ROTATIONAL MOLDING INNOVATIONS

Ripple Engineering making waves with pressure-cooled rotomolding

By Audrey LaForest
Plastics News Staff

You could say it was love at first cycle.

It was 2010 when Ben Ismert, a mechanical engineer from Missouri, was working as president of Schier Products Co., an Edwardsville, Kan.-based manufacturer of grease interceptors for plumbing and commercial kitchen waste. Ismert had been president of the company since 2002, when it was still primarily making the tanks out of sheet metal.

But by 2010, Schier Products had transitioned to plastic to improve product quality and longevity.

"We saw the writing on the wall with the sheet metal ones," Ismert said in a phone interview. "They were rusting out, and there were so many competitors that there was just no way we could make those and make any money on them."

Schier Products had been using regional rotational molding vendors since it first introduced a polyethylene tank option to customers in the 1990s.

"We had so much momentum with the polyethylene containers … and we were making so much more money on them, so we continuously reinvested. I fell in love with rotational molding," he said. "I kind of fell in love with it right away. It was just an amazing process. It was something different."

Ismert and his team at Schier Products eventually "learned the limitations of the traditional rotomolding process," he explained.

They were burned out by inconsistent quality, warped parts and pinhole leaks, and sometimes found steel wool from the passive vents molded into the sidewall of the products.

"I'd scratched out an idea, back in like 2003, that was actually an electrically heated rotational molding machine that measured the pressure and temperature inside of a part and just had better process control," he recalled. "I was talking about it with my partners back then: Let's just hire somebody and try to make one."

And so, with the help of an engineer, he did.

Enter Ripple Engineering

After successfully building two prototype machines, Ismert sold his shares at Schier Products and in 2015 formed Ripple Engineering LLC, a startup manufacturer of pressure-cooled rotomolding machines in Kansas City, Mo. The company currently operates out of a 10,000-square-foot facility with fabrication and welding equipment, as well as room for research and development.

Ismert is the full-time owner and sole employee at Ripple Engineering, but he is working with local teams of designers, engineers, welders, machinists, programmers and electricians.

"Our mission is very specific," he said. "It's to double the rotational molding industry."

He has spent the past two years or so testing the more modernized rotational molding machine's technology on a prototype they built — improving it, tweaking it and applying for patents — as he prepares to deliver the first production model to a customer in the first quarter of this year.

Ismert declined to name the customer, but he said the company is not a rotational molder — a distinction he was hoping for, so the customer would not have "any preconceived notions of how things should work," he added.

The production model will also feature Industry 4.0 capabilities, such as remote monitoring and troubleshooting.

"Our machine makes a perfect part every time. This is what everyone should be striving for," Ismert said. "It does that by monitoring and controlling the temperature and the pressure inside of the mold for the duration of the heating and cooling cycles."

'Temperature is what matters'

Ismert describes Ripple Engineering's pressure-cooled rotomolding process as a hybrid of rotational molding, injection molding and blow molding.

"You get a rotomolded part, which is a biaxial rotation, a slow rotation. It's a very uniform wall thickness, high-impact strength part," he said. "But with our machine, it's like an injection molding machine because you set it up for one mold at a time, so scheduling becomes much simpler."

The process is similar to blow molding, he added, because you are using pressure inside the part to help form and cool it.

But, there are a few differences. On a Ripple Engineering rotomolding machine, the oven and the mold rotate together.

"Everything happens at one 'station,' meaning we don't move from a heating chamber to a cooling chamber to a service area, etc.," Ismert said. "It also makes it possible to get all of our sensors inside the hot areas; while keeping the heat-sensitive electronics on the outside of the oven."

And instead of passive vent tubes stuffed with steel wool, for example, Ripple Engineering's machines use what Ismert calls "active venting technology."

The machine automatically opens and closes the vent during the heating stage to equalize pressure between the inside of the part and the surrounding atmosphere, eliminating the potential for blow holes and thin spots at tool parting lines and removable inserts, according to a company brochure on the technology. The active vent can also be programmed to hold a specific pressure inside the part during the heating cycle after a layer of material forms on the inside surface of the mold.

"This could be helpful in improving the part's surface aesthetics and potentially improve the part's strength characteristics," Ismert explained.

But, above all, "temperature is what matters — not time — but temperature," he said.

"During the traditional process, the inside temperature of a part continues to climb long after it is removed from the oven to the cooling chamber. We refer to that as heat momentum," he explained. "It happens in our oven as well, but we can easily see it and control it. So, during heating, our cycle is set to look for a specific internal air temperature."

When that temperature is achieved, the machine switches to the cooling stage and large volumes of air begin to circulate inside the part. The air is at a low pressure, which holds the part against the mold wall, improving cooling times, Ismert said.

"The internal air temperature and mold surface temperature are kept within a customer-specified range to control warpage and shrinkage," he explained. "The cooling cycling ends at a specified internal temperature or mold surface temperature."

The controlled cooling cycle boasts shorter cycle times, improved impact strength and reduced warping when compared with traditional rotomolding. The result is "predictable and controllable shrinkage," Ismert said.

A mold featured in the company's brochure posted a 10-minute savings during the cooling cycle, but Ismert said Ripple Engineering is experimenting with chilled internal air and better air circulation in the oven to reduce the cooling cycle time even further.

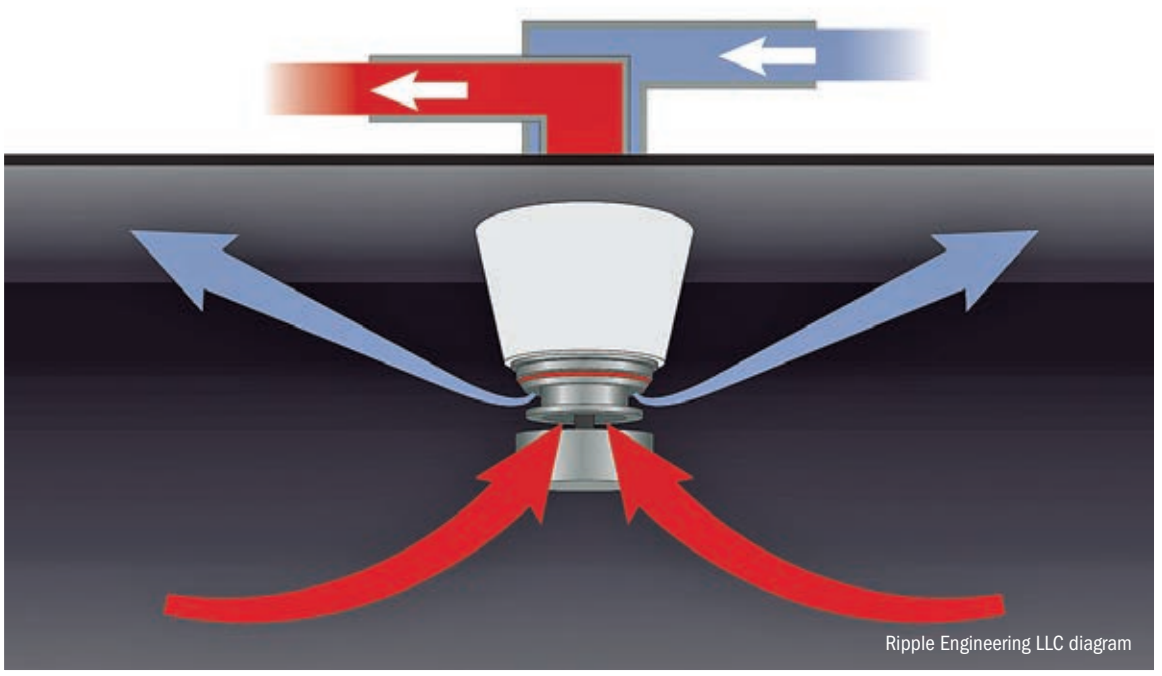
Ismert said he is also "extremely" interested in exposing the process to material types outside of polyethylene — "key to executing our company mission," he added — as the processing window becomes more transparent and controllable with the addition of pressure and temperature monitoring inside the part.

"I think we can double the number of products that are molded with this process," he said. "I think we can easily bring in 10, 20, 30 different kinds of materials, and I'm not talking grades of polyethylene. I'm talking about the stuff that injection molders get to play with."

Ripple Engineering LLC photo

Ben Ismert, founder and sole employee of Ripple Engineering LLC, works with local teams of designers, engineers, welders, machinists, programmers and electricians in a 10,000-square-foot facility in Kansas City, Mo.

Ripple effect The active vent inside the mold circulates air during the cooling phase. "This is the feature that produces all the benefits," Ben Ismert, founder of Ripple Engineering LLC, said.



Ripple Engineering LLC diagram