CASE STUDY

LONG-LASTING GREASE FOR SATELLITE REACTION WHEEL

INDUSTRY:
Aerospace

APPLICATION:
Satellite Reaction Wheel

COMPONENT:
Precision Bearing

LOCATION:
USA

BACKGROUND

Space applications require some of the most technically sophisticated lubricants known to the industry. Once launched, mechanisms within these applications are almost impossible to service, which makes selecting the correct lubricant a critical task for design engineers. The wrong lubricant could contaminate the component and cause failures or evaporate and fail to lubricate the mechanism for the life of the application. A leader in the design and manufacture of rockets and spacecraft, approached Nye Lubricants in search of a grease for their reaction wheel bearings. The reaction wheels in this satellite design would spin continuously for a minimum of five years and required a reliable, long-lasting lubricant that could prevent wear under vacuum conditions.

CHALLENGES

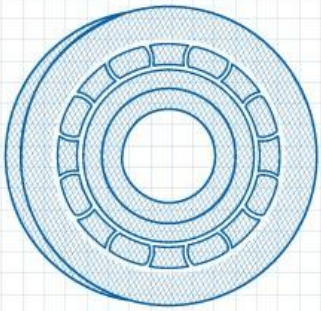
- Can we provide a low outgassing grease with excellent vacuum stability?
- Can Nye provide a grease that will last for, or beyond, the life of the satellite system?

SOLUTION

RHEOLUBE® 2000

A sodium complex soap thickened, medium viscosity, multiply-alkylated cyclopentane grease

- Ultrafiltered to prevent bearing failure from contamination.
- Long-lasting Pennzane formulation exclusive to Nye
- Low outgassing and vapor pressure
- Wide-temperature performance



RESULTS

Nye engineers worked with the customer to discuss possible solutions including custom formulations as well as our existing line of space lubricants. Using test results gathered by engineers in our Vacuum Aerospace and Semiconductor Test Laboratory, Nye was able to provide the customer with pre-validation data including outgassing, vapor pressure, and particle generation results. The customer ultimately selected Rheolube® 2000 as it exceeded their vacuum stability and life requirements, and they remain satisfied with its performance.

Base Oil Properties	Conditions	Rheolube® 2000	Test Method
Chemistry	–	Cyclopentane/Sodium Soap	–
Temperature Range	–	-45 to 125 °C	–
Kinematic Viscosity	-40 °C	72,000 cSt	ASTM D445
	40 °C	110 cSt	
	100 °C	15 cSt	
Viscosity Index		137	ASTM D2270
Grease Properties			
Vacuum Stability	24 h, 100 °C	TML 2.461 wt%	ASTM E595
		CVCM 0.729 wt%	
Knudsen Vapor Pressure	25 °C	1.79 x 10^{-10} Torr	–
SRV	100N, 50Hz, 1mm stroke, 2 h, 40 °C	Coefficient of Friction = 0.11 mm	ASTM D5707
		Wear Scar = 0.41 mm	

*CTM: Nye Company Test Method

Since 1844: Our performance is reflected in the value we bring to our customers.

Nye Lubricants is a leader in the innovation, formulation and provision of synthetic lubricants, enabling and improving breakthrough products and critical new technologies. We bring proven experience, deep technical knowledge and customer focus to solve our customers' toughest challenges, adding tangible value to products in a wide range of industries and applications.

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