Ground Support Equipment

POLYMER SOLUTIONS FOR AN EFFICIENT TURNAROUND ON THE TARMAC

A quick turnaround to get you back in the air

Before takeoff and after landing, ground support equipment (GSE) services the aircraft for its next flight and assists in transporting it to and from the terminal. GSE aids in the loading and unloading of both luggage and passengers, as well as maintaining aircraft systems.

- Jacking, towing and e-taxi equipment are responsible for lifting and moving the aircraft.
- Ground power units provide power to the aircraft when it is on the ground, enabling electrical systems to function when the engine is not in use.
- De-icing equipment helps prepare aircraft in the toughest weather to ensure safe flight.

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Our polymer solutions ensure leak-free, long-lasting performance in ground support systems while the aircraft is on the tarmac. In fuel and water supply lines, seals and diaphragms are used in couplings and nozzles. Robust, polymer bearings support lifting cylinders in airway bridges and aircraft jacking equipment. And custom elastomer-to-metal bonded components ensure fluid pumps can do the job in de-icing equipment.

Trelleborg Sealing Solutions Aerospace partners with customers to ensure solutions meet their unique requirements. Depending on application needs, components and the materials they are manufactured in, are designed and specified to, for example, operate continuously at extreme low temperatures or be compatible for use with aggressive fluids.

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Aircraft De-icing

In freezing conditions, aircraft is de-iced on the ground to prevent frozen contaminants from interfering with the aircraft's aerodynamic properties and dislodged ice from damaging the engines. Our range of polymer seals and components is specially engineered to operate with aggressive chemicals, at extremely low temperatures, and in very dirty environments to ensure the reliable operation of critical de-icing equipment.

Torlon® Injection Molded Components

Trelleborg Sealing Solutions Aerospace is a certified manufacturer of high-performance Torlon® components, including balls and other pieces used in nozzles. This material is specially engineered to withstand harsh operating environments and aggressive fluids used in de-icing equipment.

High Load Slydring® Bearings

Offering long service life, our Slydring® bearings are a low friction, robust and cost effective alternative to metal bearings. Turcon®, HiMod® and Orkot® materials are engineered to withstand abrasive, frozen contaminants.

Diaphragms

Commonly used in pumps and valves, diaphragms are manufactured to customer specifications and can be produced with or without fabric reinforcement, and with optional inserts to eliminate secondary operations.

Gaskets

Used in high pressure spray nozzles, pumps and valves in de-icing equipment, our range for elastomer and elastomer-to-metal bonded gaskets ensures efficient operation in the harshest conditions.

Elastomer Seals & Back-up Rings

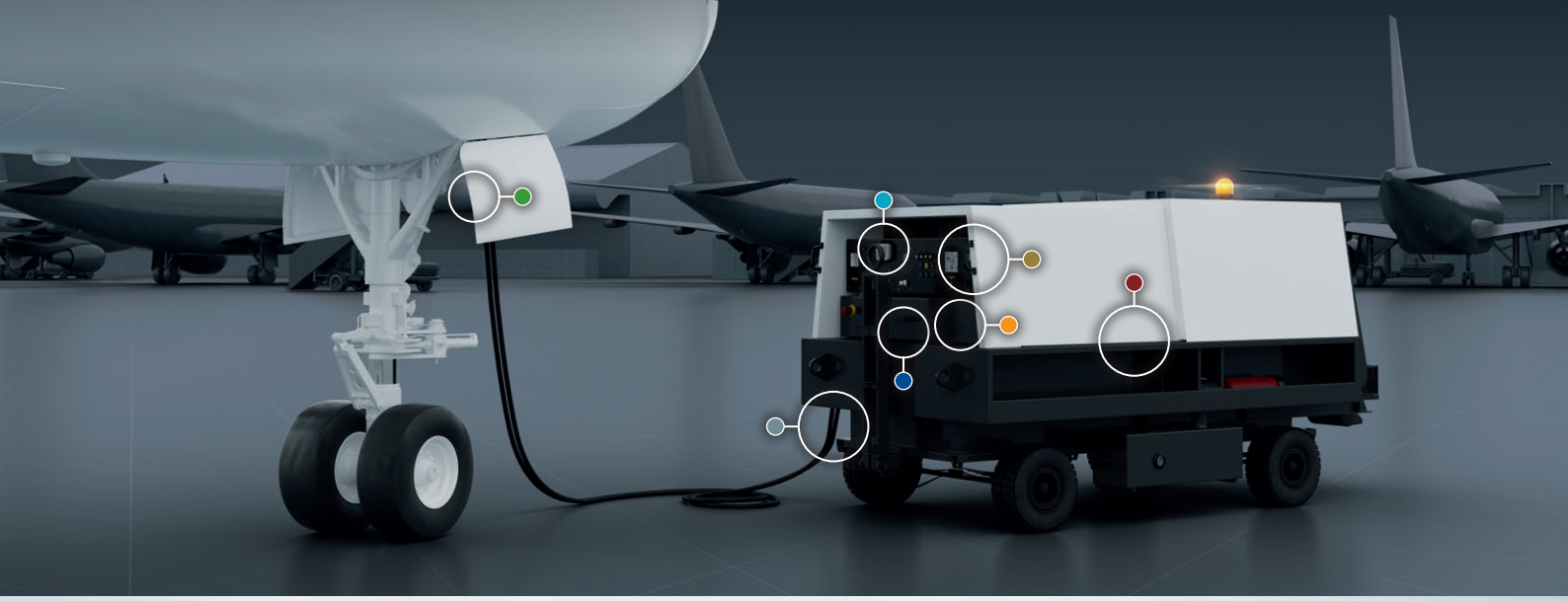
Specified to ensure compatibility with extreme temperatures and aggressive de-icing fluids, elastomer O-Rings and square rings are ideal for static and slow dynamic sealing applications. In high-pressure environments, Turcon® Back-up Rings are used in tandem with elastomer and Turcon® contact seals to increase extrusion resistance.

Engineered Seal Components

The Variseal® product range comfortably operates both at very low and very high temperatures. It is universally compatible with all commercially fluids used in support of aircraft. Since the Variseal® products are machines and not molded, almost any shape of seal can be made, and even components with more than one sealing function can be designed.

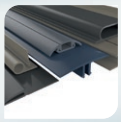
Ground Power Units

Multiple fixed or mobile ground power units (GPUs) drive aircraft's electrical systems while it is on the tarmac. Polymer components ensure safe and efficient operation by protecting and housing electrical hardware within the units. Trelleborg's GPU components can withstand extreme temperatures and are custom designed to meet application needs.



Custom Thermoplastic Components

Used for example as plug bodies, custom-machined or injection-molded components are manufactured from a wide range of robust thermoplastic materials.



Extruded Sealing Profiles

Along housing components, sealing profiles prevent the ingress of dirt, dust and water to ensure the continuous operation of GPUs in all weather conditions. Profiles are designed and manufactured to meet customer requirements.

Multicomponent Parts

Ideal for power cable connectors, multicomponent technology strongly bonds a range of polymers into one engineered piece. Components in unique seal geometries can combine multiple functions and are customized to the customer's application.

HiSpin® PDR RT

Our high speed rotary seals are specially engineered for use e-Axles ensuring essential lubrication in the gearbox, while preventing leakage to the motor at high rotational speeds in excess of 60 m/s / or 200 ft/s.

EMI/RFI Shielding Components

Isolating materials play a critical role in ensuring the safety and performance of GPUs. Trelleborg has a wide range of both conductive and isolating polymers and elastomers that can be tailormade to the required EMI/RFI properties. Our portfolio of electrically conductive and non-conductive materials includes Turcon® PTFE compounds, which can be manufactured into a wide range of sealing geometries.

V-Ring®

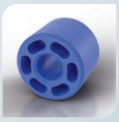
An all-rubber lip seal, the V-Ring® prevents the ingress of dirt, dust and water into rotary applications. Its specially designed, flexible sealing lip minimizes friction by maintaining low contact pressure and makes it suitable for use in applications with axial movement.

Custom Elastomer Components

Trelleborg's comprehensive elastomer molding expertise enables us to design and manufacture custom components, from electrical connector seals to protective caps.

Fuel Servicing

The airport environment can be incredibly demanding for fuel servicing equipment. Trelleborg seals and polymer components prevent leakage and contamination of the system, ensuring efficient and reliable performance of fuel servicing equipment. These components must withstand high pressure and extreme temperatures encountered on tarmac. On top of this, fueling systems must be protected from the contaminants commonly found in an airport setting including sand and dust.



Custom Thermoplastic Components

Trelleborg custom-machined or injection-molded components are manufactured from a wide range of robust, thermoplastic materials to meet application needs.

High Load Slydring® Bearings

Offering long service life, HiMod® and Orkot® bearings are a low friction, robust and cost-effective alternative to metal bearings. Their lower weight facilitates easier handling and since they do not require stringent tolerances with mating components, they easily connect to aircraft.

Turcon® and Elastomeric Seals

Sealing components and scrapers provide strict leakage control and protect fuel system hardware against contaminants coming from the airport environment. Turcon® demonstrates excellent low-friction characteristics, making it the optimal material for low-lubrication environments. Elastomeric O-Rings and square rings are ideal for static and slow dynamic sealing applications.

Diaphragms

Diaphragms, made from specially engineered elastomer materials play a critical role in fuel servicing applications. They are manufactured to customer specifications, with and without fabric reinforcement, and with optional inserts to eliminate secondary operations.

Gaskets

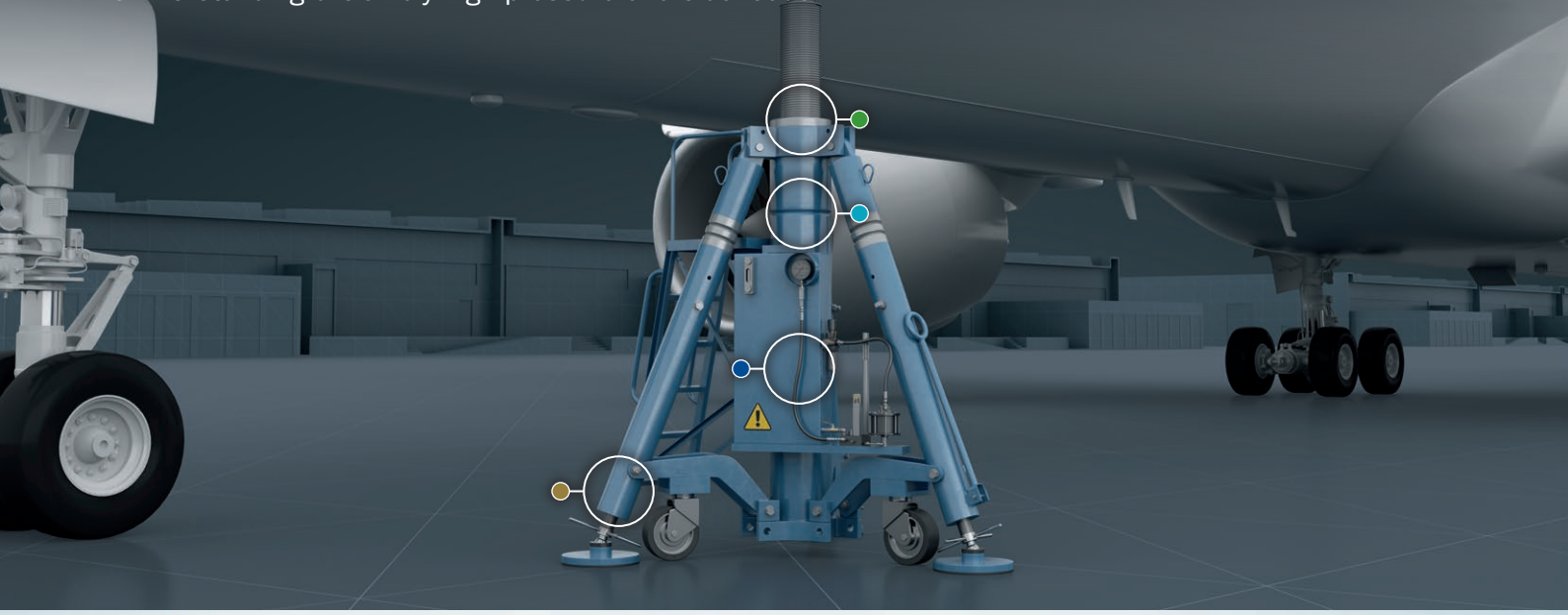
Gaskets are used within adapters, couplings, nozzles and valves. Elastomer and elastomer to metal bonded gaskets are designed to meet application requirements.

Turcon® Roto Variseal®

The rotary swivels and couplings used un re-fuelling equipment need to stay leaktight and have low friction joints to ease operation under all climatic conditions. The Roto Turcon Variseal has all these features plus an excellent flexibitity allowing slight misalignment of the components. It has universal chemical resistance and can easily cope with all temperatures encountered on the apron.

Aircraft Jacking

Aircraft jacking systems lift extremely heavy loads and are critical to the maintenance of aircrafts. Reliable operation is vital when it comes to both performance and the safety of the operators who work with this equipment. Jacking systems demand reliable seals with a long service life and must be capable of withstanding extremely high pressure and side loads.



High-Performance Seals

We offer a full range of precision-engineered rod, piston and face seals for demanding operating environments. Products, including spring-energized seal assemblies such as the Turcon® Variseal® Metaplast, are designed to withstand the high pressures found inside jacks. By selecting the right sealing system a zero leak condition can be achieved avoiding drift of the jack.

High Load Slydring® Bearings

Offering long service life, HiMod® and Orkot® bearings are a low friction, robust and cost-effective alternative to metal bearings. Their lower weight facilitates easier handling and since they do not require stringent tolerances with mating components.

Turcon® Ball Screw Seal

Specially engineered to seal and prevent the contamination of ball races, the ball screw seal is a spring-energized seal, which is compatible with all fluids and greases and follows ball screw backlash.

Turcon® Excluder® AS

Aircraft Jacks are often exposed to adverse weather and sand and duct. A good scraper is essential to protect the delicate sealing systems that holds up many tons of aircraft. The Turcon Excluder AS is a tough scraper with a secondary function as a sealing element. It can be used on both Chromes and HVOF treated rods.

Potable Water and Lavatory Serv

Both lavatories and drinking water systems need efficient and reliable clean water filling and wastewater drainage services during aircraft turnaround. Additionally, leaking waste water poses a corrosion risk to aluminum structures. Our standard and custom-designed polymer seals are essential to prevent contaminants from polluting drinking water on the aircraft.

All components designed to come into contact with potable water meet applicable regulations. Parts used for wastewater and lavatory-specific servicing are also compatible with the chemicals and waste found in these systems.

Liquid Silicone Rubber (LSR) Components

LSR components are manufactured using state-of-the-art injection molding and overmolding technology. They are custom designed to meet application requirements and can integrate complex features such as under cuts and blind sections.

Custom Thermoplastic Components

Custom-machined or injection-molded components are suitable for a wide range of potable water and lavatory servicing applications. They are manufactured from a robust thermoplastic materials, specified to comply with all relevant regulations.

Silicone Tubing

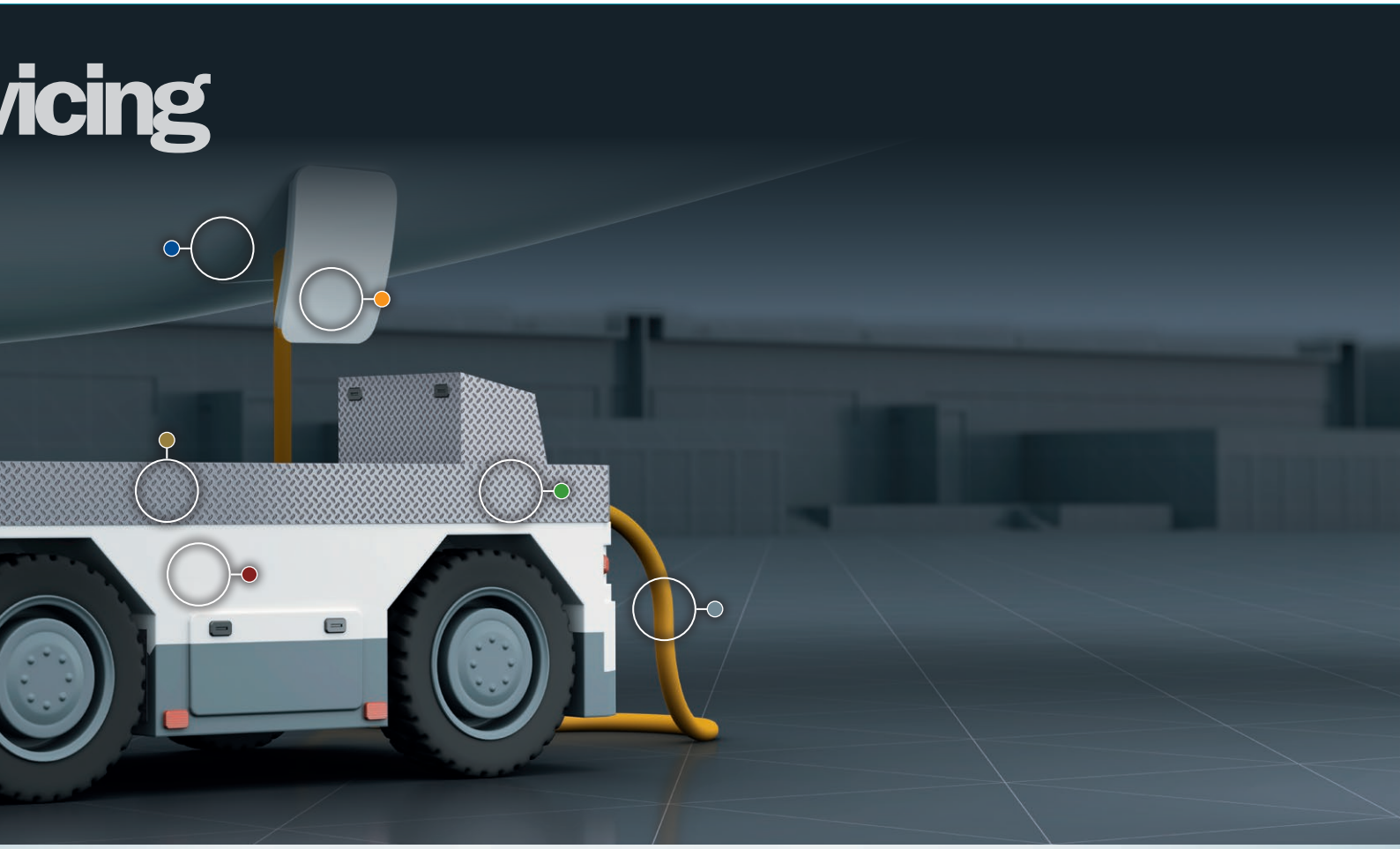
Critical in ensuring an efficient supply of potable water, reinforced silicone tubing and hose is manufactured according to customer specifications and can be supplied as an assembly with sanitary fittings.

Gaskets

Used in a wide range of potable water, lavatory servicing and pump applications, gaskets are custom designed to application requirements. Using material compounds specified to meet compliance requirements, elastomers can be bonded to metal for easy-to-handle, one-piece solutions.

Diaphragms

Commonly used in pumps and valves, diaphragms are manufactured to customer specifications and can be produced with or without fabric reinforcement, and with optional inserts to eliminate secondary operations. For potable water applications, diaphragms are available in specially engineered elastomer materials, which are fully compliant with US and EU standards and regulations for drinking water.



High Clean Variseal®

Trelleborg's extensive range of engineered seals, including Variseal® spring-energized seal assemblies, is designed for the most demanding applications. Our Turcon® HiClean material has been specially designed to simplify cleaning processes, due to its low friction characteristics and compatibility with aggressive cleaning agents.

Turcon® Back-up Rings

In applications with high operating pressures, Turcon® Back-up Rings can be used in tandem with elastomer O-Rings to increase extrusion resistance.

O-Rings

Commonly found in static and slow dynamic applications for potable water and lavatory servicing, O-Rings are available in a wide variety of sizes and materials, as well as FEP and PFA encapsulated seals. Materials are specified to meet compliance and compatibility requirements.

Custom Elastomer Components

Custom-designed and manufactured to meet lavatory serving application needs, elastomer components are typically used in pumps and valves and as port caps.

Tubing & Hose

Hoses and tubing for water supply and drainage are available in a wide range of materials, including silicone and PTFE, and can be composed of multiple layers when the application requires chemical compatibility and high strength.

CERTIFICATIONS & COMPLIANCE

- ISO 14001
- NADCAP
- NSF/ANSI 61
- FDA CFR 21
- AS 9100

Aircraft Towing

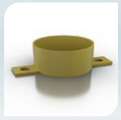
Traditionally, specialized tugs or tractors move aircraft around the airport, either attached directly to the tow vehicle or using a tow bar. Robust, reliable seals are used to prevent leakage and contamination in dirty environments, and to ensure tow vehicles and equipment perform reliably and efficiently. Our solutions are capable of withstanding high pressure and torque, and demonstrate resistance to various hydraulic liquids used in aircraft towing equipment.

Elastomer Seals & Turcon® Back-up Rings

Specified to ensure compatibility with hydraulic fluids, elastomer O-Rings and square rings are ideal for static and slow dynamic sealing applications. Since aircraft towing equipment operates with heavy loads, Turcon® Back-up Rings are recommended in tandem with elastomer seals for increased extrusion resistance.

Orkot® Wear Pads

Outperforming metal bearings, Orkot® bearings and wear pads demonstrate extraordinary bearing strength and high impact tolerance. Orkot® products can be used without lubrication, minimizing contamination of the surroundings and eliminating lubrication maintenance.

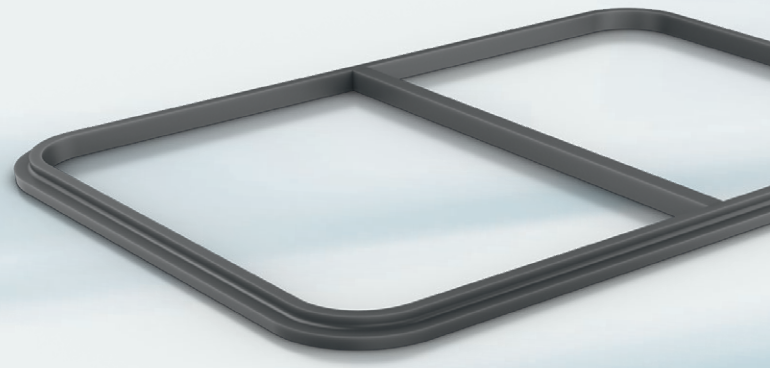


Custom Thermoplastic Components

Used, for example, as retaining rings, custom-machined or injection-molded components are manufactured from a wide range of robust thermoplastic materials, all meeting the requirements of even the most demanding applications.

Custom Molded Elastomers

Custom molded elastomer components are used to damp and protect various systems on the towing vehicle. The elastomer materials used are specially designed for long service life and can withstand arduous conditions on the airport tarmac. Products include rubber boots, bellows, and grommets.



Electric Taxiing System

New electric taxiing systems are an environmentally friendly alternative to traditionally powered tow vehicles. They allow the plane to taxi and pushback without running its engines, thereby eliminating fuel consumption and reducing greenhouse gas emissions during ground operations. Seals are used within electric motor systems to prevent ingress of dust, dirt or water and to prevent leakage of oil to the environment or to other areas of the motor where it could damage electrical components.

High Load Slydring® Bearings

Offering long service life, HiMod® and Orkot® bearings are a low friction, robust and cost-effective alternative to metal bearings. Their lower weight facilitates easier handling and since they do not require stringent tolerances with mating components.

Custom Elastomer Components

Extensive, in-house elastomer molding expertise and capabilities enables us to design and manufacture custom components to meet your precise needs.

Rotary Seals

Rotary seals protect electric taxiing equipment by preventing the ingress of dirt and water. Our range of seals for rotary applications includes Turcon® lip seals, spring-energized Variseal® and elastomer-energized seals.

HiSpin® High Speed Rotary Seals

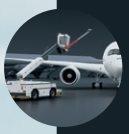
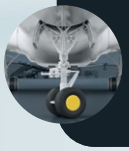
Our HiSpin® seals have been specially designed for use in e-axles, which house the electric motor and gear box in a single unit and operate under extreme rotational speeds.

Elastomer Seals & Turcon® Back-Up Rings

Elastomer O-Rings and square rings are ideal for static and slow dynamic sealing applications. In high-pressure environments, Turcon® Back-up Rings are used in tandem with elastomer and Turcon® contact seals to increase extrusion resistance.

Summary Certifications

We are experts in material development with solutions manufactured from innovative compounds that meet our customers' challenges, as well as regulatory requirements. The table below lists standard materials. For special requirements, Trelleborg's material development engineers can create a compound to meet specific needs.

	ISO 9001	NADCAP	ISO 14001	AS 9100
 AIRCRAFT DE-ICING	✓	✓	✓	✓
 GROUND POWER UNITS	✓	✓	✓	✓
 FUEL SERVICING	✓	✓	✓	✓
 AIRCRAFT JACKING	✓	✓	✓	✓
 POTABLE WATER AND LAVATORY SERVICING	✓	✓	✓	✓
 AIRCRAFT TOWING	✓	✓	✓	✓
 ELECTRICAL TAXIING SYSTEM	✓	✓	✓	✓

FDA CFR 21 NSF/ANSI 61

Certified Materials

Mil-DTL-83528
AMS 1424 Compatible
AS 8791
AMS-P-83461
AMS-P-25732
NAS 1613
AMS 7379

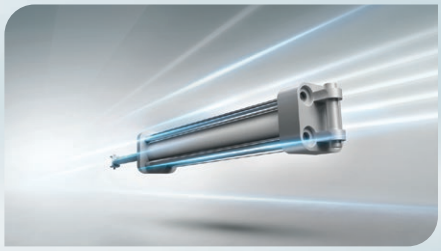
Trelleborg Sealing Solutions Market Presence

Trelleborg Sealing Solutions Aerospace offers a full portfolio of solutions and services for nearly any aerospace application. Materials and products can be used in any type of aircraft and our products are designed to provide maximum efficiency to customers. In addition to our experience in the aerospace industry, we are also able to offer solutions based on industrial technology where full aerospace certification is not required.

Advanced Air Mobility

Aerospace

Automotive

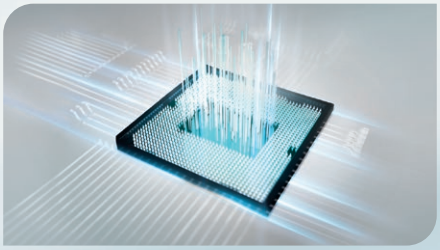


Fluid Power – Pneumatics

Manufacturing & Machine Tools

Material Handling

Construction & Mining Equipment



Semiconductor

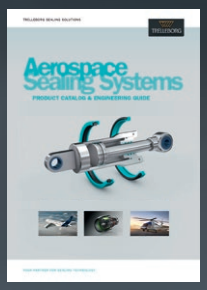
Oil & Gas

OUR AEROSPACE LITERATURE

Explore our website, industry-specific brochures and product catalogs to get an overview of the solutions that are suitable for your application. You can order directly or contact us for engineering assistance to select the most suitable product.
We offer free-of-charge engineering services for seal selection and can develop custom products if our standard range does not meet your requirements.

Go to:
trelleborg.com/seals/literature

Airframe and Engine Sealing Capabilities



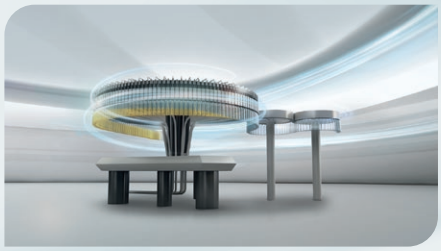
Aerospace Sealing Systems

Engineered Thermoplastic Aerospace Solutions

Conductive and Shielding Solutions

Advanced Air Mobility

Onboard Systems



Food & Beverage

Processing Equipment

Fluid Power – Hydraulics

Renewable Energy & Power Generation

Healthcare & Medical

Agriculture

Marine Equipment & Construction

Water & Sanitary

Robotics

Trelleborg is a world leader in engineered polymer solutions that seal, damp and protect critical applications in demanding environments. Its innovative solutions accelerate performance for customers in a sustainable way.

Trelleborg Sealing Solutions is a leading developer, manufacturer and supplier of precision seals, bearings and custom-molded polymer components. It focuses on meeting the most demanding needs of aerospace, automotive and general industrial customers with innovative solutions.

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