pre-owned presses prompted the company to consider new technology.

Step up

“Servoforming caught our attention,” says Rubin, “especially the ability to dwell at any point in the stroke, the technology’s pendulum motion for shorter strokes, and faster speeds and ram control. As metal stampers, we need to maintain our position at the forefront of the market. Servoforming took us to a new level.”

Engel Diversified considered several brands but settled on AIDA-America Corps’ DSF Direct Drive 330-ton servo press. “We have an AIDA 250-ton mechanical press,” says Rubin. “We’ve had good luck with it from a performance and reliability standpoint. We were also im-



A 10,000-lb.-capacity feedline with coil car allows one coil to run while another is changed in minutes, above. Step-feed mode reduces die prove-out and setup time, left.



pressed with AIDA’s service. They have been very responsive.”

When looking at different machines, “we noticed a couple of features unique to AIDA’s servo press,” he continues. “Since we design and build our own tooling, we were attracted to the hydraulic overload [HOLP] feature and the step-feed mode.”

When HOLP senses an overload, AIDA’s design—a patented large-diameter, metal-to-metal seal—almost instantaneously evacuates oil around the connection point’s ball seat. Reaction time can be measured in milliseconds. “The HOLP system is an inexpensive insurance policy to prevent damage to the press and tooling because it halts the slide’s downward motion once an overload is detected,” says Greg Bonczkowski, regional sales manager for AIDA.

The step-feed mode reduces die prove-out and setup time by allowing an operator to use a hand wheel to run the press at less than 1 stroke per minute. Full-rated tonnage and torque are available in step-feed mode as well as full control of slide motion.

Distributor TCR Inc. helped tip the scales in AIDA’s favor. “The press was an

important component but its speed—and our need to overcome challenges with processing high-strength steel—meant we needed an integrated solution that included press controls, lubrication, scrap and part handling, [safety] guarding and a 10,000-lb. capacity feed line with coil car that would allow us to run one coil of material while staging another,” says Rubin.

Problem solved

The DSF Direct Drive 330-ton servo press system was installed at Engel Diversified in late 2019 and was operating just two weeks later. It runs cold-rolled, galvanized, stainless and high-strength steels along with aluminum from 18- to 10-gauge.

“We needed more coil capacity because our automotive applications are taking us into 7- and 8-gauge high-strength steel,” Rubin says. “Although the feed line is geared to heavier material, it only takes one technician about five minutes to change a coil.”

Malleability

High-strength steels have very high springback characteristics that can result in dimensionally inaccurate parts. The material needs more tonnage, lower speeds and higher energy to properly form parts—requirements Bonczkowski

Stamping/Presses

says are especially suited to the “infinitely programmable stroke and velocity profiles of the servo press.”

Engel Diversified minimizes springback by programming the press for multiple restrikes at bottom dead center to support its wipe forming and blanking operations.

“More often than not, we can address a wipe forming issue by simply adjusting press speed and dwelling at the bottom of the stroke,” says Production Manager Ken Handzel. “This ensures the form is set. On a few parts, we use the multiple restrike profile, which hits the part more than once to set the form.”

Wipe forming consists of two blocks in a die. One block is stationary and holds the part in place. The other block moves up or down to form a feature on the part.

The servo press is also reshaping Engel Diversified’s tool design philosophy. Dwell mode has allowed the stamper to eliminate some stations from its progressive dies. Ram control minimizes shock and vibration, extending tool and punch life.

Reorganization

In addition to changing its approach to tool design/build, Engel Diversified has been able to reorganize its work flow. Case in point is a small, stainless steel cup 1¼ in. deep and ¾ in. in diameter that the company previously produced on a large hydraulic press.

“We had to perform multiple draws on the hydraulic press to make the part,” Handzel explains. “We were able to transfer the part to the servo press and immediately eliminate one draw operation as well as a trim operation. We’re working on eliminating an outside annealing operation as well. We were able to free up capacity on our deep-draw hydraulic press and increase our capacity.”

Way of the future

The manufacturer has shifted some mechanical press work to the servo machine as well. “We can blank parts on the servo press up to 12 in. by 18 in.,” says Rubin. “That’s why we bought a 30-in. coiler to replace our 18-in. unit. We can now quote wider material and bigger parts.”

AIDA’s pendulum mode works in tandem with the larger coiler to produce



HRPO locking ring made for fluid handling, top. Stamped cold-rolled steel cable strain relief bracket for electronics application, above. HSLA assist step bracket produced for Tier 1 auto supplier, right.



parts like an automotive running board bracket. With pendulum mode, the crank shaft swings back and forth, allowing the slide to travel less distance in the non-working portion of the stroke, boosting throughput while maintaining the same forming velocity in the working portion of the stroke. “Prior to the pandemic, we were producing 12,000 to 24,000 brackets per month,” says Rubin. “Production is beginning to pick back up, and we’re making the part on the servo press. We had some issues with wipe forming this part on a conventional press. When we processed it in pendulum mode, we found we could increase throughput by 60 percent.”

Inherited tooling is another by-product of the pandemic for the manufacturer. “Stampers are coming to us with parts

and the tooling that goes with them,” he says. “There can be a lot of hiccups with inherited tooling. It can be challenging to hit the tolerances customers are looking for when you are working with 30-year-old tooling, for example. But the servo press gives us more control and helps us to get closer to those requirements than we ever could have with a mechanical press.”

Rubin believes servoforming is the way of the future for Engel Diversified. “We headed down this path and it turned out better than we imagined,” he says. “That doesn’t happen often. It’s kind of refreshing.” **FFJ**

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