

MeltFlipper® Case Study

Customer: The Piolax logo features the word 'PIOLAX' in a bold, blue, sans-serif font. The letter 'A' is stylized with a red and blue triangle above it.

Case Study: Reducing Scrap and cycle times using MeltFlipper® Technology

Canton, GA - "Find efficiencies in your plastics processing operation" is the mantra drilled into US molders seeking to maintain their position as high quality, competitive suppliers to large automotive OEM companies. It's no secret that North American molding operations are under pressure to scrutinize every area of their manufacturing operation, driving out waste in order to eek out fatter margins in an exceptionally competitive processing market. When Piolax Corporation of Canton, GA sought to streamline and drive inefficient practices from their Tier 1 automotive OEM molded parts business, they sought a solution that would provide faster cycle times, better quality parts, and reduced scrap—without investing in expensive capital equipment. With the help of their plastics supplier, Ashland Distribution Company of Dublin, OH, Piolax connected with Beaumont Technologies of Erie, PA to make their operations more efficient and competitive in the tough automotive molding marketplace.

Although the drive for improved efficiency is in nearly everyone's job description at Piolax Corporation, how to go about doing this was not easily apparent to this leading supplier of plastic and metal fastening products. With a major portion of the company's business coming from state of the art plastics processing, staying on top of emerging processing technology while maintaining skills and a technological edge on the competition are a principal growth strategy for this Tier 1 supplier. It was their account executive, Mark Shade of Ashland Distribution Company's General Polymer technology service group who originally approached Piolax regarding a new parts and process optimization technology. He had seen an alternative that could help processors drive out waste and add value to their end products.

While most efficiency solutions come in the form of a new machine, or a new automation system, what Shade recommended was radically different. Called MeltFlipper, this licensed technology from Beaumont Technology allows molders to use their existing tooling and machinery to their fullest potential, offering exceptional end products without any expensive machinery upgrades.

Choosing the Weapon

The Ashland Distribution Company is challenged to help keep their customers competitive in the tough manufacturing business. In order to do so more effectively, Ashland set up the General Polymer technology service group in 2000, with a mission to seek out and provide innovative processing solutions that can be implemented at competitive prices with minimal disruption to a manufacturing operation. The new division was tasked with connecting with companies in the plastics industry that provide such processing advantages, and their search lead to Beaumont Technologies of Erie, PA. Just a few years earlier, John Beaumont, Professor of Engineering at the

Plastics Technology faculty of Penn State Erie had presented a paper at an ANTEC conference that offered a simple yet revolutionary concept to the molding industry: the ability to control the molding process by managing the melt after the plastic had left the nozzle of the injection molding machine. At the conference, the paper went on to win the Best Paper Award, and also to launch a new company. The concept presented in the paper, and now a licensed technology available to, and used by molders worldwide, is called MeltFlipper technology, and its simple execution yet exceptional results caught Shade's attention. He attended a presentation and trial run at an area molding shop, and found the premise of what John Beaumont was introducing to molders as a practical solution to mold balancing challenges.

"As soon as I learned more about the MeltFlipper, it was immediately apparent that Piolax could benefit from the technology," recalls Shade. He was so impressed with what the technology could do for the company that he scheduled a meeting with Piolax Corporation's Molding Manager Joe Sutterfield and Tooling Manager Jack Godfrey to introduce Beaumont and MeltFlipper technology to them



Figure 1: Sample Air-Damper Product
Manufactured by Piolax Corporation

Piolax Corporation's dilemma centered on a molding program at the Canton, GA plant to mold glove box air damper parts for automotive OEM's (Figure 1). At issue were scrap problems and inefficiencies and inconsistencies in the end products. Convinced that a 'bigger hammer' or expensive capital equipment would be costly and too time consuming, Piolax was intrigued about this PA-based company's big idea for better molding.

Explaining the MeltFlipper Technology

The MeltFlipper is a proprietary licensed technology that provides a mold imbalance solution by rotating the melt, thereby strategically repositioning the various melt regions to provide balanced filling between cavities. The benefits of this process, according to Dave Hoffman, Technical Sales & Marketing Manager at Beaumont Technologies, are that the molder can resolve mold-filling imbalances and reduce inconsistencies that limit the number of cavities used in injection molding molds. Further, the molder can balance pressure, temperature, viscosity, and material properties in the entire mold-instead of a more piecemeal solution as provided by steel balancing or conventional hot runner drop temperature manipulation. The unique processing advantage that the technology provides is the ability to control the plastics once it leaves the injection molding nozzle and flows into the mold cavities, without purchasing any new tooling. " A molder can quickly realize faster cycle times, better fill balancing that produces higher quality end parts while eliminating typical processing problems such as flash, short shots, dimensional variations, and core shift to name a few. The process yields higher mold efficiencies for lower per part prices, and faster mold commissioning times – all of which are essential in today's global economy," says Hoffman.

Basically, the process works by repositioning the side-to-side material property variation, created by shear in the runner system, so it becomes symmetrical to the vertical axis. When using MeltFlipper, each cavity gets an equal share of high and low viscosity melt, and the repositioning requires a turning, or 'flipping' of the melt flow. Exact details are restricted to licensees of the technology, but the 'guts' of the process requires a minor mechanical variation to the runner geometry at or near the branching points.

Rising to the Challenge

The problems that Piolax was experiencing with the air damper program were serious enough to warrant a full analysis of what was going wrong in the molding process. The major issue was scrap and rejected parts, which in some cases were running as high as 30%. These figures were unacceptable to the company, explains Clyde Melton, Senior Vice President of Piolax Corporation. "We needed to trim our scrap levels significantly, so we can economize our raw materials and labor costs per part," Melton explains.

Beaumont Technologies representatives traveled to the Georgia plant to diagnose the molding problems on-site. After tearing down the mold operation, the Beaumont team determined that the problems centered on 2 gates of a 4 cavity mold. The filling imbalances were creating a core shift problem, resulting in long hollow handle component on the air chamber shaft having different wall thicknesses and unequal dimensional characteristics.

Using the New Weapon of Mass Production

With the mold problems defined and located, Beaumont Technologies began to diagnose the 'fix' for the air damper molding program. First, Beaumont consultants along with Ashland Distribution personnel redesigned the runner system for geometrically balanced operations. Utilizing MeltFlipper technology, the team was able to fix the cavity-to-cavity problems and the intra-cavity inconsistencies for side-by-side compatibility. The net effect was that the two gates were filling at the same rate, and the material was distributed evenly around the mold core utilizing the standard cold runner mold that Piolax had been using in the factory. With Piolax licensing 3 mold with the MeltFlipper technology, Beaumont gave a presentation and seminar to the engineering staff to help them become experts in using the technology. Since the time of this initial project, the Piolax Corporation has opted to purchase a site license, which allows them to utilize MeltFlipper technology in all of their molds on-site, new or existing.

Beaumont was able to create these dramatic changes within 36 hours, dialing in the mold performance to a previously unprecedented level of accuracy and part-to-part consistency. The loose cores were tightened and the steel imbalances corrected to create the strong molding program that Piolax envisioned to mold the air dampers.

The results were dramatic. Piolax reduced their scrap problem from 30% to 2%, a 28% overall reduction in costly wasteful processes. Moreover, their cycle times were improved and machine time better utilized so that their productivity shot up 10%. These efficiencies have allowed the company to expand their air damper business to the point where today company officials claim that they have 85% of the air damper marketplace in North America and in Asia. And, since there was no new tooling, the company did not experience any down time while learning new machinery or debugging it. The return on investment for the MeltFlipper investment was quickly realized, and the company now specified the technology into all new bids that they compete for. "Beaumont's MeltFlipper technology helps keep us competitive, and the cost of implementing the process is very reasonable, so we are able to quickly turn out world-class parts with a very fast ROI for our company," Melton states.

Building a Processing Arsenal

Building on the success of the MeltFlipper technology, Beaumont Technologies was able to further implement a new automated software product called the '5 Step Process' to their client, Piolax. The 5 Step Process allows molders to isolate mold variations by comparing the weights of parts from short shot molded parts from each cavity, allowing the molder to recognize what is creating these variations. The 5 Step Process separates out the challenges of dimensional variations in the mold, cooling effects, and shear-induced material property variations.

Some of the benefits that the Process brings to a molder are: faster time-to-market through quicker mold commissioning, help in developing mold qualification standards, identifies and quantifies various sources of filling imbalances, focuses efforts on solving the root causes of filling imbalances, provides a window into a mold's quality and performance specifications, self-contained database for easy file management, and an easy-to-read automatic report generator.

To achieve these benefits, Piolax submitted mold samples and parts molded during short shot operations. Beaumont then weighed the parts and utilizing data collected during these tests, determined the mold steel variation during the mold cycle. Last, Beaumont was able to calculate the shear induced variations, and came back to Piolax with solutions for better part-to-part dimensional accuracy for their end parts.

In addition, Beaumont representative traveled to Piolax to host a seminar on using the 5 Step Process for the company's engineers, and taught them how to optimize their molding process. With the combined efforts of the two licensed technologies, Piolax was able to realize higher quality end parts with reduced cycle times, coupled with vastly improved efficiencies in machine time and materials use.

Today, Piolax quotes the inclusion of MeltFlipper and the 5 Step Process into all their new molding projects. The parts optimization technology from Beaumont has proven so valuable that the company accepts this low cost quality solution as a cost of doing a high quality molding program properly, and the results speak for themselves. By finding ways to cut waste, drive out part-to-part imperfections, and utilize the injection molding machines and materials more efficiently, Piolax has streamlined its operation to be one of the most competitive molding operations in the world.

Piolax Corporation was established in August of 1988 in Canton, GA as a subsidiary of Piolax Incorporated. Piolax is known worldwide for the elasticity of their parts. Piolax is committed to growing along with our customers. Because of our commitment to supply innovative quality products that our parent company has designed for the global automotive industry, Piolax has grown to a global corporation with operations in the US and Taiwan. (note: this sounds like a quote but has no quotation marks, or words on who said it.

Ashland Distribution Company is a division of Ashland, Inc. (NYSE:ASH). We are a leading distributor of chemicals, plastics, materials for composites, ingredients and environmental services in North America. Ashland is a recognized leader of and pioneer in the distribution of thermoplastic resins. Ashland Inc. recently reported results for fiscal 2003, which ended Sept. 30, 2003. Ashland Distribution Company's sales and operating revenues in fiscal 2003 were \$2.8 billion, up 11% from fiscal 2002. Operating income was \$32 million, up from \$1 million in fiscal 2002.