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Metal-to-Plastic Conversion: Cut Costs, Liberate Design, Improve Functionality

The Innovation Briefs Theater will showcase how to transition from metals to plastics in medical device designs

Chris Wartinger, business development manager at Mack Molding (Arlington, VT; www.mack.com), will present "Metal-to-Plastic Conversion: Cut Costs, Liberate Design, Improve Functionality" on Wednesday, February 9. The session will commence at 2 p.m. at Innovation Briefs Theater 2.

***MPMN*:** Why should medical device OEMs contemplate replacing metals with plastics in medical applications?

Wartinger: While metal has been the traditional material of choice for orthopedic instrumentation, new plastic resins, combined with scientific process development and validation, are now making inroads into that market. Why? Because plastics have yielded lower costs, more flexible designs, and improved single-use and reusable orthopedic instruments.

***MPMN*:** How does converting from metal to plastic cut costs, liberate design, and improve functionality?

Wartinger: Once you have amortized upfront tooling costs, the injection molding process is inherently less expensive. The savings can be found primarily in the processing itself. Plastic parts can be molded in seconds, where machined metal components will take minutes to produce. It is a common myth that injection molding only pays off in high-volume applications. We recently had a customer with more than 200 part numbers, a multimillion-dollar tool package, and low-volume runs that paid off the tooling after only one year of production. Design freedom and improved functionality actually go hand-in-hand. In general, you can design more complex geometries with plastics than you can with metal. Multiple parts can be consolidated into one, often generating additional cost savings. Plus, you can integrate other components into the plastic part, such as magnets, posts, etc. Plastic parts can be color coded, which can be very useful if you have a series of parts that are different sizes or are used with other components that have to match up. Color coding makes it very easy for the surgeon or nurse in the operating room to quickly identify the correct part out of the tray or package of instruments. Conversely, plastics can also be transparent, allowing the surgeon to see through the part during the procedure.

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MPMN**:** Are there particular applications for which you are advocating the material?

Wartinger: Metal is converting to plastic in many applications across many markets. In our presentation, however, we will focus on the orthopedics market where traditionally machined or cast metal parts are converting to new polymers, particularly for disposable applications. Some of these high-performance materials offer similar mechanical properties to stainless steel, but are lighter and offer more design freedom and lower processing costs. Handles for surgical instruments are another place where we're seeing the material shift from either machined metal or hard plastic. Today, surgeons are choosing instruments that have been overmolded with soft-touch thermoplastic elastomers for a more comfortable, ergonomic feel and a more secure grip. Thermoplastic elastomers also allow for color coding, as well as OEM branding that can be incorporated into the handle design.

MPMN**:** By making the switch from metals to plastics, will medical device manufacturers have to sacrifice mechanical strength and other properties commonly associated with metals? Why or why not?

Wartinger: The strength properties of metal are superior to those of plastic, so it's critical to determine the specific application's requirements before settling on the material of choice. How strong does the application need to be? Does it require the higher processing costs of metal, or could you choose a resin with high mechanical properties, incorporate geometry into the design to maximize its strength, and cut costs in the long run? It is less a question of which material is stronger, but rather, which material best meets the application's specific strength requirements. How strong does the component have to be?

MPMN**:** What key points do you hope to make to attendees?

Wartinger: Metal is no longer the only solution for orthopedic applications. There are new polymers on the radar screen, as well as contract manufacturers that have both the plastics and medical expertise to design for manufacturability and assist with material selection, process recommendations, and manufacturing techniques that can lower costs, enhance design, and improve part functionality.

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