Defective Main Engine Lubricating Oil Outlet diaphragm

The vessel had completed a scheduled dry-docking. After departing from the dry dock the vessel experienced extensive water leakage at various locations, which led to excessive water on the tank top. The leaks were repaired and completed the following day.

The following day an unusual noise could be heard from cylinder unit 4. The main engine was stopped and the crankcase opened. An inspection of the unit revealed problems that could not be rectified immediately.

Cylinder unit 4 was isolated. Furthermore the crew found the system oil was contaminated with 2% water. Without any rectification the main engine was restarted and the voyage resumed.

Shortly afterwards a loud noise was heard from the main engine and the exhaust gas temperature of cylinder unit 8 was slowly falling, so it was decided to stop the main engine for further investigation.

The crew changed several fuel injection valves and fuel pumps. After several starting attempts the engine was finally restarted.

During an inspection in the destination port, by the main engine manufacturer, it was discovered that there was extensive damage to the main bearings, big-end bearings, cross-head bearings, piston rods, piston crowns and exhaust valves. All these parts had to be replaced and the vessel was out of service for three weeks.

An investigation by the manufacturer's engineers found that two of the three rubber diaphragms on the crank case oil outlets were defective. Water from the tank top had entered the main engine sump tank via these defective diaphragms and thus contaminated the lubrication oil.

Consequences

The damage to the main engine was extensive and expensive. The repair cost for this type of engine damage can easily reach millions of dollars.

Prevention

Inspect the diaphragm sealing for the crankcase oil outlet every 32,000 hours of operation. We strongly recommend always replacing the diaphragms during inspection.

The cost of an inspection/replacement is minimal compared to the consequences if left unattended.

A water content higher than 1% could lead to critical damage within a few days of operation. If the oil system is contaminated by an amount of water exceeding the limit of 0.2%, the manufacturer should be contacted.

Sufficient oil should be kept onboard for one complete system change of the main engine crank case oil.

Discussion

Go to the "File" menu and select "Save as..." to save the pdf-file on your computer. You can place the marker below each question to write the answer directly into the file.

1. What were the immediate causes of this accident?

2. Is there a chain of error?

3. Is there a risk that this kind of accident could happen on our vessel?

4. Do we inspect the diaphragm sealing for the main engine crankcase oil outlet every 32,000 hours of operation?

5. If not how should this be implemented into our PMS?

6. Do we keep spare diaphragms?

7. Do we have sufficient oil onboard for one complete system change of the main engine crank case oil?

8. What are our procedures if the lubrication oil gets contaminated?

9. How do we test the lubrication oil?

10. How could this accident have been prevented?

11. What sections of our SMS would have been breached if any?

12. Is our SMS sufficient to prevent this kind of accident?

13. If procedures were breached why do you think this was the case?

14. What do you think was the root cause of this accident?

15. Do we have a risk assessment onboard that addresses these risks?