

Latest Technologies in Laboratory Corrosion Testing for Lubricants and Greases

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Introduction

Corrosion stands as a constant worry as machines are the center of production and testing for most industries. These machines operating in damaging environments such as in the rain, submerged in water, exposed to the weather will expect corrosion to come into play. With corrosion, the chemical properties change as well as the physical and mechanical behaviors, resulting in a decrease in performance as the chemical makeups have been altered. Lubricants can be used to address this issue, creating a separation between the machine and the physical environment, resulting in longer lasting and higher performance machines. With the K9445X Corrosion Tester, lubricant greases can be tested for its ability to withstand exposure to a damaging environment.

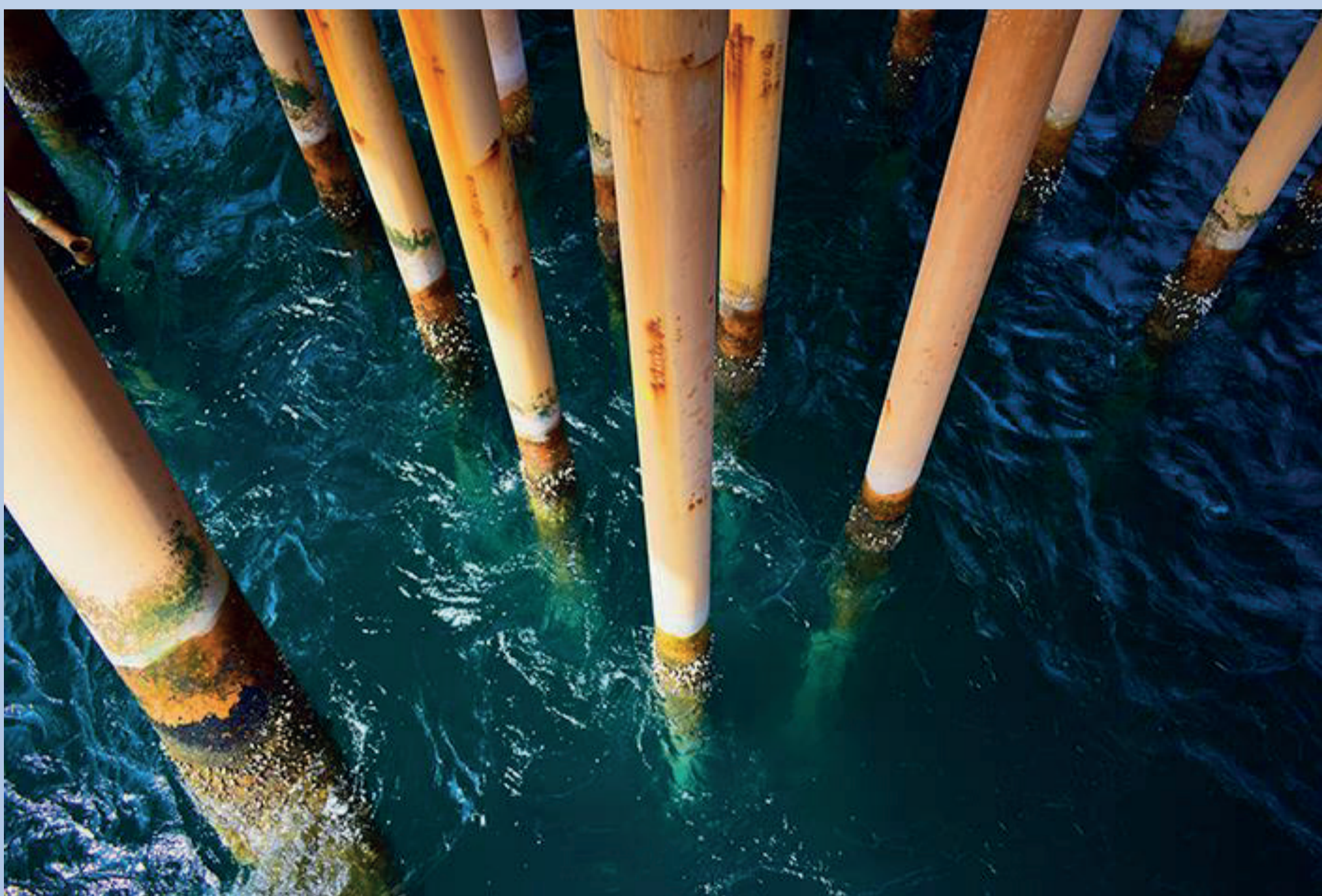


Figure 1 – Metal in a corrosive environment

Background Information

Purpose

Lubricant greases may look alike, but they all have differing compositions such as viscosity, water resistance, water solubility and a plentitude of other characteristics. With each change, the effectiveness of it on its metals will alter. The testing of greases is essential as the condition of greases must be made known before applying it to expensive machinery.

K9445X Corrosion Tester

The K9445X corrosion tester offers a simple method for the testing of lubricant greases. It applies the EMCOR test to find the corrosion inhibiting characteristics of the greases offering a general understanding of how much the grease decreases the corrosion rate against metals. As such, it makes possible to tell which greases are successful with protection in certain environments and which ones are not.



Figure 2 - K9445X Corrosion tester

Testing Procedure

The rolling bearings are filled with grease and is exposed to a damaging environment such as distilled water, synthetic sea water, or sodium chloride solution. The instrument will then alternate between running and standing conditions for a week, with its running condition being a rotation with a standard speed of 80 rpm. It is highly customizable, with settings to change the duration of each stop and run, what motor speed to rotate the bearings at, and the total hours to run to fully encapsulate what the grease could possibly be exposed to. Afterwards, the bearings can be inspected for rust and rated on a scale of 0-5 with 5 being severe corrosion and 0 with none. In addition, a grand total of 8 test positions can be used to compare greases.

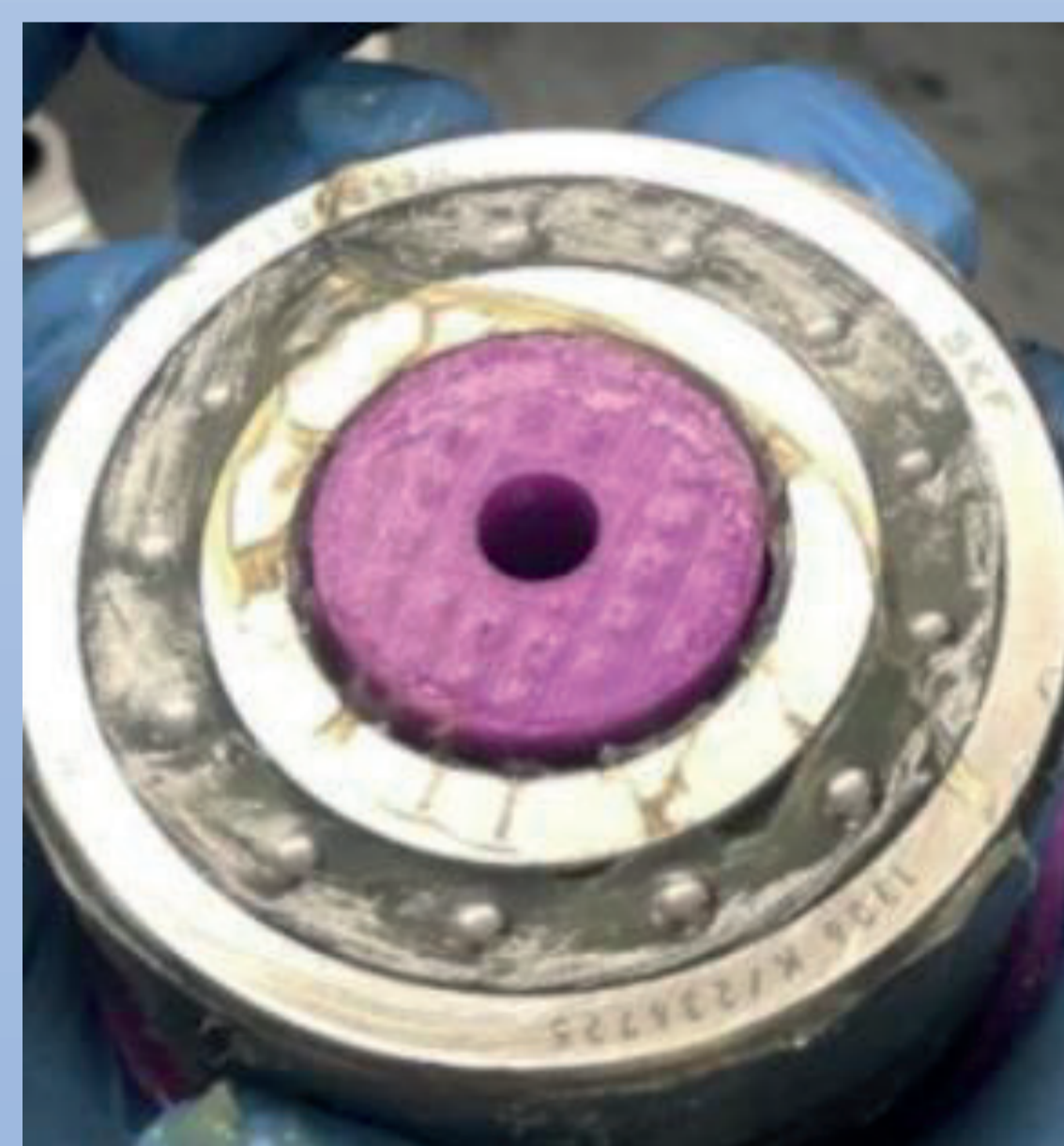


Figure 3 – Grease Coated Bearings

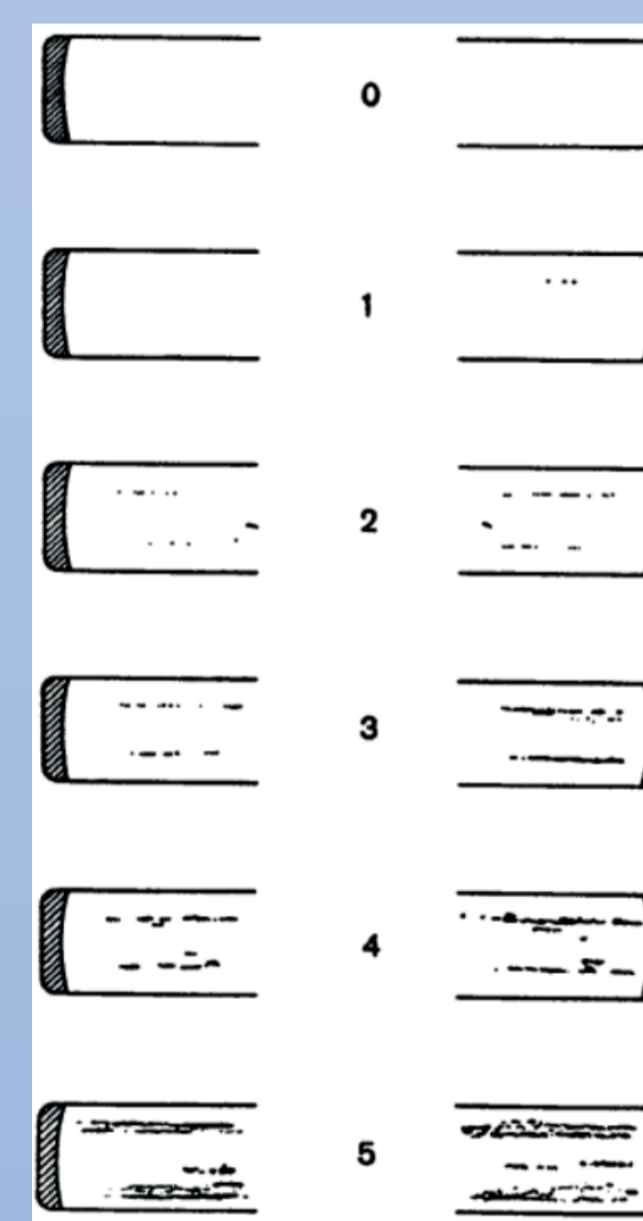


Figure 4 – Levels of Corrosion on bearings

Precision of K9445X Corrosion Tester

The K9445X corrosion tester is consistent at what it does. According to the experimental procedures with the instrument, the repeatability and reliability were found to be very high. Its repeatability, defined by its ability to gather the same results using the same operator, apparatus, conditions, operations, and methods between successive

tests would only exceed the values shown below in only in one out of twenty cases. Its reliability, defined by its ability to gather the same results using the same operator, apparatus, conditions, operations, and methods between two independent tests at different times stay the same, only exceeds the values shown in one out of twenty cases. These values represent the degrees of corrosion given by the instrument after each test.

Test Fluid	Repeatability	Reproducibility
Water as specified in 7.2	1	1
Synthetic sea water as specified in 7.3	1	2
Sodium chloride solution as specified in 7.4	1	2

Figure 5 – Precision values for different corrosive environments

Discussion

With this information of 0-5 severity for the corrosion of the bearings, it is made possible to demonstrate the extent of protection from the grease to protect against exposure to a damaging environment, resulting in a better understanding of the performance of the grease.

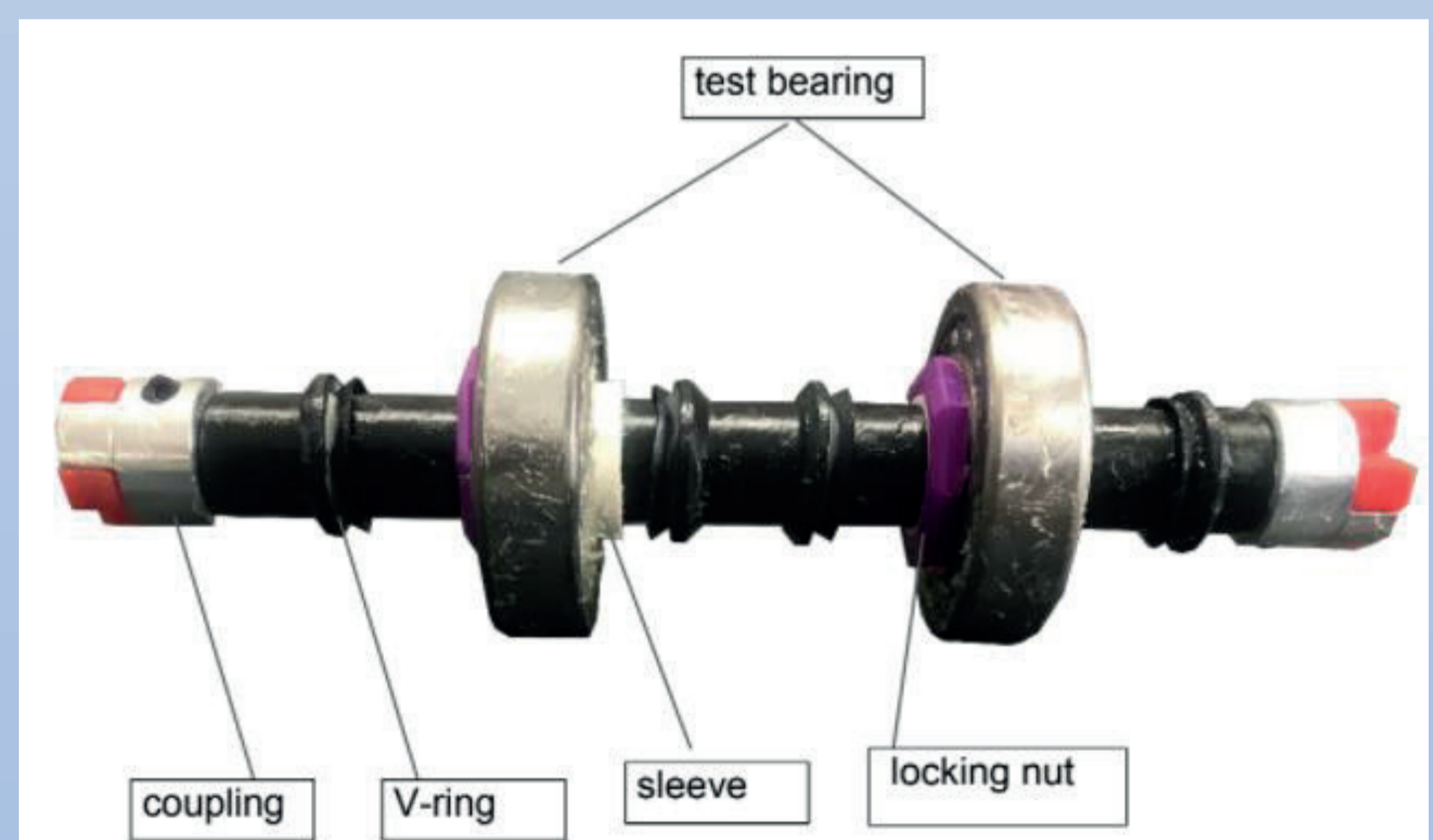


Figure 6 – Parts of the Instrument

Conclusion

New instruments and methods for laboratory testing of lubricants and greases are being innovated, allowing the confirmation of their quality and ability, therefore ensuring the performance of the machines that the lubricants are used on. The K9445X corrosion tester is extremely proficient at its job, creating a general idea of how a lubricant grease will function under damaging environments.

References

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