CASE STUDY

REDUCING FRICTIONAL TORQUE FOR LINEAR GUIDE RAILS

INDUSTRY:
Semiconductor

APPLICATION:
Semiconductor Processing Equipment

COMPONENT:
Linear Guide Rail

BACKGROUND

A company that manufactures semiconductor processing equipment approached Nye about lubricating the rail in a linear guide system. The company wanted to reduce wear in the sliding application. The environmental conditions were high vacuum, and typical operating temperatures ranged between 25°C - 150°C. To prevent contamination and premature failure of the system, the company required a lubricant with low outgassing, excellent friction and wear properties, and low particle generation.

CHALLENGE

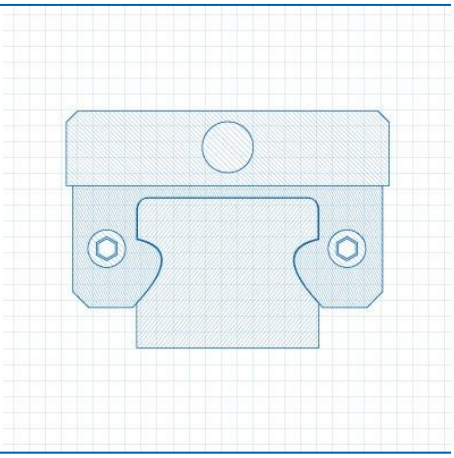
- Can the lubricant reduce wear under sliding conditions?
- Lubricant must be cost-effective.

SOLUTION

NYETORR® 5200

A soft, PTFE thickened, medium viscosity cyclopentane grease.

- Extremely low particle generation
- Low outgassing and vapor pressure
- Reduces frictional torque on sliding surfaces
- Excellent vacuum stability



RESULTS

Nye's Applications Development and Validation Testing Lab ran Vacuum Stability, Dynamic Particle Generation, Knudsen Vapor Pressure, and Coefficient of Friction & Wear testing on several NyeTorr® products. The customer decided to move forward with NyeTorr® 5200 as the lubricant for this linear guide after it proved to reduce frictional torque on sliding surfaces by approximately 33%.

Base Oil Properties	Conditions	NyeTorr® 5200	Test Method
Chemistry		PTFE / Cyclopentane	
Temperature Range		-45 to 150 °C	
Kinematic Viscosity	40 °C	108 cSt	ASTM D445
	100 °C	15 cSt	
Viscosity Index		137	ASTM D2270
Grease Properties			
Oil Separation	24 h, 100 °C	2.8%	ASTM D6184
Evaporation	24 h, 100 °C	0%	CTM*
Vacuum Stability	Total Mass Loss	0.068 wt%	ASTM E595
	Collected Volatile Condensable Materials	0.007 wt%	
Knudsen Vapor Pressure	25 °C	1.1 x 10^{-8} Torr	CTM*
SRV Coefficient of Friction & Wear	Coefficient of Friction	0.114	ASTM D5707
	Ball Wear Scar	0.44 mm	
Dynamic Particle Generation		ISO Class 3	

*CTM: Nye Company Test Method

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