

Melt Management Magazine

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Beaumont Technologies Helps U.S. Molding Industry!

**WADAL PLASTICS DESIGNS FOR
SUCCESS AND KEEPS MOLDING
PROGRAM STATESIDE**

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Work Stays Home, Out of China, By Savvy Use of Technologies

When a customer says, "Either cut your pricing or we'll be forced to move our custom molding program to China," most would consider this an ultimatum tantamount to meaning, "We're going with a Chinese molder and your operation is not getting the contract".

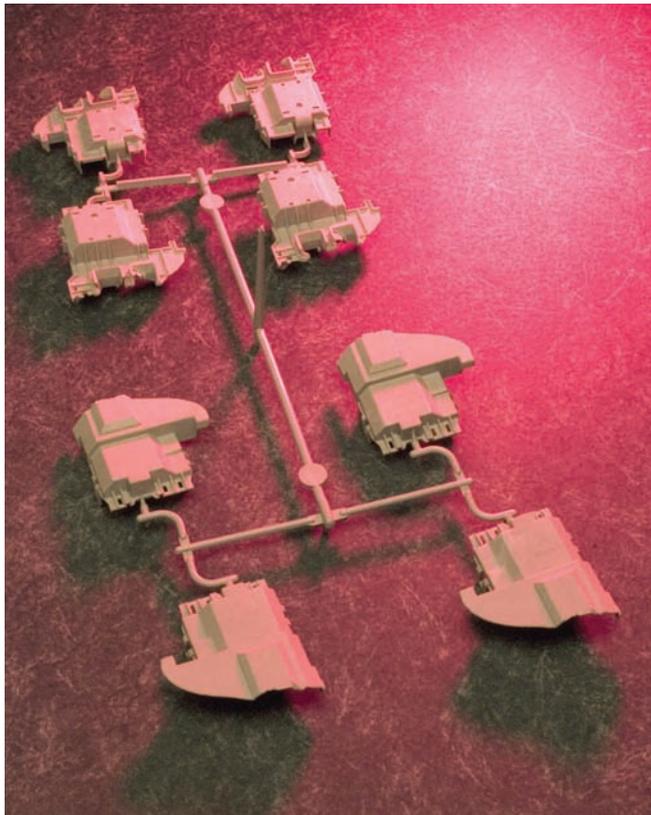
When WPI (WADAL Plastics, Inc.) received this rebuff, a harbinger quite prevalent to North America based custom injection molders, they did not take the news lying down. WPI is a 15 year-old medium-sized and heavily-automated custom molder with two locations, one in Medford, WI and the other in El Paso, TX.

Instead of "rolling over" and seeing the business travel offshore, WPI turned to Beaumont Technologies, Inc. (BTI) for innovative technology solutions to help make them globally competitive. And, in doing so, this successful custom molder not only trimmed their pricing so they were able to compete with the Pacific Rim nations, they also provided their customers with value-added capabilities by supplying them with better quality products right out of the mold.

The long-term result, however, is more than defending a vital piece of business, which the company successfully did. It was confirmation to the plastics industry, to this important Wadal customer, and to all WPI prospects, that the right mixes of business savvy and calling on valued business partners for technology solutions indeed positions North American companies more strongly in the world marketplace.

"Naturally, we were delighted, but several things came together to make it happen," recalls Robert J. (Bob) Lange, President and CEO of WPI (along with Wade Cullen and Dale Baumann, both of whom, along with Lange, are also partners of the firm). "It began with our reading a veritable blitz of articles about new molding solutions from Beaumont

Technologies of Erie, PA and Moldflow Corporation in Wayland, MA. This was followed by face-to-face discussions and presentations at the 2003 NPE by representatives for these companies, which ultimately resulted in our keeping molding business in the US. Our approach and resultant success," continues Lange, "together reinforced our efforts to consistently achieve an annual growth of 20% or higher, something we've done historically for some time now." *NOTE: BTI is a Certified Consultant and Authorized Reseller in Moldflow's Certified Consulting Partners Program.*



The molding program that tripped these innovations off involved a special two-part electrical switching box for a major appliance line. For years, Wadal had been injection molding 400,000 or more parts for this important customer.

Due to the nature of the complicated molding operation, there was little room to reduce costs, as each part was currently configured in independent 4-cavity molds. But engineers at WPI had an idea that, on paper, would meet the cost target. However, this new idea did not come without serious risks based on their extensive experience with injection molding plastic parts. The existing program involved molding two 72-gram individual parts - a snap-together top and bottom switching box - in

two 4-cavity molds on the firm's Milacron injection molding machines. Adding to the challenge were the complex shapes of the two parts and the nature of the materials Wadal was running, a 33% glass fiber filled polypropylene, which presents material shrinkage and warpage potentials during the molding process.

Wadal Plastics Company's new concept was to combine the existing A&B side inserts from both 4-cavity molds into a single common mold base and mold both parts at the same time. Voila! The cost target was achievable, but the inherent

part quality risks that a molder takes when using a family mold remained a major concern. The WPI engineers considered these hazards, but knew that their technology and consulting supplier, Beaumont Technologies Inc. had successfully solved similar issues for them in the past.

"As we looked toward cutting costs in order to reduce our pricing," recalls WPI's Lange, "we realized we had done everything possible with each of the 4-cavity molds, so it was a matter of improving the molding process and operation. We literally went back to square one, turning to Beaumont Technologies to take a close look at our molding process and the possibility of combining both 4-cavity molds into one 8-cavity family mold."

The combination of products and services from BTI – among them CAE by BTI™ mold filling analysis service, a patented melt rotation technology licensed and sold under the name MeltFlipper®, and a software program called the 5-Step Process™ for debugging and commissioning molds – readily overcame and streamlined production challenges. When implemented, these technologies allowed WPI to better compete in the global marketplace by reducing their internal costs and improving product quality.

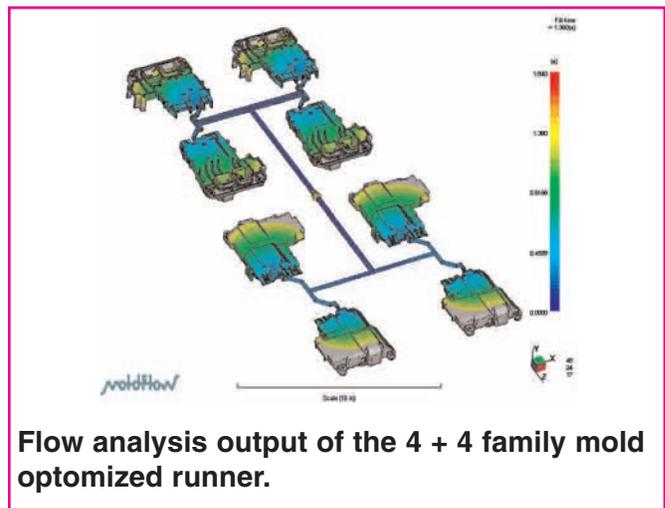
"The first step," cites Mr. Lange, "was having BTI take an in-depth look at our concept for combining the two 4-cavity molds into a single 4+4 family mold. After their careful analysis, they recommended that the conversion could be done successfully, provided the new runner system was designed for success right from the start. As any molder knows, making a family mold run efficiently can be a daunting challenge. Our partners at BTI advised us that by utilizing their CAE products with the company's MeltFlipper technology would help us balance the melt properties in the mold for a successful outcome. We were confident this would happen because we'd successfully worked with BTI on other projects."

Lange continues, "We have mold filling simulation in-house, but using mold filling simulation alone does not guarantee success because it does not pick up on the shear induced melt property changes, which occur as the polymer flows. We chose to outsource the entire process to BTI and take advantage of their expertise to perform the filling analysis, and optimize the runner system, which included incorporating MeltFlipper technology to achieve what the software predicted."

Mold filling simulation can be a successful tool for optimizing runner sizes, gate locations, and evaluating the filling pattern in a mold cavity in advance provided that the user knows the capabilities and limitations of the software. Plastics flow is complex, and not always easy to theoretically replicate in a virtual medium. Thus, most commercially available mold filling software simulations are simplified, with some assumptions made on the behalf of the user, so that the calculations can be arrived at more easily. This typical approach means that homogenous melt conditions within the runner are assumed, and any software currently cannot accurately diagnose shear-induced melt property changes that occur as the polymer flows. Most software uses a simple 1D beam ele-

ment for flow solutions in the runners. This 1D approach assumes homogeneous melt conditions which advance from node to node, and are not capable of predicting the asymmetrical melt conditions that develop through the runner system and parts. Even some three dimensional (3D) simulations that are commercially available to the plastics industry do not adequately predict shear-induced phenomena properly.

But success can be designed into the mold, before building even takes place, by incorporating MeltFlipper melt-management technology into the runner system. These technologies control the melt properties and resolve the non-uniform material conditions facing molders in the real world. The result is the actual mold filling performance more closely resembles the simulation's predicted results, as seen in the figures supplied.



New machinery or automation systems often are promoted as the only fix for mold programs with production problems. In this case, solutions came from "within the process", as neither company advocated investing in costly new machinery and instead looked inward on the actual injection mold, design, and process for a tangible (and economical) solution. MeltFlipper is a technology which allows molders like WPI to use existing tooling and machinery to their fullest potential, without spending capital on new machinery. By way of explanation, the technology manages the melt properties within a runner system by rotating the melt. In doing so, it strategically repositions the various melt regions to provide a balanced filling between and across the cavities in the mold. This technology, coupled with utilizing Moldflow software, allows WPI to successfully design the melt delivery system to balance the material properties throughout the entire 4+4 family mold. The results are faster cycle times, better fill balancing to achieve higher quality parts while eliminating problems such as flash, short shots, dimensional variations and core shift, among others. Higher mold efficiencies enabled WPI to achieve lower per part pricing, and pass the savings along to customers that needed these reductions to stay competitive.

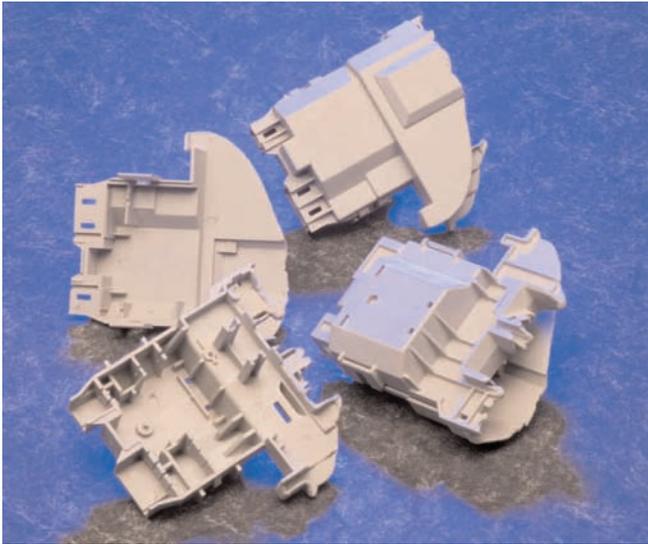
In addition, BTI's 5 Step Process mold commissioning software helped WPI isolate variations and quantify mold imbal-

ances caused by issues shear-induced flow melt property variations and steel dimensional variations within their completed molds.

As a result of these investments, WPI officials claim they have standardized all their molding operations, from the mold building, commissioning, and then the entire molding process, using the BTI and Moldflow offerings.

Regarding the pricing issues, Lange reports they were able to satisfy this customer and attract new customers (as applicable) by offering numerous benefits, among them:

- 8 cavity family mold pricing instead of the previous 4 x 2 molding.
- An 18% cost reduction was achieved for the base.
- A 24% cost reduction was achieved for the cover.
- The ROI for the total project was 10 months, which included the licensing of BTI products, CAE services, and the cost to build the new mold.
- Part quality improved in the 8 cavity mold from what was previously achievable in independent 4 cavity molds.
- Faster mold commissioning times for quicker “art-to-part” turnaround times, owing to the ability to balance molds expeditiously.
- Consistent cavity filling.
- Excellent part consistency and repeatability.



“The moral of the experience.” concludes WPI’s Bob Lange, “is North American processors can be competitive, not only closing in on what was once deemed preferential pricing, but also providing a substantial amount of value-added due to superior industrial technology being implemented into our processes. Other benefits, which almost go without saying, include working with firms like ours means we’re basically in the same time zone, don’t have to pass along long-distance

shipping costs and expedited costs due to lead-time constraints, and can provide extremely quick time-to-market turnaround, from the initial launch all the way through the life of the part.”

Addendum

BTI is proud to be a partner in WPI’s strategy. The company believes that a mold’s melt delivery system must be engineered and scrutinized to be successful; just cutting accurate cavity geometries is not enough. Six Sigma results, the coveted manufacturing standard, will not be realized until variations are designed out of the process, the mold, and the part geometry. Such technologies as MeltFlipper, used in conjunction with mold filling simulations, are excellent ways to progressively implement a mold program to improve the product, process, and productivity of the mold program for the molder.

WPI (WADAL Plastics, Inc.), with facilities in Medford, WI and El Paso, TX, is a solution-driven custom molder with a proven track record of successfully taking over existing mold programs. The company primarily serves the appliance, lawn and garden, fenestration and automotive plastics sectors. Capabilities range from 40 to 330 ton presses, plus 80% of their plants offer process automation (pickers and servo robots among them), WPI extends the benefits of being a one stop resource, from mold design and building to molding and beyond with a variety of secondary operations to their customers.

Beaumont Technologies, Inc., headquartered in Erie, PA, offers a unique mix of products designed to optimize the efficiencies of the mold and the injection molding process. These products and services are part and process enhancing tools that help the injection molding industry become more competitive and profitable in world markets. The company’s expertise lies within an in-depth understanding of polymer flow and processing technologies which enable molders and moldmakers to decrease lead-times while maintaining a high quality level of process and part control. Products include the patented MeltFlipper® melt rotation technology guaranteed to balance filling in hot and cold runner applications, the 5 Step Process™ mold commissioning software, and CAE by BTI™ flow analysis services.

Conclusion / Company Contact Information

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