

# **Case Study**

### **NYE LUBRICANTS SUCCESS STORIES**

### BionX™ (iWalk)

**Industry**: Medical

**Application:** Ankle Prosthesis

Component: Ball Screw

Time Period: April 2013 - June

2014

### **BACKGROUND**

Nye was contacted by iWalk, now known as BionX™ Medical Technologies Inc., a leader in the field of prosthetic devices. The company was working on designing powered "smart" prostheses, in particular an ankle prosthetic. Their design used a small precision ball screw to continually adjust the angle of the prosthetic foot relative to the lower leg. The ball screw is actuated by a battery powered electric motor. iWalk needed our help in maximizing the life of the ball screw while keeping the battery size small. Initial wear tests run by iWalk showed better results from 2 mm ceramic balls than 2 mm steel balls.

## For more information, contact our technical expert.

Bill O'Hearn

Regional Engineering Manager

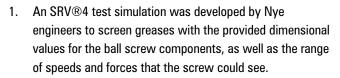
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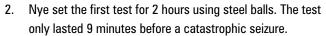
Email: bpo@nyelubricants.com

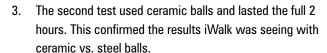
### **CHALLENGE**

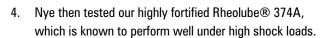
Which low friction lubricant can help minimize the amount of energy needed to actuate the ball screw while prolonging the operation time of the battery?

### **SOLUTION**











- 5. 374A was first tested with ceramic balls, but failed after only 43 minutes.
- 6. 374A lasted the full 2 hours when tested with steel balls. A 16 hour re-test showed that 374A performed consistently for the entire length of the test.

<b>Lubricant Properties</b>		Rheolube® 374A	<b>Test Method</b>
Base Oil		PA0	
Thickener		Lithium Soap	
Temperature Range		-54°C to 177°C	
Kinematic Viscosity	40°C	121 cst	ASTM D-445
	100°C	16.9 cSt	
4 Ball Wear (1hr, 1200RPM)	40 kg Load	0.44 mm	ASTM D-4172
Penetration	NLGI Grade	2	ASTM D-217
	Unworked	244	
	Worked 60x	267	
Low Temp Torque	Starting (-54°C)	6781 g/cm	ASTM D-1478
	Running (1 hr, -54°C)	1879 g/cm	
SRV, Step Load		2000 N	ASTM D-5706

### **RESULTS**

Based on Nye's recommendation, and after some of their own testing, iWalk finalized their ball screw design using steel balls and Rheolube® 374A in their ankle prosthetic.

