Designer-Molder Collaboration Streamlines Device Production

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Discussion and collaboration between a medical device designer and a molding partner early in the design process can save significant expense and help avoid manufacturing obstacles that would otherwise not emerge until production has begun. This article looks at the great benefits realized from early cooperation between these two parts of the product development lifecycle.

The most important tool that medical device designers and their molders have is communication. The closer the collaboration between the design engineer and their molder, the more smoothly and efficiently the project will proceed. With the designer sharing as much information as possible about the device without revealing sensitive intellectual property details, and the molder sharing expertise about the molding process, the design and production can be streamlined to speed time to market and reduce production cost.

Standard industry practice is that the design engineer supplies detailed design drawings to the molder. The degree of detail in those documents can be critical to the molder, and engineers may not always be aware of just how much detail the molder requires. Molders need to know not only the physical specifications of the component, but also specific details such as how, where, and by whom the device will be used; what environment the device will be used in; whether it is re-usable or disposable; what type of sterilization method is required; is it part of an assembly;

etc. All of these details can directly affect the design of the tooling.

Many experienced molders are knowledgeable about both the parameters for the optimum molding process and the performance characteristics of plastic materials, both of which will have a significant impact on the success of the project. Designers may not have the same range of experience as molders when designing the device or component. Collaborative discussions at the beginning of a project can lead to subtle design changes in the product that facilitate smooth, efficient manufacturing while enhancing the product's performance.

Material Selection

As many injection molders could attest, designs submitted for quotation often treat material selection in one of two ways: the drawing either specifies "material TBD," leaving the choice up to the molder, or a material is specified without any information as to why that specific material was chosen. In some of the latter cases, experience tells us that there is a better option.

There are literally thousands of plastic resins to choose from, the majority of which have varying properties with a wide variety of characteristics, so the proper material choice will have a profound effect on both the injection molding process and the performance of the product. Early collaboration between the designer and the manufacturer concerning material choice will help optimize the product's performance, and assist in ensuring a product that is cost-effective and has the highest chance of successful production.

Some of the newer materials being developed, such as Liquid Silicone Rubber (LSR), offer unique performance characteristics, both when used alone and when bonded with hard plastics and metal. Using such materials can dramatically affect the design of the component. LSR, for example, can produce seals and gaskets that are integrated into the component, eliminating the need for separate parts requiring assembly. LSR and TPE can also be used to create integrated soft areas on switches, pads, and in grip areas that make the device easier to use.

Discussing material selection at the earliest design stage of the project not only saves time and cost, but also provides options the designer may not be aware of.

Tolerance Specifications

Often, designers specify tight dimensional tolerances, or utilize the title block tolerances, either of which may add unnecessary cost and complexity to the component or device. With early collaborative discussions, areas of the product that require close tolerances, and those that don't, can be identified and have realistic tolerances specified. This maximizes production success and minimizes tooling cost.

Product Design Considerations

Design engineers who lack knowledge in basic plastic design principles may be prone to design a component or device with challenges that directly affect the mold and molding process. This results in potential product failure and increased manufacturing costs. Early discussions between designers and their molders can focus on the basic rules of plastic part design and help the designer significantly

reduce mold and part costs while achieving a "quicker to market" introduction.

Some of the most fundamental of these guidelines include:

- Sharp corners should be minimized and radiused to reduce potential stress areas
- Nominal walls should be designed with uniform thickness to reduce the likelihood of warping or distortion during cooling
- Generous draft should be designed in to facilitate part removal from the mold and to reduce the molding cycle time
- Extremely small or thin areas in the product should be avoided to reduce the likelihood of product failure

The Benefits of Collaboration

In conclusion, this article provides a brief overview of the benefits of early collaboration between designers and their molders, and the unique challenges that are presented to both when designing plastic components for efficient manufacturing and maximum performance.

More importantly, it is meant to help all parties involved profit from the availability of the latest innovations in materials that enable the production of high-performance components and devices efficiently and cost-effectively.

For those interested in increasing their knowledge of plastic part design and molding, there are informative seminars available online, and many local community colleges offer training courses in plastics molding technology. The knowledge gained will be extremely valuable in guiding designers toward designing components that take full advantage of today’s molding technology.

It is the nature of the medical device market that has proven each device has its own unique challenges, some involving the physical design itself and some involving the choice of the most appropriate materials. In each case, investing time in collaborative discussions with a knowledgeable molder will pay dividends in making the best, most informed choices, leading to a successful product in the marketplace.

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