



Lube oil real time monitoring

MAN Energy Solutions

Future in the making

Condition monitoring

What is the added value, in terms of engine operation of continuous lube oil monitoring in real time?

If lube oil is a key factor that determines actual lubrication and therefore the smooth operation of the rotating components (bearings, con-rods, camshafts etc.) of an engine, it is also a key determinant in the good heat dispersion in the engine, its cooling, its cleanliness and its protection against corrosion.

Therefore, it is important to ensure both the lube oil quality and the condition of the lube oil flowing in the engine. It is one of the mainstays of Condition Monitoring applied to engine operation and maintenance.



All the damages undergone by the engine are somehow related to lube oil

We know that 50% of the engine damages are caused by lube oil alteration. To be clear, when lube oil is polluted, contaminated, or altered, lube oil becomes the source of engine deterioration or even damage occurrences. Furthermore, 70% of engine defects are visible in the lube oil.

So if nothing is done quickly, the wear of a major component, cylinder scuffing, bearing shell seizure or water ingress, for example may, in a matter of minutes cause a major damage i.e. a nightmare for the engine operators.

Essential inspections and analyses

All the engine manufacturers urge their customers, in terms of vigilance, to protect the condition of their engines and the lube oil. To do so, it is recommended to carry out all the maintenance operations described in the maintenance guides and to perform regular lube oil analysis.

Condition Monitoring System

However, despite pre-established schedules, circumstances may occur that can be detrimental to the integrity of the engine, its major components, or its lube oil. This is precisely the purpose of the Condition Monitoring systems which are used to act at the right time on the engine and its auxiliaries, according to the current needs and state of the engine. « Depending on the engine operating context, the needs and state of the engine change and deteriorate differently over time, requiring more or less important maintenance operations», explains Frédéric Rivière, technical project manager for Lube Oil Condition Monitoring at MAN Energy Solutions.

Indeed, to start a corrective action when it is necessary, one needs to have the relevant data in real time. All Condition Monitoring systems generate real-time information and alerts.

Whenever there is an alarm, quick reaction is necessary to prevent damage occurrences. So, Condition Monitoring provides gradual information and warnings according to the significance of the anomaly. It is then the engine operator's job to output the information to carry out the required measures and action ... and thereby prevent the worst from happening. and thereby prevent the worst from happening.

Process defects before they become major damage occurrences

In this field, MAN Fluid Monitor for lube oil is particularly innovative. This Condition Monitoring system is used to react in real time as soon as a deviation or a defect has been detected. It ensures lube oil quality, pollution, and contamination monitoring; it also keeps an eye on the deterioration of the components and the engine (by the engine itself). « There is no better way

prevent major damage occurrences than to provide continuous real time engine state monitoring. Thanks to an alarm and an engine stop recommendation issued by the system, the operator can quickly act to solve the anomaly », sums up Benoît Perrot, Product Manager of MAN Fluid Monitor, launched at the beginning of 2020.

... to Condition Based Maintenance

The Must Have of engine operation, in terms of engine performance, availability and maintenance optimization is without any doubt Condition Based Maintenance i.e. to implement maintenance schedules which consider the actual condition of the engine throughout its operation. Yet, Condition Based Maintenance aimed at by the engine operators can be performed only if they have been provided with a Condition Monitoring system. The shipping classification societies are aware of this and urge the shipowners to use such systems.

So, whenever we get as close as possible to the time when a deterioration begins, we protect pro-actively the rotating machines and keep them available.

However, that is not all. The advantages of a continuous approach are easy to understand: shorter internal response time, more targeted and efficient corrective actions resulting in improved productivity thanks to breakdown prevention. Production managers can now more than ever have full control over the production tools because they are less affected by untimely, sudden, and often costly breakdowns.

We fully enter the world of connected objects and personalization & optimization field provided by digitalization; the whole organization is more flexible, agile, and efficient.



When Condition Monitoring prevents the worst from happening....

Please find here below some defects (among many others) detected by MAN Energy Solutions Condition Monitoring system
i.e. MAN Fluid Monitor for lube oil

Engine being restarted

Detection of water ingress during the pre-lube phase

During the pre-lube phase, which precedes the engine start, if water is combined with lube oil, the risk of damage occurrence is high. Measurement in real time of the lube oil condition is a good way to prevent this type of damage occurrence.

A customer equipped with MAN Fluid Monitor for lube oil experienced it recently when its Condition Monitoring system detected water ingress- the engine starting sequence was stopped before the nonconformance caused a major damage occurrence.

The system was checked – condensation water had not been removed from the lube oil sump.



Cylinder scuffing

Another convincing example of the efficiency of MAN Fluid Monitor for lube oil, which during the starting phase after engine maintenance works detected a high increase of metal foreign particle content.

The engine was stopped immediately, and investigations carried out. Result: detection of a honing related problem in relation to the cylinder liner which prevented damage to major components.



Base Number (BN) deterioration

Another example, but not the least: during the COVID 19 lockdown period in 2020, the ship operation was stopped, and so was its engine. When the engine was started, the system quickly detected a very high deterioration of the lube oil quality. This deterioration generated an oil mist - very detrimental to the engine - which was later detected by the Oil Mist Detector.

The deterioration of the Base Number was confirmed afterwards by additional laboratory analyses. The ship 'staff could very quickly take the necessary measures to stop the engine, identify the cause of the deterioration and process it.

The lube oil was renewed further to the lube oil supplier's request to prevent any damage. The engine was then started in the best possible condition and the ship's operation resumed without any financial consequence that could have resulted from a major damage occurrence.

Engine running

Detection of water when the engine is running

MAN Fluid Monitor for lube oil detected water ingress in the lube oil system of a marine engine – the engine was stopped immediately. The engineers found the cause of the problem: water leakage in way of a cylinder head.

The cylinder head was replaced without delay and the ship operation resumed and unavailability prevented.



Lube oil pump wear

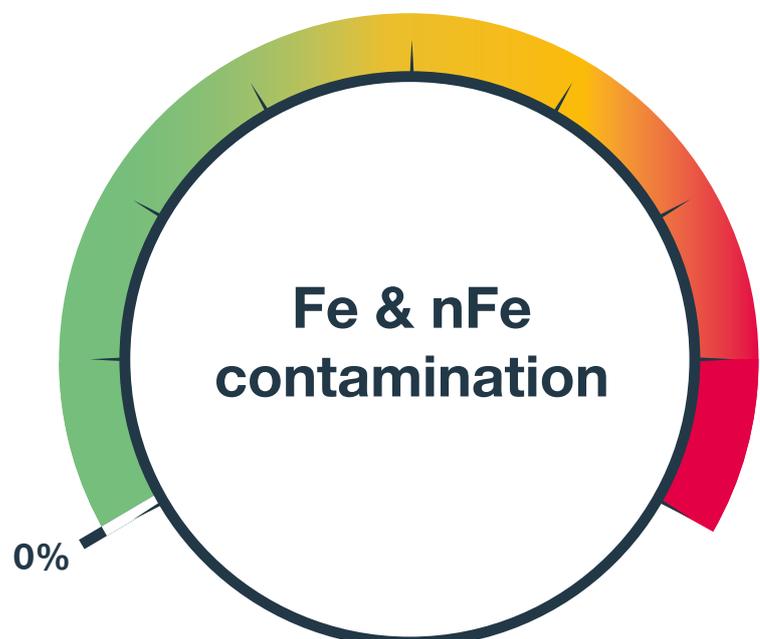
During the operation of a marine engine, foreign metal particles appeared following a slow gradual deviation. Preventive maintenance was performed to monitor this minor defect. After checking it was found that some components of the pump were worn.

The customer renewed the wear parts and prevented further damage to the pump. Condition Monitoring also protects engine ancillary equipment.

Bearing seizure

Bearing seizure is one of the major damage occurrences to engines. Thanks to MAN Fluid Monitor continuous monitoring, a MAN Energy Solutions customer detected a quick increase of foreign metal particle content of the lube oil and was thereby warned of a damaged mechanical part– it was a crankshaft main bearing: silica (casting sand) had got into the engine because of a lube oil filtering problem.

Since the Condition Monitoring system had issued an early alarm, the customer could stop the engine before the incident caused the destruction of major parts.



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