

## Case Study: NanoLub® RC-X Additive for Heavy Machinery

Main Finding: Increase in Bearing durability by nearly 100% and in Bearing dynamic load by about 25%.

Client

ZVL Slovakia, a.s

The tests purpose was lubricity improvement of tested oil by determination of bearing durability. The tests were conducted on Open ZVL Bearing type 6305, lubricated with OL-46 neat oil vs.OL-46 formulated with NanoLub® product. In both cases the tests were conducted on 20 samples of 6305 bearings. The tests were run consecutively, one after the other at the same testing station. The tests ran on 5 testing spindles, with 4 bearings on each one. The test was carried out until the 5<sup>th</sup> bearing dropped out in the process of testing normal course (for both tests).

### Open ZVL Bearing type 6305



#### Test conditions:

Test equipment used: RAH -3D	
Radial load:	4500 N
Axial load:	0
Method of testing:	Until the fifth bearing dropped out from the test due to fatigue effect - pitting.
Test frequency of rotation:	4300 / min
Type of used lubricating oil:	
1st test	OL-46
2nd test	OL-46 + Nano Save1

	OL-46	OL-46 + Nano Save1
Maximum oil temperature reached before insertion of bearings	51°C	49°C
Reached temperature measured on the outer bearing rings	51-61°C	46-56°C

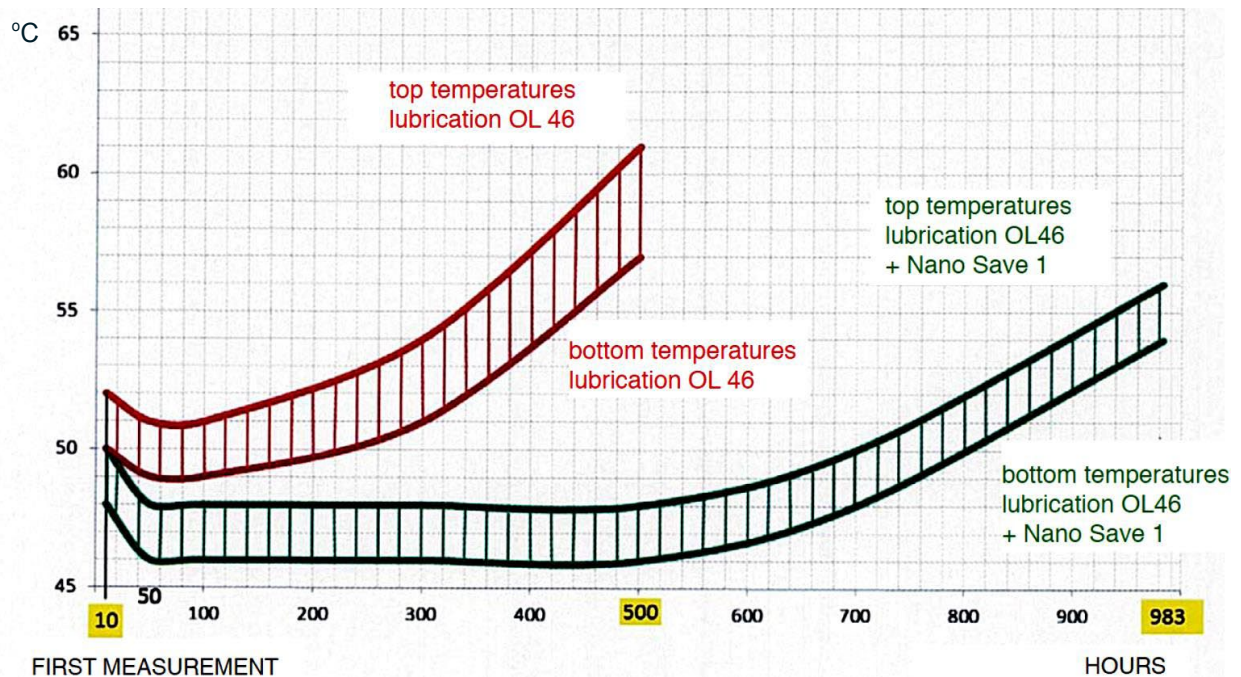
**Test results:**

	OL-46	OL-46 + Nano Save1
Unbiased estimate of basic durability of produced batch	501 hours	938 hours
Unbiased estimate of BDBC of produced batch:	22751 N	28488 N
Ratio of unbiased estimate of BDBC of produced batch and catalogue (defined) value:	109.9 %	137.6 %

The calculation of the durability results, bearing capacity and overall evaluation was carried out in accordance with ISO 281, PN 5 0209 and work procedure no. PP 42.01-910.4

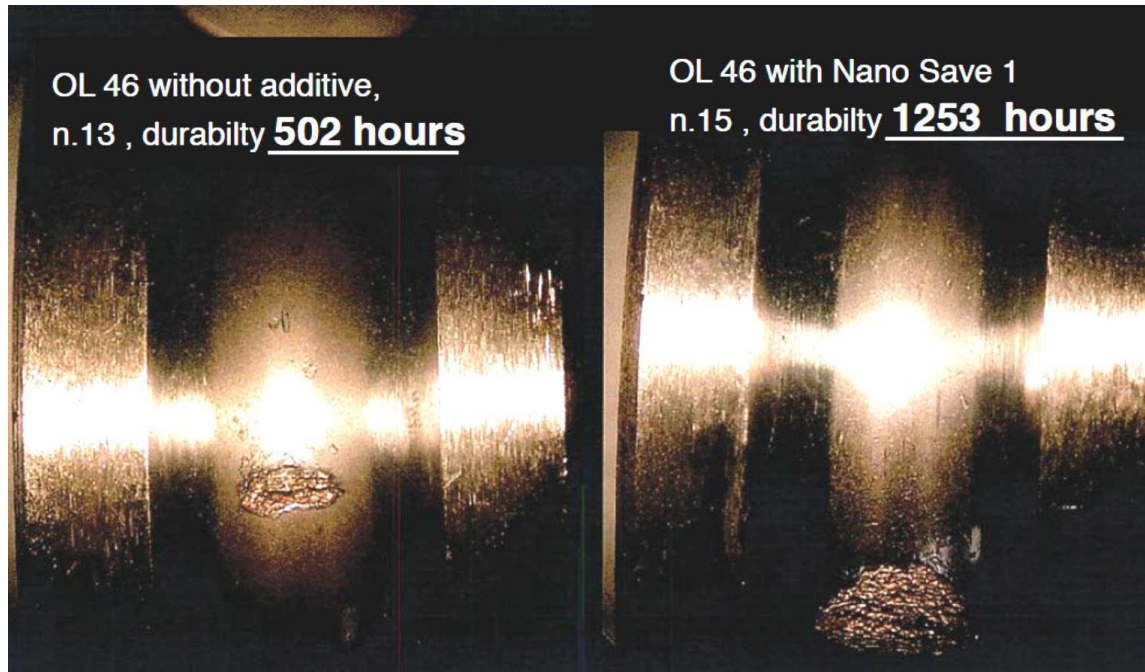
Durability Tests of rolling bearings for lubrication with oil.

The graph below demonstrates the temperatures of Open ZVL Bearing type 6305 during the test, with the addition of NanoLub®:



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Photos 1 and 2 - wear and tear of the running surface of both inner bearing rings (differently lubricated) is about the same, the difference is in the lifetime according to the method of lubrication.



The comparison of the obtained results demonstrates the effects of NanoLub<sup>®</sup> additive in OL-46 bearing oil, leading to an increase in service life of the bearings by nearly 100% and to an increase of their dynamic load by about 25%.

It is clear from the results of the comparative test that the overall aspect can be categorized as satisfactory, demonstrating a clear positive impact of the added ingredient – NanoLub<sup>®</sup> on the achieved service life and capacity of rolling ball bearings.