



# Case Study

## NYE LUBRICANTS SUCCESS STORIES

**CONFIDENTIAL  
CUSTOMER**



**Industry:** Semiconductor

**Application:** Wafer Transfer Robot  
in Vacuum Environment

**Component:** Bearing

### BACKGROUND

A company that manufactures robots for the semiconductor industry 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 NyeTorr® 5300 and NyeTorr® 6300 greases in the application, but wanted to improve the outgassing properties.

**For more information,  
contact our technical expert.**

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### 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, industry standards in the high vacuum world?

#### Bearing in Robot Arm



### SOLUTION



1. Nye chemists were given testing requirement specs that the new grease had to exceed.
2. An experimental grease was formulated.
3. Vapor pressure, outgassing, and vacuum stability tests were conducted.
4. Testing results were at the lowest edge of detection Nye had ever seen for a lubricant.
5. 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.

Lubricant Properties		Experimental Grease	NyeTorr® 6300S	Test Method
Base Oil		PFPE	PFPE	
Thickener		PTFE	PTFE	
Temperature Range		-75 to 250°C	-75 to 250°C	
Kinematic Viscosity	40°C	204.5 cSt	188.3 cSt	ASTM D-445
	100°C	61.6 cSt	56.8 cSt	
NLGI Grade		1	1	ASTM D-217
Outgassing/TML (125°C, 24 hrs)		0.007 %	0.026 %	ASTM E-595
4 Ball Wear (75°C, 24 hrs, 1200 RPM)	20 kg	0.6 mm	1.0 mm	ASTM D-2266
	40 kg	1.1 mm	1.3 mm	
Knudsen Vapor Pressure (torr)	200°C	3.05 E-08	8.55 E-08	CTM-059

### RESULTS



The experimental grease met customer requirements for all specs, including outgassing results that were four times lower than NyeTorr® 6300 results. The grease is currently being used in the bearing as an ultra-low outgassing grease with low torque and good friction and wear properties.