



FREUDENBERG SEALING TECHNOLOGIES

Aerospace Division Overview

Freudenberg-NOK Sealing Technologies
General Industry
México

Key Figures for the Freudenberg Group



~€ 12.00 bn
Sales in 2023



~50,000
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

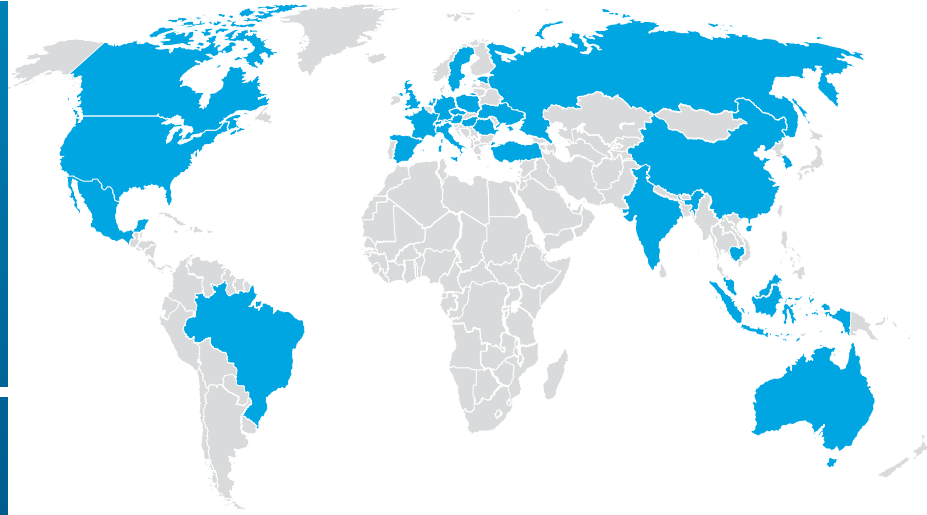


100%
Family owned



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

Freudenberg Sealing Technologies is part of the Global Freudenberg Group



Sealing Technologies

€2.45bn



Vibracoustic

€2.5bn



EagleBurgmann

€0.9bn



Performance Materials

€1.6bn



Medical

€0.3bn



E-Power Systems

€0.08bn



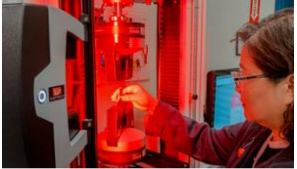
Home & Cleaning Solutions

€1.3bn



Chemical Specialties

€1.45bn



Oil & Gas Technologies

€0.09bn



Filtration Technologies

€0.7bn



Japan Vilene Company

€0.5bn



FREUDENBERG-NOK

Key Figures for Freudenberg Sealing Technologies



€2.45bn
sales in 2022



~13,500
employees



Global footprint
in roughly 60
countries worldwide



>5bn
seals a year or
20 million per day



>1,800
specific material mixtures
and 1,000 raw material
compounds



Production of the
first seals in
1929



One of the biggest
industrial consumers
of rubber (excluding
tire manufacturers)



**Successful
partnerships**
with NOK in North
America and Asia



**Advancing
eMobility**
extensive product portfolio
for the electrified powertrain



3.8%
R&D ratio

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

Freudenberg Sealing Technologies

Aerospace – Division

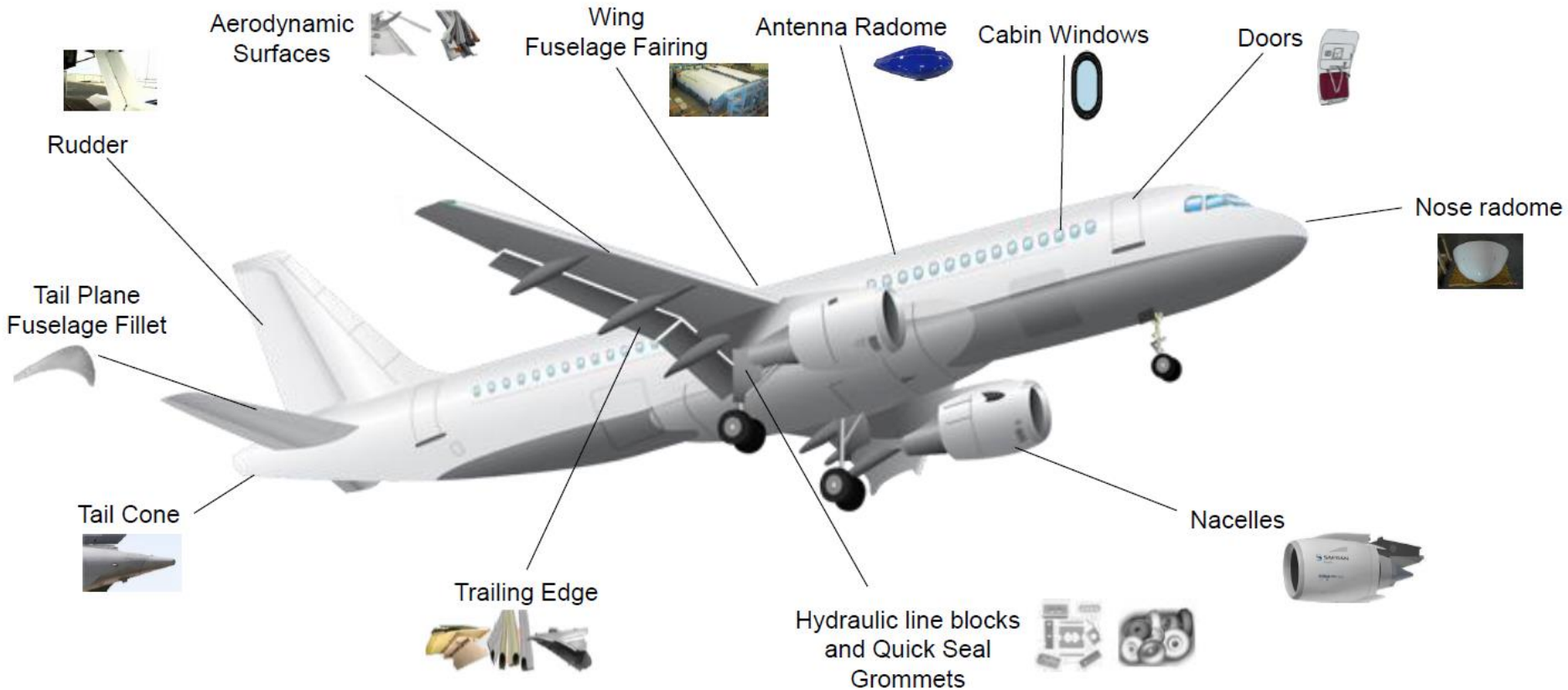
- **Location**
- **Seal Applications**
- **Products**
- **Lead Center / Competence Center**

Global Aerospace Business Locations



Aerospace Seal Applications

Key Application Areas of Aerodynamic Seals in an Aircraft

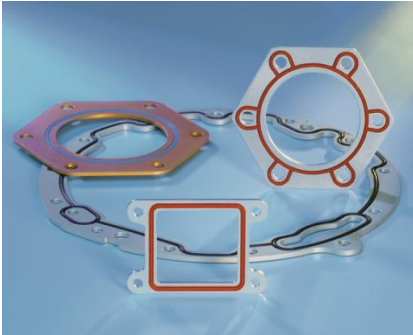


Aerospace Market – Products

O-rings



Plate Seals and Gaskets



Oil Seals (Simmerring®)



Aerodynamic Airframe Components



Fire Resistant / High Temperature



Diaphragms

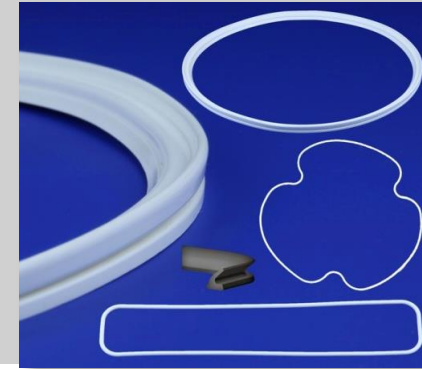


O-Ring Division

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 numbers, 5,000 tools,



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

Fluid Power Industry

Industry Products: Troy, Ohio



- Founded in 1980's as PTFE seal producer
- Total Employees: Over 120
- Materials: PTFE (~70), PA (6), TPU (8), TPE (2)
- Certifications: ISO9001, ISO/TS 16949, ISO 14001, ISO 45001
- Services: Application Engineering

Manufacturing Processes:

■ Primary Processes

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

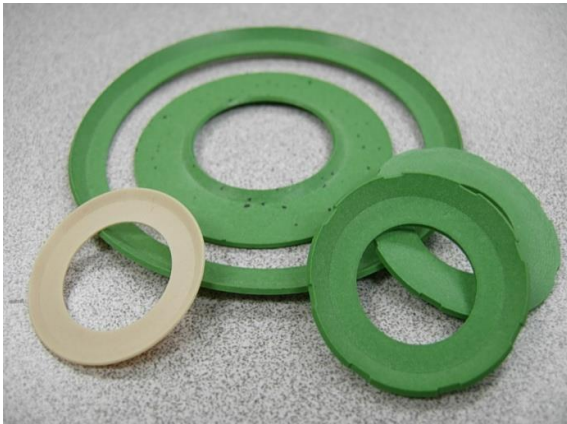
Markets Served:

- 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

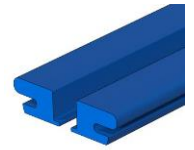
- Quality – 0.6ppm
- OTD – 98.6%

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 joints 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



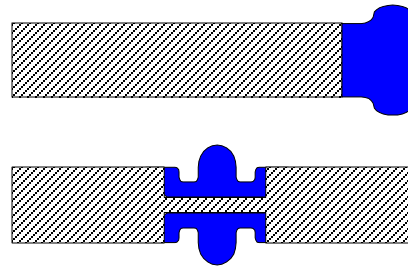
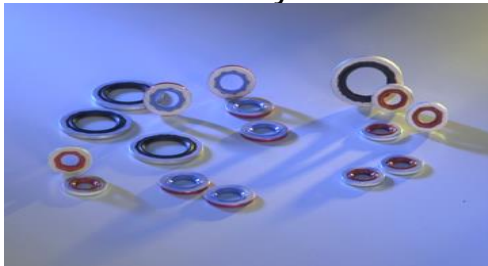
Plate Seals & Gaskets

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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