

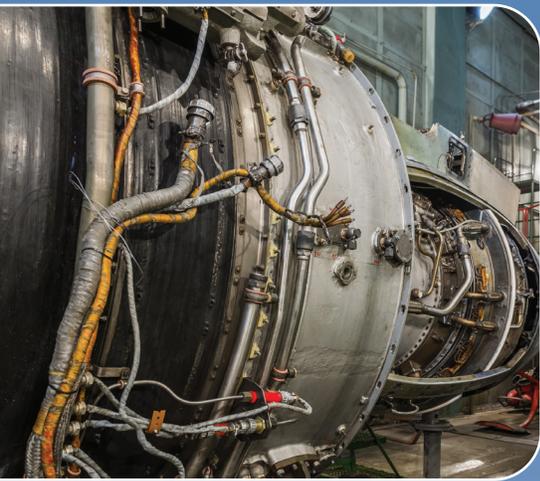


Omniseal Solutions
SAINT-GOBAIN

Aviation Industry Handbook

Beyond the boundaries of
POSSIBLE


SAINT-GOBAIN



JET ENGINES & AUXILIARY POWER UNITS (APU)

High temperature and high speed: Sealing solutions for extreme conditions

Temperatures up to 365°C (690°F)

Omniseal® 103A Spring-Energized Seal for lubrication system



Compatibility with HPC/HTS oils (AS5780/MIL-PRF-23699)

Omniseal® Rotary Lip Seal (30 Series) for APU accessory connections



Meldin® 7021 Stator Vane Bushes

For rotary applications: speed up to 60 m/s and beyond in special cases

Excellent combination of wear resistance, mechanical properties and dimensional stability for polyimide components

Lubrication Systems

Internal and Accessory Gearboxes

Low and High Pressure Compressor

Low Pressure Turbine



AIR MANAGEMENT SYSTEMS

Omniseal® and Meldin® critical parts: Working at their best together

Temperatures up to 365°C (690°F)

Omniseal® 103A Spring-Energized Seal



Excellent thermal oxidative stability



Meldin® 7022 Labyrinth Seal for bleed air

Low coefficient of thermal expansion



Meldin® 7001 & Omniseal® Gasket for de-icing ducts

Wear resistance and low friction

Bleed Air Valves

Anti-Icing Systems

De-icing Ducts

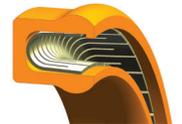


LANDING GEARS

Superior performance: HVOF-coated shafts

Wide temperature range with cold storage (from -55°C /-67°F up to > 200°C/392°F)

Omniseal® RP Spring-Energized Seal for NLG



Designed to fit standard AS4716 and MIL-G-5514 grooves



Meldin® 5330 Bearing for shock strut

Wear resistance, peak pressure and constant friction solution – no shrinkage at low temperature

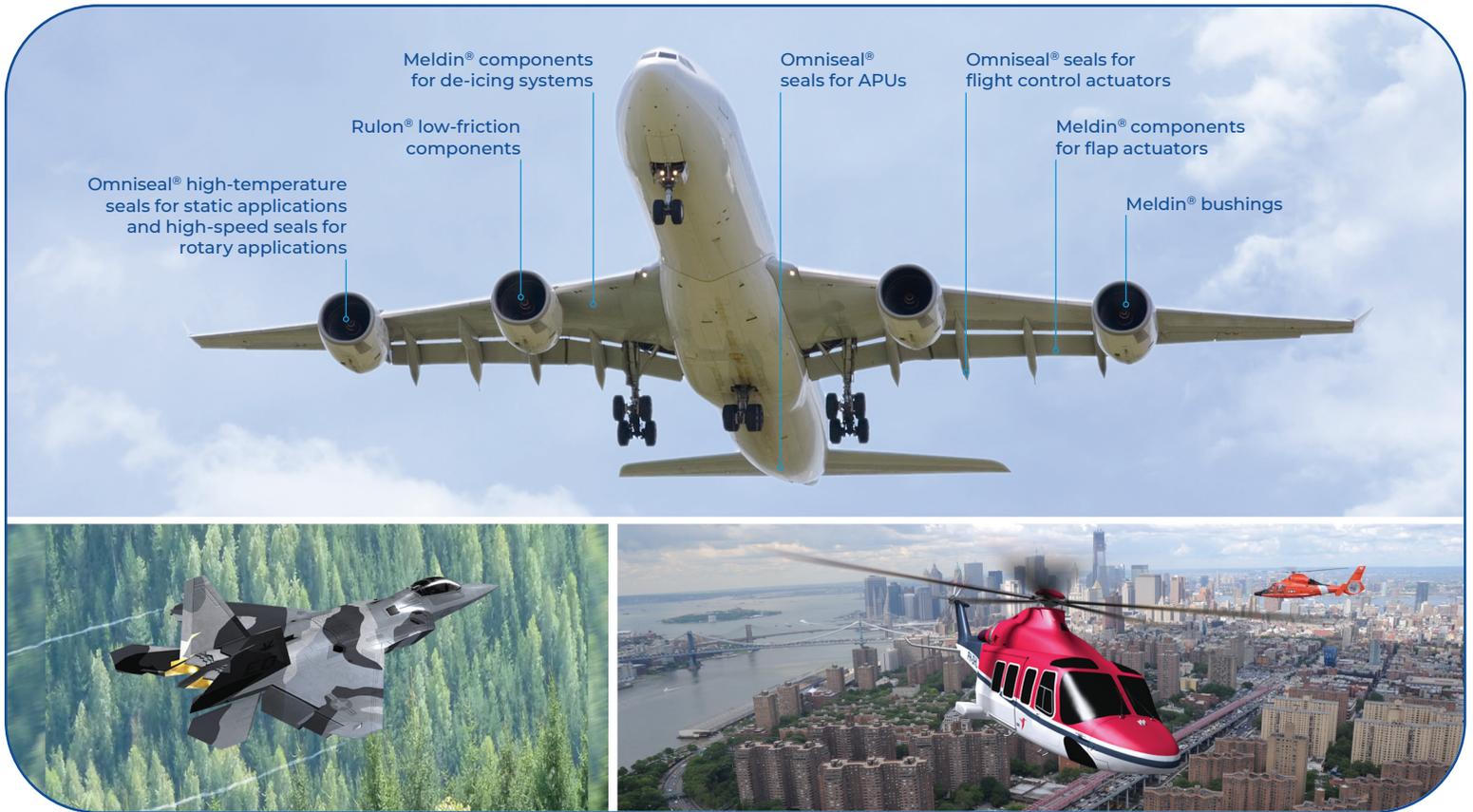
Precision Fit

Shock-Strut Assemblies

Actuators

Universal Joints

GOING BEYOND SEALING & MATERIAL SOLUTIONS



OMNISEAL® POLYMERS

Filled PTFE ideal sealing solution

- Excellent chemical compatibility with all aerospace fluids
- High temperature resistance (up to 365°C/690°F)
- Replaces elastomer products when they reach their temperature, pressure or chemical limits
- Installation in closed or blind grooves are possible with specific procedure and tools
- Almost unlimited design capabilities with no specific tooling required
- For rotary shaft applications, can handle high speed (up to 60 m/s)
- Easier to install and replace than mechanical seals, requires much less space and allows easier integration
- Testing capabilities for pre-validation

RULON® FLUOROPOLYMERS

Filled PTFE compound materials for wear and friction controls

- Choice of more than 1,000 formulations that enhance desired properties:
 - Mechanical strength
 - Wear resistance
 - Low abrasion in dynamic applications
- High wear resistance at various temperatures, as in track liner applications for thrust reverser systems
- Exceptional chemical resistance to harsh environments
- Different manufacturing processes available to produce:
 - Bearings
 - Bushings
 - Cup seals
 - Piston rings
 - Custom components

MELDIN® POLYIMIDES

State-of-the-art polyimide thermoset material used in aviation for decades

- High temperature/mechanical strength combinations, as in stator vane bushing applications in engine compressors
 - High dielectric strength properties such as engine electrical harnesses
 - Excellent thermal stability for precise components such as bearings or piston rings in bleed air or de-icing systems
 - High wear and self-lubricating properties for applications such as abradable seals or landing gear bushings for jet engines
- Meldin® material solutions are designed to customer specifications.

Proven in the Past...

For more than 50 years, Omniseal Solutions™ has been supplying critical parts to the aviation industry for use in commercial and military aircraft as well as helicopters. Our Omniseal®, Rulon® and Meldin® solutions are helping customers with challenges in high temperature/pressure, weight reduction, fuel efficiency, high thermal stability and fatigue/corrosion.

As Omniseal Solutions™ understands the continuous push to improve flight in terms of safety, comfort, cost, maintenance, efficiency and power, we work closely with our customers to solve these complex issues so they can venture as high and as far as possible to meet tomorrow's challenges.

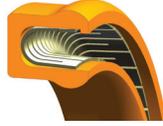
... Prepared for the Future

FLIGHT CONTROLS

Long life: A key requirement

No compression set at low temperatures

Omniseal® 400A Low Friction Spring-Energized Seal for electromechanical actuators



Dry running, good wear resistance, compact design solutions



Meldin® 7021 Spring Retainer

Sealing capability against HVOF-coated hardware surfaces

Low friction to limit size of the actuators and consumption of electrical power

Horizontal Stabilizer Trim Actuator (HSTA)

Primary and Secondary Control Actuators



HELICOPTERS

Excellent sealing performance: Rotary speed up to 60 m/s

Dry running

Omniseal® Rotary Lip Seal (70 Series)



Long life



Omniseal® Rotary Lip Seal (60 Series)

Compatibility with engine and transmission oils in compliance with MIL-PRF-23699 and DOD-PRF-85734

Very tight leakage requirements

Main Gearbox (MGB), Intermediate Gearbox (IGB), Auxiliary Gearbox (AGB) and Tail Rotor Gearbox (TGB)

Rotorhead Seals



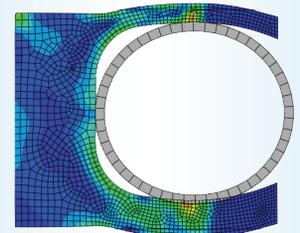
CRITICAL PARTS PROTECTING CORE AVIATION SYSTEMS

Through our decades of experience, Omniseal Solutions™ has built a foundation of meeting and exceeding the continuously increasing performance requirements of the aviation industry for temperature (from cryogenic to extremely high), speed and chemical compatibility.

We support customers not only with our solutions but with our team who engineer, design, research and develop precision sealing and material solutions, using the latest technology tools such as Finite Element Analysis and Simulation.

Our Core Competencies:

- Maintenance-free solutions
- Lightweight components
- Low friction materials
- Vibration control
- Noise reduction
- Excellent chemical resistance
- Low and high pressure sealing
- Low and high temperature resistance



Solutions

Main Features

OMNISEAL® POLYMERS

High-Performance
Spring-Energized Seals

- Temperatures from -210°C to +316°C (-346°F to +600°F).
- Pressure: Vacuum up to 3,448 bar (50,000 psi).
- Low and controlled friction.
- Broad chemical resistance.

High-Performance PTFE
Rotary Shaft Seals

- Temperatures from -53°C to +232°C (-65°F to +450°F).
- Shaft speed in excess of 36 m/s (7,000 fpm).
- Pressures up to 35 bar (508 psi).

RULON® FLUOROPOLYMERS

High-Performance
Fluoropolymer Compounds

- Temperatures from -268°C to +316°C (-450°F to +600°F).
- Low friction, high wear life and broad chemical resistance.

MELDIN® POLYIMIDES

High-Performance Thermoset
Polyimide Materials

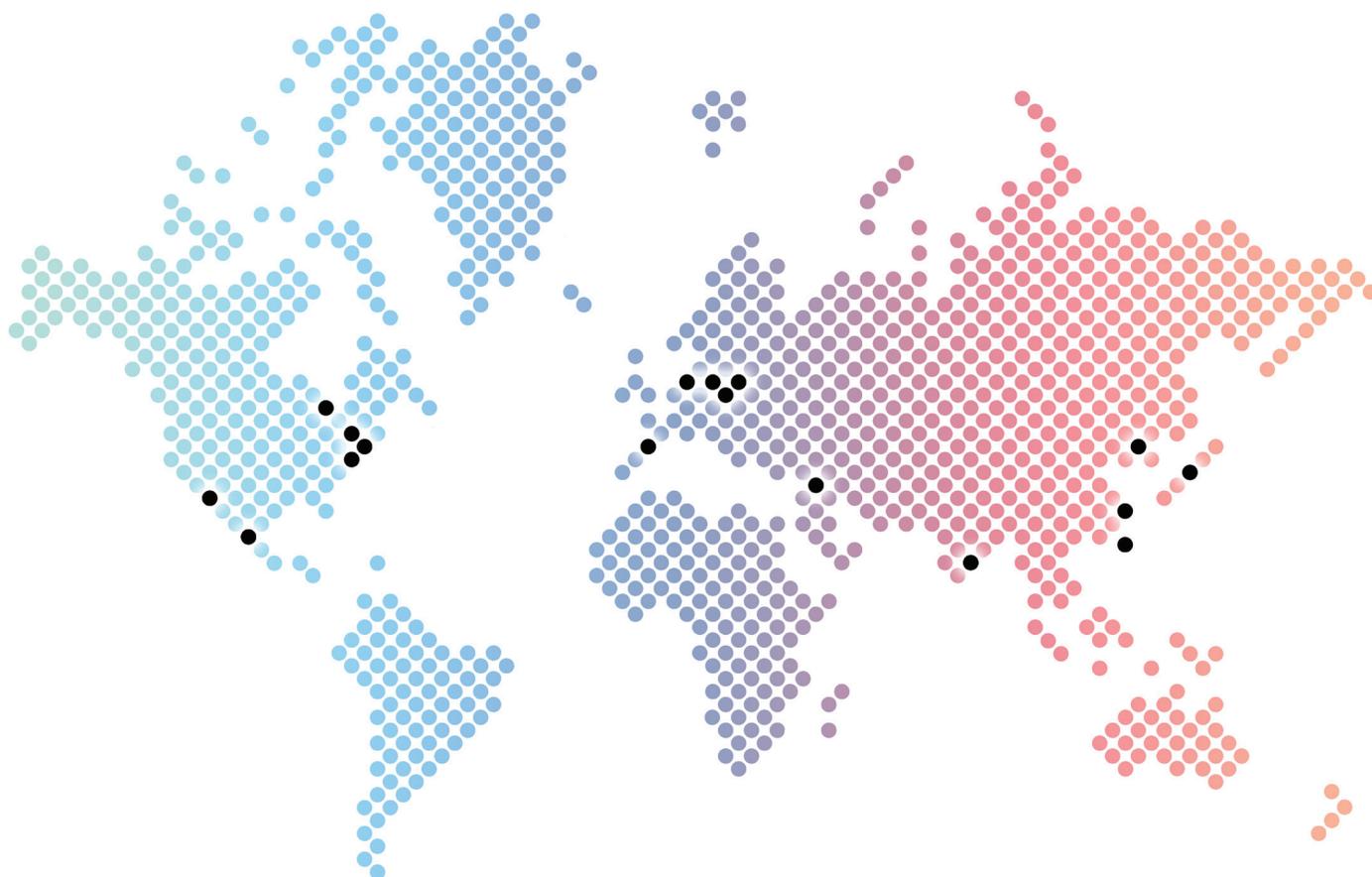
- Temperatures from cryogenic through +316°C (+600°F), intermittently up to +482°C (+900°F).
- Superior strength and rigidity combined with self-lubrication properties.

OMNISEAL® METALS

High-Performance Metal Seals

- Temperatures from cryogenic up to +1,093°C (+2,000°F).
- From ultra-high vacuum to 6,894 bar (100,000 psi).
- Leakage performances as low as 10⁻¹² sccs with GHe

ONE GLOBAL TEAM... A DEDICATED CUSTOMER FOCUS



GLOBAL & LOCAL PRESENCE

With 17 manufacturing facilities in 10 different countries, Omniseal Solutions™ is a diverse group that is committed to being customer centric.

Contact our team of experts for more information. We have local resources to support you!

- **Americas:** Garden Grove, CA, USA; Bristol, RI, USA; Orange, CT, USA; Cleveland, OH, USA; Northboro, MA; Saltillo, MX
- **Europe:** Kontich, Belgium; Mechelen, Belgium; Vimercate, IT; La Rioja, Spain; Kolo, Poland; Willich, Germany
- **Asia:** Shanghai, China; Bangalore & Chennai, India; Suwa & Tokyo, Japan; Seoul & Incheon, South Korea; Taipei, Taiwan

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