

IS/18
dated --.--.2018

Information Message on PRANA Predictive Analytics and Remote Monitoring System

As it follows from the analysis of the gas turbine unit shutdown, performed on --.--. 2018, and its further cooling down in the shaft-turning gear mode, the following deviations were detected in the lubrication system operation:

- As the rotor speed decreases, with the shaft-turning gear valve open and the main lubrication pumps turned on (main lubrication oil pump (MLOP) - 10MBV21AP001 and auxiliary lubrication oil pump (ALOP) - 10MBV21AP002), an emergency pump (ELOP - 10MBV21AP003), activation and continuous operation are registered, caused by a decrease in lubricating oil pressure, noted at the following measurement points:
 - below 3.3 bar at the head of the lubrication pump - (setpoint of 10MBV21CP001 discrete pressure sensor);
 - below 1.3 bar at the supply to bearings - (setpoint of 10MBV26CP101 analog pressure sensor);

Later on, with the shaft-turning gear valve open and simultaneous operation of three lubrication pumps (MLOP, ALOP, ELOP), the oil pressure readings are oscillatory (MAX \approx 1.5 bar, MIN \approx 1.0 bar).

ELOP deactivation is possible at oil pressure above 1.7 bar (setpoint of 10MBV26CP101 analog pressure sensor).

MLOP current varies between 29 and 41 A, ALOP current varies between 34 and 42 A.

These fluctuations in the lubrication pumps current correlate to the changes in the lubrication system pressure and may evidence of unstable operation of pumps due to their air locking.

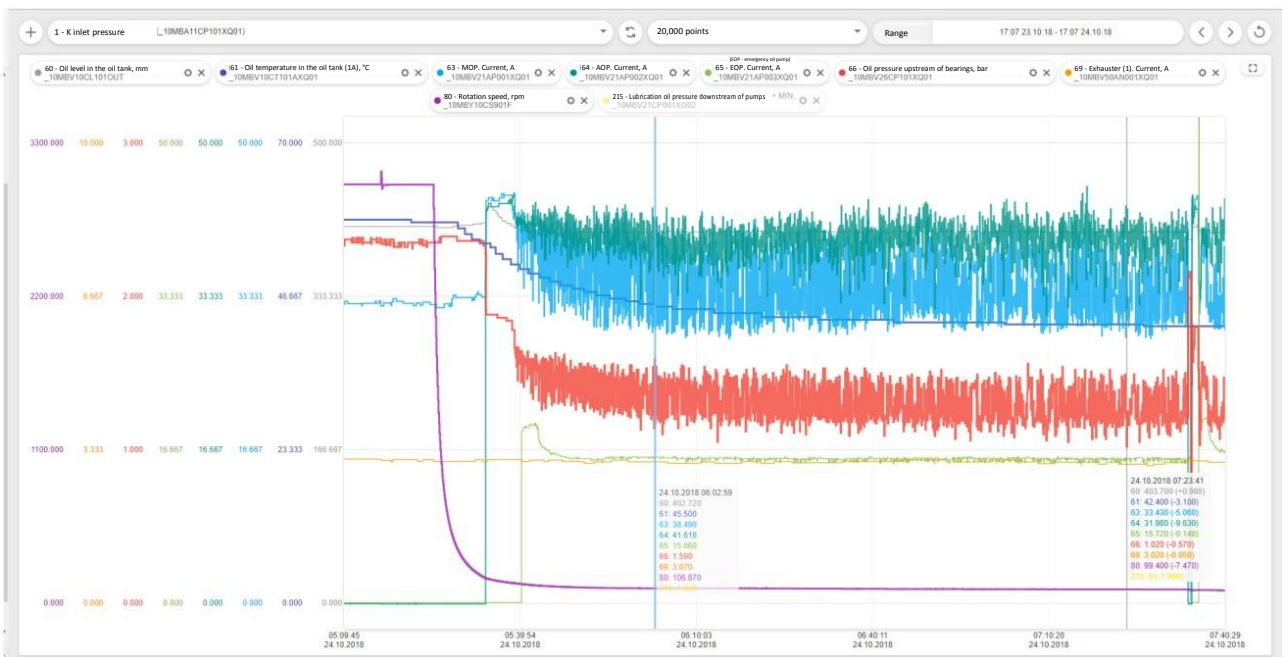


Fig. 1 Lubrication system performance after GTU shutdown on 24.10.2018

- With closed shaft-turning gear valve, deactivated MLOP and ALOP and constantly operating ELOP, the oil pressure decreases from 2.16 bar to 0.27 bar without a subsequent increase in pressure generated by ELOP. Pressure restores to the previous value only after the main pump (MLOP or ALOP) is activated.

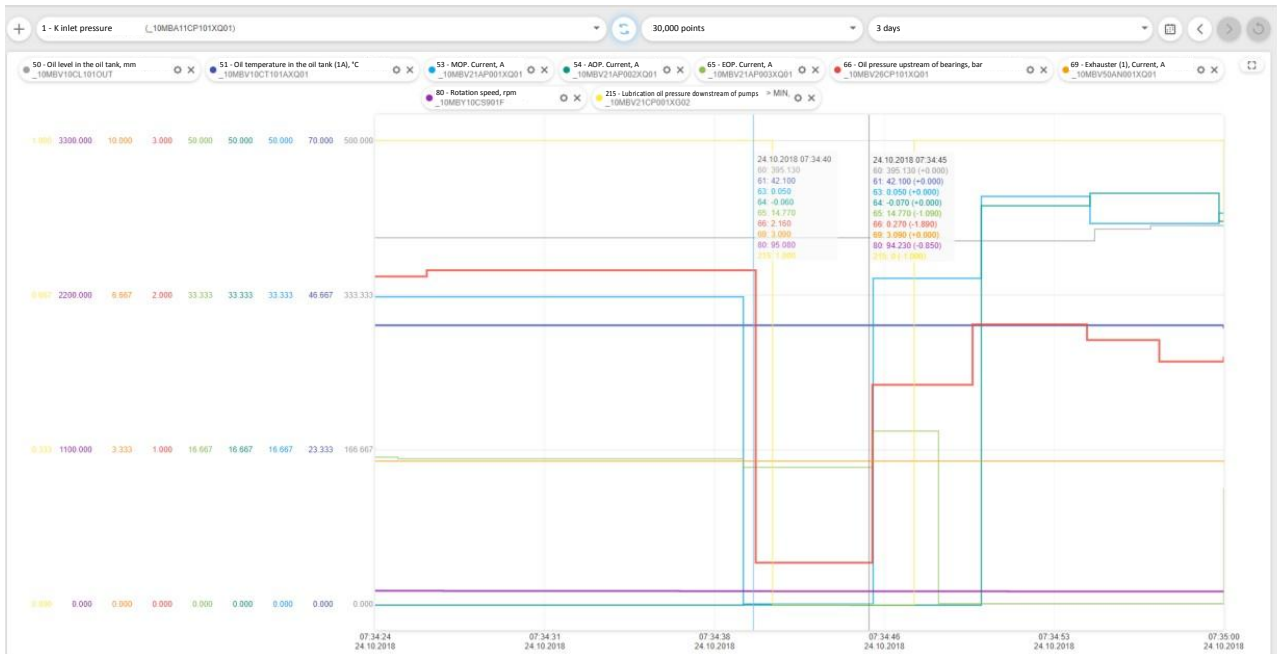


Fig. 2 ELOP performance (emergency lubrication oil pump)

- The current consumed by oil vapor exhauster during operation is 3.0 A, which exceeds the rated current of 1.0 - 1.2 A (according to factory documentation), which may indicate an excessively high flow through the exhauster, which can be caused by extraneous air ingress into the system.

It is recommended to:

- Check for the absence of extraneous noise during MLOP, ALOP and ELOP operation.
- Using the additional control instrumentation, measure the head pressure at each oil pump (MLOP, ALOP, ELOP) during simultaneous and individual operation, with shaft-turning gear valve open and closed.

MLOP and ALOP should provide the following pressures with shaft-turning gear valve open:

- 4.6 - 4.8 bar at the pump head (according to 10MBV211CP501 pressure gauge);
- 1.6 - 1.8 bar at the supply to bearings (according to 10MBV26CP501 pressure gauge or 10MBV26CP101 analog pressure sensor).

With shaft-turning gear valve closed and the nominal speed of GTU rotation, MLOP or ALOP should ensure the following pressures:

- 5.2 - 5.4 bar at the pump head (according to 10MBV21CP501 gauge);
- 2.1 - 2.3 bar at the supply to bearings (according to 10MBV26CP501 gauge or 10MBV26CP101 analog pressure sensor)

When operated from batteries alone, ELOP should provide stable oil pressure to the bearings of 1.0 - 1.3 bar (according to 10MBV26CP501 gauge or 10MBV26CP101 analog pressure sensor) for more than 45 minutes.

3. Check the back-pressure valve operability at the head of ELOP (absence of jams, tightness).
4. Check an exhaustion in the oil tank, drain pipes and compare with the requirements of factory documentation. During the operation of at least one lubrication pump, the exhauster must provide a vacuum in the tank in the range of 3.0–4.0 mbar. Adjust the vacuum, if necessary.
With the help of portable devices, measure the current consumed by the exhauster in-situ and compare with the passport data.
5. Compare sensor oil level readings in the oil tank with the level through the sight glass. The recommended operating range of oil level during GTU operation (at nominal rotation speed and oil temperature in the oil tank of 60 °C) should be within 385 ± 10 mm. If necessary, add oil to the required level.
6. Through the sight glass and with the shaft-turning gear valve open, check the foam level in the oil tank and the depth of its distribution. If necessary, analyze the oil for changes in its physical and chemical properties and compliance with regulatory documents for energy oils.
7. In order to improve the quality of recommendations, please provide feedback.

Chief Specialist
on Turbine Equipment

/Signature/

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