



The AIDA DSF direct-drive servoforming press allows Meier Tool to gain higher output and increase part repeatability from difficult-to-form materials.

SERVOFORMING

Meier Tool & Engineering solves forming challenges with a direct-drive servo press

Mechanical Presses

As medical devices are becoming smaller and more powerful, product footprints are shrinking. The trend is proving to be fertile ground for Anoka, Minn.-based Meier Tool & Engineering with its capability to produce small, miniature and micro-sized components with intricate features and ultra-tight tolerances.

The fabricator has more than 30 years of experience providing high-precision stampings and complex tooling for industries that include aerospace, defense and electronics. In 2008, Cretex Companies Inc., Elk River, Minn., purchased Meier Tool to support Cretex's ongoing growth in the medical market.

"We have a different skill set that separates us from other fabricators," says Jordan Gaffaney, manufacturing engineer for Meier Tool. "It's our attention to detail and the know-how of our tooling designers and toolmakers to create dies that can produce the delicate, complex parts our customers demand. Our press technicians also have the experience to overcome the production obstacles associated with the nature of these parts."

For suppliers working to meet stringent requirements in highly regulated industries like the medical field, Meier Tool's ability to take a part from design to production is critical. In addition to innovative tooling, transitioning parts from development to full production requires the right equipment.

"We had several projects in particular where we knew we would need more than a traditional press," says Gaffaney. "We needed to be able to control slide velocity not only throughout the stroke but during bottom dead center work. With the equipment we had, we couldn't stamp the parts without completely redesigning the tooling we had developed or considering material alternatives less likely to crack or fail with a faster hit."

Innovative solution

Meier Tool's search for unconventional press technology led it to AIDA-America's



Meier toolmakers can see physically how a die is performing during different stages of the stamping process by using the servo press's manual step feed to test and debug complex tooling.



A fully programmable slide stroke and motion gives Meier Tool the flexibility to control slide velocity throughout the stroke and during bottom dead center work for optimal production.



DSF direct-drive servoforming press. Located in Dayton, Ohio, AIDA is a global provider of gap, straightside, progressive, transfer, high speed, cold forging, servo-driven and mechanical presses as well as feeders and automation.

“We considered other servo press products from other manufacturers, but AIDA was able to give us the tonnage and bed size we needed at a competitive cost,” Gaffaney says. “We also knew AIDA’s North American headquarters in Ohio could provide us with the kind of regional service and application support we were looking for.”

The 110-ton DSF-N2 straightside servo press was installed in December 2011. Meier immediately put it to the test with a complex part from material the fabricator received but was unable to form on its conventional presses.

“They gave us a light-gauge copper coil strip and a progressive die with a severe draw,” says Todd Wenzel, president of TCR Integrated Stamping Systems, an AIDA distributor located in Wisconsin Rapids, Wis. “We used the servo press’s fully program-

mable slide stroke and motion to slow just the drawing portion of the stroke. This meant the ram approached the material rapidly with crank speed slowing down to 12 strokes per minute just before material contact. To further optimize productivity, we reduced the stroke length to use just the bottom 3½ in. Although we slowed the tool’s forming speed to just 12 strokes per minute, press output was 56 parts per minute. We were able to make good parts from material that failed on Meier Tool’s mechanical press and we did it faster.”

Gaffaney says the test results raised the Meier Tool team’s comfort level. “We learned we could control how and when we do the work and change the speed or cut out sections of the stroke where we were not working to add value to our production processes,” he says. “The servo press also has greatly expanded our ability to stamp exotic materials.”

Precision forming

With 20 different tools in the development stage, the fabricator is using the servo press to run a variety of stainless steel and titanium material in thicknesses ranging from 0.002 in. to 0.03 in. Precision deep draws, coined flat parts and formed flat parts in irregularly proportioned shapes are being produced on the press in development runs that can range from 100 up to 10,000 for use in the medical and defense markets as well as cost-sensitive material applications.

Die testing is a crucial early step in preparing these parts for full production capacity. The press’s manual step feed gives toolmakers an inside look at what is happening to the tool as the press cycles.

“Each click of the hand wheel represents 0.004 in. (about the diameter of a human hair) of ram movement,” says Bob Southwell, vice president of sales and marketing for AIDA-America. “Unlike ‘inching,’ which is not precise and lacks full energy capability, limiting the press to dry cycling only, the servo press’s manual step feed gives a toolmaker precise control in either direction. This feature allows the operator to barely touch the material and back up or move very slowly through the material to check elements like timing while retaining full torque and energy capability.”



The servo press's features such as full torque and energy at low speed and programmability have expanded Meier Tool's ability to stamp exotic materials.

Mechanical Presses

A traditional press requires an operator to run a new die through the entire stamping process. “We’ve used simulation software in coordination with some tool projects, but the ability to form a part at full tonnage while moving it incrementally allows our toolmakers to physically see how the die is performing during different stages of the stamping process,” says Gaffaney. “It is very beneficial.”

Repeatability

In addition to testing and debugging its new dies, Meier Tool has found its operators can perform part inspection while the component is still in the die. “Once we reach full production capacity on the servo press, we can conduct 2-D inspection of a part at different stages of progression through the die by pausing the press,” says David Herstad, inside sales manager for Meier Tool. “We’ll actually be able to use a camera to measure different criteria like dimensions to ensure the part is meeting customer specifications. This ability to pause the press during production means quicker time to market, especially for medical applications where the tolerances can be extremely tight.”

Meier has built its reputation by taking on the toughest jobs. The fabricator understands the peculiar nuances and pitfalls of working with exotic materials like titanium and platinum. With its largest part 2½ in. by 1 in., Meier Tool can produce parts as small as 0.01 in. with a 0.065-in.-diameter deep draw or three-to-one height-to-diameter ratio.

When producing these types of parts from exotic metals, high forming speeds can cause material to crack or fail, yet it takes a certain amount of energy to produce the part. A conventional mechanical press stores its energy in a flywheel. Slowing the press reduces the flywheel’s energy, which can cause the press to stop mid-cycle because it lacks the energy to complete the stamping process. “With the servo press’s pendulum stroke, we can change speed just for the working portion of the stroke without sacrificing production,” says Gaffaney. “It also means we get repeatable parts.”

When the servo press is in pendulum mode, the crank shaft swings back and



AIDA's servo press supports Meier's tooling designers and toolmakers' work to create dies that can produce the delicate, intricate parts customers demand.

forth in a motion similar to a pendulum on a grandfather clock—unlike a traditional press that must cycle all the way around. “Since the servo press stores its energy in large capacitor banks versus a mechanical flywheel, press speed can be changed or slowed during the working portion of the stroke without sacrificing energy,” says Southwell. “The pendulum stroke allows the slide to travel less distance in the non-working portion of the stroke so production rates may be increased while still maintaining the same forming velocity in the working portion of the stroke.”

In addition to higher output and increased repeatability of parts from difficult-to-form materials, Meier Tool finds it also can add accessories to the servo press easily. “We have several projects where using a material carrier like a progressive die to move parts from station to station isn’t practical,” says Gaffaney. “The servo press technology will allow us to use a robotic transfer system to gain a higher material part usage

ratio and reduce tooling costs by eliminating idle stations.”

Prior to Meier Tool’s purchase of the servo press, tooling design efforts were constrained by the limitations of the mechanical presses on the shop floor. “The AIDA servo press takes us to a new level of opportunity for continuous improvement on our tooling,” says Gaffaney. “The ability to change slide stroke length, motion and speed at will has helped us gain important intelligence from our old tools. The servo press technology has proved to be both a teaching tool and a mechanism for opening new doors for us in challenging markets.”

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