



Overview

Overmolding is a molding process in which two or more materials are combined to produce a single part. Typically the part seamlessly binds a rigid plastic with a rubber-like elastomer. The result is a soft-touch, non-slip surface common on power tools, toothbrushes, razors, consumer electronics, medical devices and more.

An overmolded part begins with the molding of a rigid, thermoplastic substrate. On top of the substrate, a thermoplastic elastomer (TPE) is molded. The plastic substrate and TPE are joined either through insert molding or multi-shot molding. 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. In contrast, multi-shot molding is performed on an injection molding press that shoots multiple materials in a single operation. This allows the TPE to be overmolded immediately following the molding of the substrate. The choice of methods is based on a number of factors including production volumes, tooling costs and part designs.

To address the challenges that arise from the design of an overmolded product, companies rely on a variety of prototyping methods.

Option 1: Prototype Injection Molds

When time and expense are not issues, the ideal method is to inject mold prototype parts using the selected substrate and TPE materials. By using the production methods and materials, the prototype possesses the same qualities as the final product. The problems with this approach are that it is extremely costly, time consuming and inflexible. While cost and delivery depend on complexity and size, typically this prototyping approach costs between \$6,000 and \$50,000 and takes three to eight weeks to complete.

Option 2: RTV Molds

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 a pattern



Figure 1: Overmolding offers a distinctive look and feel for consumer products like toothbrushes
Photo courtesy of Matrix Tooling, Inc

into 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.

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 for 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

Why Connex?

The Connex printing systems possess a unique technology that is one of the most important industrial innovations of the last five years. Jetting multiple materials enables overmolding in a single build process. A model can be constructed quickly and affordably - ideal when the design is still in flux. This solution is much less costly and time-consuming. It is rapidly replacing injection molding and RTV molding to produce prototypes. In a single build process, and with little effort, a prototype part can be printed to simulate several variations of an overmolded product. As stated in the Vista Case Study (see References below): "The Connex gives you the opportunity to evaluate more design options in less time and cost."

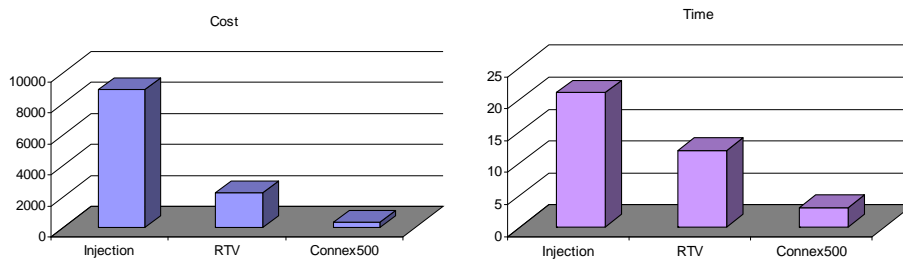


Figure 2: Prototype printed by Connex



Figure 3: The end-product

The charts below compare the three options for creating overmolding prototypes:



Tips and Tricks

Create a mechanism that enables you to mount a separate part on your full assembly of rigid and soft parts. Then use the Connex systems' ability to print up to 9 different materials in one build process and assemble each part on the model for evaluation. Label each part that you evaluate with its relevant friction coefficient value. The label will later help you quickly determine which part received the best score in your evaluation criteria tests.

Reference

- Case study: Vista Technologies – Can be found on the Objet website under “Case Studies – Overmolding”
- White paper: Overmolding – Can be found on the Objet website.

Disclaimer

Objet Geometries Ltd. is not responsible for misuse of our products or their use in conjunction with unsafe or improperly maintained equipment or for uses other than intended as specified in this application note.

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