Machine Automates Production of Liners for Motorcycle Helmets

Safety head gear is a requirement for everyone who participates in numerous sports (football, baseball, hockey), professions (law enforcement, military, construction) and activities, such as motorcycle riding. Unfortunately, the typical Department of Transportation (DOT)-approved safety helmet has not improved much over the past several decades, leaving people susceptible to permanent injury, paralysis or death.

KIRSH helmets feature a silicone liner that increases helmet strength and durability, while reducing the angular rotation that gets applied to the head during impact. Photo courtesy KIRSH Helmets

Jason Kirshon set out to change that in 2016, when he established KIRSH Helmets in Schenectady, NY. Kirshon focused on developing a DOTapproved helmet with a comfortable liner that offers excellent protection at optimal and lower rates of impact. The usual liner, in contrast, is made of stiff polystyrene or polypropylene foam, and has just enough density (0.5 inch) to comply with Federal Motor Vehicle Safety Standard 218 for high-impact crashes.

Kirshon and his team of engineers worked closely with Precision Valve & Automation (PVA) throughout the project. Together they developed an aluminum mold that established the liner thickness and dispense pattern. PVA then designed and built a custom machine to mass produce the liner. A third-party manufacturer uses the machine to make all of the liners.

The machine features an MX4000 variable-ratio gear pump metering system and a gantry-type Delta 8 dispensing robot. Each pump on the MX4000 is independently controlled with a servomotor, enabling end-users to make slight adjustments to the system's mix ratio, shot size, flow rate, pressure control, vacuum degas, recirculation and auto purge functions as desired.

The Delta 8 dispenses a low-viscosity silicone with a 1-to-1 mix ratio of resin and hardener. Made by Quantum Silicones, the materials are plumbed separately to a mixing valve and thoroughly mixed to eliminate bubbles and cross contamination. A thin layer of silicone is then dispensed into the mold to form the liner.

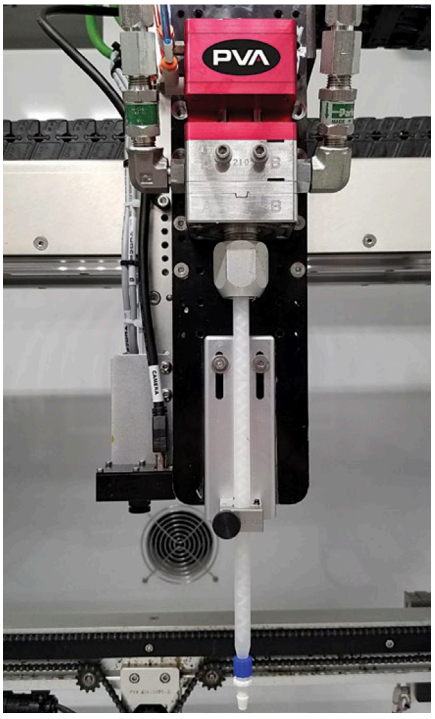
Once installed, the liner increases helmet strength and durability, while reducing the angular rotation that gets applied to the head during impact. It provides these benefits at lowand high-energy impacts, from any direction, at any one point in time.

Equally important, the helmets are small and lightweight to decrease angular acceleration during impact. Large-diameter-shell helmets increase angular acceleration, leading to rotational injuries inside the brain.

The MX4000 offers continuous material flow up to 3,000 cc per minute, at a pressure up to 4,000 psi. It uses high-pressure material regulators and filters to handle adhesives and sealants with a viscosity up to 1 million centipoise. The system accepts material containers from one liter to 30 gallons. A standalone controller stores multiple dispensing profiles.

The Delta 8 is ideal for selective coating, potting, bead and meter-mix dispensing applications. It features a servo-controlled, three-axis motion platform suitable for inline or batch operations. The unit covers a work area of 24.45 by 23.43 by 3.94 inches, with X-Y-Z repeatability of ±25 microns and a maximum acceleration of 0.5 g. Minimum drop size is 5 microns. Its onboard PC allows for unlimited program storage. An optional four-axis platform can tilt and rotate the valve.

For more information on automated dispensing systems, call 518-371-2684 or visit www.pva.net.



Precision Valve & Automation designed and built a custom machine to mass produce the liner for KIRSH Helmets. Photo courtesy Precision Valve & Automation