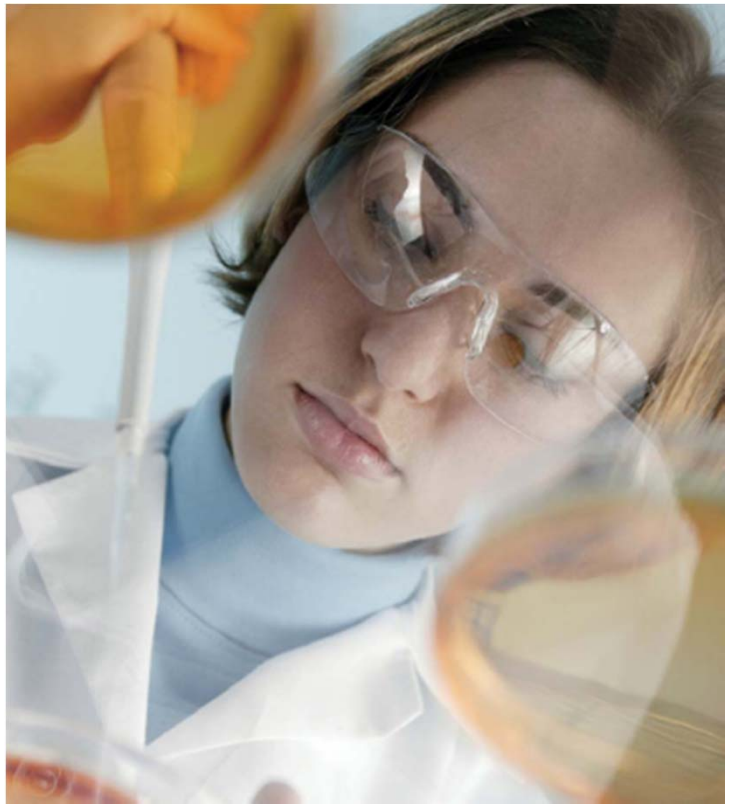
Parker Seal – Life Sciences

Welcome



ENGINEERING YOUR SUCCESS.

March 21, 2012

Agenda

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

Parker Hannifin Operational Groups

Aerospace

Fluid Connectors

Hydraulics

Automation

Climate Controls

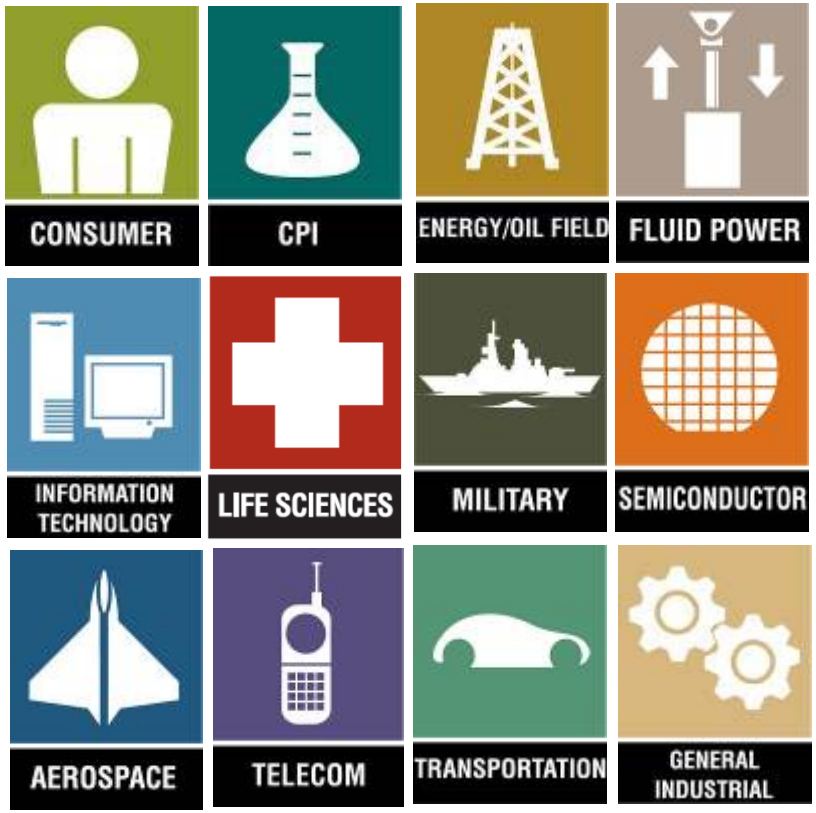
Seal

Filtration

Instrumentation

The Broadest 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.

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Material Development & Engineering

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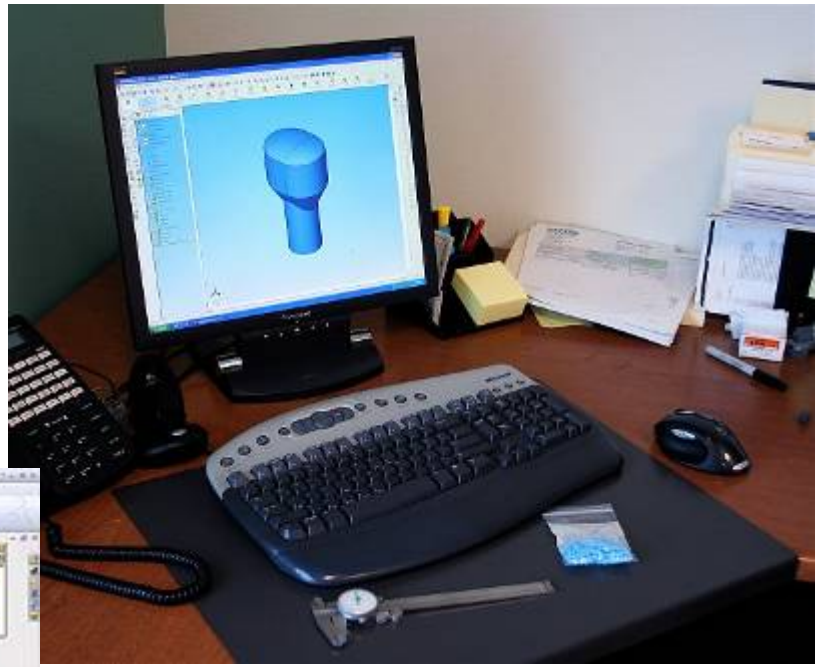
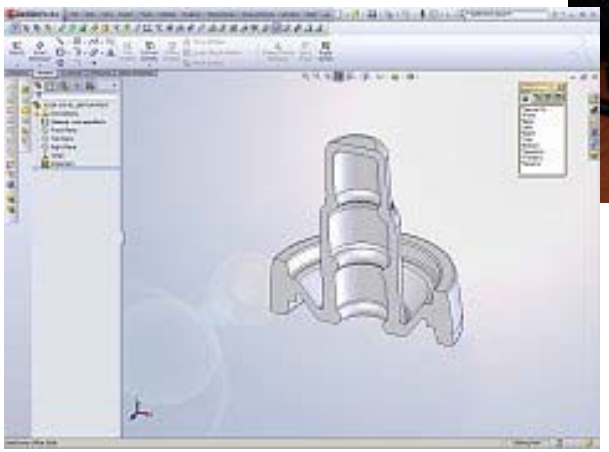
From Concept to Finished Product

- 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,EPMEPR
Flurocarbon	FKM, FPM
Fluorosilicone	FVMQ
Hifluor	FKM
Hydrogenated Nitrile	HNBR, HSN

Liquid Silicone Rubber	LSR
Nylon 6	PA 6
Perfluoroelastomer	FFKM, FFPM
Polyacrylate	ACM
Polyetheretheketone	PEEK
Polytetrafluoroethylene	PTFE
Polyurethane	AU, EU
Silicone	VQM, PVMQ
Tetrafluoroethylene-Propylene (Aflas®)	TFE/P

In-House Compound Testing Lab

ASTM Procedures	Number
Compression Set	D395, D1229
Durometer Hardness Testing and Verification	D2240
Low Temperature Bend and Brittleness Testing	D2137
Ozone Resistance Testing	D1149, D1171
MDR (Moving Die Rheometer) Testing	D2084
Resistance to Liquids	D471
ASTM Tear B and Tear C Testing	D624
Tensile, Elongation and Modulus Testing	D412
Heat Age Testing and Beilstein Testing	D573, D865
Temperature of Retraction	D1329
Demattia Cut Growth Testing (Flex Testing)	D813

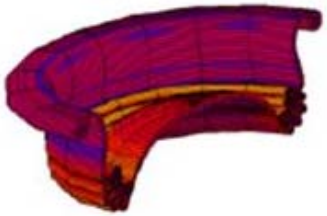
Our laboratory can test to determine whether a compound meets your specification.

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

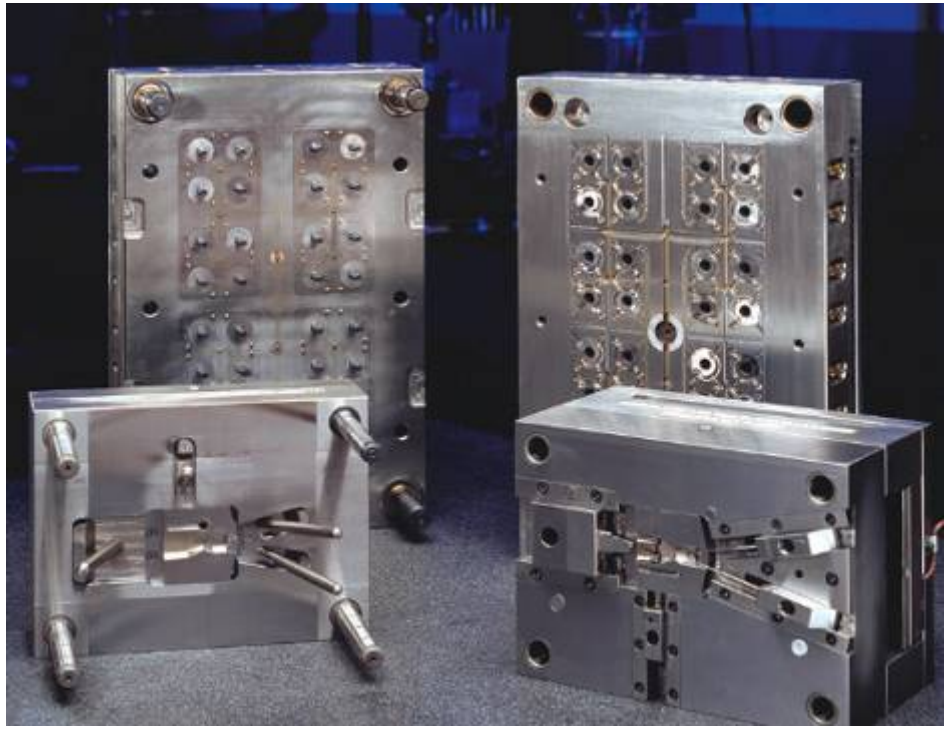
BELLOWS AS MOLDED

PRESSURIZED



INTERNAL VACUUM

Prototype & Production Tooling



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Parker Seal
Product Overviews

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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

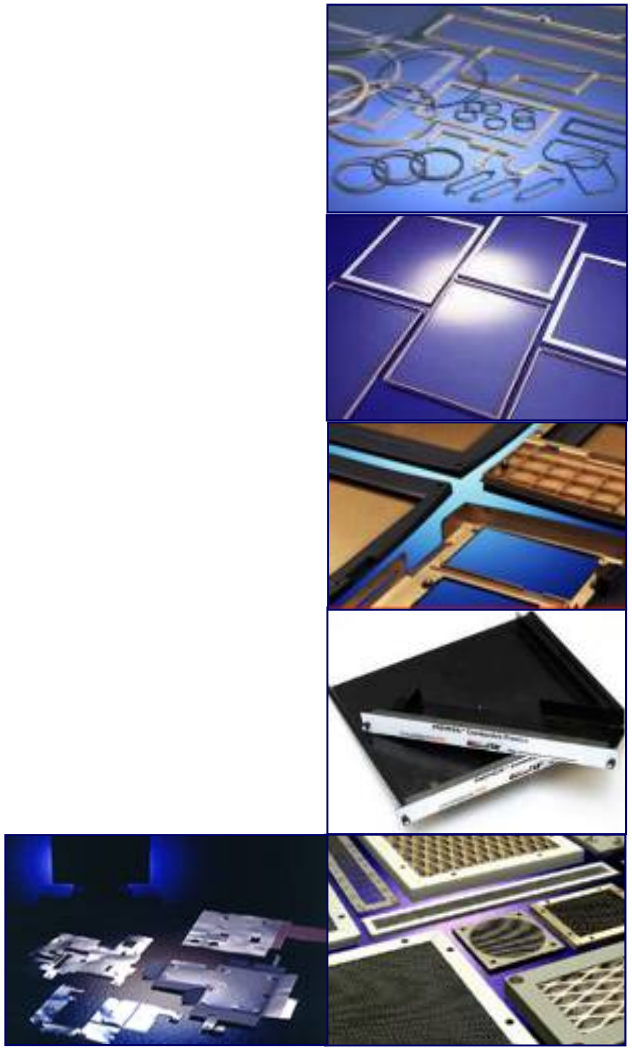
- Small-diameter precision cut seals
- Large diameter lathe cut filter seals
- Custom extruded & spliced seals
- 4-corner, spliced hollow profiles

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

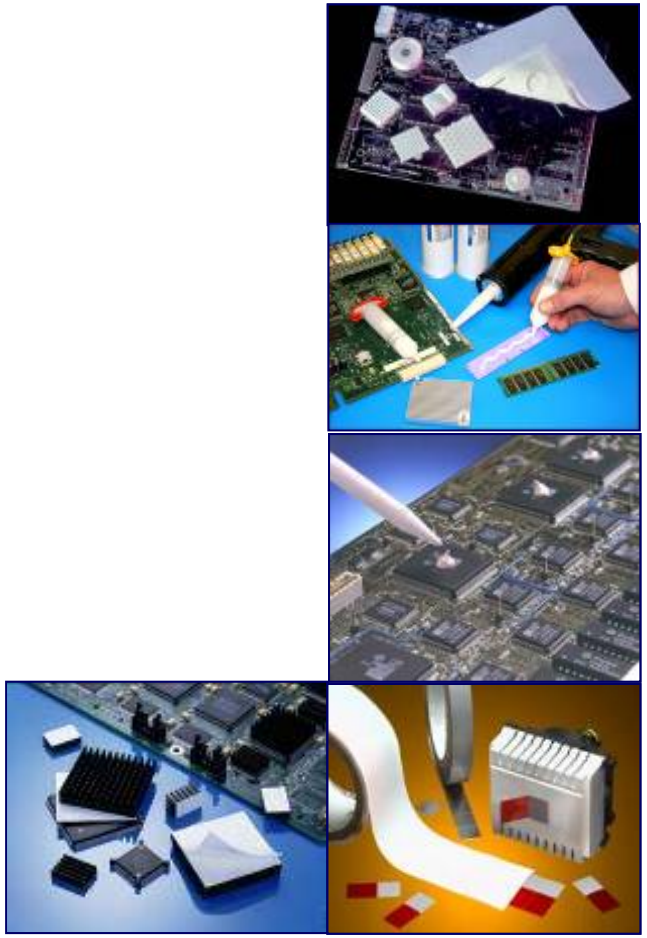
EMI & RF Shielding

- 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:

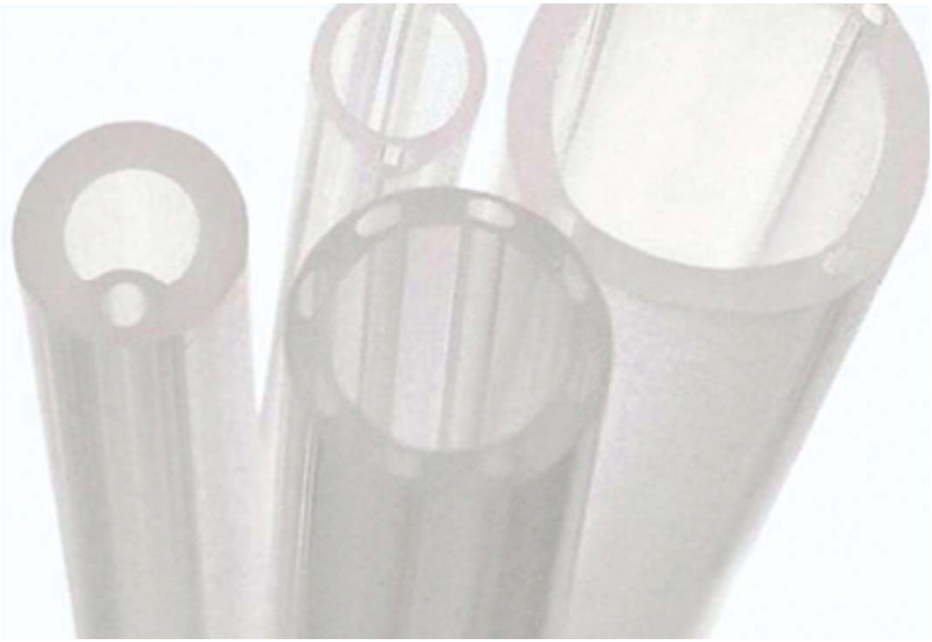
Medical device and instrument assembly
Silicone medical devices
General medical devices
Medical instrumentation
Medical component manufacturing
Liquid silicone molding (LIM)
Silicone extrusions
Thermoplastic & TPE injection molding
Insert and over-molding
Flash-less transfer molding
Organic rubber injection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

Thermoplastic & TPE Injection Molding

Insert and Over-Molding

High Volume Flashless Molding

Organic & Silicone Elastomers



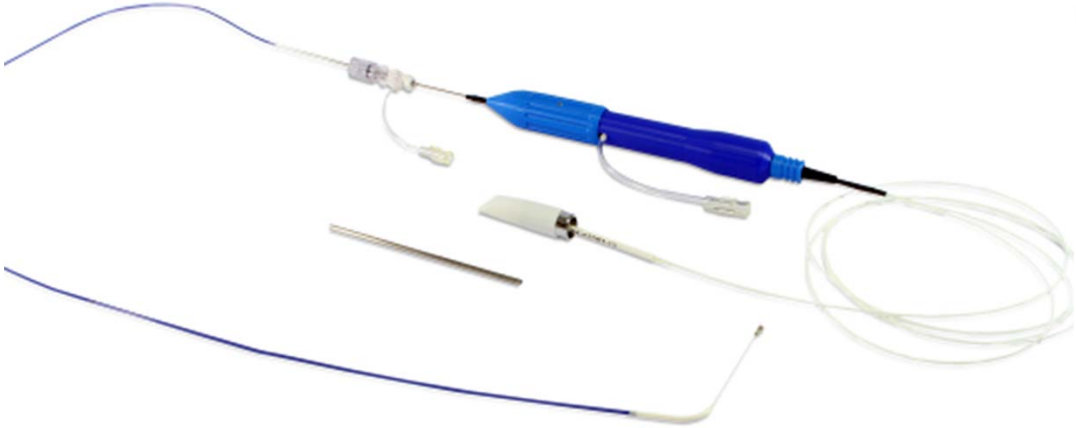
Medical Grade Silicone Extrusions

USP Class VI

Biocompatible Materials

Silicone Medical Device Assembly & Fabrication

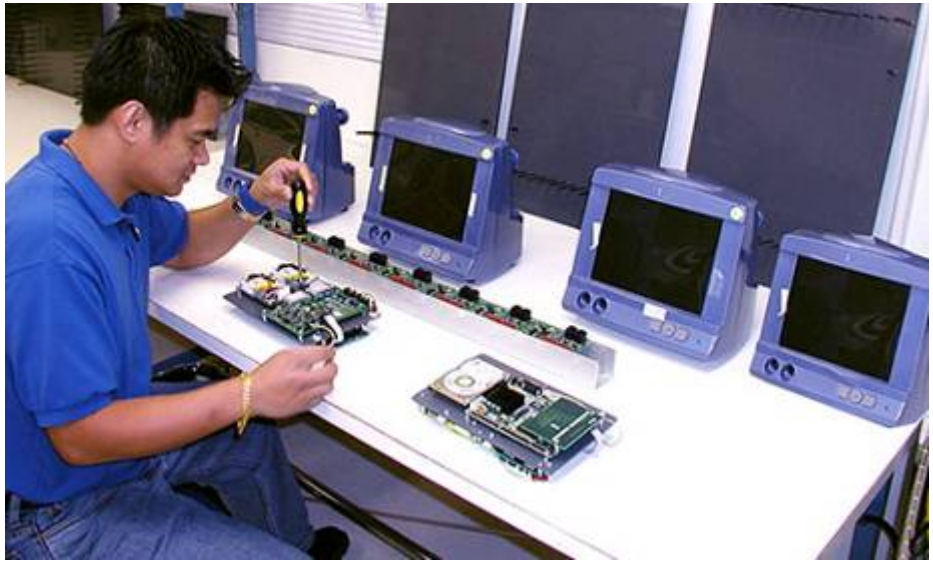
Medical Device Assembly & Fabrication



PCU29

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



Slide 31

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PC User, 12/4/2008

Packaging, Printing and Sterilization

PCI

Class 10,000 and Class 100,000 Clean Rooms

Slide 33

PCU30 Remove HTG Background

PC User, 12/4/2008

FDA & cGMP Compliant, ISO Registered

FDA
cGMP

ISO 9001:2000
ISO 13485
REGISTERED

Parker

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
- Helsigor, 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

Parker Seal - Life Sciences

From concept

to finished product

Together we can develop innovative medical devices that continuously improve the quality of our lives.

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