



MinebeaMitsumi
— AEROSPACE —

Self-Lubricating Machinable Liner Technology



minelon® oscimax®

Self-Lubricating Machinable Liner Technology

Minelon® & Oscimax®



A COMPREHENSIVE PRODUCT FAMILY

Expanding the selection as well as the supply of a highly adaptable technology.



MinebeaMitsumi's Minelon® and NHBB's Oscimax® machinable liner systems are designed for use as self-lubricating liners for bearings and fretting buffers for friction plates. Available solutions range from cost-effective standard bearings to high-value custom components – as well as line-only application on customer parts.

These materials far exceed customer and industry standards and provide exceptional wear life with the capability to achieve tighter tolerances and more consistent and reliable performance. They perform especially well in operating conditions characterized by high moisture, fluid and debris contamination, and elevated temperatures.

TARGET APPLICATIONS

Minelon® and Oscimax® bearings and fretting buffers are utilized in countless high performance aerospace applications. Here are just a few typical uses:

FIXED WING AIRCRAFT

- Access Doors
- Environmental Systems
- Flight Controls
- Landing Gear

ENGINES

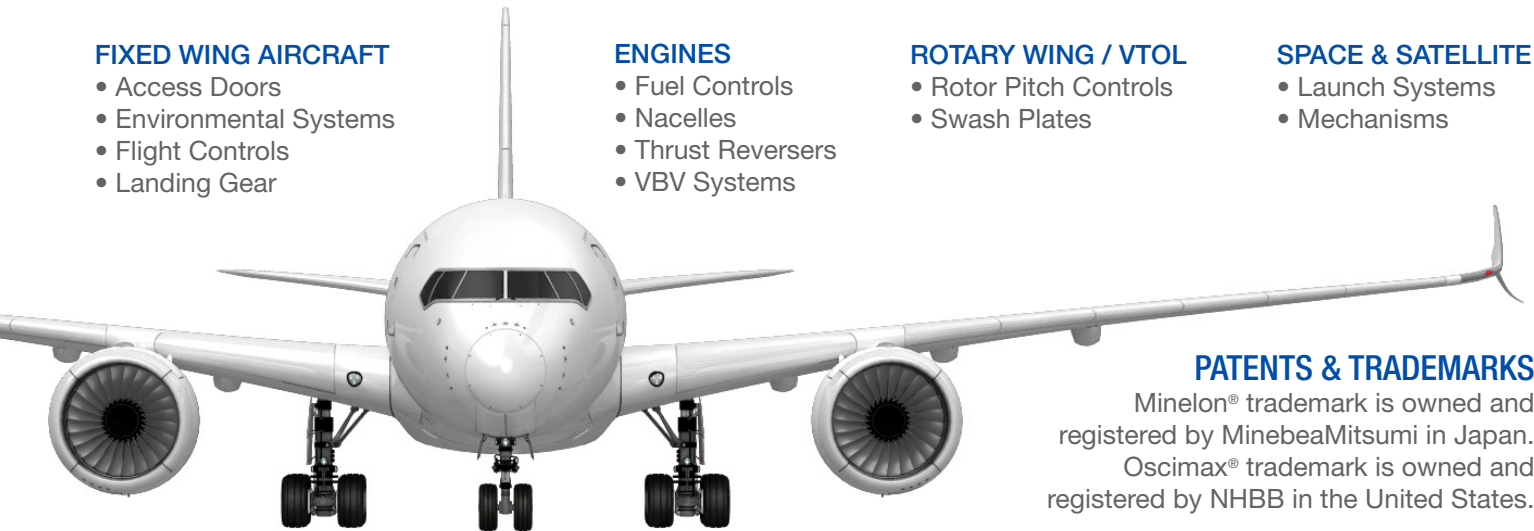
- Fuel Controls
- Nacelles
- Thrust Reversers
- VBV Systems

ROTARY WING / VTOL

- Rotor Pitch Controls
- Swash Plates

SPACE & SATELLITE

- Launch Systems
- Mechanisms



PATENTS & TRADEMARKS

Minelon® trademark is owned and registered by MinebeaMitsumi in Japan.

Oscimax® trademark is owned and registered by NHBB in the United States.

QUALIFICATIONS

PROTOTYPES

We are committed to offering fast lead times for prototypes. Please contact Sales early in the design phase to ensure timely delivery (see back cover).

Standard	Product	Status
AS81934	Bushings	Approved
AS81820 / AS81820 Type A	Spherical Bearings	Pending

Minelon® and Oscimax® are also qualified to multiple OEM performance specifications. Contact Sales for more information (see back cover).

Self-Lubricating Machinable Liner Technology

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MATERIAL AND PERFORMANCE PROPERTIES

Our proprietary technologies provide optimum performance and application flexibility.

Oscimax® and Minelon® are homogenous mixtures of thermosetting polymeric resins, PTFE, and other durable compounds. These proprietary formulations deliver several important performance properties and benefits.

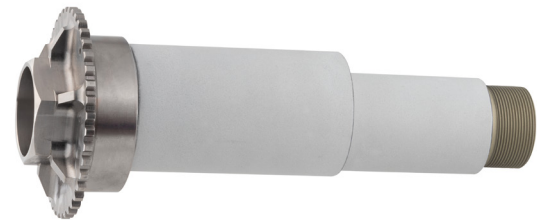
Performance Properties	Benefits
Full Machinability from surface to substrate	Tighter tolerances and exact fits
Low friction	Reduced torque and uniform motion
Superior and consistent wear rates	Longer life and predictable performance
High resistance to moisture and harsh chemicals	Reliable performance under harsh conditions
Adaptable to a variety of surfaces	Flexible self-lubricating/fretting barrier solution

SIX UNIQUE FORMULATIONS

With so many choices available, we can tailor a liner system to exceed your application's performance requirements.

We designed each one to perform reliably within a particular range of operating conditions. Such breadth satisfies a wide range of performance requirements, whether you need a hard-wearing liner with longer life, a low friction solution for lightly loaded applications, or something in between.

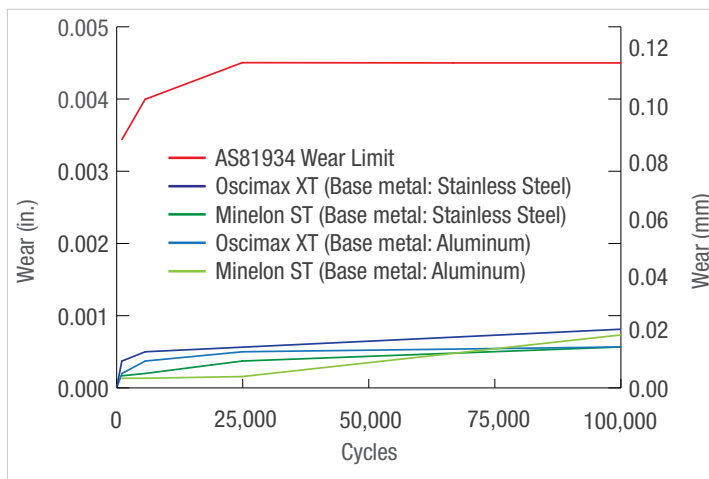
Description	Versions
Baseline - exceeding AS81934-qualified performance	Minelon® ST Oscimax® XT
Lower friction - option for complex performance factors	Oscimax® XY Oscimax® XZ
Custom formula for thicker application, OEM approved	Oscimax® XB
Landing Gear	Oscimax® XG
Spherical Bearings	Oscimax® XT Minelon® ST



Complex Machined Part with Minelon®

LINER WEAR TEST RESULTS

Test conditions per AS81934*



PERFORMANCE SPECIFICATIONS

Property	Range (inch)	Range (metric)
Nominal Thickness	0.010–0.015 in.	0.254–0.381 mm
Minimum Thickness	0.007 in.	0.178 mm
Maximum Thickness	0.040 in.	1.016 mm
Static Limit Load	67,000–80,000 psi	462–552 MPa
Static Ultimate Load	112,500 psi	776 MPa
Dynamic Load	16,000–50,000 psi	110–345 MPa
Coefficient of Friction	0.03–0.10	
Operating Temp.	-65– +325 °F	-54– +163 °C
Wear Test Data*	0.0003 in. at 50 ksi 0.0027 in. at 37.5 ksi	0.0076 mm at 354 MPa 0.0686 mm at 259 MPa
Fluid Compatibility**	Hydraulic oil, lubricating oil, jet fuel, de-icing fluid	

*Tested at room temperature to 100K cycles

**Representative example

*Radial Load: 37,500 psi (258 MPa); Oscillating angle: ±25 degrees; Speed: 20–30 cpm

PRODUCT SELECTION AND APPLICATION ENGINEERING SUPPORT

Our product engineers stand ready to assist you with selecting the appropriate self-lubricating liner system for your application. Contact a sales office nearest you to request assistance (see back cover).

GLOBAL SALES AND MANUFACTURING

Contact a sales office nearest you to learn more about our world-class capabilities.

MinebeaMitsumi Aerospace is committed to delivering the right products and solutions, no matter where in the world you are. Our international team of highly trained sales and product specialists serves as your expert connection to the highly developed engineering, manufacturing, and new product development capabilities of our worldwide network of aerospace manufacturers. Before you begin your next project, contact MinebeaMitsumi Aerospace, the global brand that's bringing excellence together.

MACHINABLE LINER TECHNICAL SUPPORT

Engineering support is provided by NHBB Astro Division in the Americas, NMB-Minebea GmbH in Europe, and Karuizawa in Asia. If you need assistance, please contact the sales office nearest you.

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