

ULTRA-LOW OUTGASSING FOR WAFER ROBOT BEARINGS

INDUSTRY:
Semiconductor

APPLICATION:
Wafer Transfer Robot in
Vacuum Environment

COMPONENT:
Bearing

LOCATION:
Japan



BACKGROUND

In-vacuum and cleanroom applications require lubricants with low-outgassing properties in order to reduce the risk of contamination and potential failures. Nye was approached by a company that manufactures robots for the semiconductor industry who needed a high temperature, ultra-low outgassing grease for robots operating on OLED Display (organic light-emitting diode) manufacturing lines. The environmental conditions were high vacuum and typical operating temperatures were in the range of 160°C to 240°C. The company was using a PFPE grease in the application but wanted to improve the outgassing properties.

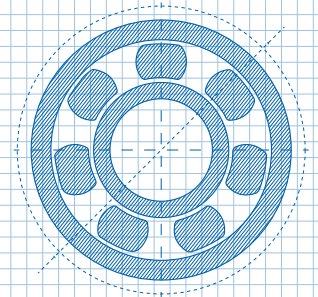
CHALLENGE

- Can Nye formulate a grease that provides outgassing, friction, and wear properties that are significantly better than those of NyeTorr® 5300 and 6300 greases, both industry standards in the high vacuum world?

SOLUTION CUSTOM FORMULATION

A PTFE thickened, heavy viscosity, NLGI Grade 1, perfluoropolyether grease.

- Highly stripped version of NyeTorr® 6300S
- Lowest outgassing grease ever produced by Nye
- Operates -75 to 250°C, a wider temperature range than NyeTorr® 6300



RESULTS

Nye formulated a custom product for this company to meet their requirements for all specs, including outgassing results that were four times lower than NyeTorr® 6300 results. Testing was also completed to ensure friction and wear characteristics of the grease were not affected by the special processing necessary for low outgassing results. This custom formulation is now being used in the bearing as an ultra-low outgassing grease with low torque and good friction and wear properties.

Base Oil Properties	Conditions	Custom Formulation	Test Method
Chemistry		PFPE / PTFE	
Temperature Range		-75 to 250°C	
Kinematic Viscosity	40°C	200 cSt	ASTM D-445
	100°C	57 cSt	
Viscosity Index		346	ASTM D-2270
Grease Properties			
NLGI Grade		1	ASTM D-217
Outgassing/TML/CVCM	24 hrs, 125°C	0.012%/0.004%	ASTM E-595
4 Ball Wear	75°C, 2 hrs, 1200 RPM - 20 kg	0.5 mm	ASTM D-2266
	75°C, 2 hrs, 1200 RPM - 40 kg	1.3 mm	
Knudsen Vapor Pressure (torr)	200°C	8.55 E-08	CTM-059

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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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