

## Penn State Erie conference covers molding innovations

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Image By: Bill Bregar, Plastics News

Michael Hansen of Mack Molding, holding a big part made by external gas-assisted molding.

ERIE, PA.—At a Penn State Erie conference, officials of injection molders learned about liquid silicone rubber molding, external gas-assisted molding, a new mold cooling technology and automation.

Per Flem explained how Recto Molded Products Inc. in Cincinnati became "green" and saved money in the process.

Conference chairman Brad Johnson, a Penn State Erie professor, said about 110 people attended the May 22-23 Injection Molding: Innovation and Emerging Technologies Conference.

Michael Hansen of Mack Molding Co. explained external gas-assist molding, where the gas "creates a blanket" that cushions the outside of a part. This is different from traditional gas-assist where the gas flows through internal channels in a part.

"That's the important difference. It's going behind the part, like a cushion or a blanket," he said.

In some parts, you can use both internal and external gas.

Hansen, senior technical development director of Mack in Arlington, Va., passed around some large, flat parts with ribs and bosses — showing off the perfect surface of the computer housings, ATM covers and other items. Normally, those features could cause sink marks.

Hansen said that in his experience, you should not send the gas through the nozzle and instead use separate injectors. But external gas has allowed Mack to make some very part parts that have a single gas injection point, instead of several.

Hansen said external gas can make good quality, big flat parts on smaller-tonnage machines than you would normally need. It reduces knit lines and allows you to make bigger ribs.

"It really almost eliminates stress and warpage," he said. "It's almost like a compression molding process."

External gas-assist also reduces mold wear. "You don't have to jam-pack your part. If you do it right, you leisuely pack it with the gas. You don't have flash," he said.

An applications engineering manager for Incoe Corp., Brodie Delemeester, explained how Incoe's SoftGate can control the release of melted plastic in sequential valve gating of large parts.

SoftGate adjusts the opening time, usually from one to five seconds. By properly coordinating opening and closing of the valves, SoftGate creates a gradual and controlled flow of plastic, greatly reducing or eliminating flow marks and hesitation lines, he said.

Delemeester passed around automotive parts like a door pillar and tailgate trim panels. SoftGate also

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works well with door panels, he said.

Penn State Erie attendees also heard from Paul Boettger of Technoject Machinery Corp., who discussed hot runners for medical molding. Special valve gates are important for medical parts, since most of them cannot have any gate vestige, he said. Technoject, of Bolton, Ontario, represents Heitec hot runners from Germany.

Customized options can include a machined-in inside edge gate, linear-edge gate nozzles or a crown-edge gate nozzle, which Boettger said is good for long parts such as pipettes and syringe barrels.

Medical molding requires a smaller nozzle footprint, he said. "Valve gates have always been favored in the medical industry because of the gate vestige consideration and not having the particulates. But also better processing is another big advantage that you do have with the valve gates," Boettger said.

Rick Ortwein, applications specialist with Linde LLC, told attendees how liquid carbon dioxide can quickly cool hot spots in the mold, cutting cycle times by 30-60 percent and reducing knit lines.

Liquid carbon dioxide experiences a very quick temperate decline when there's a pressure drop, "cooling pretty rapidly" the metal, he said. "We're evening out temperatures throughout the mold."

Ortwein said the process uses only a very small amount of liquid carbon dioxide. Linde drills a hole through the center of the core pin and line it with a stainless steel tube that acts as a "capillary tube" to move the Co2 into very tight spaces in the mold.

One group of papers on LSR molding featured speakers from Arburg Inc., M.R. Mold & Engineering Corp., Momenite Performance Materials Inc. and Kistler Instrument Corp.

Susan Montgomery, president of Priamus System Technologies LLC, explained how LSR requires a way to balance cold runners, since LSR, a thermoset, is heated and cured in the mold. Viscosity — a function of temperature, pressure and fill rate — "is critical for liquid silicones," she said. Mold temperature is very important.

In-mold sensors can identify cavity imbalance, Montgomery said. Several features affect the cold runners in an LSR mold, including fill time, mold temperature and venting.

She said Priamus, in Brunswick, Ohio, is working on using its sensors to control valve gates in LSR molding.

George Kipe of LSR mold-maker Kipe Molds Inc., in Placentia, Calif., talked about common problems like shear thinning. The viscosity of the material impacts fill time, he said.

Flem, of Recto Molded Products, outlined how the custom injection molder has dramatically cut energy use. He installed a new chiller to replace an old leaking one, and bought a Plas-aid dryer, and a Single temperature controller, bringing improvements in energy efficiency.

Recto Molded also added solar panels to its roof in Cincinnati. The investment was quickly paid back because of federal tax credits and lower energy prices. But the federal government has greatly reduced the tax incentives. "I cannot recommend solar panels to anyone at this point in time, based upon that change in the financial portion of that business," he said.

Recto also installed a new cooling tower, and the company collects rainwater for use in the tower. "I got the biggest one I could afford and put variable drives on it," he said. "Don't ever be afraid of oversizing, as long as you have variable-speed drive," he said.

Flem said it's important to have a simple, fast way to measure electricity usage. Avoid peak-load charges, such as when restarting machines on Monday morning.

A side company of Recto Molded, named Cincinnati Process Technologies, is the U.S. agent for injection molding machines from Asian Plastic Machinery Co. Ltd., part of Chen Hsong Group. CPT offers a device called the Energy Spy for plant-wide energy

monitoring using a simple red light/yellow light/green light display.

Technicians at Recto Molded Products use Energy Spy for machine startups, watching the lights to know how to stagger the process.

"I wanted something very, very simple so that everybody in the building could understand what was going on," Flem said.

In the winter, Recto Molded sends hot water from its molds to a heat pump, so it can help heat the building.

Flem also is a big advocate of all-electric Roboshot presses, for very accurate molding and energy sipping operation. "As long as you have a good barrel and check ring and a decent screw, it's incredible what all-electrics can do," he said.

Penn State Erie leaders used the molding conference to showcase the school's facilities. Johnson, the conference chairman, said 100 percent of graduates get jobs. "Sometimes at career fairs, we have more people looking for employees than we have graduates coming out," he said.

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