Lack of communication caused serious main engine damage

The engineers on the bulk carrier were doing scheduled maintenance on one of the ballast pumps. They had closed all the isolating valves to the ballast pump and put up notices about the job in the engine room and engine control room, but not on the bridge. They didn't finish the job on the first day, so continued the next day.

The following day the Master asked an officer to print out the alarm list for the ballast water management system before arriving at the next port as a port state inspection was expected. To get the list the officer had to start the ballast water management system, which he did.

The bilge high level alarm was suddenly activated in the engine room. An oiler checked the bilges and could see water pouring in, covering the tank top. An engineer turned off the power to the ballast water management system. He also found out that two ballast system valves were open from the main seawater crossover suction line. He closed these valves immediately to stop the ingress of the water. These valves had been opened automatically when the ballast water management system was started. The engineers pumped the water from the tank top into the bilge holding tank.

One hour later the M/E bearing wear alarm - Water Level 50%, went off. The lube oil for the crank case was found to have 0.09% of water in it. The second lubricating oil purifier was started. A couple of hours later the M/E bearing wear alarm went off once again. A second sample of the lube oil was taken, and it was found that the oil had 0.08% of water in it.

The chief engineer decided to partially change 3,000 litres of lubrication oil for the crank case. Afterwards a third sample was taken and the water content was 0.019%. The engine was stopped, and a full change of the lube oil was completed. A crosshead bearing was opened for inspection. No damage was found. However, one of the rubber diaphragm seals for draining the crankcase to the system lubricating oil tank was found to be defective. This caused the water flooding into the engine room to contaminate the lube oil.

The main engine was restarted, and the voyage resumed. The main engine was an electronic controlled model i.e. the exhaust valves and fuel injection system were powered by hydraulics. The system lubrication oil was also used as a hydraulic medium. The following day there were problems with some hydraulic components and the main engine had to be stopped. A couple of cylinder units and pumps had to be dismantled, cleaned and reassembled. The main engine could not be restarted because of low hydraulic pressure. It was decided that one of the cylinders had to be blanked off. The main engine was started and stopped several times over a number of days as the hydraulic system was leaking. Because the engine was running on low rpms, the scavenge trunking became fouled with oil deposits, so the engine had to be stopped several times and the trunking had to be cleaned.

Because water contaminated the lubrication oil there was serious damage to several crosshead bearings, crosshead pins, main engine cylinders, hydraulic pumps and main engine turbo charger bearings. ■

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.

When discussing this case please consider that the actions taken at the time made sense for all involved. Do not only judge, but also ask why you think these actions were taken and could this happen on your vessel?

1. What were the immediate causes of this accident?

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

3. How could this accident have been prevented?

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

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

6. Does our SMS address these risks?

7. When maintenance is being done in the engine room, is this discussed with the bridge officers?

8. If maintenance is being done on equipment operated from the bridge, are signs also posted on the bridge?

9. How do we ensure that the valves to the seawater line are secured if we are working on the ballast system?

10. Are our procedures on how to operate systems with pressurised seawater (open to sea) sufficient?

11. How often are the diaphragm seals for the crankcase lubricating oil inspected?

12. Is the diaphragm included in the vessel's PMS?

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

Make sure you are aware of the Club's Member Alert from 30 October 2015 about the **Main Engine Lubricating Oil Outlet diapraghm**, see attached.

Main Engine Lubricating Oil Outlet diaphragm

In 2007, the Swedish Club published a Member alert, The "Forgotten" Rubber membrane, where we reported about a number of main engine claims caused by water contaminated lubricants. The incidents caused by failure of the lubricating oil outlet diaphragm connecting the main engine crankcase and sump tank.

We have recently seen an increasing number of incidents regarding these "forgotten" parts of the machinery, hence the need to address this topic again.

The engine configurations concerned are all 2-stroke main engines from Wärtsilä and MAN Diesel A/S.

Consequences

In all cases excessive quantities of water on the tank top have entered the main engine sump tank via the defective diaphragm and subsequently contaminated the main engine lubricating oil system, resulting in severe damage to the main engine bearings and journals.

The repair cost for the engine damage can easily reach millions of dollars. This obviously does not take into account loss of time, towage, transshipment of cargo and other commercial embarrassment caused by the casualty.

Manufacturers' recommendations

The design of both Wärtsilä and MAN Diesel A/S lubricating oil outlet diaphragms are quite similar. Wärtsilä has recommended maintenance as follows:

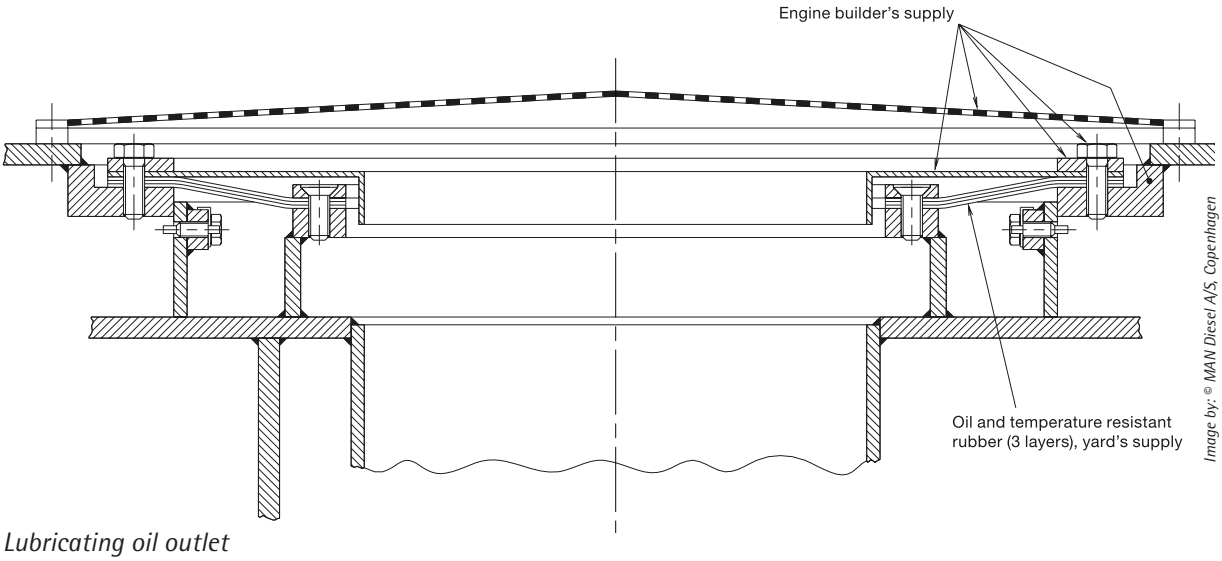
- Inspection/replace at 40,000 running hours or at dry dock.

MAN Diesel A/S, Denmark, has released a Service letter SL08-492/JVG, March 2008. In order to avoid water entering the main engine sump tank through a defect in the crankcase oil outlet, it is recommended to:

- Inspect the diaphragm sealing in the crankcase oil outlet every 32,000 hours of operation, and replace the diaphragm if indicated by the inspection.

Failed diaphragm

Deteriorated diaphragm



Lubricating oil outlet

It should be stated that during construction of the ship, the parts in question are supplied by the yard, and not by the engine manufacturers.

Loss Prevention

All situations with excessive water on the tank top in connection with defective diaphragms are critical. During a dry-docking it is, for various reasons, more common to have water on the tank top than during normal operations.

In line with the recommendation issued by MAN Diesel A/S, Copenhagen, we recommend that all diaphragms are replaced in connection with every relevant scheduled inspection of the ship.

If heavy contamination of water is present in the system: (1) the lube oil in the sump tank must be transferred to a settling tank, (2) the sump tank and crank case should be cleaned, and (3) fresh oil filled to the level recommended by the engine maker.

Observations

Obviously all situations with excessive water on the tank top in connection with defective diaphragms are critical. During a dry-docking it is, for various reasons, more common to have water on the tank top than during normal operations.

In the recent incidents we have noted that none of the vessels had enough lubrication oil onboard to completely replenish the system.

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

We would recommend to owners that spare diaphragms are kept onboard at all times.

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