EagleBurgmann
Division Packings and Gaskets
Agenda

- History of EagleBurgmann packings and gaskets
- Our portfolio
- Packings and gaskets product range
- EagleBurgmann world wide
- Packings and gaskets global production network
- How it works
- Why EagleBurgmann
1884 Feodor Burgmann invented the first machine-braided, self lubricating stuffing box packing

1907 gasket sheets were added to the the product range

During 20th century the product portfolio has been completed with metallic gaskets and engineered products

2004 start of Packing production in Turkey

1999 Start up of Burgmann Packings Cixi, China

Since 2000 several EagleBurgmann Service Centers have been equipped with gasket production cells

Opening of new GasketXpress production plant in Germany in 2011
EagleBurgmann: our portfolio: a comprehensive range of products and services for our customers. Worldwide.

- Mechanical seals for pumps
- for agitators
- for compressors

- Magnetic couplings

- Seal supply systems

- **Compression packings**
- **Gaskets**

- Carbon floating-ring seals

- Expansion joints

- Special products
<table>
<thead>
<tr>
<th>Gaskets</th>
<th>Packings</th>
<th>On-Site Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiber gaskets</td>
<td>Packings</td>
<td>On-Site Service solutions for planned shut downs</td>
</tr>
<tr>
<td>PTFE-gaskets and stripes</td>
<td>Graphite rings and customized sealing solutions</td>
<td>On-Site gasket production</td>
</tr>
<tr>
<td>Graphite gaskets and stripes</td>
<td>Fugitive emission sealing sets and packings (German TA-Luft)</td>
<td>Stock management</td>
</tr>
<tr>
<td>Metallic gaskets</td>
<td>Injectable packings</td>
<td>Consulting &amp; Engineering</td>
</tr>
<tr>
<td></td>
<td>Non-ceramic fiber packings</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cartridge packings</td>
<td></td>
</tr>
</tbody>
</table>
Worldwide presence and proximity to the customer

Subsidiaries: 60
Service Centers: 168
Distributors: 140

Argentina · Australia · Austria · Belarus · Belgium · Bulgaria · Brazil · Canada · Chile · China · Colombia · Cyprus · Czech Republic · Denmark · Ecuador · Egypt · Estonia · Finland · France · Germany · Great Britain · Greece · Hungary · India · Indonesia · Iraq · Israel · Italy · Japan · Jordan · Kazakhstan · Korea · Kuwait · Latvia · Libya · Lithuania · Malaysia · Mauritius · Mexico · Morocco · Myanmar · Netherlands · New Zealand · Nigeria · Norway · Oman · Pakistan · Paraguay · Peru · Philippines · Poland · Qatar · Romania · Russia · Saudi Arabia · Singapore · Slovenia · Slovakian Republic · South Africa · Spain · Sweden · Switzerland · Syria · Taiwan · Thailand · Trinidad and Tobago · Tunisia · Turkey · Turkmenistan · Ukraine · United Arab Emirates · Uruguay · USA · Uzbekistan · Venezuela · Vietnam · www.eagleburgmann.com/world
Packings and gaskets - Globale production network

Ireland
Research and development of engineered packings.

Germany
GasketXpress production for Europe wide demand of e.g. metallic gaskets.
Research and Development of gaskets.

Turkey
Production of graphite rings and packings.

China
Production of metallic gaskets and packings.
Typical Service Center Setup for PG Products
The GasketXpress center Germany serves as a hub for European end users and is combined with a production facility for metallic gaskets

→ To meet short term delivery expectations from European customers
How it works for you – Total customer care

EagleBurgmann
On-Site-Service

Customer Production facility

Local supply of gaskets from close-by Service Center

Customized sealing solutions from GasketXpress Germany

EagleBurgmann Service Center
Goeteborg/ Sweden

GasketXpress production facility
Wolfratshausen/ Germany

Customized production, logistics and engineering of sealing solutions on site
125+ years of experience

Single Sourcing opportunity due to complete product range

60 subsidiaries and more than 250 locations offer a unique global sourcing network

High Quality standard with multiple approvals and certifications

High application and product know-how

On-Site Service for plant shutdowns and T/A’s

High-tech low emission solutions

Decentralized production network ensures fast availability of both standard and special products

On-Site Service and global Service Center network offers maximum support during start-up phase of new plants
Key industries rely on us

Oil & Gas
Pipelines
Refineries
Petrochemical / Chemical
Energy
Pulp & Paper
Pharmaceuticals, Food & Beverage
Water / Sewage
Shipbuilding
Mining
Aerospace
Other
Shareholders

Freudenberg

- A family-owned company
- Our guiding principle: long-term customer satisfaction is more important than short-term profit
- 14 autonomous business units
- Sales € 5.48 billion (2009)
- 34,319 employees (2009)
- Locations in 55 countries
- Business units:
  - Seals & vibration control
  - Nonwovens
  - Household products
  - Specialities and others
- Major shareholder of the NOK Group since 1959

NOK Corp.

- Listed in the 1st section of the Tokyo stock exchange
- Founded 1941 as Japan Bearing Production Company
- Comprised of Eagle Industry Co., Nippon Mektron, NOK Klüber, Neopt and Unimatec Co.
- Sales € 4.31 billion (2010)
- 41,210 employees (2010)
- Locations in 24 countries
- Range of products and services: seals, flexible circuit boards, high temperature resistant acrylate polymers, opto-electronic equipment, release agents and lubricants
Milestones

1884: Company founded in Dresden
Invention of the first machine-braided stuffing box packing

1945: Business re-established by Feodor Burgmann

1951: The company relocates to Wolfratshausen

1962: Development and production of mechanical seals

1964: NOK establishes Nippon Sealon Co. Ltd.

1978: Company renamed Eagle Industry Co., Ltd

1989: Niigata production site established as Eagle Machine Works Co. Ltd.

1941: Foundation of NOK (Japan Bearing Production Company)

1956: NOK Corporation develops the first general-purpose mechanical seal

1964: Foundation of NOK (Japan Bearing Production Company)

1978: Company renamed Eagle Industry Co., Ltd

1989: Niigata production site established as Eagle Machine Works Co. Ltd.

1993: Acquisition of the KE Group, Denmark - market leader in expansion joints

2004: Burgmann taken over by Freudenberg

2005: Acquisition of Elof Hansson Industriekomponenter AB, Sweden and expansion of international footprint

2005: Sales of Burgmann products in Japan

2006: Transition of Eagle Division Mechanical Seals for General Market to EagleBurgmann Japan

2009: KE-Burgmann acquires the American Company EJS
## Product Portfolio

<table>
<thead>
<tr>
<th>Mechanical seals for pumps</th>
<th>Mechanical seals for agitators</th>
<th>Mechanical seals for compressors</th>
<th>Magnetic couplings</th>
<th>Seal supply systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cartridge seals</td>
<td>Dry-running agitator seals</td>
<td>DGS/NF series</td>
<td>MAK series</td>
<td>Quench systems</td>
</tr>
<tr>
<td>Elastomer bellows seals</td>
<td>Liquid-lubricated agitator seals</td>
<td>PDGS high-pressure version</td>
<td>High-efficiency series</td>
<td>Thermosiphon systems</td>
</tr>
<tr>
<td>Component seals</td>
<td>Gas-lubricated agitator seals</td>
<td>MDGS series for screw compressors</td>
<td></td>
<td>Heat exchangers</td>
</tr>
<tr>
<td>Metal bellows seals</td>
<td></td>
<td>TDGS series for steam turbines</td>
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<td>SPO closed-circuit buffer fluid systems</td>
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<td>Carbon ring oil barrier seal CSR/CSE</td>
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<td>SPA open-circuit buffer fluid systems</td>
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<td>CobaSeal® oil barrier seal</td>
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<td>SPN refill units</td>
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<td>Gas supply systems</td>
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<td></td>
<td>RoTech Booster</td>
</tr>
</tbody>
</table>
## Product Portfolio

<table>
<thead>
<tr>
<th>Carbon floating-ring seals</th>
<th>Compression packings</th>
<th>Gaskets</th>
<th>Expansion joints</th>
<th>Special products</th>
</tr>
</thead>
<tbody>
<tr>
<td>WD series (two part housing) and special WD series variants</td>
<td>Universal and engineered stuffing box packing products</td>
<td>Fibre gasket sheet and gaskets</td>
<td>Fabric expansion joints</td>
<td>High-grade metall bellows</td>
</tr>
<tr>
<td>WKA series (chamber version)</td>
<td>Ready-to-install sealing sets</td>
<td>Graphite gasket sheet, gaskets, and tapes</td>
<td>Metal expansion joints</td>
<td>Dynamic and static sealing elements</td>
</tr>
<tr>
<td>Shaft sleeves</td>
<td>Injectable stuffing box packing</td>
<td>Metallic gaskets</td>
<td>Rubber expansion joints</td>
<td>Stern tube and marine seals</td>
</tr>
<tr>
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<td>PTFE gasket sheet, gaskets and sealants</td>
<td></td>
<td>Rotary kiln sealing systems</td>
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<td>High temperature glass fibre gaskets and tapes</td>
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</table>
TotalSealCare – Modular Service

Consulting / Engineering
- Current state analysis
- Standardization
- Recommendations
- Technical standards

Maintenance
- Repair / Maintenance
- Commissioning
- Conversion / refurbishment
- 24/7 service
- Documentation
- Data management

On-Site Service
- Projects on site (e.g. fugitive emissions control)
- Specially equipped service containers
- On-site installation
- Commissioning / standardization

Technical Analysis & Support
- Diagnostics
- Root cause and damage analysis (e.g. material analysis) to increase service life
- Bad actor program

Service Agreements
- e.g. by repair type or fixed fee

Inventory Management
- Optimized, cost-efficient inventory tailored to your needs

Seminars & Training
- A range of modules for groups, individuals or tailored to your specific needs

Consulting / Engineering

Maintenance

On-Site Service

Technical Analysis & Support

Service Agreements

Inventory Management

Seminars & Training
Value selling for refinery projects

End User

- Complete product range
- Local content
- High tech LE solutions
- On-site services

EPC

- Product certification & approvals
- High quality products
- Compliance with specs.

EPC

- High tech. expertise
- Competitive project pricing
- Reliable delivery times

PC

- Performance
- Cost of Products
- Reduced time to quote

Sealing vendor as **High supply chain security & availability**

Sealing vendor as **established global market player**

Sealing vendor as **committed/best-cost project supplier**

Sealing vendor as **trouble-free supply chain partner**
**Situation**

- Application: Reactor Jacket Water Heater
- Pdesign = 45 bar/ Ptest = 68 bar
- Tdesign = 340°C (cycling !)
- Medium = water/steam
- Stud Bolts: 36 x ¾”
- Material: ASTM A193 Grade B7
- Gasket: Kamprofile Gasket (Dim.: 559 x 539 x 3,0mm + 2 x 0,5mm graphite - 4mm total)

**Problem**

- Quick start up from abient to 180°C-220°C. Short cool down period
- Leaking for several years with SWG and (standard) KAM
- Bolt stress : 340N/mm² → 219 Nm

**Solution**

- Maintain process T at 150°C via by-pass steam or
  - Progressively increase/decrease T or
    → bolt stress to 410N/mm² → 265 Nm
- Use ball profile or convex kamprofile
- Live loading (Bellevilles disc springs)
- Thread and load bearing surfaces
- Lubricated
- Use of torque control methods
  → Good Engineering Practise !
Thank you for your attention