Embracing the Challenges in IMD at Distinctive Plastics

An Interview with Tim Curnutt

Tim Curnutt has an entrepreneurial spirit and a mind that sees possibilities rather than obstacles. With a mechanical engineering degree and a tool-making background, he started Distinctive Tool & Die in 1981 in the garage of his home. When the business direction indicated a need for an injection molding machine, he installed one – in the master bedroom. In 2000, when plastics molding began to feel comfortable, Curnutt added new challenges to his professional life with two-shot molding and in-mold decorating.

Now incorporated as Distinctive Plastics, the Vista, California injection molder has 65 full-time employees and runs 24/7. Serving primarily the leisure/appliance and industrial markets, Distinctive Plastics also has customers in the medical, electronics, consumer products and government sectors.

Curnutt may not be conventional, but he can be labeled with other terms that often are attached to successful entrepreneurs: engaging, energetic and risk-taker. In this interview, Curnutt discusses his business' history and the factors that have led to its success in the field of in-mold decoration.

Q: How did Distinctive Plastics gets its start?

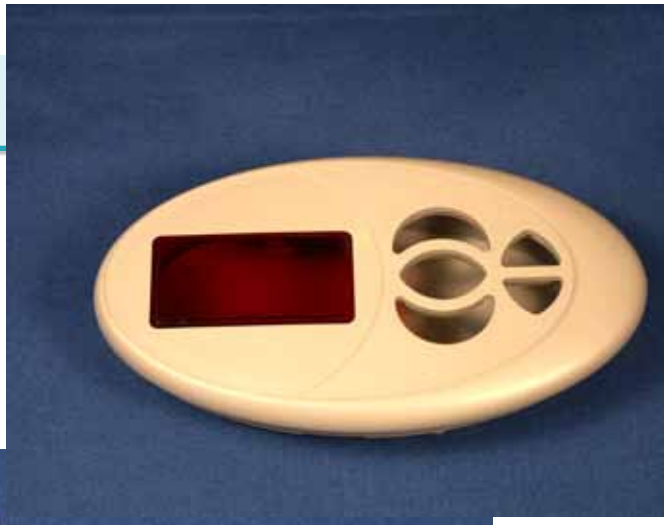
I'd always wanted to be an entrepreneur, and it finally came together when I started designing molds. My first moldmaking customer was a man named Jon Watkins, who started building spas in his garage. That company is known today as Watkins Manufacturing, a Masco Company. The company makes Hot Springs Spas, the #1 selling portable spa, and Caldera Spas. A year after I started working with Jon, I had built three molds and decided that, instead of sub-contracting the work, it would be better to mold the parts myself. So I installed an 88-ton Arburg molding machine in the master bedroom, using a Doughboy swimming pool to cool the molds and machine. (This, incidentally, heated the swimming pool.) Clipping, assembly and packaging operations were conducted on the patio.

It was a good place to start and one thing flowed into another. By 1985, customer demand required that I move out of the master bedroom and into a larger facility. As the plastic business grew, the company incorporated as Distinctive Plastics in 1987. Expanding into the company's third industrial facility in 1999, I decided to pursue insert molding, in-mold decoration and 2-shot molding as niche competencies. Since then, these competencies have accounted for as high as 20 percent of sales.

Q: What motivated Distinctive Plastics to add in-mold decorating to its line of services?

In 1999, after nearly 20 years of molding plastics, I wanted to get into something more exciting; more challenging. I looked at several different processes, including medical molding, thin-wall molding, silicone molding and even blow molding. I chose IMD and 2-shot molding because I was impressed by the unbelievable possibilities and beauty of the finished product. I have always said, "With these technologies, you are only limited by your imagination."

I also was challenged by the fact that the technologies were relatively under-developed compared to most injection molding. There aren't very many mold makers who know how to make 2-shot and IMD molds. There aren't many processors who are experienced in it, and not many printers know how to make appliqués for IMD. That's a challenge. It's not a known science, and that makes it fun.



Q: What are the barriers to entering the market?

Finding supplier partners that understand and innovate is one of the largest barriers to entry. There are a great deal of people who are used to IML, but IML and IMD are two very different applications. For instance, there are a lot of printers out there, but how many are familiar with the structures needed to bond in the IMD process? Although we utilize insert-molded flat and formed IMD appliqués, currently our primary method of IMD decoration is reel-to-reel, and there are only three companies in the world that have knowledge and experience in that method. We have found excellent cooperation with KURZ (see sidebar on page 10).

Most IMD and 2-shot molds have to be made with our in-house toolroom, not only because of the difficulty in finding qualified mold makers, but also for the sake of protecting proprietary mold designs and techniques. We spend a great deal of time and resources in prototyping and conducting DOEs to develop these designs and competencies.

In addition to the challenge of finding good resources, one of the greatest barriers to entering the market is understanding the exaggerated effects of scrap and the learning curve. A new project starts out at about four times the normal scrap rate, and then works its way down. That's quite a learning process. Even after we have a successfully formed sheet, it goes into the mold and is formed even more. That can cause cracking of the decoration, instability in the plastic and other issues that lead to rejection from a quality control standpoint. There's a lot of experimentation, and with mid- to-low volumes, that's a hard cost to absorb. After a while, you start to get a hang of it because you've seen it before. But nobody ever wants to do something that's been done before.

Q: What differences are there in designing for in-mold decorating?

With IMD, you not only have the normal challenges of maintaining a stable process for the sake of dimensional stability, but you also throw in a very high cosmetic requirement with thin film that is affected by the plastic flow. At Distinctive Plastics, we use the Nautilus Mold Qualification and Design of Experiments software for injection molding. This program brings all the principles of Scientific Molding into an easy-to-use graphic interface and enables our process engineers to dial in the process to achieve maximum stability. ▶

2010 IMDA award winner in Best IMD Durable Product category

We also are working to educate our customers on designing for in-mold decoration. For instance, with the reel-to-reel method, the contours aren't as deep, and we have to be careful not to form too radical of a curve; too much of a contour in the molded piece can lead to cracking in the graphic; and metallics also are hard to deal with because they like to crack. The film in reel-to-reel appliqué can be stretched only 10 percent with metallics, as opposed to 20 percent with regular inks. In some cases, the traditional molding process guidelines are modified. Most injection molders don't want a lot of gates because they don't want weld lines, but I've been finding that with something delicate, it is important to the success of the project to reduce the amount of flow going by. More gates have been the answer in that instance.

The resources available through the In-Mold Decorating Association (IMDA) have been very useful, with information shared in a non-competitive environment by a group representing nearly every phase of the IMD process, from film makers to injection molding. The case studies, "Getting Started Guide" and other articles on the website are extremely helpful.

Q: Describe the product that won the IMDA award. What made it challenging?

The Caldera Spa Control Panel that won the 2010 IMDA "Best Durable Product" award is a clear acrylic bezel. This bezel not only had a very high level of cosmetic requirements, it also had strict dimensional requirements, environmental requirements and chemical resistance requirements. In addition, there was a requirement to block light in all areas except where the LEDs and display shine through.

KURZ Reel-to-Reel In-Mold Decorating

Distinctive Plastics has had great success using the KURZ method of reel-to-reel decorating for its in-mold designs. More common in Europe and Asia, reel-to-reel offers advantages to molders and decorators looking to reduce waste and eliminate the costs associated with diecutting in the decorating process.

"Historically, interior automotive trim was the perfect industry for reel-to-reel IMD, with shallow drafts and shallow draws utilized for a wood grain pattern," said Chip Bailey, product manager for KURZ. "From there, reel-to-reel became popular for cell phone lenses, because it was simple to decorate the entire lens surface. Now, laptop covers are the biggest thing going, with the entire cover decorated with ink and a pattern, as opposed to spot decoration."

The hard coats being utilized for this process are the number one advantage, according to Bailey. The films are UV-cured and pass the durability specifications set by the automotive industry. The films can pass hundreds and hundreds of abrasion cycles, which makes the decorative aspect of the product extremely durable.

"Manufacturers and decorators like the system because it is dry," Bailey explained. "Rather than dealing with inks and solvents, an in-mold image is applied within the molding machine. The expertise being used is still molding, and additional expertise in printing isn't needed." The reel-to-reel IMD method can register continuous rotogravure pattern, silk screen, metalized and holographic images. "The only limitation is that parts must be two-dimensional-plus, but not three-dimensional. There is a limit to how deep a draw can be achieved."

Bailey recommends high-volume parts for the reel-to-reel process due to the initial equipment investment. Once a facility is ready to implement reel-to-reel IMD, a KURZ mold engineer would assist with the initial mold design, helping customers understand the modifications needed for excellent adhesion to the part surface. "We supply and manufacture molds for IMD," said Bailey, "and we supply the foils. We can walk customers through every step of the process for successful implementation."

In the past, we had formed acrylic graphic appliqués and insert-molded them for this product. Anyone who has worked with acrylic appliqués can tell you the problems with forming and handling the brittle acrylic appliqués. In the version that won the IMDA award, with the help of Gordon Boettcher from KURZ, we redesigned the product to use the KURZ method of reel-to-reel IMD, and that was able to provide us with a very high-quality look with extreme complexity. The graphic combined a variety of metallic effects, a machined look, dead-front printing, a transparent window and close registration text and logo – all with a UV- and chemical-resistant top coat. In all, there were nine printing processes. Challenges still exist with the forming over the contours of the bezel, and maintaining blemish- and defect-free printing is always a challenge, but the damage due to handling was greatly reduced with the KURZ method.

Q: How has the current economic climate affected your customers' desire for IMD?

In general, most of our customers took a 30 to 50 percent hit with the economic downfall, starting in 2008. Some of our customers were unaffected and some grew, but the overall effect on Distinctive Plastics was about a 30 percent drop in sales by 2009. Since then, we have been recovering 10 to 15 percent per year, mainly through the addition of new customers. In 2006, our sales coming from our niche competencies of IMD and 2-shot molding had grown to 20 percent of sales. Due to the recent economic fall, many of the IMD projects have given way to less expensive methods and last year, less than 5 percent of sales were attributed to IMD. However, this year the inquiries into IMD have doubled and I expect to see the quoting process bear fruit soon. Our customers are wanting to provide that high-end, dramatically decorated look again, and IMD accomplishes that.

Q: What differentiates Distinctive Plastics?

We are not just a molder with many years of experience; we are innovators. Deeply rooted in our philosophy is the appreciation for the mechanics of what makes injection molding happen. Tooling and scientific methods have always been my passion, and I have surrounded myself with employees who feel the same. I have found that with an open mind and a natural curiosity, many projects that were deemed impossible by others become reality at Distinctive Plastics. I encourage my team to constantly look at more technologically advanced ways of accomplishing each job. By the use of scientific processing and robotics, we have been able to offset the effects of much of the plastic increases over the last couple of years.

The group at Distinctive Plastics has successfully worked as a team on many 'art to part' projects. A customer can simply bring us a concept on a table napkin, and we can generate a complete drawing and assembly in-house. Our experience with in-mold decorating also makes us unique. We've done the trial and the error – and we've succeeded. ■