

Dukane Expands Ultrasonic Press Product Line with Exlar's GSX Series Linear Actuators

APPLICATION

Ultrasonic welding of plastic parts.

CUSTOMER

Dukane Corporation, whose Intelligent Assembly Solutions Division is located in St. Charles, IL, designs and manufactures equipment for joining plastic parts for a number of different industries around the world. One of the primary joining methods is ultrasonic welding.

CUSTOMER CHALLENGE

The process of ultrasonic welding consists of compressing parts together using a press while the part contact surfaces are melted using high-frequency, low-amplitude vibrations generated by piezoceramic transducers. Traditionally, ultrasonic presses have been actuated by pneumatic cylinders. Although pneumatic welders are economical and well-suited to most simple applications, Dukane realized there was a need to develop a new line of ultrasonic welding presses that provided superior performance in terms of weld consistency and process control. It was essential that this new line of welding presses fulfilled the application needs of customers requiring very high-quality, repeatable results, such as those in the medical industry, and other value-added industries. In addition to superior performance, Dukane was looking for a compact actuator solution that would have a long travel life, resulting in an overall small equipment envelope and reliable operation.

SOLUTION

Dukane selected Exlar's GSX Series linear actuators for their new line of ultrasonic welding presses. Several press models were developed, differing in size and force/speed capacities, which utilize different actuator configurations. With a compact package size and long travel life, five times that of a similarly sized ball screw actuator, Exlar's GSX Series linear actuators were a great fit for the application.



Dukane's iQ Series Ultrasonic Press System which utilizes Exlar's GSM Series linear actuator.

With the replacement of pneumatic cylinders in their ultrasonic welding presses, Dukane demonstrated significant improvements in process repeatability. These improvements resulted in superior product quality as well as reduced production costs due to a smaller number of rejects. One example is the welding of round polycarbonate parts approximately one inch (25 mm) in diameter. The standard deviation of the weld collapse distance was about four times smaller for the press with Exlar's GSX than for a comparable press with a pneumatic cylinder. In addition, the weld strength consistency was more than one and a half times better for the servo welder compared to the

pneumatic welder. Not only did the new ultrasonic welding presses perform well in internal Dukane testing, but a number of Dukane's customers have also provided very positive feedback regarding the repeatable performance of these presses.

Unlike the previously used pneumatic cylinders, Exlar's GSX Series linear actuators allow for direct position and speed control. This capability has made it possible for the new servo ultrasonic welding presses to successfully complete certain applications which were considered very difficult or impossible to achieve with pneumatic welders due to the very small forces and weld collapse distances involved. Furthermore, Exlar's GSX Series linear actuators are capable of making changes in speed and force at rates that exceed those of pneumatic welders, which can be advantageous for applications requiring a dynamic profile during the plastic welding and solidification phases. By replacing the pneumatic cylinder in their new ultrasonic

press system with Exlar's GSX Series linear actuators, Dukane eliminated the need to supply compressed air for press operation. This can lead to cost and time savings in commissioning, operating, and maintaining equipment for their customers. The elimination of pneumatic components has also simplified the process of calibrating ultrasonic press systems.

RESULTS

- Small machine envelope
- Long machine service life
- Significant improvements in process repeatability
- Superior product quality
- Reduced production costs for customers
- Direct position and speed control
- Ability to change motion rapidly
- Eliminated requirement to provide compressed air
- Eased equipment calibration