

COMPLETE
MANUFACTURING
AND SUPPORT
SERVICES FOR YOUR
MEDICAL DEVICE.

**Precision Extrusion
Thermoplastic
& Silicone**

Multi-lumen Tubing
Coextrusion
Balloon Tubing
Transition Tubing

**Silicone
Fabrication**
Molding
Dip Casting
Sheeting
Films

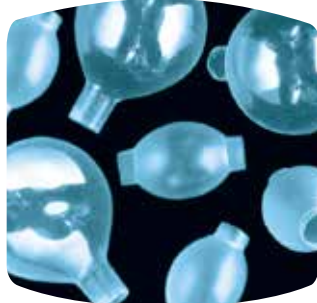
**Secondary Operations
Assembly
Packaging
Sterilization**

Capabilities to Support Your Success



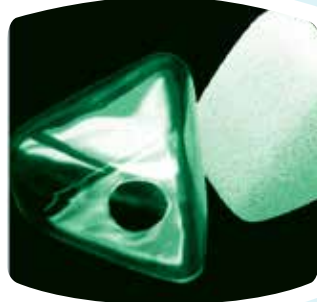
Silicone Extrusion

- Single lumen, multi-lumen, and profile extrusions
- Coextrusion of silicone and non-silicones
- Unlimited shapes; round, elliptical, star shaped, crescent, etc.
- Transition tubing for drains or rotating profiles for kink resistance and strain relief
- OD from 0.008" to 1.5" (0.20mm to 38mm)
- Wall thickness as thin as 0.003" (0.075mm)
- Tolerances as tight as +/- 0.001" (0.025mm)



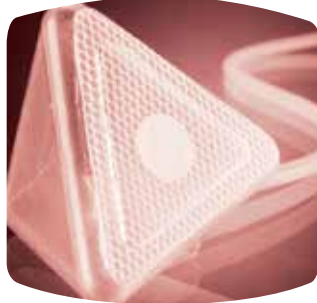
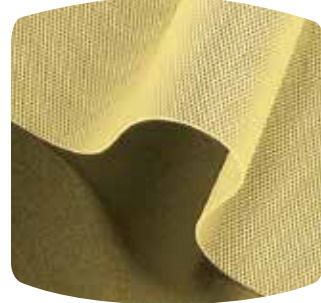
Comprehensive Silicone Molding

- Complex geometries, thin walls and tight tolerances
- Long-term implant, medical grade, and USP Class VI and ISO tested materials
- Experienced tool design and process validation
- Liquid injection molding, transfer molding, compression molding, micro molding
- Over-molding and insert molding for high bond strength and efficiency
- Prototype to high volume automation



Silicone Dip Casting, Dip Molding, Encapsulation and Coating

- Producing hollow parts or coatings by dipping in silicone dispersion
- Complex components and deep undercuts
- No parting lines or flash
- Textured, smooth, or optically clear surface
- Wall thickness as thin as 0.002" (0.05mm)
- Wall tolerances as tight as +/-0.002" (0.05mm)



Silicone Sheeting, Films and Coatings

- Proprietary calendaring and knife coating processes
- Multi-layer sheets and films
- Vulcanized or un-vulcanized (for bonding applications)
- Reinforced or non-reinforced
- Thickness from 0.0005" to 0.125" (0.013mm to 3.18mm)
- Optically clear, pigmented, or radiopaque
- Smooth or embossed
- Full range of durometers as well as gels and adhesives



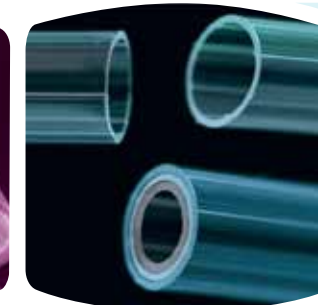
Secondary Operations, Complete Assembly, Packaging and Sterilization

- Slitting, drilling, cutting, punching, skiving, trimming, tipping
- Printing, coating
- Bonding and assembly of silicone and non-silicone components
- Annealing/post curing
- Clean room packaging and labeling
- In-house and management of external sterilization

The Contract Manufacturing Division of Lubrizol Life Science Health (LLS Health), including five facilities over two continents, has expertise in custom manufacturing solutions supports your success at every stage:

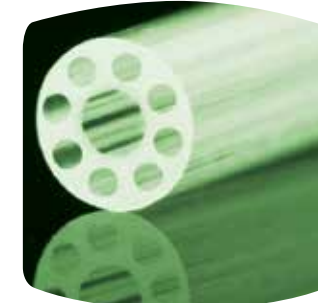
- Engineering support to meet your design challenges
- Proven quality management process to meet your standards
- Continuous improvement for manufacturing efficiency

In every department, in all we do, we are caring for the life of your product.



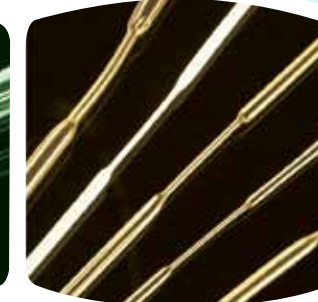
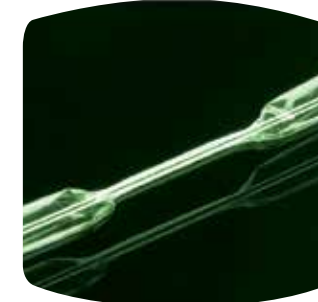
Precision Thermoplastic Extrusion

- Single lumen, multi-lumen, and beading
- Single layer, multi-layer, or striped
- Unlimited shapes; round, elliptical, star shaped, crescent, etc.
- Bump or tapered tubing
- Expertise in a full range of thermoplastic materials
- Outer diameters ranging from 0.005" to 0.300" (0.13mm to 7.6mm)
- Wall thickness from 0.005" (0.13mm)
- Tolerances as tight as +/- 0.00025" (0.0063mm)



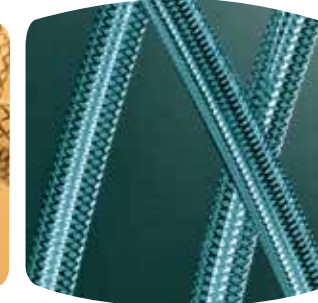
Lead Tubing

- Polyurethane and silicone lead tubing
- Precision control of dimensions, cosmetics, and mechanical properties
- Single lumen, multi-lumen and twisted lumen
- Experience processing commercial and proprietary polymers
- Wall tolerances as tight as +/- 0.0005" (0.013mm)



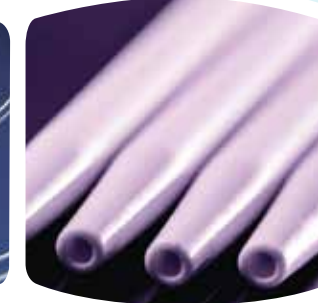
Heat Shrink Tubing

- Standard and custom polyolefin heat shrink tubing
- Ultra thin walls provide ease of removal and low profiles for sheathing
- High expansion ratios up to 10:1 provide high compression force
- Low recovery temperatures of 250F to 400F (121C to 204C)
- Expanded ID 0.01" to 0.30" (0.25mm to 7.62mm)
- Expanded wall thickness as thin as 0.0003" (0.0076mm)



Braided Catheter Shafts/Catheter Assembly

- High pressure resistance, kink resistance, and stiffness
- 0.030" to 0.200" (0.762 to 5.08mm) ODs
- Round or flat wire, or fiber reinforcement from 0.001" to 0.010" (0.0254mm to 0.254mm)
- 25-125 picks per inch
- Variable or constant pick pattern
- Continuous layer processing



Balloon Tubing

- Tight dimensional tolerance +/- 0.0005" (+/- 0.012mm)
- Repeatable mechanical properties
- High concentricity >90% and tight cosmetic control
- Fatigue, burst and collapse testing

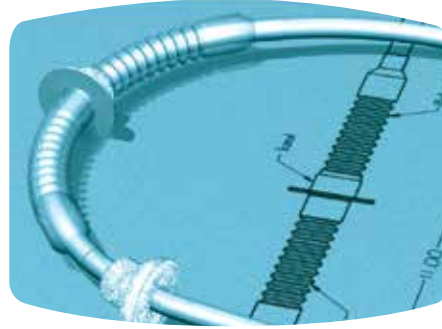
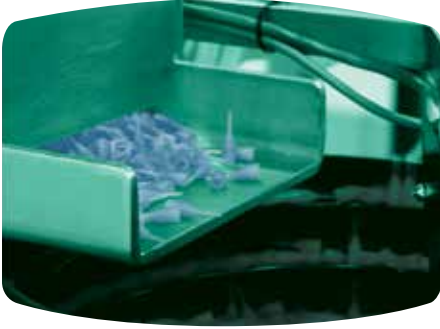
Secondary Operations

- Tipping, tapering, rounding, flaring
- Printing



Quality

- Certified ISO 13485:2016 facilities
- Validated processes
- Continuous improvement culture
- Lean and Six Sigma Methodology



Engineering

- Material selection and design assistance
- Quick response prototyping
- Tooling and fixture design
- Automation



Service

- Personal service
- Problem solving focus
- Disciplined project management
- Lean manufacturing principles
- Supply chain solutions

About Lubrizol Life Science Health

The Health business team partners with customers to speed their innovative medical devices and differentiated pharmaceutical products to market. Our dedicated team provides best-in-class polymers and excipients, along with state-of-the-art product design, development, and manufacturing services, with the ultimate goal of creating solutions that improve patient outcomes.

For more information visit lubrizolmeddevicecm.com.