Design Talk: Micro-Molding Devices and Components

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By Jeff Randall, *PE*

As medical technology advances and the demands on surgical parts increase, the need for high-quality, tight-tolerance components continues to rise. With advancements in minimally invasive device designs, product engineers will continue to look for opportunities to further reduce component sizes. Micro-molding by definition is an injection molding process where the manufactured components require magnification to see product details contained on or within the part. Micro-molded parts typically weigh one gram or less. Applications for micro-molded parts vary from ophthalmic, cardiac rhythm management, and audiologic components to short- and long-term implantable applications. They are also used in medical equipment that requires extremely small, precise components for external devices.

Experience Matters

As product specifications for micro-molded components become tighter, specifiers will seek experienced manufacturers who can successfully and consistently produce components that are micro-sized. Critical success factors include machinery with ultra-precise controls and tooling designed to minimize runner waste (since some micro-molded materials can cost $2,000–$5,000 per pound). Product manufacturers are being challenged to micro-mold various materials including liquid silicone rubber (LSR) and high consistency silicone, as well as rigid thermoplastics and implantable grade materials. Over-molding and cleanroom production capabilities are also crucial, including over-molding LSR onto rigid thermoplastics, LSR onto metallic components, flexible thermoplastics onto rigid thermoplastics, and rigid thermoplastics onto metallic components.

What’s Ahead?

Companies looking to stay ahead of the curve will need to invest in machinery, technology, and manpower in order to remain a leader in this unique niche. As the adult population ages, more Americans are staying active longer, and the demand for micro-molded devices, components, and implantables will surely continue to rise.