



FREUDENBERG SEALING TECHNOLOGIES

Aerospace Division Overview

Freudenberg-NOK Sealing Technologies
General Industry
México

Key Figures for the Freudenberg Group



~€ 10.00 bn
Sales in 2021



~47,800
Employees



Global presence
in approx. 60
countries
worldwide



Highly diversified
Group of companies,
some companies with
>€ 1 bn in sales



5.0%
R&D ratio



€ 670 million
Operating profit

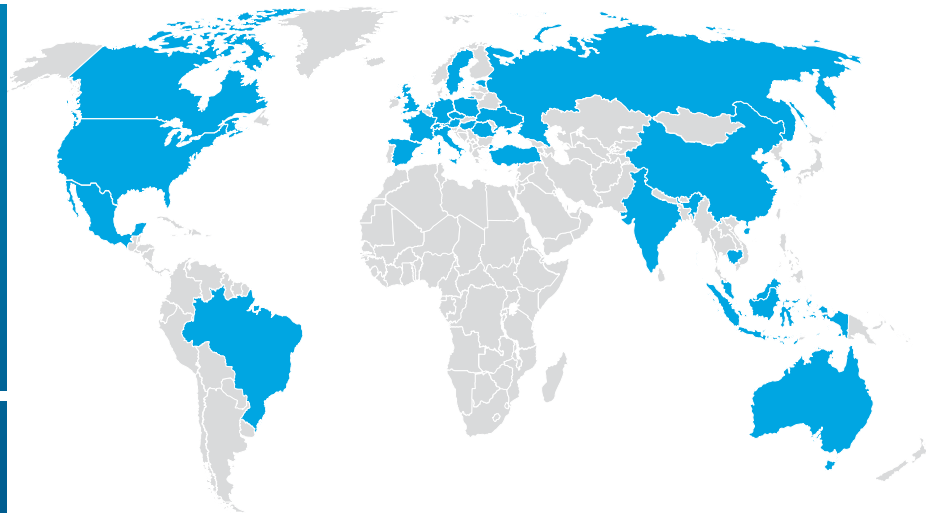


100%
Family owned



Founded by
Carl Johann
Freudenberg
in 1849

A Global Corporation Doing Business on a Regional Basis



FREUDENBERG-NOK SEALING TECHNOLOGIES

- Joint Venture with Nok Corp. (Japan)
- Headquartered in Plymouth, Michigan. (USA)
- More than 20 sites in North and South America.

FREUDENBERG SEALING TECHNOLOGIES

- Headquartered in Weinheim (Germany)
- More than 50 sites across Europe
- More than 20 sites in Asia/Australia

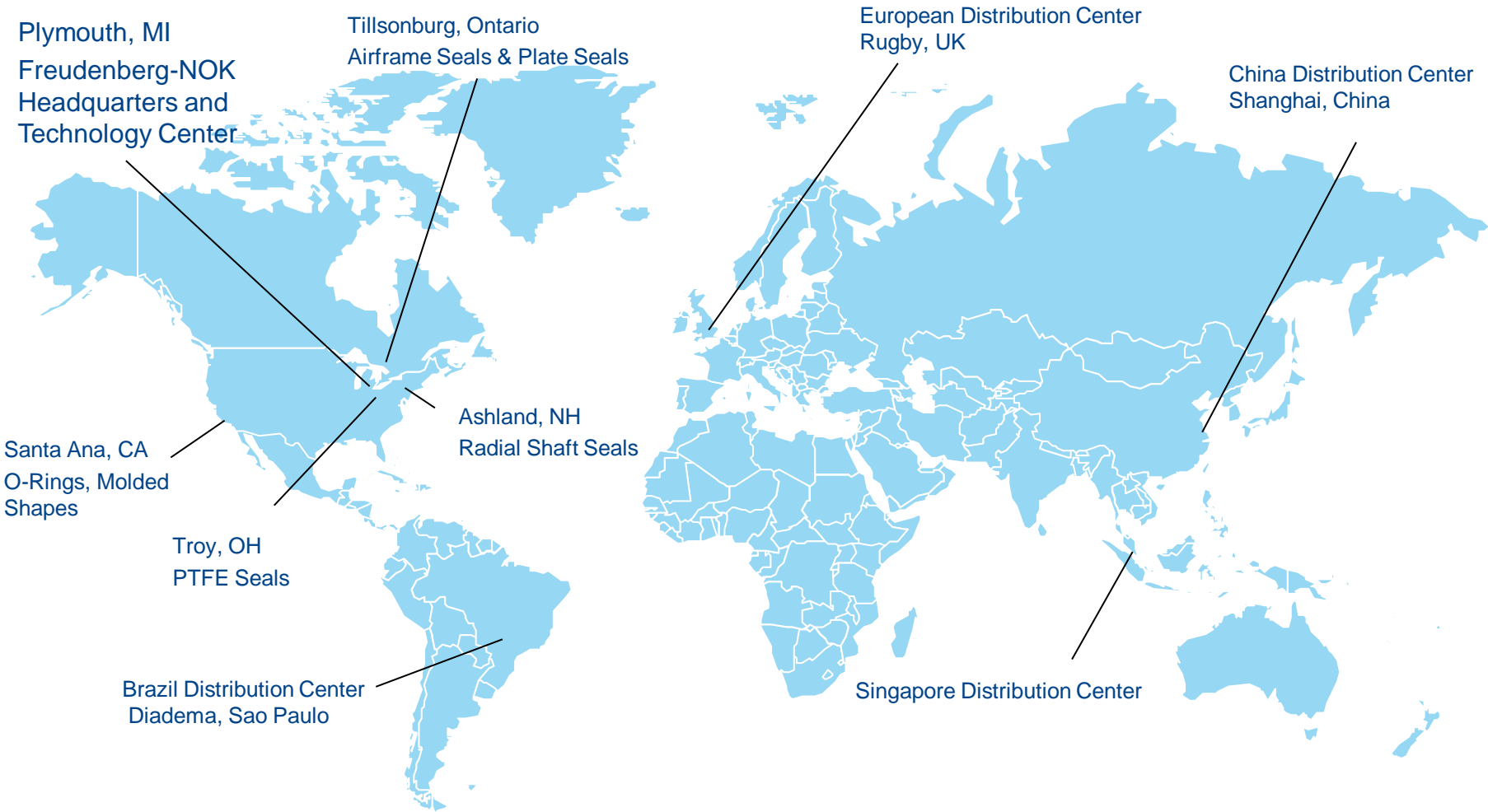
Diverse and Established Partners



Headquarters	Tokyo, Japan	Weinheim, Germany	Plymouth, Michigan USA
Established	1939	1849	1989
Ownership	Publicly Held	Privately Held	Privately Held
Employees	34,000	37,000	4,700

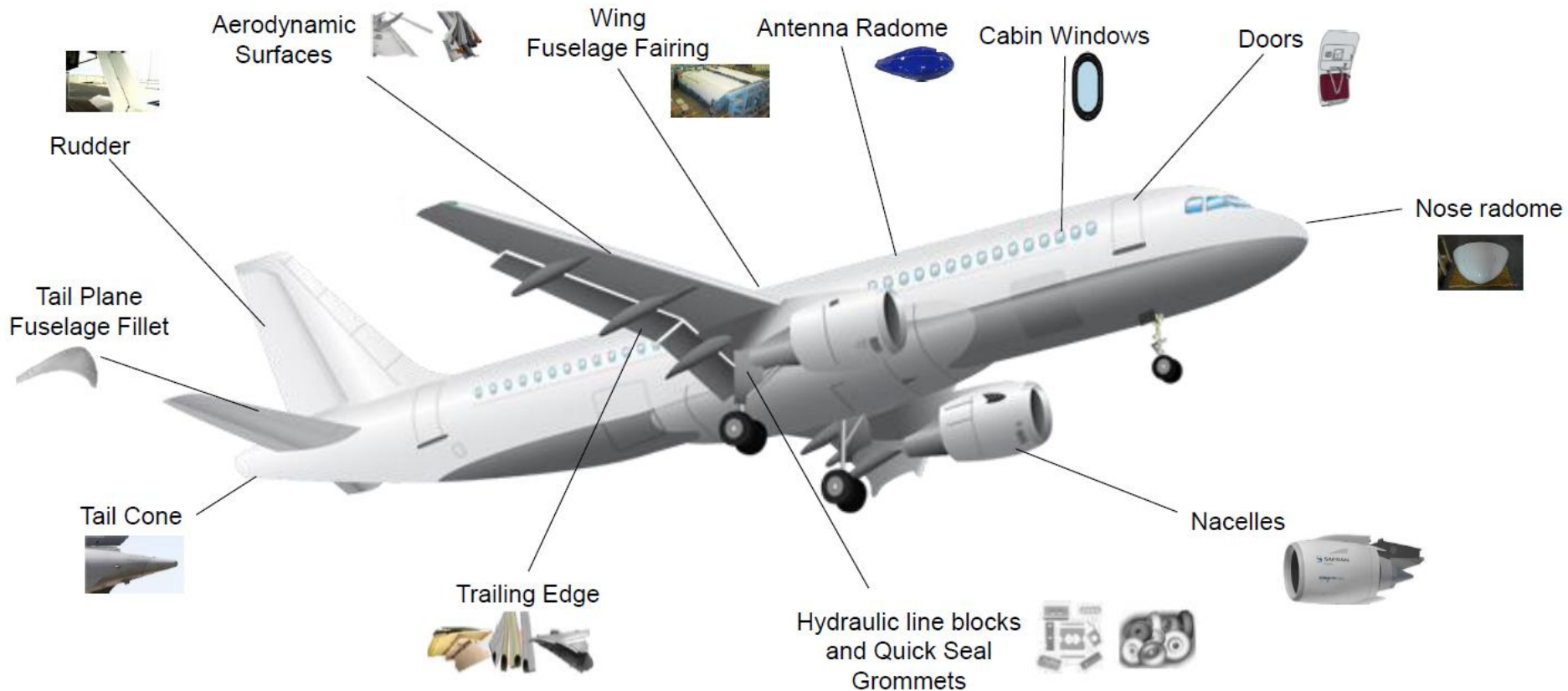
Aerospace, Automotive OEM and Aftermarket, Energy, Chemical, Medical / Pharmaceutical, Power Generation and Transmission, Agriculture, Construction, Fluid Power, Recreational, Electronics and Other Industries

Global Aerospace Business Locations



Aerospace Seal Applications

Key Application Areas of Aerodynamic Seals in an Aircraft

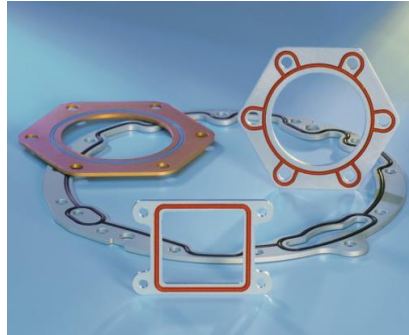


Aerospace Market – Products

O-rings



Plate Seals
and Gaskets



Oil Seals (Simmerring®)



Aerodynamic Airframe
Components



Fire Resistant /
High Temperature



Diaphragms



O-Ring Division

Industry Products: Santa Ana, California



- Established: 1975 (as ISC, acquired by FNGP 1998)
- Plant Size: 39,000 sq. ft.
- Total Employees: Over 170
- Certifications: AS9100, EN9100, Nadcap25, A2LA Lab EASE (European Aerospace Consortium), NSF
- 12,000 active part number, 5,000 tools,
- 65 Mio pieces O-ring/year



Products Manufactured:

- O-Rings
- Molded shapes

Molding Technologies:

- Compression
- Injection

Compounds:

High quality standard and custom seals in:

- Simriz® Perfluoroelastomer
- Fluorocarbon
- EPDM
- Silicon / Fluorosilicone
- NBR / HNBR

Markets Served:

- Aerospace
- Energy
- Processing industry
- Oil & Gas
- Power Engines / Trans.
- and other industries

Oil Seals / Radial Shaft Seals - Simmerring® Industry

Industry Products: Ashland, New Hampshire



- Established: 1999
- Plant Size: 17,000 sq. ft.
- Total Employees: 83
- Certifications: ISO/TS 16949, ISO 9001, ISO 14001
- 11 Mio pieces per year

Products Manufactured:

- Fluid Power
- Aerospace seals
- Pressure seals
- Transmission and powertrain seals
- Radial shaft seals

Molding Technologies:

- Injection molding
- Compression molding
- Finishing

Markets Served:

- Fluid Power
- Aerospace
- Industrial equipment
- Agriculture / Construction
- Recreation (Motorcycle, Marine, Bicycle)
- Heavy-Duty truck
- Automotive

Fluid Power Industry

Industry Products: Troy, Ohio



- Founded in 1980's as PTFE seal producer
- Total Employees: Over 120
- Materials: PTFE (50), PA (20), TPU (8), TPE (5)
- Certifications: ISO9001, ISO/TS 16949, ISO 14001
- Services: Application Engineering

Manufacturing Processes:

■ Primary Processes

- Compression Molding
- Extrusion PTFE Rod
- Injection Molding
- Injection Metal Overmolding
- Precision Net Molding

Markets Served:

- Aerospace
- Automotive
- Industrial
- Agriculture
- Energy
- and other industries

PTFE Products

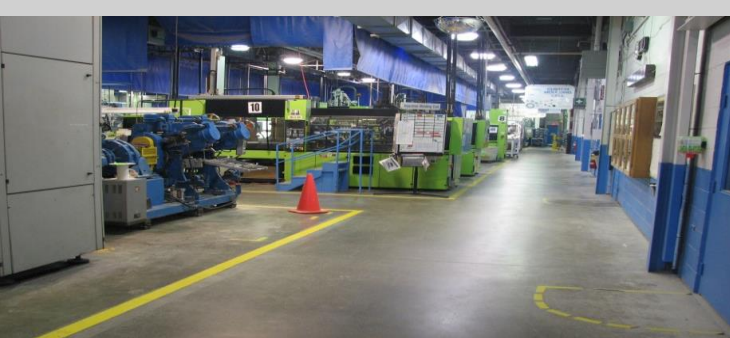
CC Fluid Power Industry

- Banded Pistons
- Piston Banding Washers
- Piston and Rod Seals
- Internal Rotary Seal Rings
- Ball Valve Seals
- Machined Shapes



Precision Low Pressure Industry

Industry Products: Tillsonburg, Ontario, Canada



- Established: 1951, Greenfield in 1976, 60+ years
- Plant Size: 44,000 sq. ft.
- Total Employees: 130
- Certifications: AS9100 Rev C, ISO9001 for design, Nadcap Approved
- 1,200 active part numbers

Products Manufactured:

- Fire seals
- Airframe seals
- Protection products
- Media transfer
- Plate seals and gaskets

Molding Technologies:

- Injection molding
- Compression molding
- Extrusion

Performance

- Quality – 0.6ppm
- OTD – 98.6%

Markets Served:

- Aerospace
- Energy
- Off Road
- Automotive
- Appliance
- Other Industries

Protection Products

Tillsonburg, Ontario, Canada

- We design and manufacture product that are designed to protect components / systems from various external sources including but not limited to abrasion, impact, vibration, electrical, and EMI.
 - Electrical connectors
 - Wire harness insulation
 - Clamp blocks for tubing
 - Avionics EMI hatch seals
 - Fuel igniter grommets
 - Engine vane grommets
 - Silicone tape
 - Boots / bellows



Media Transfer / Sealing Products

Tillsonburg, Ontario, Canada

- Our ability to contain media includes flexible ducting that offers weight and cost savings over metallic offerings. Freudenberg-NOK Sealing Technologies products provide leak-free joins and can carry and seal all type of media from air to fuel.
 - Fuel line shrouds
 - DC generator inlet ducts
 - Ventilation ducting
 - Air inlet screens
 - Transfer tubes
 - Inlet plenum seals
 - Flexible couplings

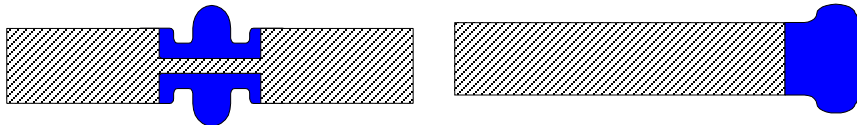


Plate Seals & Gaskets

Tillsonburg, Ontario, Canada

- Products

- NAS1523 Fastener Seals
- Metal/plastic carrier with
 - Groove Molded
 - Edge Molded
- Fluorosilicone, FKM, EPDM, NBR Aerospace materials
- Wide variety of metals



- Applications

- Jet fuel handling systems
- Hydraulic systems
- Turbine lubrication systems
- Electronic controls
- APUs



Often invisible – Always Essential



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