



Extensive main engine damage due to broken lube oil (LO) filter

A container vessel experienced extensive main engine damage due to broken lube oil (LO) filter candle mesh wires. Initial signs appeared in mid-January (wire fragments in the sump tank strainer), followed by repeated discoveries of mesh wires and metal fines through February, March, and April. By May, significant contamination was confirmed, with metal fragments embedded in bearings, crankpins, turbochargers, and other vital components. Starting late May, the vessel went off-hire at a lay-by berth in Singapore. Repairs focused on dismantling and cleaning major engine components, polishing crankshaft journals, and replacing or overhauling bearings, liners, filters, pumps, and other damaged parts. Delays arose primarily from the need for critical spares such as new bearing shells.

Causes

- Filter Candle Failure - The LO auto filter candles broke (potentially due to design, manufacturing, or handling

issues). Wire fragments circulated throughout the lube oil system, causing bearing scratches and scoring.

- Insufficient System Flushing - Simply replacing damaged filter candles did not address wire remnants that had already migrated to the sump, bearings, and pipelines.
- Delayed Recognition - Mesh-wire findings in January were not followed by a full system check, leading to deeper contamination over time.
- Mixed or Unsuitable Filter Elements - Using different filter brands or mesh sizes may have reduced overall filtration efficiency, worsening the contamination.

Best Practices

- Immediate System Flushing - If a filter fails or foreign particles are detected, promptly flush and clean the entire LO system (piping, coolers, sump, bearings) to prevent further spread.



- **Correct Filter Elements** - Use filter candles that meet the engine maker's specifications. Avoid mixing brands or mesh sizes without explicit approval.
- **Routine Condition Monitoring** - Conduct regular lube oil analysis, crankcase inspections, and sump checks to detect early signs of contamination or wear.
- **Crew Training & Vigilance** - Train personnel to investigate even minor indications of LO contamination, filtration or bearing issues. Proper handling of spare filter elements can prevent damage before installation.
- **Collaboration with Makers & Class** - Engage the engine manufacturer early in the troubleshooting process to mitigate and resolve issues quickly.

Questions

1. 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?
2. Does our SMS/PMS address these risks?
3. What early warning signs might indicate that filter candles or lube oil systems are compromised?
4. When fragments or debris are discovered in the lube oil system, what immediate actions should the crew take to minimize further damage?
5. How frequently should crankcase and sump inspections be carried out to detect contamination at the earliest stage?
6. What procedures should be followed when replacing filter candles to ensure correct handling and prevent accidental damage?
7. Why is a full system flush critical after any filter element failure, and what could happen if it is overlooked?
8. How can regular oil sampling and lab analysis help identify developing issues in the lubrication system before they escalate?
9. In what ways can crew members be trained to identify subtle signs of system contamination or bearing distress?
10. How does maintaining the correct specification and quantity of spare filter elements reduce the risk of mixed or unsuitable parts being used?
11. Why is early communication with the engine maker important when signs of contamination first appear?
12. Based on this case, what preventive strategies could be adopted to stop similar lubrication system failures in the future?
13. What immediate, actionable steps can we take from today's discussion?