

White Paper

The Overmolding Process

Multi-material products deliver more than just a soft touch

February 2009

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While modern overmolding is nearly three decades old, it has only been recently that it has expanded beyond a niche application in the injection molding arena. Over the past few years, overmolding has experienced major growth throughout an ever increasing array of products and industries. From consumer products to industrial goods, companies apply overmolding to differentiate through design, improve performance and reduce manufacturing costs.

Fueled by advances in technology and materials, and an expanding pool of knowledge and resources, overmolding has come of age. Initially a method for the replacement of rubber, emerging trends have driven overmolding into commercial reality with many more applications. Consumers demand products with a soft touch and aesthetic appeal that only overmolding can deliver. Industrial goods rely on overmolding for impact resistance and vibration damping. Product designers incorporate the process to offer a combination of great looks, nice feel and functional performance.

While the applications are endless and the value immense, there is more to the process than that required for a single-material, injection-molded part. The cost is greater, the risk is higher and the lead time is longer. As a result, molders report that early enthusiasm for overmolding is often dampened by the concern over the added complexities and additional considerations.

To address the challenges that arise from the design of an overmolded product, companies rely on a variety of prototyping methods. Tool makers and injection molders find that prototyping is vital for success. Used early in the product development process, tools such as rapid prototyping are used to validate performance, avoid rework, protect investments and preserve schedules.

What is Overmolding?

Broadly, overmolding is any molding process where two or more materials are combined to produce a

Connex500: Multi-material 3-D Printer

Objet Geometries Ltd. offers the Connex500™, the first 3-D printing system that jets multiple materials simultaneously. It offers the unique ability to print parts and assemblies with different mechanical or physical properties, all in a single build. This makes the Connex500 an ideal solution for prototyping overmolded products.

The Connex500 can also fabricate Digital Materials™ on the fly, enabling users to create composite materials that have preset combinations of mechanical properties. Based on Objet's breakthrough PolyJet Matrix™ Technology, the Connex500 simultaneously prints two FullCure™ model materials and creates 21 types of Digital Materials. It can also print a single material from any of the original seven FullCure model materials.



single part. However, the generally accepted definition of overmolding is the production of an injection molded part that seamlessly combines a rigid plastic with a rubber-like elastomer. The result is the soft-touch, non-slip surface that has become common on power tools, toothbrushes and razors.



Soft-touch, non-slip surfaces are now common on consumer products such as razor handles.

An overmolded part begins with the molding of a rigid, thermoplastic substrate. On top of the substrate, a thermoplastic elastomer (TPE) is molded. TPEs are a class of polymers that have the characteristics of thermoset rubber. However, unlike rubber, they can be melted and processed in an injection molding machine. With these qualities, TPE combines the advantages of rubber-like materials with the cost, throughput and quality benefits of injection molding.

The plastic substrate and TPE are joined through one of two methods, insert molding or multi-shot molding. The choice of methods is based on a number of factors including production volumes, tooling costs and part designs. In North America, insert molding is more prevalent than multi-shot molding. In Europe, where multi-shot molding originated, the opposite is true. Asia tends to have equal use of both methods.



Insert molding has the advantage of using conventional, single-shot injection molding machines. photo courtesy of Matrix Tooling, Inc

Terminology

Overmolding and related terms are often confused or misused. This results, in part, from the broad range of multi-material applications that extend beyond soft materials on rigid substrates. Another source of the lack of clarity is that the terms may be derived from the characteristics of the molded part or base process. For example, some use overmolding as a synonym for insert molding. In this context, overmolding includes the molding of soft or rigid plastics on any type of base material, including metal.

In general, multi-material molding is the most accurate term to use when describing all injection molding processes that involve making parts with two or more materials. This term then encompasses:

- Multi-shot
- Multi-component
- In-mold assembly
- Two-shot
- Double-shot
- Multi-inject
- Insert molding
- Overmolding

Insert molding is a two-step process. First, the rigid substrate is molded. It is then placed in a mold cavity on another injection molding machine, and TPE is shot directly over the substrate. For molders, the advantage of insert molding is that a conventional, single-shot, injection molding machine can be used. Also, the tooling cost is lower than that for a multi-shot molding process.



*A four-cavity, insert mold for overmolded part production.
photo courtesy of MGS Manufacturing Group*

In contrast, multi-shot molding is performed on an injection molding press that shoots multiple materials in a single operation. These molding machines incorporate two or more injection barrels and some form of automated part or tool movement. This allows the TPE to be overmolded immediately following the molding of the substrate. Using techniques such as common core, rotary stripper plate, core toggle/core back and co-injection, the part is manufactured in a single, automated operation.



*A 24-cavity, rotary stack, multi-shot tool automates molding of substrate and TPE
photo courtesy of MGS Manufacturing Group*

The advantages of multi-shot molding include faster throughputs, shorter cycle times, improved quality and fewer labor hours. The tradeoff is that both the injection molding machine and injection mold are more complex than those used with insert molding. This means larger capital expenditures for both machinery and tooling. It also results in longer lead times for the delivery of a production, multi-shot mold.

Benefits and Trends

The overmolding process allows designers and engineers to create strong, structural products with ergonomic comfort. The combination of two dissimilar materials also enables designers to produce eye-catching products that are easily differentiated from competitive offerings.

Integrating a TPE provides a pleasant, comfortable feel to handheld devices. Designers use overmolded TPEs to offer a distinctive tactile quality to the products they create. With a wide range of available TPEs, the soft-touch handles and grips can be molded with a “spongy,” slip-resistant texture or a firm, protective quality.



*Overmolding offers a distinctive look and feel for consumer products like toothbrushes
photo courtesy of Matrix Tooling, Inc*

From marketing’s point of view, overmolding offers distinctive traits that affect the buyers’ perceptions. For some, the aesthetic qualities are the driving force behind the multi-material product design. Flowing, complex geometries—highlighted by the use of multiple resin colors—that would be impractical through other manufacturing methods become viable alternatives to differentiate a consumer product.

But aesthetics and soft-touch are not the only advantages of overmolding. Increasingly, the process is used to offer improved product performance and lower production costs. Designers are switching to overmolded TPEs to dampen vibrations, absorb shock, isolate acoustics and integrate EMI/RFI shielding.

Meanwhile, manufacturing engineers employ overmolding for the advantages of in-mold assembly. One example of in-mold assembly is where overmolding eliminates o-rings or gaskets. By molding a seal directly on the base part, there is no need for a downstream assembly operation. This reduces manufacturing costs, simplifies production operations and reduces scrap.

Plante & Moran’s 2007/2008 *North American Plastics Industry Study* reveals that there has been strong growth for in-mold assembly. However, the company notes that its measure includes overmolding of rigid materials on rigid substrates. Plante & Moran finds that the data in the study suggests that overmolding, in all forms, accounts for 10 percent of plastic injection molding. It further estimates that two-thirds of overmolding applications use insert molding techniques.

As a multi-shot molding process, overmolding originated in Europe nearly 30 years ago. While Europe continues to lead in the application and adoption of multi-shot molding, North America and Asia are realizing rapid growth in the number of products designed for overmolding.

According to TPE supplier GLS Corporation, overmolding applications have grown over the past 10 to 15 years and exploded in the past four years. The company cites consumer, medical, sports and leisure, automotive, lawn and garden, appliance, kitchen tool, power tool, personal care and industrial market segments as prime users of

its thermoplastic elastomers. Product designers, tool makers and custom molders, state that overmolding is here to stay. The evidence they point to is in the aisles of every discount outlet and hardware store.

In a study conducted by the Freedonia Group, the company reports that the worldwide consumption of TPE was 6.6 billion pounds in 2008. The same study forecasts that annual demand will grow by 6.3 percent per year through 2011. If accurate, the forecast reveals that the TPE market will be \$13.7 billion in that year. According to GLS, it is estimated that 40 percent of the TPE produced is used in overmolding applications.

The appeal of overmolding is obvious, but market growth has not been built solely from consumer demand. While the consumer appetite for overmolded products is an important aspect of its growth, the catalyst has been technical advances in materials, expertise and resources. These developments supported the evolution of the process and encouraged adoption for use in newly launched products.

As the number of TPEs has grown, so has the breadth of applications for overmolding. Companies find that there is extensive list of TPEs available and an ever increasing range of thermoplastic resins to which they will bond. And the future of overmolding goes beyond a soft touch and comfortable feel. TPE suppliers believe that the next stage of growth will rise from a focus on performance. GLS, for example, cites service temperature, chemical resistance, UV/weather resistance and color retention as performance characteristics that will accelerate the growth of overmolding with TPEs.

With the growing number of applications and an increased interest in overmolding, suppliers have stepped forward to make product designers more comfortable in the decision to incorporate overmolding in their products. In the recent past, the pool of mold makers and molders that offered overmolding was shallow. Today, a company that sets out to make an overmolded product will find an established base of suppliers with extensive overmolding experience. This knowledge, and the guidance that is offered, helps to address the new challenges that overmolding introduces.

Considerations and Challenges

Overmolding is a highly capable process that delivers significant advantages in a product's performance and its commercial appeal. But this capability introduces considerations, challenges and obstacles not faced when performing conventional injection molding. To protect an investment in overmolding production and to produce a desirable product, the part designer, molder and tool manufacturer should convene early in the process to devise a marketable and manufacturable design.

While the fundamental rules are similar to those for standard injection molding, the introduction of the second shot of TPE adds complications to tool design, part design, processing parameters and material selection. Combining a rigid plastic and rubbery TPE also invites problems that result from misconceptions and poor assumptions drawn from previous injection molding experience.

The Case for Prototyping:

Every day, prototypes are used to perfect the designs of injection molded parts. This simple, fast and affordable measure protects companies from costly production delays, tooling rework and design flaws. It has been stated that what costs \$1.00 to fix in the design phase costs \$1,000.00 to rectify once manufacturing begins.

With the added challenges of overmolding, the importance of prototyping grows because the likelihood of flaws and problems increases and the cost and time for tooling grows.



*Tooling for an overmolded toothbrush will range from \$10,000 to \$300,000
photo courtesy of Matrix Tooling, Inc*

Tooling is expensive for even a small overmolded object, such as a toothbrush, as shown below.

| | <u>COST</u> | <u>LEAD TIME</u> |
|--|-----------------------|------------------|
| High-volume production mold: (6 – 8 cavity, multi-shot) | \$200,000 - \$300,000 | 20 – 30 weeks |
| Low-volume production mold: (multi-cavity, insert mold) | \$30,000 | 8 – 10 weeks |
| Prototyping injection mold: (single cavity, manual insertion) | \$10,000 | 3 – 4 weeks |

The worst case, without prototyping in the design phase, is that the tooling has to be redesigned and rebuilt. The more likely case, which according to Vista Technologies happens 60 percent of the time, is that the tool requires rework. For less than \$100 and in less than one day, a rapid prototype could protect against rework of production tools that could easily cost \$10,000 or more and take weeks to resolve.

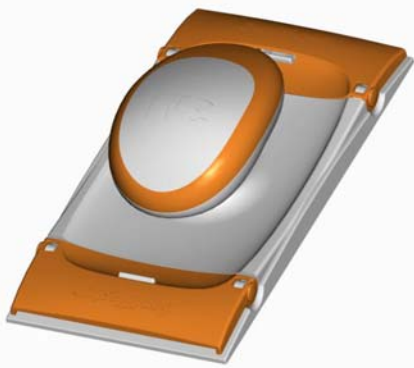
During the overmolding process, the goal is to completely fill the mold cavity so that the cosmetic and functional requirements of the finished part are met, but at the same time, prevent uncontrolled flow of material around the substrate or out of the cavity. It becomes a race to inject the TPE with enough pressure and speed to prevent it from freezing off without injecting so hard and fast that the shot shifts the substrate or flashes out of the cavity. These issues are addressed through the proper design of the tool.

Elements of injection mold design as basic as surface texturing, vent location, gate type and ejection points will be different for an overmolded part. Without these alterations, materials may delaminate, surfaces may be damaged and parts may stick in the mold.

For additional details on part design, mold design and molding parameters, GLS offers two overmolding guides, which are available at http://www.glscorp.com/resources_im.php.

The rules for design for manufacturability (DFM) and mechanical design also change. Joining two dissimilar materials alters product design decisions and creates new considerations, such as those related to adhesion and interaction.

The last hurdle with overmolded parts is to combine part design and material selection in a way that delivers the desired feel. The challenge is two-fold. First, it is difficult to quantify or describe the intended softness in terms of words or mechanical properties. Second, the feel of a soft-touch overmold is dependent upon the combination of material properties, texture and the wall thickness.



*The feel of an overmolded part is dependent on materials and design, so products like this sanding block will go through multiple design iterations.
photo courtesy of Vista Technologies*

To get the right feel, the designer will likely need to go through multiple iterations of the product design and several material trials until the product’s feel is just right. While designing the part, several factors will come into play, including durometer, thickness, hardness and coefficient of friction.

Considering the complexity and challenges of overmolding, which is compounded by the difficulty in quantifying the intended feel, prototyping becomes a key element in the product development process. Arriving at a design that provides the perfect feel, ideal function and eye-catching aesthetics becomes an iterative process involving marketing, industrial design, product design and manufacturing.

Prototyping and Testing

In light of the complexity of the tooling for overmolding and its associated cost, thorough product evaluation is a necessity. Even more so than with conventional injection molding, it is imperative to prototype an overmolded part to investigate form, fit and function, as well as manufacturability.

Rarely is the process simple and straightforward. Instead, there tends to be a lot of back-and-forth dialogue between product design, marketing and tool design. This is especially true in consumer products where designs are increasingly complex and the implicit requirements are more demanding.

Since the feel of a soft-touch grip is subjective, prototyping must move from the digital world of CAD and CAE to the physical world of models, patterns and tools. To get the product just right, prototypes are developed for review, designs are revised and materials are revisited. This process is then repeated until all are satisfied.

Option 1: Prototype Injection Molds

Without concern for time or expense, the ideal scenario is to injection mold prototype parts using the selected substrate and TPE materials. With production methods and production materials, the prototype will have the same qualities as the final product. The problem with this approach is that it is extremely costly, time consuming and inflexible.

Case study 1

Getting the Right Feel (

The feel of an overmolded TPE is dependent on more than just the hardness of the material. The interplay of the design, thickness and material properties determines how an overmolded part performs. To overcome the challenge of prototyping all of the combinations, GROWit LLC, a rapid prototyping and manufacturing services company, turns to its Connex500 3-D printer.

Over a span of three weeks, GROWit produced components of an electronic device with five different designs in five material hardnesses. According to David Gurrola, GROWit’s co-founder, “Each time we printed a new set of prototypes on the Connex500, the client revised the design and used a different material durometer. This let them get a real sense of how the parts felt.”

Each set of Connex500 parts was delivered in less than three days for only \$300. Over the course of the project, the client evaluated materials with a Shore A of 50, 61, 75, 80 and 85. Gurrola notes that it would have been unrealistic to use RTV molding to evaluate the five designs. “To make 10 sets of patterns and 10 sets of molds to cast the five design variations would have cost nearly \$8,500, and even with expedited delivery, it would have taken us more than five weeks just to make parts.”

Table

| | <u>Cost</u> | <u>Time</u> |
|---------------------------|--------------|------------------|
| RTV Molding | | |
| - Patterns (2): | \$300 | 2 – 3 days |
| - RTV molds (2): | \$550 | 5 - 7 days |
| - Cast parts (set): | <u>\$150</u> | <u>3 per day</u> |
| - Total: | \$1,000 | 1 – 2 weeks |
| Connex500 | | |
| - Rapid prototypes (set): | \$300 | 2 days |

Obviously, high-volume, production-grade tools would not be used for prototyping. However, the alternative, a machined aluminum tool, is still quite expensive and time consuming. This is true even if insert molds, with manual part placement, are used in lieu of the more complex multi-shot tools.

To prototype using the insert molding approach, two molds are required. One mold is for the substrate and the other is for the overmold. Alternatively, a “1+1” family mold can be used. This approach uses one cavity of the mold for the substrate and the other for the overmold.



*A 1+1 cavity prototype injection mold reduces cost and lead time. One cavity of the tool molds the substrate of the sander handle; the other overmolds the TPE.
photo courtesy of Vista Technologies*

While cost and delivery are dependent on complexity and size, typically this prototyping approach will range between \$6,000 and \$50,000 and take three to eight weeks to complete. Because of the investment and the lead time, this alternative does not promote design and material iterations. For most, prototype injection molds are reserved until late in the product development process when confidence in the design is high.

Option 2: Rapid Prototypes

At the other extreme are conventional models and rapid prototypes. The advantage to this approach is that a single model can be constructed quickly and affordably, which is ideal when the design is still in flux. For example, a rapid prototype of a razor could be completed in a single day for less than a few hundred dollars. The drawback of this approach has been that the prototype is constructed of a single material.

Case study 2

Avoiding Rework

Prior to the launch of the Connex500, Vista Technologies, a rapid prototyping, rapid tooling and injection molding firm, manufactured a low-volume, aluminum tool to produce a small, overmolded part for a meter reading device. Accurate Transformers, LLC needed just 350 parts per quarter, so a simple, manually-operated, insert mold was the ideal solution. The 1+1 aluminum family mold was delivered quickly and inexpensively, costing just \$8,900 and taking less than three weeks to deliver.



An overmolded meter component (left) and a Connex500 prototype (right) printed in a single operation. *photo courtesy of Vista Technologies*



In light of the fast delivery and low cost, Vista's client elected to forgo an investment of \$2,300 and two weeks for prototyping the overmolded part with RTV molding. This decision meant that the initial samples from the injection mold were effectively the prototypes. And as prototypes will do, the first overmolded parts revealed that revisions and tooling rework were required. Looking back on this project, Vista notes that with its Connex500, it could have produced a prototype with the characteristics of a Santoprene overmolding for just \$350 and delivered it in less than three days. Dan Mishek, sales manager, states, "If the PolyJet technology of the Connex500 was available for this project, we could have supplied the first overmolded prototype in 2-3 days for review. Then, any modifications could have been made to allow the injection mold to be built without any revisions. That would have saved our client a few thousand dollars and also avoided any delays in production.

| Table | Cost | Time |
|---------------------------|---------|--------------|
| Injection Molding | | |
| - 1+1 family mold: | \$8,900 | 2 – 3 weeks |
| RTV Molding | | |
| - Patterns (2): | \$500 | 2 – 3 days |
| - RTV molds (2): | \$1,700 | 7 – 10 days |
| - Cast part: | \$85 | 3 per day |
| - Total: | \$2,285 | 10 - 14 days |
| Connex500 | | |
| - Rapid prototypes (set): | \$350 | 2 - 3 days |



Single-material rapid prototypes, such as this power drill housing, lack the soft touch of an overmolded part

To overcome the one-material limitation, a representation of the overmolded TPE geometry could be hand fabricated and then glued to the surface of the machined model or rapid prototype. Although somewhat limited with respect to the complexity of the design that is possible, this method is common during the earliest days of the product development process. This handcrafted approach is used to make mock-ups for presentation of the product's design characteristics and aesthetic qualities.

The Case for Prototyping:

To enable early product revisions and protect against rework, there are several prototyping options for the overmolded toothbrush discussed earlier.

| | <u>COST</u> | <u>LEAD TIME</u> |
|------------------------------|-------------|------------------|
| Prototyping | | |
| Injection mold: | \$10,000 | 3 – 4 weeks |
| RTV mold & urethane casting: | \$1,000 | 7 – 10 days |
| Rapid prototype | \$75 | ½ - 1 day |

Option 3: RTV Molds

This leaves the last, and most common, option for prototyping overmolded products, RTV (rubber) molding. In terms of cost, time, quantity and quality, RTV molding falls between rapid prototyping and prototype injection molding. This combination facilitates early design reviews and multiple design iterations.

As with insert molding, the RTV molding process uses one mold to form the base component and another for the overmolded area. Each mold requires one pattern onto which the liquid, silicone rubber is poured. The cost for patterns and molds typically ranges from \$1,000 to \$5,000. The lead time is usually one to three weeks.

Case study 3

Getting a Handle on the Design

With the aid of a Connex500, GROWit LLC made the design of workout equipment handles interactive and evolutionary. Its client needed functional prototypes of the overmolded parts to evaluate ergonomics, comfort and visual appeal. Knowing that this would be an iterative process, the client also needed the prototypes to be made fast and affordably.



The low cost and rapid delivery of a Connex500 prototype allowed the designer to produce three versions of the workout equipment handle with the properties of an overmolded part. *photo courtesy of GROWit*

The project included three design revisions and three sets of Connex500 prototypes. Each set, which included a left- and right-hand version, was delivered in two to three days and cost \$850. The first set of prototypes was used to verify the design; the second set for evaluation of a softer overmold material. With bit of painting of the rigid portion of the handles, the final set of prototypes was also used as a marketing sample.

David Gurrola stated, “We delivered three sets of handles, each with a different design, in less time than it would have taken to make one set from an RTV mold.” He continued, “With a cost of \$5,000 for RTV molding, the client never really considered that as an option. But if he did, I am convinced that he would not have made new molds for the second or third design revisions”

Table

| | Cost | Time |
|---------------------------|---------|---------------|
| RTV Molding | | |
| - Patterns (4): | \$1,500 | 2 – 3 days |
| - RTV molds (4): | \$3,000 | 7 - 10 days |
| - Cast parts (set): | \$550 | 3 per day |
| - Total: | \$5,050 | 2 – 2 ½ weeks |
| Connex500 | | |
| - Rapid prototypes (set): | \$850 | 2 - 3 days |

A single RTV mold will produce between 10 and 50 prototype parts at a rate of two to four parts per day. After accounting for scrap caused by parts shifting in the mold and bubbles coming to the surface, the effective tool yield and daily production rate will be less.

An important distinction of RTV molding is that the materials that are cast in the rubber tools are urethanes, which are thermoset materials. Therefore, at best, RTV molding offers a reasonable approximation of the thermoplastic resins used in the production overmolding process.

Although RTV molding is a common prototyping approach, it is not ideal in all circumstance. While the cost is a fraction of that for prototype injection molds, companies report that they are hesitant to use RTV molding too early in the design cycle. If, for example, an overmolded product progressed through multiple iterations, and each was prototyped through RTV molding, the total cost and cumulative time could become unreasonable.

Another issue with time and cost is that industrial designers may want all that RTV molding offers—good looks, great details and the soft touch—but may need only one or two prototypes for concept review. When labor and expense are spread over a small number of parts, the cost and time per part are excessively high. Without consideration of the investment to make molds and cast parts, the industrial designers are unwittingly asking for the best traits of rapid prototyping and the best qualities of RTV molding. In most cases, this is an impractical request.

While a request for a few parts from an RTV or aluminum mold may not be practical, it is certainly understandable. Time is short; demands are high; and the challenges are numerous. For most companies, aggressive schedules have compressed iteration cycles. In some industries, two week cycles that include design revision, prototyping and product development are standard elements of the project plan. And with each cycle, designers hope to have a prototype that conveys every detail, every nuance and every aspect of the product with as much realism as possible.

This quality of information leads to better decisions and lowers the risk. This is especially true when evaluating the feel of a soft-touch TPE material on the handgrip of a company’s latest, most advanced product. Without a realistic prototype that conveys the softness of the handle or tackiness of the grip, some will opt to play it safe and will pursue a less sophisticated design.

On the other hand, having the right prototypes for the
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Case study 4

Head-to-Head with RTV Molding

Several years ago, Vista Technologies produced prototypes for its client, SPX Corporation, with RTV molding. Recently, SPX engaged Vista to prototype a newly redesigned version of its handheld diagnostic device. This time, the two-piece, overmolded housing was prototyped with Vista’s Connex500 3-D printer.



With RTV molding, this handheld device cost \$16,000 and took nearly 4 weeks. *photo courtesy of Vista Technologies*



Using a Connex500, a similar device was delivered in only three days for just \$2,800. *photo courtesy of Vista Technologies*

Using the Connex500, Vista printed the upper and lower housings with a rigid, white material (Shore D 83) and a rubber-like, black material (Shore A 61). The prototype parts were used to evaluate the form, fit, function and feel of the device. According to Dan Mishek, sales manager for Vista Technologies, two sets of the two-piece housing were delivered in four days for a total cost of \$4,200. “That was almost the same time and cost as that to make just the patterns for the previous RTV molding job,” he stated.

The previous prototyping order cost SPX \$16,000 and took four weeks to deliver. Mishek stated, “For RTV molding of the overmolded parts, we needed two patterns and two rubber molds for both the upper and lower pieces of the housing. That cost \$10,800 and took nearly four weeks.”

While the castings from the RTV molds revealed several areas requiring design modifications, SPX could not justify another month and \$10,000 to remake prototypes of the redesigned housing. Mishek noted, “If they had discovered design flaws in this recent product, we could have had new prototypes from the Connex500 on their desks in a couple of days.”

| Table | Cost | Time |
|---------------------------|----------|-------------|
| RTV Molding | | |
| - Patterns (4): | \$3,950 | 3 – 4 days |
| - RTV molds (4): | \$6,850 | 2 – 3 weeks |
| - Cast parts (set): | \$350 | 3 per day |
| - Total (15 sets): | \$16,050 | 3 – 4 weeks |
| Connex500 | | |
| - Rapid prototypes (set): | \$2,800 | 2 – 3 days |

job lets the product proceed through design and into production with confidence in its form, fit, function, manufacturability and marketability. With them, the company gains the confidence to proceed with production insert molds or multi-shot tooling to manufacture overmolded products with a soft-touch, distinctive look and high performance.

Conclusion

Overmolding is complex and costly, but in return it offers versatility and fuels innovation. While the effort may be greater and the risk higher, the value derived from differentiation through design, improvement of performance and reduction of manufacturing costs have eclipsed the challenges. In doing so, it has grown beyond a niche application.

Although the feel of a soft-touch TPE may be difficult to measure, the impact on a company's bottom line is not. Overmolding is here to stay, and the breadth of applications will only get larger as material suppliers creating advanced formulations that enable new, high performance applications.

What began so humbly as a process to eliminate manual attachment of rubber strips has emerged as revolution in plastic part design. By whatever name it is called—overmolding, multi-shot molding or in-mold assembly—this injection molding process is making a difference in the design, performance and appeal of consumer and industrial products.

This paper could not have been prepared without the insight and information provided by OEMs, tool makers, material suppliers and service bureaus that have experienced the unique demands for the development and manufacture of overmolded parts. Many thanks to:

- *Design Prototyping Technologies (DPT)(dpt-fast.com)*
- *GLS Corporation (glscorporation.com)*
- *GROWit (growit3d.com)*
- *Matrix Tooling, Inc. (matrixtooling.com)*
- *MGS Manufacturing Group (mgstech.com)*
- *Morris Technologies, Inc. (morristech.com)*
- *Plante & Moran, PLLC (plantemoran.com)*
- *Vista Technologies (vistatek.com)*

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