



**Omniseal Solutions**  
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the boundaries of possible



# AVIATION CASE STUDY

## SEALING PROTECTION FOR EVTOL PROPELLER BEARINGS IN ENVIRONMENTAL CONTROL SYSTEM



## PROPELLERS AND TRANSMISSIONS



OMNISEAL® SPRING-ENERGIZED SEALS (GEARBOXES)



MELDIN® POLYIMIDES (GEARBOXES, ROTORS)



OMNISEAL® ROTARY LIP SEALS (ROTORS)



### OMNISEAL® ROTARY LIP SEALS

## Sealing Protection For EVTOL Propeller Bearings In Environmental Control System

Mark Scoular August 2023

AVIATION HIGH SPEED LOW COEFFICIENT OF FRICTION DRY RUNNING DURABILITY

### Environment

In the past decade or so, there has been considerable progress in electric storage and motor technology, which are on the verge of moving the aviation industry ahead and opening new opportunities and uses. One example is the eVTOL (Electric Vertical Take-Off and Landing vehicle), where electric engines reduce noise pollution for quieter flights and provide zero emissions to help the environment.

### Challenge

Driven by the electric motor in the environmental control system (ECS), the shaft of the fan rotates at variable speeds, including up to very high speeds. The shaft is guided and supported by bearings, which require protection from the environment. A seal is a necessary and critical part since it protects this area at any given speed. Due to its critical location, no leakage can be allowed, as well as any pollution of the bearing cage below. eVTOLs are operated intensively; therefore, long lifetime is an expectation from its components.



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## Solution

Omniseal Solutions™ designs polymer, rotary lip seals that are used on propeller systems in order to protect bearings from environmental pollution (salt spray, sand, dust, etc.), with high surface speed and very high durability. Our custom design of an adapted jacket enhances the very long durability required for this kind of demanding application.

Because of their low coefficient of friction and low wear rate at high rotary speed, our rotary lip seals can run without a dedicated oil cooling system, simplifying the overall process and providing the ability to run dry for a good amount of time.



Go as high as you can – our rotary lip seals can handle your high speeds!

## Benefits

- Lifetime protection of the bearings against environment (dust sand, salt spray, etc.)
- No oil leak at variable speeds up to high speed
- Compact seal design fits compact overall design, simplifying integration and reducing overall weight

## Specification

<b>Solution</b>	• Omniseal® Polymer Rotary Lip Seal, Series 31
<b>Area</b>	• Propellers in Environmental Control System (ECS)
<b>Material</b>	• High-Performance Polymer Material A27
<b>Precision part</b>	• Custom Lip Seal
<b>Technical details</b>	• Media: Jet Oil
	• Temperature: -51°C to 120°C (-60°F to 250°F)
	• Speed: up to 12 m/s (higher is possible)
	• Counter face: Chromium hardened shaft
	• Rotation speed: 12000 RPM



## Design Expertise & Tailor-made Solutions for Your Critical Applications

Omniseal Solutions™ is a global engineering leader with over 65 years of historical legacy, relentlessly dedicated to the design and manufacture of precision sealing and material solutions that protect critical applications in the most demanding environments and passionately driven to push *Beyond the Boundaries of Possible*.



### About the Author

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