Science and Technology

MARITIME & IMMIGRATION SECURITY

SEAL MECHANISM FOR WHEEL ASSEMBLIES

PROTECTIVE SEAL FOR AIRCRAFT LANDING GEAR WHEEL ASSEMBLIES

Aircraft landing gear is continually exposed to environmental elements, allowing contaminants such as debris and moisture to damage bearing rollers and wheel assemblies. Additionally, the pressurized water used to wash the aircraft can displace the protective bearing grease and introduce condensation, causing corrosion of the assembly steel bearing and rolling elements. These corroded elements pose a significant safety risk and must be rejected and replaced immediately when discovered. Replacing landing gear is expensive and time consuming and directly impacts aircraft operations.

To address this issue, researchers at the US Coast Guard created the Seal Mechanism for Wheel Assemblies (SMWA). This innovative solution protects landing gear components from environmental contaminants, pressurized water, and related condensation. The robust seal material can withstand the forces and high temperatures that occur within landing gear wheels without obstructing the axle's turning clearance.

KEY BENEFITS

+ Provides component protection in harsh environments
+ Decreases replacement and maintenance costs
+ Mitigates aircraft safety hazards

STAGE OF DEVELOPMENT

Prototype

PARTNERSHIP SOUGHT

License

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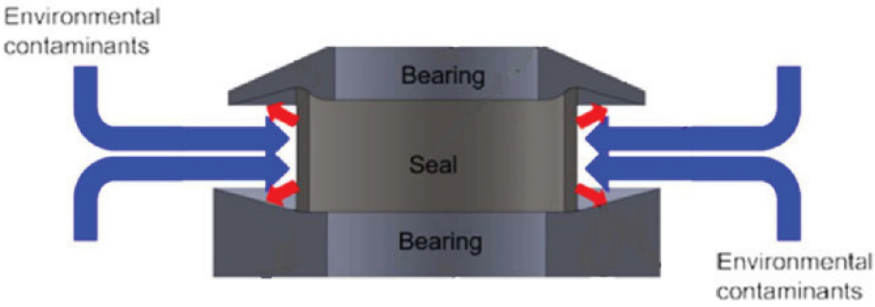
THE TECHNOLOGY

Aircraft landing gear wheels consist of two joining halves that form a "seat" for the tire. Each wheel half includes a roller bearing that allows the wheel to spin freely on the axle. Holes within the wheel half allow water to exit the cavity between the wheels, but these holes also allow condensation and debris to build up. This design fails to protect the roller bearings inside the wheel cavity, allowing pressurized water to remove the protective grease on the rolling elements and cause corrosion.

The SMWA is designed to sit within the wheel cavity and shield the roller bearings between the wheel halves. The seal material, which features silicone rubber with stiffening additives, is chemically resistant to bearing and axle greases as well as environmental contaminants. The seal can tolerate high temperatures typically reached during landing and braking, up to 400^{0}F. The seal is also designed with toughness and tensile strength that can withstand the centrifugal forces of the spinning wheel while maintaining its structural integrity, compression, and position between the wheel halves.



A cross-sectional view of the seal installed between two wheel bearings and making contact with the lower and upper rim portions of the landing gear. The blue arrows depict how environmental contaminants typically enter the wheel assembly and the red arrows show how the seal would deflect their entry.

SWMA seal fitted to a wheel bearing of a landing gear wheel assembly. The second wheel bearing would be placed on top of the seal to enclose the space between the two wheel bearings.

APPLICATIONS

The technology's potential end user(s) include:

+ **Aircraft maintenance, repair, and overhaul providers**
+ **Wheel manufacturers and installers**

PATENT INFORMATION

US Patent Application number 18/591,682

CONTACT INFORMATION

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TECHNOLOGY SOLUTION

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