

DEX QM TEST REPORT CRANE 8

OVET B.V.
The Netherlands



Test report Ovet B.V. crane 8

In April 2019, DEX QM Premium Lubricants, received the invitation from Ovet B.V. in Terneuzen, to test DEX QM GEAR DP2 ISO VG100 gearbox oil with the aim of:

- Stopping further wear in the field
- Delaying the next overhaul turn
- Reducing energy consumption
- Reducing technical and operational costs

This field test took place on Crane 8, a floating lemniscate crane intended for handling large bulk cargoes in North Sea ports. Ovet B.V. operates 4 floating Lemniscate cranes.

For the test, the oil was changed at two identical gearboxes. The two gearboxes have practically the same load in operation.



The lubricant oils used are:

- A. DEX QM DP2 ISO VG100 - Lifting gearbox (200 liters)
- B. Major X ISO VG320 - Closing box (200 liters)

Both gearboxes are of the type:

- Brand : Thyssen/ Type: NK SDN 450/SO/S
- Pe(KW): 300/ Capacity: 200litres

Tests:

1. Oil change / 16-05-2019 - approx. 50 test hours
2. 1st oil sample / 21-06-2019 - approx. 300 test hours
3. 2nd oil sample / 29-08-2019 - approx. 500 test hours
4. 3rd oil sample / Test report Ovet B.V. crane 8 - October 2019
5. Report

The results:

1. Before the oil change, both gearboxes were completely drained and - except for a small residual layer on the bottom - ready to be filled. layer on the bottom - ready to be filled with DEX QM DP2 ISO VG100 resp.
 - *(Major X) ISO VG320 oil.*
 - *During the pre-inspection, the gearbox was turned up so that all the teeth could be properly viewed. The overall impression was good with clearly visible pits, craters and flat running here and there on the field.*
2. For the 1st analysis on 16-05-2019, after about 50 HOURS ON DEX QM DP2 ISO VG100 from the lift box, an oil sample was taken. This was sent for review and analyzed to ORM consultancy in the laboratories of AR Analyses and Bureau Veritas Oil & Petrochemicals.
 - *The standard tests: membrane, photo, ICP, particle number (ISO 4406), TAN, water, viscosity, PQ index.*
 - *The result gave a very low iron value (Fe-3), from which it can be concluded that the pitting has stopped on the lifting case. For the next oil sample, it was decided to extend the laboratory test with the MCP paint test to see which sources are the possible cause of the pitting.*
3. For the 2nd analysis on 21-06-2019, an oil sample was taken from both gearboxes to see compare the Fe value between the two oils. On taking the oil sample at operating temperature temperature, it was observed that the (Major X) ISO VG320 foamed heavily and the DEX QM ISOVG100 did not. (See images in the appendix)
 - *The standard examination: membrane, photo, ICP, particle number (ISO 4406), TAN, Water, viscosity, PQ index*
 - *MCP, varnish/resin*
This laboratory result indicated that the DEX QM DP2 ISO VG100 lifting case now had a value of 4 (Fe) and on the (Major X) ISO VG320 case a value of 10 (Fe). Also, that the cabinet was suffering from resin formation and that the DEX QM DP2 ISO VG100 the resin had just been brought into solution in the hoist cabinet (resin = Varnish).
4. For the 3rd analysis on 29-08-2019, another oil sample was taken from both gearboxes. Again, at operating temperature, strong foaming was observed in the case and not in the lift box. (See images attached)
 - *The standard examination: membrane, photo, ICP, particle number (ISO 4406), TAN, Water, viscosity, PQ index*
 - *This laboratory result indicated that the DEX QM DP2 ISO VG100 lifting case now had had a value of 5 (Fe) and at the (Major X) ISO VG320 case a value of 16 (Fe). The resin formation in the (Major X) ISO VG320 cabinet appears to have increased and it is important to apply resin cleaning or replace the oil soon.*

How does DEX QM DP2 ISO VG100 wear in gearboxes?

- **PITTING** occurs when there is no hydrodynamic separation between the rotating parts. Pitting indicates high iron content in the analysis. If a high iron content is found in the analysis is found, one knows that a wear process is underway and that this shortens the life of the gears, bearings and the gearbox.
- **DEX QM prevents pitting** because it binds to the metal parts, providing a lubricating surface. The oil achieves the maximum result in the FZG friction test (FLS >14). The test shows that DEX QM's lubricating film remains unbroken even under heavy loads. The extreme-pressure properties of DEX QM DP2 ISO VG100 exceed those of the (Major X) ISO VG320 as has now also been demonstrated in practice in this test. The low friction that typifies the DEX QM DP2 ISO VG100 in this case results in a strong temperature drop of 4 degrees, resulting in less wear.
- **VARNISH** is created because an oxidation process takes place in lubricating oil - the polymerization of the hydrocarbon molecules. The varnish is a polar bond to metals recognizable by the brown discoloration. The varnish creates an uneven lubricating surface which breaks the lubricating film and prevents the oil from doing its job.
- **DEX QM DP2 ISO VG100 has a strong cleaning effect**, which deposits the old varnish deposits in the gearbox and allows it to circulate. Although this varnish does not cause pitting, the MPC value should be monitored. In older gearboxes, a lot of contamination caused by the strong cleaning effect. If the MPC value is higher than 35, it is advisable to filter the oil briefly.
- **FOAMING** oil is caused by spinning gears of air. That air slowly separates from the oil. The compressed gases cause huge increases in temperature. This works by oxidation of the oil, which can cause varnishing. Often, with non-stable base oils, there is a strong tendency for varnish to develop. Foam also has a strong negative impact because cavitation occurs.
- **DEX QM DP2 ISO VG100 has extremely good gas discharge and is very oxidation- and viscosity-stable. Therefore, DEX QM DP2 ISO VG100 does not foam.** (See images in the appendix)

Conclusion:

After intensive testing, the DEX QM DP2 ISO VG100 has demonstrated that there is no pitting in the hoist case and that this oil with a viscosity 100 offers better protection than an oil with a viscosity of 320. With this, it can be expected that for Ovet B.V. immediate and longer term, the following benefits will be visible:

- a. Lower operating costs (stoppage)
- b. Extending the life span of the complete gear box
- c. Strong fuel and energy savings
- d. Higher reliability

Dex Oil B.V. thanks Ovet B.V. for giving DEX QM Premium Lubricants the opportunity to test an ISO VG100 against an ISO VG320 and thus test the results of the FZG tests in practice.

Appendices:

- Images foam formation
- Analyses retrievable

The (Major X) oil selected by Ovet B.V., which was tested against the **DEX QM** Premium Lubricant, is an excellent oil which will hardly differentiate as far as results from similar oils from the other Majors. All parties are aware of the problem that they cannot influence the monomolecular layer thickness of the oil molecules.

The DEX QM technology can, which leads to extreme and long-term benefits in performance.

Appendix 1: Foaming Images

<p style="text-align: center;">FOAM – (Major X) ISO VG320</p> <p>Gear box Oil: (Major X) ISO VG 320 in the cabinet Ovet Crane No. 8. Visual inspection: 29-08-2019</p> <p>Make: Thyssen Type: NK SDN 450 SO/S Sn: 8 8252 5 1132/53016 KW: 300 N1/N2 rpm 1000/40</p> <p>Content: 205L Hours: 526 Temp: 52.5 °C</p>	<p style="text-align: center;">NO FOAM – DEX QM GEAR ISO VG100</p> <p>Gear box Oil: DEX QM DP2 ISO VG 100 in the cabinet Ovet Crane No. 8. Visual inspection: 29-08-2019</p> <p>Make: Thyssen Type: NK SDN 450 SO/S Sn: 8 8252 5 1132/5301 KW: 300 N1/N2 rpm 1000/40</p> <p>Content: 205L Hours: 500 Temp: 48.2 °C (-4,3°C)</p>
	