ProMed Defines HCR Molding?s Role in Complex Silicone Component Production

May 29, 2026

PLYMOUTH, MN - May 29, 2026 - PRESSADVANTAGE -
Complex silicone components rarely move from design to production on material selection alone. For medical device, pharmaceutical, electronics, and other regulated-industry teams, HCR molding has to be evaluated alongside part geometry, cure behavior, tooling strategy, inspection method, documentation needs, and long-term production expectations.

ProMed describes HCR, or high consistency rubber, as a practical silicone option for components that require careful attention to geometry, cure behavior, handling, inspection, and production repeatability. In regulated manufacturing, the choice between silicone molding processes is rarely based on material category alone. The decision usually depends on how the material moves through the tool, how the part cures, how dimensions will be verified, and how the process can be documented as the program moves from development into production.

The distinction between HCR and LSR (liquid silicone rubber) is one of the first process questions many teams face. LSR is typically supplied as a pumpable two-part material and is often associated with automated injection molding and higher-throughput production. HCR is supplied as a gumstock material, which gives it a different handling profile. That difference can affect feeding, mold design, cure control, flash management, part removal, inspection planning, and validation documentation.

For complex silicone components, HCR molding may be appropriate when the material?s physical form, mechanical properties, or processing behavior fits the application better than an LSR approach. The final choice depends on geometry, wall thickness, tolerance expectations, production volume, assembly needs, and the environment where the component will function. A short-term implantable component, a disposable medical device part, an electronics-integrated wearable, or a desiccant-loaded silicone component may each place different demands on the molding process.

Part geometry is often where those differences become visible. Thin sections, thick sections, undercuts, molded-in interfaces, tight radii, and assembly contact areas can affect how silicone fills, cures, releases, and

holds its intended shape. A design that appears workable in a CAD model may need adjustment once the molding method, tool steel, venting, gating, parting line placement, and inspection plan are reviewed together. Early review can reduce avoidable rework and give engineering and quality teams a stronger basis for validation planning.

Tooling decisions carry added weight in regulated programs because prototype success does not automatically translate into production readiness. Prototype tooling may confirm part geometry, material behavior, and handling needs. Production tooling has to account for repeatability, maintenance, cavitation, cure consistency, part removal, and inspection access. For HCR components, those questions often include how the material will be prepared and placed, how cure conditions will be controlled, and how molded parts will be removed without distortion or damage.

Inspection and metrology planning are closely tied to those tooling and material decisions. Silicone components can be difficult to measure because they may deform under contact, reflect or transmit light differently than rigid plastics, or include features that are difficult to access with a single inspection method. Optical inspection, tactile measurement, computed tomography, and other metrology tools may each have a role depending on part size, feature location, material behavior, and tolerance requirements. The inspection method has to fit the component and the feature being evaluated.

Validation planning also depends on the ability to define and repeat the manufacturing process. In HCR molding, that may include material preparation, molding parameters, cure controls, tooling conditions, operator steps, inspection criteria, packaging requirements, and downstream assembly operations. Familiarity with a silicone material does not replace the need to establish process controls, document critical steps, and test against defined product requirements.

ProMed?s work in silicone molding, thermoplastic molding, over-molding, assembly, molded desiccants, testing, analytical support, tooling, and polymer-based dosage form manufacturing gives the company practical experience with these connected decisions. The company is a family-owned, privately held contract manufacturing and development partner serving highly regulated industries, with support spanning prototype, process development, validation support, and production manufacturing.

That broader manufacturing view matters when HCR molding is part of a larger device, assembly, or product platform. A silicone component may need to fit against a thermoplastic substrate, bond to an insert, interface with electronics, support moisture-control performance, tolerate a packaging process, or move through secondary assembly steps. In those cases, the molding process needs to be evaluated alongside substrate compatibility, adhesion planning, cleanliness, dimensional stack-up, packaging exposure, and long-term supply expectations.

HCR molding is best understood as a process option that should be evaluated through material fit, manufacturability, inspection feasibility, and documentation readiness. When those factors align, it can support complex silicone component production in regulated environments. Determining that fit early gives product development, engineering, quality, and procurement teams a clearer path from prototype work into controlled, repeatable production.

About ProMed:

Since 1989, ProMed has been recognized as a leading Contract Manufacturer of complex, intricately designed molded silicone and plastic components and assemblies for highly regulated industries. ProMed?s expertise extends across applications for short-term and long-term implantable devices, single use devices, drug-releasing combination devices, and specialized materials and processes for defense applications. The company collaboratively works with customers from prototype through production, providing over 30 years of experience related to design for manufacturability, material selection, tool and fixture design, process development, manufacturing, and other value-added services that result in cost-effective solutions with superior quality.

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For more information about ProMed Molded Products, Inc., contact the company here:ProMed Molded Products, Inc.Jim ReedJim.Reed@ProMedMoldedProducts.com15600 Medina Rd, Plymouth, MN 55447

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Website: https://promedmolding.com/?utm_source=GMBlisting&utm_medium=organic

Email: Jim.Reed@ProMedMoldedProducts.com