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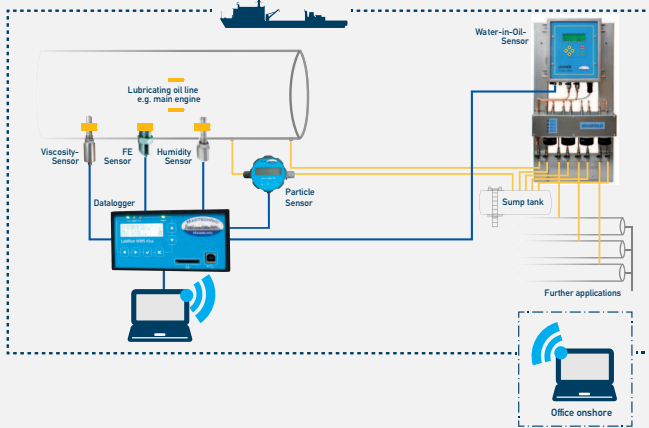
# MARTECHNIC®

Fuel, lube and hydraulic oil management

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# MODULAR MONITORING SYSTEM

## > LUBE OIL



• Lube Oil Inline Monitoring

OIL  
MANAGEMENT

# ONBOARD TESTING WITH DIGITAL 4.0 DEVICES

## > INNOVATIVE SOLUTIONS

### > TWIN CHECK 4.0

Water-in-oil and alkalinity  
reserve (BN, TBN)



### > IRON CHECK E

Iron concentration in  
cylinder drain oil



**Digitalization leads to new age testing of crucial oil  
parameters on board a ship:**

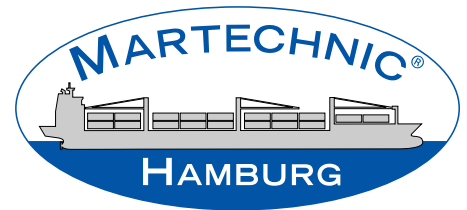
1. Automation of measurements
2. Digital evaluation with precision
3. Direct availability of test results

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## OIL QUALITY MANAGEMENT BY:



## EVERYTHING OKAY WITH YOUR OIL?

### > CHECKING OIL QUALITY ON SITE

- Water in Oil
- Base Number
- Acid Number
- Insolubles
- Viscosity
- Particles





# Introduction to Martechnic

**Successful oil quality management: 20 years' experience in on-site condition of fuel, lube and hydraulic oil monitoring**

**S**ince the founding of the company in 1997, Martechnic® has focused on designing and developing innovative technical solutions, including equipment and services for conducting continuous and preventive maintenance of critical parts of various engine systems. Irrespective of engine types and their application areas – be it the international maritime sector, offshore oil platforms or onshore industries – fuel, lube and hydraulic oils are crucial fluids used for engine operation.

In this respect, recognising the importance of the smooth running and continuous optimal performance of machinery, Martechnic regards the implementation of proper condition monitoring techniques of fuel, lube and hydraulic oil through the method of direct on-site assessment as an integral part of its established oil quality system. By means of regular or continuous oil condition verification, it is possible to not only improve equipment maintenance and reduce cost but also ensure compliance with international norms of environmental protection and to save precious resources.



**Fig.1 Martechnic's longstanding experience, technical expertise and regular innovative solutions are the key benefits of effective oil condition monitoring practice**





# Improving maintenance on-site

**Martechnic®'s goal is to provide engineers with equipment and management solutions to conduct continuous and preventive maintenance**

**M**artechnic®'s aim is to assist engineers in efficiently and safely running various engine types, and thereby reduce cost, save precious resources and protect the environment. Fuel, lube, and hydraulic oils are crucial fluids in operating nearly all engine types. Martechnic's mineral oil test kits enable users to test and evaluate fuel, lube, and hydraulic fluids promptly and on-site. An immediate assessment of the oil condition can be made, and effective decisions, as well as measures, taken at the right time.

The applications are easy to perform and provide operators with independence and re-assurance which is not achievable by external laboratory analysis alone. Martechnic's daily commitment is to meet the customers' requirements with fast and individual responses, application specific solutions and efficient order processing. There is, indeed, a wide network of agencies that represent Martechnic around the globe.

It is important to know the actual condition of mineral oil in order to run engines without producing any fluid waste, causing unnecessary down times or even catastrophic engine failure. Martechnic brings test and monitoring equipment to the user on-site, providing a means to produce results 'on the spot' and where they are needed most. Information drawn from this may confirm smooth running of engines, or give a pre-alert by detecting a trend in the wrong direction, allowing corrective action before any negative events occur.

Inferior or degraded quality of a product may get noticed along with possible engine wear before any severe failures occur; maintenance intervals can be corrected; or in the worst case scenario, the reasons for engine problems can be traced. Different applications have different important parameters, and so various combinations of tests could be beneficial and prevent a delay and detour through an external lab.

## Test kits

Water in oil is the 'omnipresent enemy' to every mineral oil application and requires focused attention. Gas oil and lube oil also have a negative impact, because a reduced flashpoint of a lube could result in a crankcase explosion. Viscosity is a major criteria to assess whether a supplied product matches with the quality stated on the delivery note. Fuel gets delivered by volume and is paid for by weight, and so density is a critical commercial factor.

All test equipment has been designed to be quick and easy in operation and to be used by persons unskilled in laboratory



procedures. However, the attention paid by the user, cleanliness and maintenance of the equipment, as well as its storage conditions, may affect the degree of accuracy obtainable. Portable test kits do not have the same accuracy as laboratory analysis devices. They do not fully replace them, but complement them instead. Martechnic offers test kits for nearly all fields of mineral oil application, and the Fuel & Lube Oil Test Cabinet is an 'all-in-one' solution.

Going a step further rather than providing only handheld equipment, Martechnic has adapted stationary sensors to put a focus on especially critical applications. The MT Modular Monitoring System is an assembly of various sensors connected with one central data logger. It is possible to monitor water content, viscosity and particles on the same engine, or any other combination of applications. The components can be selected





individually, and specifically, for certain applications. Should monitoring for any parameter not be required, the corresponding components get taken out of the scope of supply, and the investment will be amended accordingly, optimised for the user.

As any results gained either by lab or by on-site testing will always reflect on the condition of the sample drawn, Martechnic provides suitable sampling equipment to obtain representative samples, so that efforts invested in maintenance can pay off. Care should be taken to ensure that the sample is representative. Failure to give samples the attention they deserve is a risk and can cause misleading results. No representative sample means no correct results and therefore a waste of money.

Martechnic provides the drip sampling equipment mainly for fuel oil, but also for other fluids like hydraulic and lube oil, or even water. After sampling any kind of liquid it is essential to store, handle or send the samples in a safe container without possible risk of contamination. For that purpose, Martechnic also offers a range of clean sampling bottles – on a single basis or complete as a sampling kit which comes together with labels and a carton ready for forwarding to the laboratory. If required, Martechnic also provides customised sampling sets and a labelling system.



#### Martechnic offers a full range of test kits covering the following:

- Water in oil;
- Viscosity;
- BN (alkalinity reserve);
- AN (acidity);
- Flash point;
- Density;
- Compatibility;
- Insolubles;
- Pour point; and
- Salt water determination.

#### Ultra-sonic cleaning:

- Standard tanks;
- Tanks for larger components of customised size;
- External transducers for existing cleaning tanks; and
- Cleaning chemicals of highest efficiency.

The MT Sample Retention System is especially designed to comply with MARPOL Annex VI legislation, and, as a result of its manifold equipment, enables shipboard staff to easily follow the rules in a safe and efficient manner, as the IMO legislation demands that ship operators comply with strict regulations concerning emissions, which includes the collection, retention and storage of bunker fuel oil samples.

Economic and effective cleaning is of great advantage for on-board applications. Even filter elements and engine parts with complex bores and holes could be deeply cleaned ultrasonically. Piezoelectric ultrasonic elements produce high-frequency sound waves which generate mechanical energy in the cleaning liquid, causing a 'push and pull' effect on the surface of metallic cleaning objects. This cavitation effect creates vacuum bubbles which implode on the surface of the cleaning object. While the object stays undamaged, waste and deposits are removed thoroughly.

Martechnic offers portable transducers to operate in any existing tank on-board and cleaning tanks for fixed installation.



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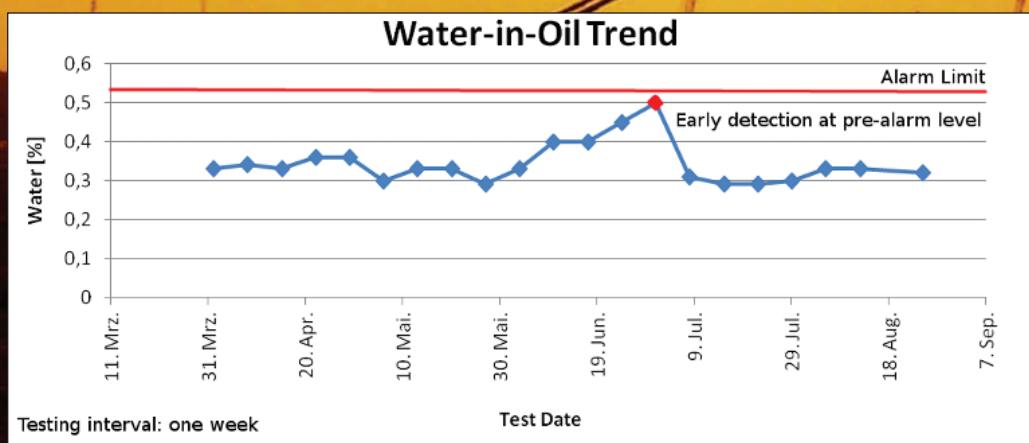
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# Trend analysis: advantages of regular/continuous oil condition monitoring

Regular or continuous assessment of the condition of lubricating and hydraulic oil enables early detection of any occurring changes or irregularities directly on-site. Likewise, this assessment provides the possibility of appropriate actions in order to ensure proper oil system maintenance and the optimal performance of engine system components. The trend analysis is an effective method that helps to follow the rate of change in the oil condition over time, and to directly determine if this change suddenly exceeds the set limits (the so-called 'alarm level line'). Moreover, data trending is initially intended for keeping the oil properties at a certain pre-alarm level and providing critical early warning information.

The graph shown depicts the regular monitoring with the TWIN CHECK 4.0 test device and the detection of a sudden increase in water concentration in lubricating oil at an early stage under the alarm limit line. Such early detection enables immediate action in the event of an occurred issue. As shown on the graph after the measures were taken, the water-in-oil content stays within its normal range when considering all subsequent measurements.



**Monitoring of water-in-oil trend with the TWIN CHECK 4.0 test device**

# The role of sensor technology for condition monitoring of environmentally acceptable lubricants (EALs)

**Internationally recognised standards on the protection of the marine environment – and the corresponding legislation adopted by the US Environmental Protection Agency (EPA) in 2013 – Vessel General Permits (VGPs) limit the application of traditional, mineral-based oils for vessels entering US waters and establish the necessity of environmentally acceptable lubricants for machinery parts below the waterline (e.g. stern tube bearing, thruster gearboxes and horizontal stabilisers).**

In the context of synthetic, ester-based, environmentally acceptable lubricants the conventional water-in-oil measuring devices cannot be employed for quick, on-site lubricant condition verification. As portable devices are designed for measuring the content of water-in-oil with the help of the reagent (based on calcium hydride), this method is not suitable for EALs because of the occurring chemical reaction between the reagent and parts of the lubricant itself.

Accordingly, it is advisable to install advanced sensor technology in order to conduct continuous real-time monitoring of water-in-oil concentration. Depending on the specific case, either sudden seawater ingress or lubricant contamination as a result of high humidity from the air, Martechnic offers two different sensor systems developed as a result of a particular case: the humidity sensor and the infrared water in-line sensor AHHOI. In both systems the importance of continuous measurement can be explained by the fact that contact between environmentally acceptable lubricant and water leads to the increased biodegradability of oil, which means that the lubricant's lifespan (initially longer than the life expectancy of a conventional mineral-based oil) can become decreased if water is not detected in due time.





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