# Connecting Quality and Success with Two-Shot Molding

Ray Townsend

**Medical device manufacturers are constantly looking for ways to eliminate waste, cut costs, save time, and generally, get products to market faster. When it comes to molding, one machine is helping to accomplish all of that. This article looks at a two-shot molding machine that can deliver consistency and repeatability while offering the additional benefits mentioned below.**

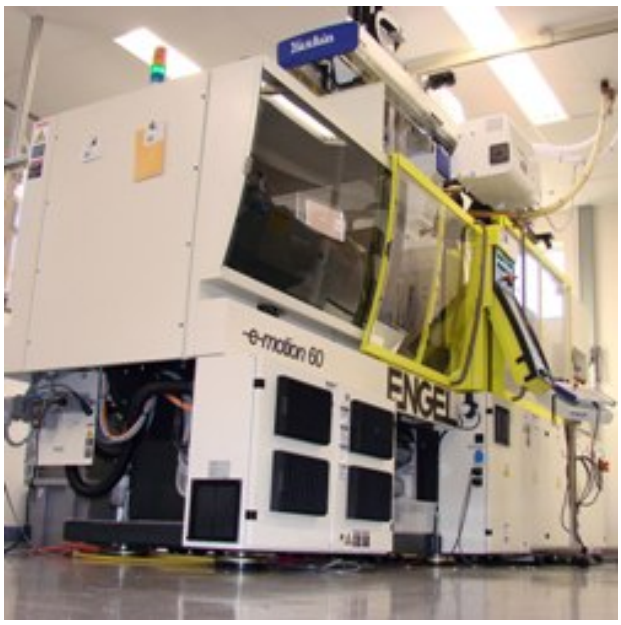
Manufacturing tubing connectors, namely disposable quick connects, can be a difficult game of balancing quality, performance, ease of use, and cost. Engineers and product development teams struggle in weighing these issues when designing a new product for the medical industry, and face the challenge of meeting the critical need for each without compromising another.

However, two-shot injection molding can ease this struggle. Benefits, such as enhanced grips and ergonomics, highly functioning seals, improved cycle times, lack of need for assembly, and decreased costs are making this technology a favorite among designers, engineers, manufacturers, and end users. Combining all of these features makes it much easier to meet the challenge of balancing the quality, performance, ease of use, and cost requirements.

For example, used to create a seal in quick connects, o-rings can be especially costly in terms of both material and assembly. They can also pose a risk of poor performance if they are not properly assembled. This is where two-shot molding can enter the equation and balance the scale. The seal created by a two-shot machine costs only a few cents, is of the highest quality, and doesn’t require any assembly.

Another example of a feature that a two-shot machine can provide is the inclusion of tactile ergonomic grips on the exterior of a fitting. End users in hospital facilities often have gloved hands, and any features that help them handle a connector with ease and confidence are greatly appreciated.

Value Plastics [1], a manufacturer of high-end plastic tubing connectors for medical devices and other applications, has not only adopted this technology, but they have chosen to take two-shot molding to a new level. Instead of simply introducing it into their Fort Collins facility, they have considered the frequency of their Design Center’s custom requests and decided to prepare for the future. While companies traditionally employ this technology to create one specific product, Value Plastics has taken a more proactive, forward-looking approach that will allow their diverse client-base to benefit from a variety of unique product solutions.




**The ENGEL e-motion all electric tiebarless combimelt offers multi-component, two-shot injection molding. The unit is smart and performs multiple functions at once.**

**ENGEL E-Motion Combimelt**
The ENGEL [2]e-motion combimelt is the first in the world to integrate injection molding features usually spread among a variety of separate devices. The only one of these customized machines is in use today at Value Plastics.
For designers and engineers in the medical device industry, the combimelt provides customers the highest assurance that plastic parts are consistently manufactured to maximum standards, which makes the process less labor intensive and produces quality pieces faster.

Where other two-shot molding machines commonly produce just a single product over and over, the fully calibrated and fully optioned combimelt easily accommodates nearly every conceivable product style or design that requires high-quality, reliable production. Not only are the opportunities vast, but the high-end machine comes with sophisticated software that allows for a level of integration, precision, and control that customers will appreciate. Rick Cairns, engineering manager for Value Plastics, explains, “This is a one-of-a-kind machine in that we have employed every available option, and where possible, actually doubled-up on features to provide maximum process control and production capability. The fact that everything is fully integrated and managed under one program greatly contributes to our emphasis on consistent, quality parts.”

**Software and Server**
The smart combimelt features high-end software networked to a server that carefully monitors and permanently records thousands of specific output and input parameters and data for each product’s first and second shot. When subsequent production runs occur on the combimelt, the process parameter data is

instantaneously available to the operator of the injection machine.

Unfortunately, at many plants with older systems, operators simply record some key parameter settings on paper, store data in a file cabinet, then re-enter the information on the machine for future orders, which significantly increases the opportunity for error.

**Integrated Master Controller**
Unlike standard two-shot molding machines, a single master controller is completely integrated into the combimelt, which eliminates the cost of purchasing multiple separate controllers. The controller simultaneously manages temperature, pressure, clamp function, tool rotation, and more to ensure a superior single or two-shot molded product. Examples of specific features include:

*Wide Range, High-Temperature Control Systems*—Instead of a separate controller with 20 or more different temperature set points that must be input manually, the master controller uses data from the server to instantly set correct temperature levels, for both heating and cooling of the injection molds depending on the resin. Products that use high temperature resistant resins may require 300°F during the two-shot process. The Whittmann TEMPRO plus 320 (mold temperature controller) can operate up to an astounding 320°F, whereas older temperature controllers rarely exceed 200°F. Instead of using a separate heated oil system to reach the high temperatures, the integrated temperature controller incorporates a water/propylene glycol mixture. Older systems that use heated oil can leak and contaminate the machine and product and are more dangerous to operate. Heat transfer of oil, as compared to water-based systems, is very poor.

*Tool Rotation*—Rather than a standard hydraulic motor to rotate the molds, the combimelt uses clean, completely electric servo motors throughout its system and can control multiple independent servo-driven motions within the tooling. Servos move the tool or tooling components to specific, preset positions during the machine cycle.

*Small Size*—The second injection unit on the combimelt is mounted at a 45° angle above the first unit, which creates an extremely small and efficient footprint on a tight manufacturing floor. Most two-shot machines today have a larger, L-shaped layout.

After the two-shot, multi-component molding process is complete, a robot incorporated into the combimelt can actually place parts into a bag that is already labeled and then seal it.

**Implications for Manufacturers**
What does this mean for medical device manufacturers? When device designs need more than standard, single-shot fittings, there are now an infinite number of two-shot possibilities that can be designed into the next solution. With the combimelt’s e-factory software components, medical device companies are guaranteed they’ll receive the exact product, whether it’s their 10th or 100th order, days, months, or years from now.

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