

# Rexnord Aerospace Products & Industry Solutions



Customer-focused  
Solutions.

Reliable Performance.

Trusted Brands.



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# Keeping Aerospace Applications Moving

For more than 60 years, Rexnord has provided quality bearings, seals, electrical components, and gear services for use in the aerospace industry all over the world to original equipment manufacturers (OEMs). As the premier leader in the supply of highly engineered specialty bearings and mechanical seals, Rexnord products can be found in every aspect of the aerospace industry, from engine systems and flight controls to landing gear and aircraft structures. Whether it's the rudder of a plane or a landing gear, Rexnord Aerospace products help provide a smooth operation.

With dedicated production facilities, Rexnord provides global availability of products and services to meet your schedule. Our sales professionals provide support when you need it and offer solutions tailored to your specifications. Altogether, the Rexnord team delivers on our promises to provide the lowest total cost of ownership and valuable expertise solutions that enhance your ease of doing business with us.

Our goal is to consistently **create superior value** for our customers, shareholders and associates.



Aircraft Engines & Auxiliary Power Units (APUs)



Aircraft Gearboxes



Aircraft Doors



Airframe Structures



Flight Control Systems



Landing Gears

Visit [www.rexnord.com](http://www.rexnord.com) to learn more about our aerospace expertise.

## Rexnord Innovation Center

The Rexnord Innovation Center is a third party, independent accredited laboratory that delivers advanced technology, innovative thinking and breakthrough research to improve productivity and efficiency for aerospace industry clients around the world. With more than 40 years of aerospace component testing experience, the Rexnord Innovation Center knows what it takes to qualify parts under the stringent requirements needed for approval. That's why customers turn to the Rexnord Innovation Center for testing, including fatigue testing, component qualification testing, vibration testing of in-flight electronic entertainment modules, and more.

Call 414-643-3067 or email [innovationcenter@rexnord.com](mailto:innovationcenter@rexnord.com) for more information.



### Applications

Environmental Chamber Testing of Various Airframe Components

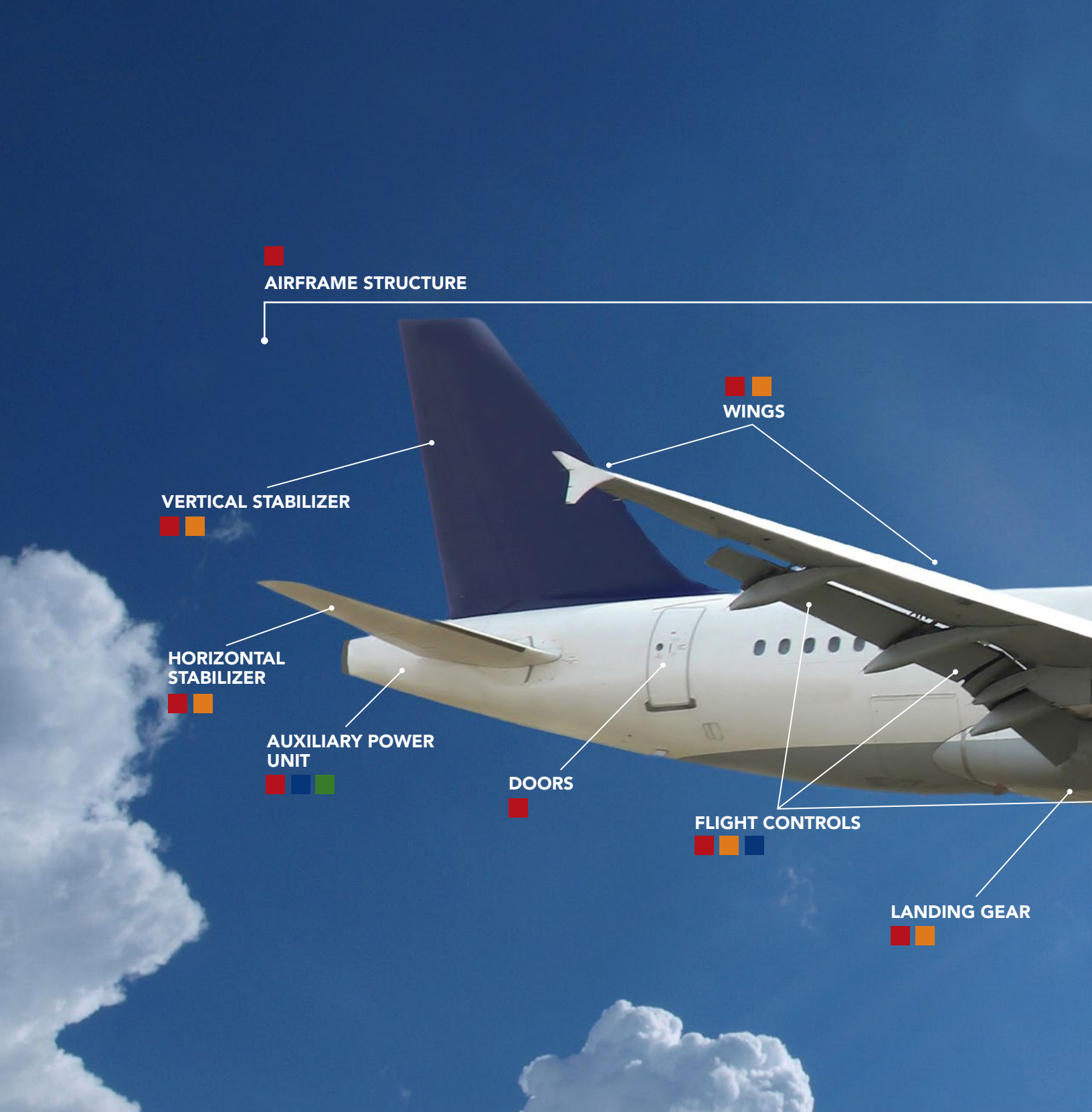
Flight Control Surface Bearings

Flight Spectrum Component Endurance Testing

Landing Gear Components

Track Roller Bearings

Vibration Testing of Electronic Components Per RCTA DO-160E



AIRFRAME STRUCTURE

WINGS

VERTICAL STABILIZER

HORIZONTAL STABILIZER

AUXILIARY POWER UNIT


DOORS

FLIGHT CONTROLS

LANDING GEAR

## Bearings

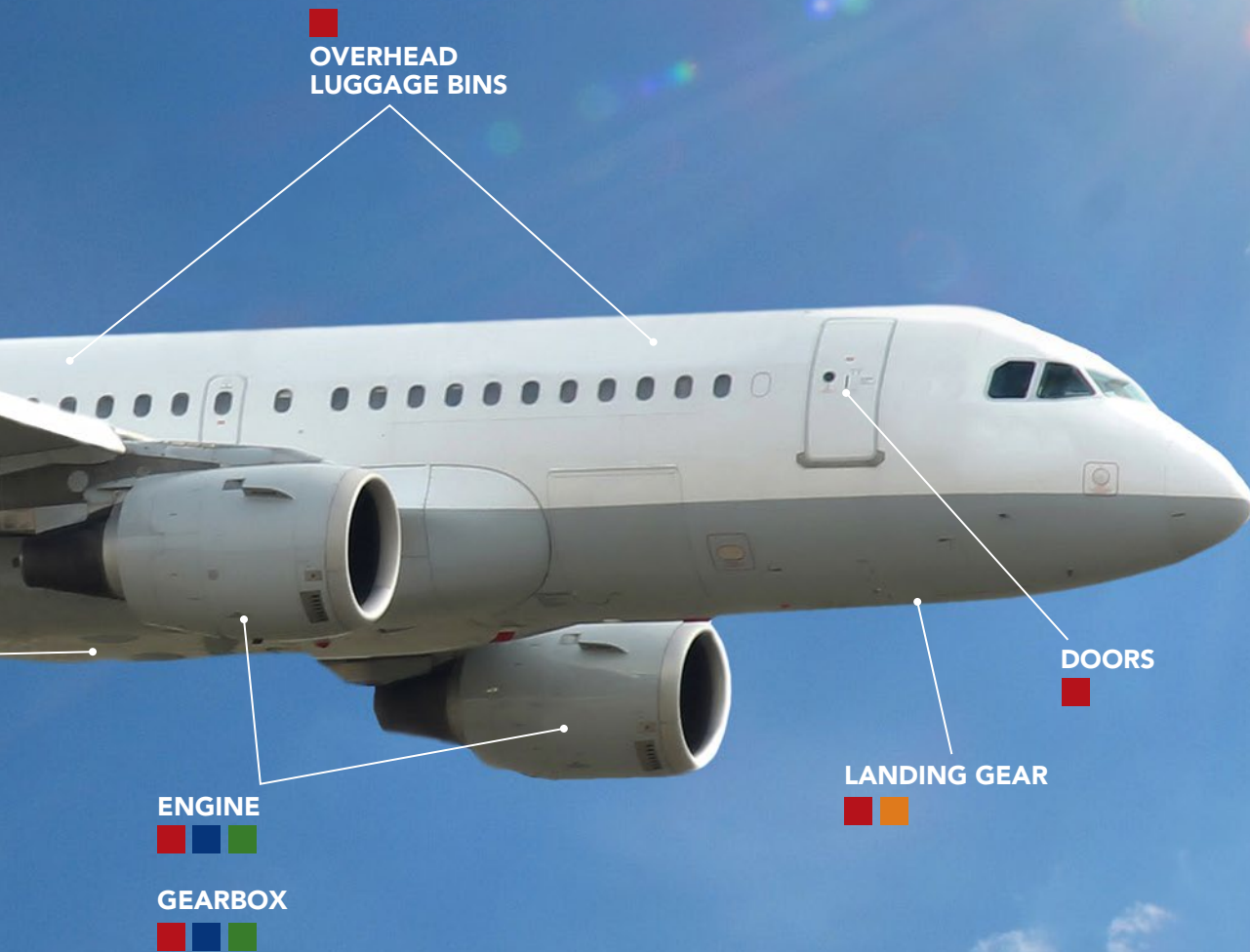


 Rexnord PSI Aerospace Plain Bearings



 Rexnord Shafer Aerospace Roller Bearings

# Rexnord Aerospace Application Examples Map



Map shows typical aircraft applications for the Rexnord Aerospace offering.

## Gears



**Rexnord Aerospace Gear Capabilities and Services (Micro Precision and Precision Gear brands)**

## Seals



**Rexnord Cartriseal Aerospace Seals**



# Rexnord PSI Aerospace Plain Bearings

Engineered bearing solutions through technology and design enhancement

## Applications

- Airframes
- Landing Gear
- Military, Fixed and Rotary Wing Aerospace Vehicles
- Power Plants

For decades, Rexnord Aerospace has engineered Rexnord PSI Aerospace Plain Bearing solutions for customers' application needs. By continually enhancing the technology and design of our bearings, we are able to apply innovation to challenging, new and existing applications. Every bearing is the result of advanced computer-aided design, exhaustive and comprehensive in-house testing, and state-of-the-art manufacturing methods. Our focus on technology allows us to meet unique requirements with high-quality products at reasonable costs.

## Preferred by OEMs

Rexnord PSI Aerospace Plain Bearings are preferred by OEMs because they offer features that make them ideal for bearings requiring high vibration and dithering motion:

- Reduced bearing weight
- Wide temperature range
- Broad range of material, configuration and fit offerings
- Increased bearing stiffness
- Extended service life (due to ball/race conformity)
- "On-wing" replacement (with only ball and pin removal)
- Corrosion resistance

## Rexnord PSI Aerospace Slotted-entry Plain Bearings



- Unique two-piece design features a ball (inner ring) that has a spherical race to accommodate misalignment
- Outer ring/rod end has an entry window to allow insertion or removal of the ball
- Balls are fitted to the outer member after all manufacturing operations are completed, yielding a higher-strength outer race than formed designs
- Easy replacement without removing the entire assembly on the aircraft

REXNORD  
PSI



### Rexnord PSI Aerospace Split-ball Plain Bearings

- Axial separation of the ball into two halves allows individual halves to be inserted axially into the outer race
- Rotated into alignment within the outer race eliminates the need for a ball-entry window
- Manufacturing expertise and precise machine control ensures exact matching of ball halves
- Ball sphericity and uniform final assembly clearance are maintained to ensure the design functions properly in your application



### Rexnord PSI Aerospace Split-race Plain Bearings

- Axial separation of the outer race eliminates the need for the ball entry window found in the slotted entry design
- Manufacturing expertise and precise machine control ensures exact matching of outer race halves to retain the sphericity required and allow the bearing design to function properly (for example, accept ball motion and ball misalignment)
- Ball and race conformity provides increased bearing stiffness and extended service life
- Ideal for extra wide or neck balls that require repairable design through ball replacement and "on-wing" replacement (with only ball and pin removal)





# Rexnord PSI Aerospace Rexlon 2000 Self-Lubricating Liner Material

Durable protection of your bearing surface areas

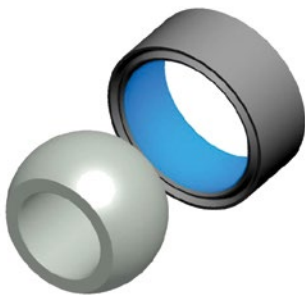
To protect your surface areas, such as bearings and other load-carrying moving components, from corrosion, fretting, galling, and wear, we offer two types of Rexlon 2000 Self-Lubricating Liner Material coatings — Rexlon 2000 LF and Rexlon 2000 Type III. Both coatings are fully machinable, provide minimal wear at high loads, and can be applied to irregular shapes and most materials. Additionally, the coatings feature low friction at cold temperatures and exceed the performance requirements of current military application specifications.

## Rexlon 2000 Type III Applications

- |                |                               |
|----------------|-------------------------------|
| Airframe       | Industrial Machinery          |
| Jet Engines    | Railroads                     |
| Landing Gear   | Off-Road Vehicles             |
| Cargo Handling | Exercise and Leisure Products |
| Energy Systems |                               |
| Marine         |                               |

## Rexlon 2000 LF Applications

- Airframe
- Cargo Rollers
- Energy Systems
- Thrust Bearings



### Rexlon 2000 Type III

Rexlon 2000 Type III can be applied to most metallic and some non metallic surfaces of varying shapes due to its ability to be sprayed or molded, providing an excellent bearing surface for complex surface profiles. It is machineable and honeable after application for ultimate customization and pin-to-wear surface fit.



### Rexlon 2000 LF

Rexlon 2000 LF is ideal for surface areas requiring low friction and wear. It provides excellent wear properties at low temperature for track rollers, hinge pins, cruciforms, and other load-carrying moving components requiring low friction and wear.



# Rexnord Shafer Aerospace Roller Bearings

Delivering trusted roller bearing designs for demanding applications

For more than 60 years, Rexnord Aerospace has served manufacturers for commercial and military aerospace sectors with the Rexnord Shafer Aerospace Roller Bearings and Tools offering. Through extensive engineering analysis, innovative design, state-of-the-art manufacturing, and total product lifecycle support, customers rely on Rexnord Shafer Aerospace Roller Bearings for extreme performance under severe operating conditions.

**Customers count on our complete offering of Rexnord Shafer Aerospace Roller Bearings for a range of advantages:**

- **Rolling friction of 1–2 percent provides minimal wear rates** for predicted life and lower moment loading
- **Precessing prevents fretting damage** and provides longer bearing life
- **Internal self-alignment accommodates misalignment** at installation and in use, and reduces bearing size
- **Design allows for relubrication** to ensure longer bearing life and inhibit corrosion
- **High load capacity** reduces bearing size and weight
- **Radial and axial load-carrying capabilities** accommodate more application conditions
- **Minimal initial clearance** minimizes system backlash and can be preloaded
- **Stainless steel bearings available** to provide superior corrosion resistance
- **Double row bearing with center guide ring provides an average of 20–25 percent higher load capabilities** (both static and dynamic) within the same envelope, allowing growth of airframe while retaining current sizes
- **Integral rod ends** allow an engineer to design within a space-restricted envelope

## Applications

Airframe Structures (Hinge and Control Rods)  
Door Systems  
Flight Controls  
Landing Gear  
Specialty Industrial Machinery and Race Car Suspensions



## Rexnord Shafer Aerospace Rod End Roller Bearings



### Features and benefits

- Ideal for flight control systems — including actuators and linkages — and door systems
- Provide high load-carrying capacity and low friction even under substantial misalignment
- Offer customized designs to meet a wide range of operating conditions and applications
- Broad range of physical mounting configurations, shapes and internal design variations
- Bore sizes range up to 10 inches (254 millimeters)
- Several rod end bearing styles are available for your application, including single row and double row — double row styles are available with standard retainer, standard precessing retainer, our patented precessing center guide ring, and full-complement precessing bearing

### Theory of operation

Rexnord Shafer Aerospace Rod End Roller Bearings are comprised of an inner ring, a roller complement and a rod-end body. These components contact each other via spherical raceways that allow the bearing to operate in a misaligned condition without detriment to its expected performance. These robust components combine to transfer high radial and axial loads between a pin/shaft and linkage. A retainer guides the roller complement in a rotational direction, causing it to rotate around even when the bearing is operating in oscillatory motion. This precessing action eliminates wear because the rollers do not stay in one position on the bearing raceways. In combination with a lubricant, seals and shields, the bearing operates with low friction (torque), low wear and long life.

## Rexnord Shafer Aerospace Annular Roller Bearings



### Features and benefits

- Ideal for flight control systems — including actuators, hinge lines, linkages and torque tubes — and landing gear and door systems
- Provide high load-carrying capacity and low friction even under substantial misalignment
- Several annular bearing styles are available for your application, including single row and double row — torque tube configurations are available in both styles or can be made with a swageable outer ring; double row styles are available with standard retainer, standard precessing retainer, our patented precessing center guide ring, and full complement precessing bearing

### Theory of operation

Rexnord Shafer Aerospace Annular Roller Bearings are comprised of an inner ring, a roller complement and an outer ring. These components contact each other via spherical raceways that allow the bearing to operate in a misaligned condition without detriment to its expected performance. These robust components combine to transfer high radial and axial loads between a pin/shaft and housing. A retainer guides the roller complement in a rotational direction, causing it to rotate around even when the bearing is operating in oscillatory motion. This precessing action eliminates wear because the rollers do not stay in one position on the bearing raceways. In combination with a lubricant, seals and shields, the bearing operates with low friction (torque), low wear and long life.



## Rexnord Shafer Aerospace Roller Bearing Installation and Removal Tools

Buying high-quality bearings is the first step toward achieving complete satisfaction for bearing applications. Proper installation is a critical step that allows a bearing's full design capabilities to be converted into the expected performance desired by the end user. That's why we offer a complete installation, swaging and bearing removal offering to our customers. Our extensive experience in bearing installation and removal tooling design and application makes us uniquely qualified to meet all of your installation, swaging and bearing removal needs.



### Features and benefits

- Designed for use in all Rexnord Shafer Aerospace Roller Bearing installation applications
- Simplicity of operation under complete operator control
- Easy to use with readily available shop equipment, fits standard drill press
- Minimal effect on outer ring size, bearing internal free play and bearing torque
- Ensures uniform swaging around the entire bearing circumference
- Repeatable swaging quality
- Specified by all major airframe manufacturers
- Standard series of Rexnord Tri-Roller Swaging Tools is available for all Mil-Spec bearings
- Can be custom designed to fit your specific bearing installation needs
- Swage all MIL Spec-grooved series, Polytetrafluoroethylene (PTFE), and metal-to-metal bearings, as well as Rexnord Roller Bearings
- Special installation tools available for almost any grooved bearing configuration





## Rexnord Cartriseal Aerospace Seals

High-quality seal designs for optimum leak protection

Since 1946, Rexnord Aerospace has designed high-quality seals for a range of aerospace and industrial applications, and are designed to provide optimum leak protection in many operating environments. In fact, our engineers design optimum solutions for some of the most complex operating parameters. Count on Rexnord Cartriseal Aerospace Seal designs to provide outstanding performance, significant customer value and long life.

### Applications

APUs	Industrial Turbines
Environmental Control Systems	Pumps and Compressors
Gas Turbine Engines	Rockets and Weapon Systems
Gearboxes and Accessories	Turbine Main Shafts
Hydraulic Power Systems	Other Rotating Components

### Rexnord Cartriseal Aerospace Face Seals

#### Features and benefits



- Ideal for providing virtually leakage-free operations
- Compact design minimizes weight and space requirements
- Versatile design allows for customization
- Repairable design to reduce overall lifecycle costs
- Wide operating ranges allows standardization of seal types
- Integral design options to reduce part count and weight
- Interchangeable liftoff sealing technology accommodates product upgrades within the same space
- Broad offering of mating ring material and mounting options are available to meet the demands of specialized operating conditions and ensure the optimum performance of the seal assembly
- Can be designed to be tamper-resistant or repairable

#### Theory of operation

Each of our face seal solutions has two components — one unit that remains stationary and one that rotates with a shaft. When the two parts mate, they form a seal or interface. Typically, the interface has one soft face with self-lubricating qualities, such as carbon graphite or bearing bronze, and a hard face of heat-treated steel or an equivalent surface. Satisfactory performance is made possible by separating the two faces with a lubricating film (normally one micron or less in thickness), and controlled mechanically to suit the permissible leakage rate and desired life of the seal. With precision analysis, we optimize various forces to achieve the desired balance between low leakage and long life for each application.

## Rexnord Cartriseal Aerospace Circumferential Seals

### Features and benefits

- Ideal for sealing cryogenics and hot gases from bearings
- Minimal leakage in an exceptionally large range of temperatures: -400 to 1,600 degrees Fahrenheit (F) (-240 to 871 C)
- Metallic retaining ring controls carbon thermal expansion rate to match the shafting, and ensures low leakage during full range of temperature
- Compact construction and design provides high-quality seal performance when space is limited, and minimizes weight and space requirements
- Spring-loaded designs provide a positive sealing barrier during static conditions
- Broad offering of material options are available to meet the demands of specialized operating conditions
- Versatile design allows for a wide range of variations and customization
- Available in single, multiple and fractured ring options
- Precisely assembled segmented carbon elements accommodate axial shaft movement
- High-temperature capacity allows for a wide application range
- Repairable design reduces overall lifecycle costs



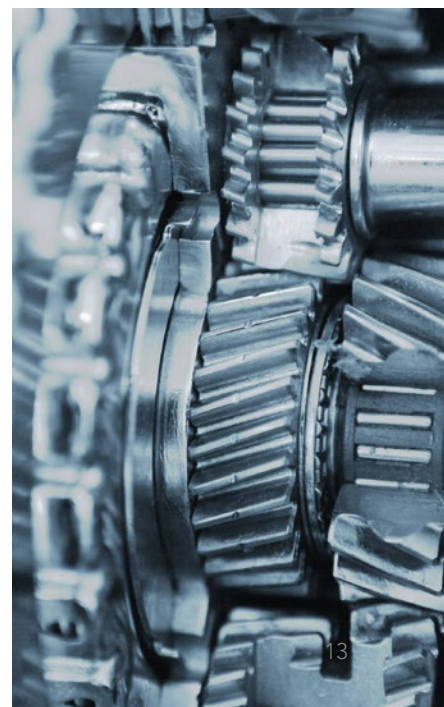
### Theory of operation

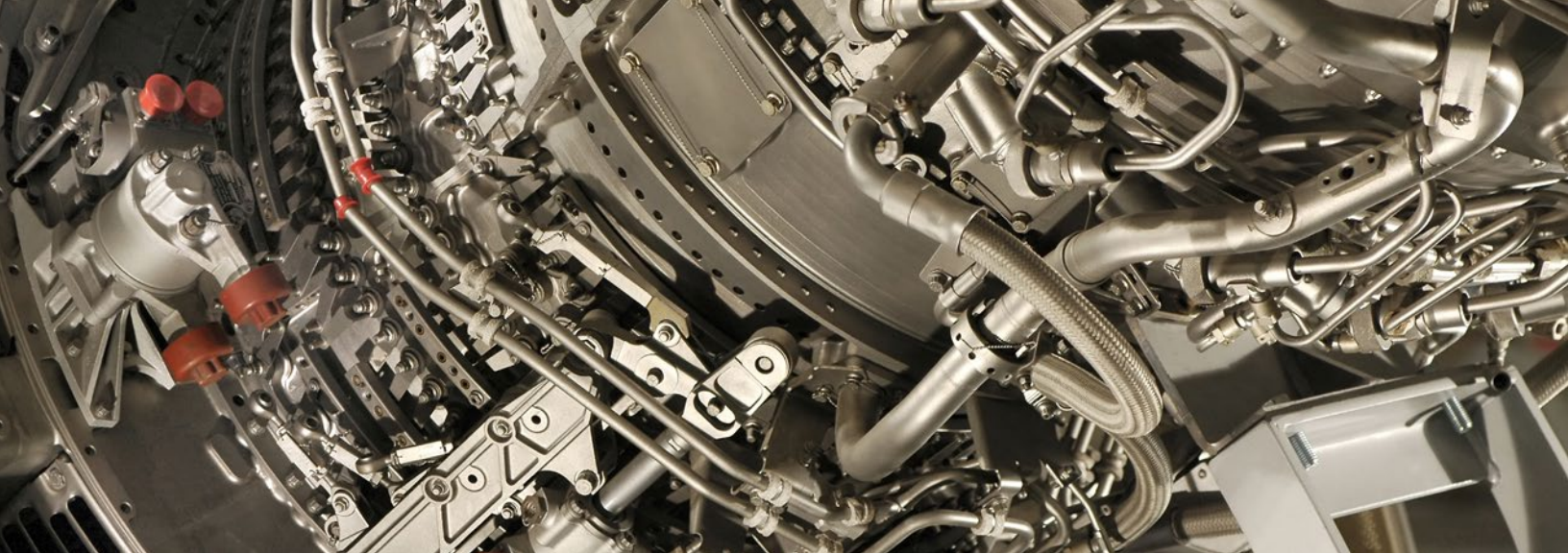
**Rexnord Cartriseal Aerospace Controlled Gap Seals** are designed with a carbon insert encased in a metal retaining band. The assembly of these two parts, commonly referred to as the labyrinth ring assembly, is designed to match the thermal and centrifugal growth of the shaft or sleeve being sealed. As the temperature rises, the floating carbon ring assembly expands at a rate similar to that of a shaft or sleeve.

The pressure drop between the lateral sealing faces provides the closing force needed to maintain contact between the carbon and the mating surface under dynamic conditions, while a wave spring is used to maintain face contact during static conditions. For high-pressure applications, the labyrinth ring assembly is pressure balanced to reduce the face pressure and allow close dynamic tracking.

To ensure the lowest possible leakage, our engineers conduct a computer-aided analysis to determine the optimum clearance and thermal expansion between the labyrinth ring assembly and the shaft, stress and centrifugal growth of the labyrinth ring assembly, labyrinth ring stability, and thermal gradients in the seal.

**Rexnord Cartriseal Aerospace Segmented Seals** are comprised of a number of jointed segments forming a ring. The segments are held together radially by a garter spring, with axial force provided by multiple coil springs or wave springs. Driven pins engaged with notches or slots on each segment prevent rotation. With precision analysis, our engineers optimize various forces to achieve the desired balance between low leakage and long life for each individual application. Our seals can also be designed to be tamper resistant or repairable.





## Rexnord Aerospace Maintenance and Repair

Committed to providing outstanding customer service for Rexnord PSI and Shafer Aerospace Bearings and Rexnord Cartriseal Aerospace Seals

Choose Rexnord Aerospace Maintenance and Repair for:

Repair Services

PMA Products

Quality Without Compromise

At the end of the day, our technical expertise doesn't mean anything if our customers are not getting the service they need to be successful. At Rexnord Aerospace, we are committed to having the same focus and energy on customer service as we have on our vast technical knowledge of bearings and seals. Our mission is to take care of our customers no matter what, when or where in the world they operate. In fact, as a result of our proven history of supplying specialty bearings and mechanical seals to the aviation market, the world's leading aviation companies rely on our quality, durability and reliability in demanding applications.

### Features and benefits

- Technical support and customer service every day of the year
- Availability of AOG part support and rotatable pools of both PMA and repair parts
- Engineering support readily available for urgent customer needs that require further analysis
- Provide quality without compromise — we are an FAA-approved





# Rexnord Aerospace Gear Manufacturing Service Capabilities

Complete custom manufacturing service capabilities for your aerospace gear applications

For decades, OEMs within the commercial, defense and general aviation industries have depended on Rexnord Aerospace Gear Manufacturing Service Capabilities for a wide range of gears through our Micro Precision and Precision Gear brands. With a focus on continuous improvement, our excellence in engineering and manufacturing allows us to consistently provide high-quality services and customized parts to our customers.

## Applications

- APUs
- Engines
- Flight Controls
- Fuel Pumps
- Gearboxes
- Horizontal Stabilizers
- Landing Gear
- Safety Shutoffs
- Wings

## Types of gears:

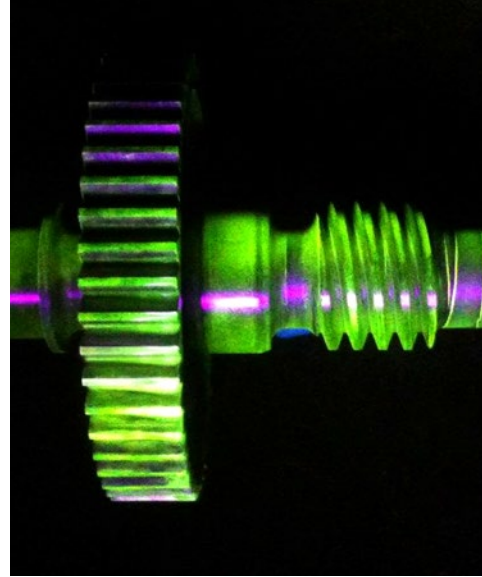
- Helical
- Mitters
- Spiral bevels
- Splines
- Spurs
- Straight bevels
- Worm gears

## Capabilities

Through our in-house facilities, Rexnord Aerospace offers the following gear manufacturing service capabilities on gears from .125 inches (3.175 millimeters) to 18 inches (450 millimeters):

- Assembly
- Broaching
- CNC gear and spline grinding
- EDM
- Gear and spline cutting
- Grinding (CNC and manual)
- Hobbing
- Milling
- NDT
- Turning





## Rexnord Aerospace Gear Outside Service Processing

Supporting you with a range of outside service processing capabilities customized and produced for your specific needs

For decades, OEMs within the commercial, defense and general aviation industries have depended on Rexnord Aerospace Gear Outside Service Processing for their complex gear component needs. These components can be found in mission-critical applications. By utilizing these services that offer an efficient and competitive economical solution, we can help you reduce the impact of your capacity and capability restrictions. Our offering includes NDT, gear and spline teeth cutting, gear grinding, and auxiliary services.

### NDT services

At Rexnord Aerospace, we utilize NDT, a wide group of analysis techniques to help evaluate the properties of a material or component that does not permanently alter the article being inspected, to save costs and time in product evaluation. Applications of NDT include detection of cracking and porosity in welded joints, surface defects in castings and fatigue cracking in stressed materials. We have a team of experts dedicated to this testing to ensure full compliance with Prime Contractor Specifications and industry standards. Types of NDT we offer include Nital Etch, MPI and MFD, LPI and PFD/FPI.

### Gear and spline teeth cutting

We offer gear teeth cutting for your bevel, helical, spiral bevel, spur and worm gears from .125 inches (3.175 millimeters) to 18 inches (450 millimeters). Additionally, we are a trusted vendor to aerospace OEMs that only need "cut teeth work" on higher assembly parts.

### Auxiliary services

We use a range of auxiliary machines to complement our gear tooth processing machines, including state-of-the-art CNC turning and milling, multi-capability automatic honing and CNC grinding equipment. Additionally, we feature tooth shaving equipment, broaching machines, engine lathes, and more. Our finishing machines, such as glass bead blasting, tumblers and laser etching machines, allow us to meet the demanding tolerances and finishes required in the aerospace industry.

### Applications

- APUs
- Engines
- Flight Controls
- Gearboxes
- Horizontal Stabilizers
- Landing Gear
- Wings



## Additional Aerospace Industry Products & Solutions

Providing more industry expertise with Rexnord Berg miniature precision mechanical parts

Producing solutions for more than 40 years, Rexnord Berg has provided miniature precision mechanical parts to the aerospace industry, including:

- Engineered assemblies
- Gears
- Sprockets and pulleys
- Timing belts
- Roller chains
- Worm gear boxes
- Lead screws
- Hardware fasteners

You'll find these products in aircraft instruments and controls, communication equipment, throttle controls, window shades, and more. Customers choose these products for customization capabilities, application-specific materials, quality machining processes, pre-assembled solutions, and more.

### Partner with us for reliable, high-quality components and expertise.

When you partner with us for your miniature precision mechanical part needs, you get a team of dedicated experts, all focused on your productivity and finding the best solution for your application by collaborating with your engineers.

#### We offer you:

- Products manufactured in our 150,000-square foot, state-of-the-art facility
- 97 percent customer-satisfied on-time delivery
- Ease of doing business, offering expedient quoting and a wide variety of product sizes
- Live customer and technical support 7:30 a.m. to 5:00 p.m. CST

### Applications

Aircraft Instruments and Controls  
Automatic Pilot Equipment  
Communication Equipment  
Flight Simulation  
Navigation Instruments  
On-board Aircraft Systems  
Pilot Information Systems  
Satellite Tracking  
Seat Actuation  
Throttle Controls



For more information on the Rexnord Berg products mentioned here, call 800-232-BERG or 414-747-5800. You can also visit us online at <http://wtemberg.com>





## What our customers are saying

Read below for customer testimonials on the Rexnord Aerospace product offering.

"Our Rexnord Shafer Aerospace Roller Bearings did not disappoint and are highly dependable."  
— *Senior Designer at a major manufacturing company*

"We're able to count on Rexnord Aerospace to accommodate our needs, no matter how urgent our requests are."  
— *Director of Operations at a machining company*

"Throughout the ordering and development process, Rexnord Aerospace provided outstanding customer support to us — much better than other suppliers."  
— *Buyer and Engineer at a world-leading aircraft manufacturer*

"We were impressed that our Rexnord Cartriseal Aerospace Shallow Hydropad Seals held up to our demanding surface speed applications."  
— *Engineer at a major airline company*

## Need more information on our Rexnord Aerospace product offering? Want to connect with our experts?

Let us know how we can help you. Visit the Rexnord Aerospace section of [www.rexnord.com](http://www.rexnord.com) and click on "Support." We'll be in touch shortly.

## Why Choose Rexnord?

When it comes to providing highly engineered products that improve productivity and efficiency for industrial applications worldwide, Rexnord is the most reliable in the industry. Commitment to customer satisfaction and superior value extend across every business function.

### Delivering Lowest Total Cost of Ownership

The highest quality products are designed to help prevent equipment downtime and increase productivity and dependable operation.

### Valuable Expertise

An extensive product offering is accompanied by global sales specialists, customer service and maintenance support teams, available anytime.

### Solutions to Enhance Ease of Doing Business

Commitment to operational excellence ensures the right products at the right place at the right time.