Welcome
Agenda

- Parker Hannifin overview
- Material development & engineering overview
- Medical product overview
- Open discussion
Parker Hannifin Operational Groups

- Aerospace
- Fluid Connectors
- Hydraulics
- Automation

- Climate Controls
- Seal
- Filtration
- Instrumentation

The Brodest Motion and Control Product Line
Market Focused
At Parker, we partner with medical device and pharmaceutical companies to design and manufacture silicone and plastic components and medical devices.
Material Development & Engineering
From Concept to Finished Product

- Design & process engineering
- Custom material compounds
- In-house test lab
- FEA application validation
- Prototype & production tooling
Design & Process Engineering Support

• Utilize technology driven design tools, including:
  • AutoCAD
  • Autodesk Inventor
  • CATIA
  • Solid Works
  • Pro/ENGINEER
Specialty Elastomer Seal Materials

Compounds
- Mixture of a base polymer and a specific blend of chemical ingredients
- State-of-the-art formulations

In-house mixing
- Advanced computer control technology
- Consistent quality

Specialty elastomers
- Satisfy the unique sealing needs of the customer
- FDA, USP Class VI, UL

Ultra-high purity (UHP) process
- Totally enclosed and dedicated manufacturing
- Ensures an extra level of cleanliness
# Common Polymer Families

| Acrylonitrile-Butadiene (Nitrile, Buna-N) | NBR, EU |
| Butyl Rubber (Butyl) | IIR |
| Chloroprene Rubber (Neoprene) | CR |
| Ethylene Acrylate | AEM |
| Ethylene Propylene Rubber | EPDM, EP MEPR |
| Fluorocarbon | FKM, FPM |
| Fluorosilicone | FVMQ |
| Hifluor | FKM |
| Hydrogenated Nitrile | HNBR, HSN |
| Liquid Silicone Rubber | LSR |
| Nylon 6 | PA 6 |
| Perfluoroelastomer | FFKM, FFPM |
| Polyacrylate | ACM |
| Polyetheretherketone | PEEK |
| Polytetrafluoroethylene | PTFE |
| Polyurethane | AU, EU |
| Silicone | VQM, PVMQ |
| Tetrafluoroethylene-Propylene (Aflas®) | TFE/P |
# In-House Compound Testing Lab

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Our laboratory can test to determine whether a compound meets your specification.
Application Validation Through FEA (Finite Element Analysis)

- Optimized seal loads
- Optimized material usage to eliminate waste
- Visualization of deflection, pressure points, & conformance
- Failure analysis
- Virtual prototype evaluation - reduces costly tool revisions
- Animation provides application visualization
Prototype & Production Tooling
Product Capabilities

- LIM silicone & organic elastomer O-rings & custom molded shapes
- Multi-lumen extrusions
- Medical device assembly & fabrication
- Micro-molded elastomer seals
- Machined PTFE & engineered plastics
- Metal & plastic overmolded composite seals
- EMI shielding
- Thermal management
O-Ring Material Technologies

• Engineered elastomer O-rings
• USP-Class VI & FDA
• Continuously molded
• Broad chemical compatibility
• O-Ring kits & lubricants
Custom Molded Elastomer Shapes
Urethane, PTFE and Engineered Plastics

- Engineered polymeric & plastic seals
- Radial & reciprocating seals
- Custom machined performance plastics
- Medical grade urethane extrusions
Extruded & Precision Cut Seals

- Small-diameter precision cut seals
- Large diameter lathe cut filter seals
- Custom extruded & spliced seals
- 4-corner, spliced hollow profiles
Composite Seals

- Over-molded rubber-to-metal & rubber-to plastic
- Isolator mounts & grommets
- Metal & elastomer composite seals.
- Fastener & fitting seals
- Edge molded seals
- Sanitary seals
EMI & RF Shielding

- Conductive, molded & extruded elastomers
- EMI shielded displays
- Conductive coatings & compounds
- Conductive plastic
- EMI filters & vents
- Shielding laminates & fabric foil tapes
Thermal Interface Materials

• Thermal gap fillers
• Phase change materials
• Thermal adhesive tapes
• Dispensable thermal compounds
• Thermal insulator pads
Our expanded medical contract manufacturing capabilities include:

- Medical device and instrument assembly
- Silicone medical devices
- General medical devices
- Medical instrumentation
- Medical component manufacturing
- Liquid silicone molding (LIM)
- Silicone extrusions
- Thermoplastic & TPE injection molding
- Insert and over-molding
- Flash-less transfer molding
- Organic rubber injection molding
- Packaging, printing & sterilization
Thermoplastic & TPE Injection Molding
Insert and Over-Molding
High Volume Flashless Molding

Organic & Silicone Elastomers
Medical Grade Silicone Extrusions

USP Class VI
Biocompatible Materials
Silicone Medical Device Assembly & Fabrication
Medical Device Assembly & Fabrication
Medical Instrumentation

- Sensors
- Pneumatics
- Hydraulics
- Controls & control circuitry
- Actuators
- Steppers
- Servos
- Mother boards & displays
- Power supplies & special purpose PCBs
- Hard drives
- Harnesses
- Lead screws
- Drive gears
- Sheet & machined metal
- Plastic & metal enclosures
Remove HTG Background
PC User, 12/4/2008
Packaging, Printing and Sterilization
Class 10,000 and Class 100,000 Clean Rooms
PCU30

Remove HTG Background
PC User, 12/4/2008
FDA & cGMP Compliant, ISO Registered
Seal Group Manufacturing Locations
Worldwide – Where You Need Us

North America
United States of America
- Anaheim, CA
- Fontana, CA
- Riverside, CA
- San Diego, CA
- Ventura, CA
- New Britain, CT
- North Haven, CT
- Pembroke Park, FL
- Elgin, IL
- Woodridge, IL
- Goshen, IN
- Ligonier, IN
- Merrillville, IN
- Syracuse, IN
- Lexington, KY
- Woburn, MA
- Gothenburg, NE
- Hudson, NH
- Cranford, NJ
- Millville, NJ
- Fairport, NY
- Marion, NY
- Wilson, NC
- Northwood, OH
- Spartanburg, SC
- Lebanon, TN
- Livingston, TN
- Nacogdoches, TX
- Salt Lake City, UT
- Lynchburg, VA

Canada
- Orillia, ON

Mexico
- Apodaca, Monterrey
- Tijuana, Baja California
- Zapopan, Jalisco
- Matamoros, Tamaulipas
- Mexico City, Federal District

Europe
Belgium
- Boom, Belgium

Czech Republic
- Sadska, Czech Republic

Denmark
- Helsig, Denmark

Finland
- Oulu, Finland

France
- Saint-Ouen l’Aumone

Germany
- Bietigheim-Bissingen, Germany
- Pleidelsheim, Germany

Italy
- Adro (BS), Italy

United Kingdom
- Grantham, United Kingdom
- High Wycombe, United Kingdom

South America
Brazil
- Sao Paulo, Brazil

Asia
China
- Beijing, China
- Dongguan-Guangdong, China
- Shanghai, China
- Shenzhen, China
- Suzhou, China
- Tianjin, China
- Wuxi, China

Hong Kong
- Kowloon, Hong Kong

Southeast Asia
- Singapore

India
- Chennai, Tamil Nadu
The Parker Advantage

• FEA application validation
• Material development
• Design innovation
• Broad range of elastomer capability
• From prototype to production - quickly and cost effectively
• Global footprint
Together we can develop innovative medical devices that continuously improve the quality of our lives.