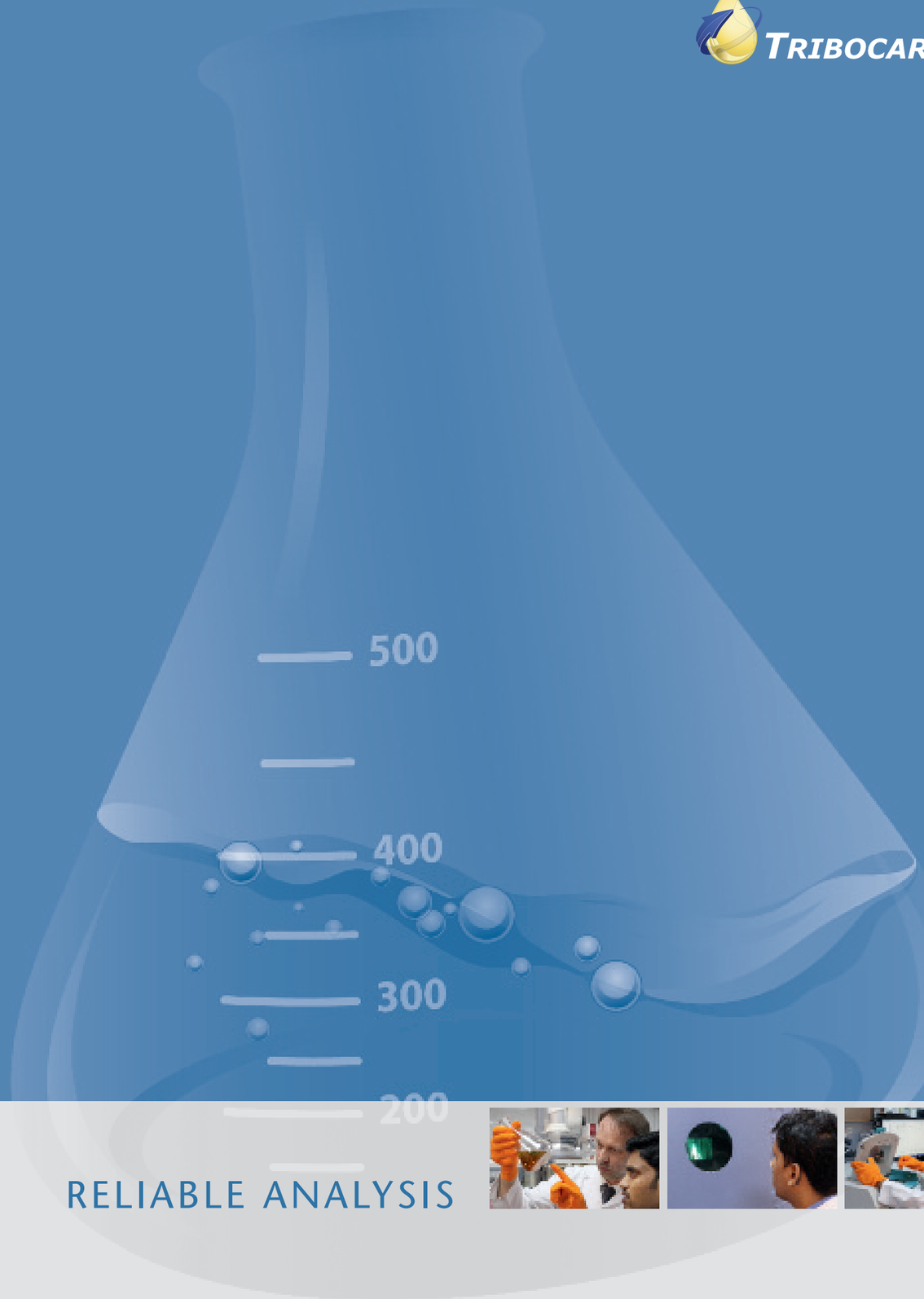
TRIBOCARE



TRIBOCARE.COM

RELIABLE ANALYSIS

About us

Tribocare FZC is a new generation laboratory using the latest analytical techniques to examine the quality of your products. We operate from the Sharjah emirate of the United Arab Emirates, which is well connected to the East and West. We guarantee first-class service at reasonable cost with quick turnaround time. We cater to all analytical needs with special emphasis on fuels and lubricants as well as potable water and fire fighting foam testing.

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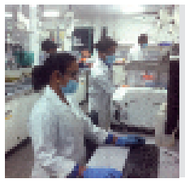

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WHY TRIBOCARE?

LABORATORY

TRIBOCARE has become the leading laboratory in the Middle East and its well-connected location has proven ideal for receiving samples from all over the world.

QUALITY

We are ISO/OEC 17025:2005 certified. We keep our high standards as we understand the implication that a cost effective analysis method can have on the precision of your results.

TIMING

The faster the better. Time is essential when some of the data is not within specification.

PRICING

We are here to provide the best possible service that is in line with your needs to enable you to run and improve your business.

RESULTS

The results are tracked and analysed quickly with the help of our enterprise level LIMS application. Analysis results come along with effective recommendations.

YOUR PARTNER

We are here to help you beyond providing data, trend analysis, condition reports and recommendations.

Fuels analysis is a very important aspect of machinery maintenance. Testing fuel for suitability before use is essential. Even though fuel related machinery problems are caused by only a small percentage of all the fuels which are supplied, the importance of regular fuel testing should not be underestimated.

Fuel analysis can identify potential causes for fuel filter plugging, smoke, loss of power, poor injection performance, malfunctioning throttle position sensors and sticking valves.

Marine Fuel Analysis

Residue and Heavy Fuel Oil

Before using a certain fuel in your engine, the fuel quality should be established by analysing a small sample in a reliable and well-reputed laboratory. This will help to optimize consumption, ensure regulatory compliance and select an appropriate purification process to improve the fuel oil quality. Furthermore, it contributes to preventing engine downtime and avoiding expensive dry-docking of the vessel.

When choosing a laboratory the selection should be based on expertise, the quality of data analysis and recommendations as well as the analysis speed, all of which at reasonable cost. Here in TRIBOCARE we fulfil all these requirements.

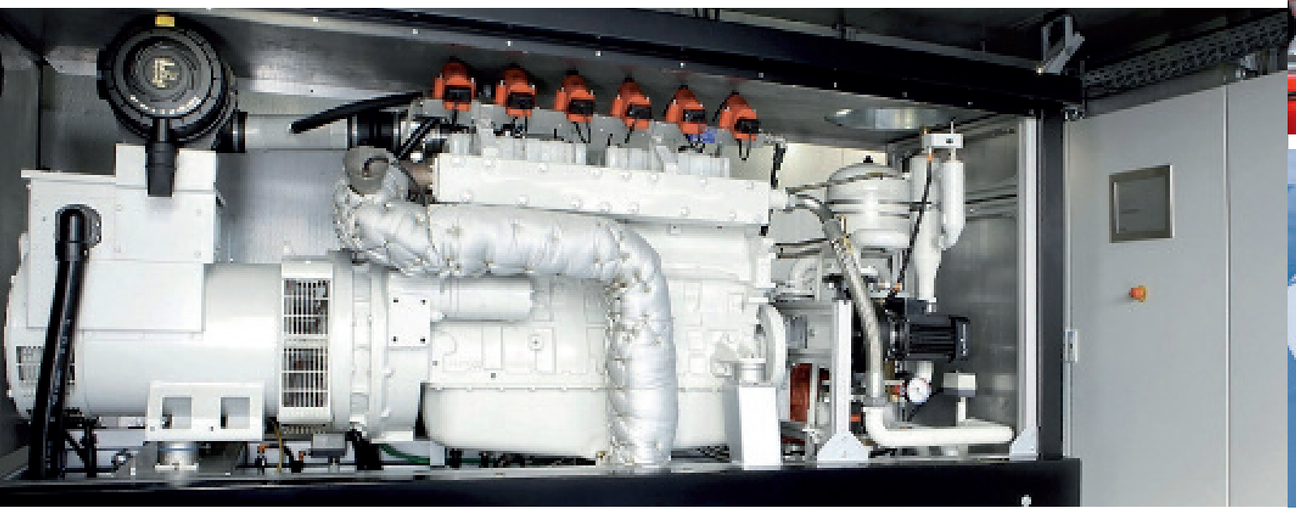
TRIBOCARE is fully equipped with state-of-the-art premium brand instruments to test bunker fuel samples in accordance with ISO 8217:2012. In addition, we have the means to carry out screening tests to check the fuel for chemical contaminants and impurities.

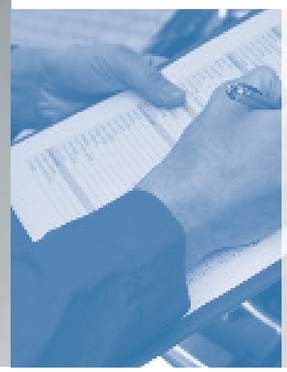
We are committed to providing accurate results, always within 48 hours and at reasonable cost.

Low and Ultra-low Sulphur Gasoil

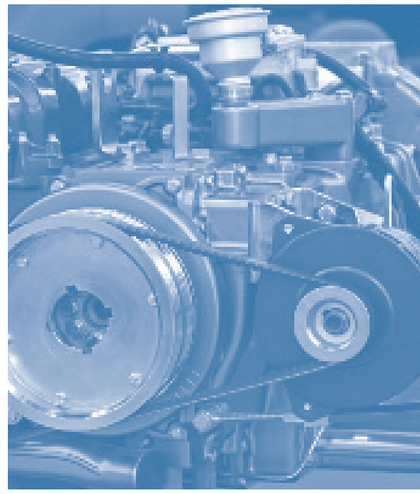
Marine diesel engines are categorized as low-speed, medium-speed and high-speed. These three engine types require different fuels. Low-speed engines can be fuelled with residual fuels containing high Sulphur levels whereas medium-speed engine fuel requirements vary according to the engine design. High-speed engines are sensitive to the fuel quality and run on clear distillate fuel with low Sulphur content.

The application of diesel with less than 500 ppm Sulphur can cause wear to the pump in engines of earlier generations due to the reduced lubrication properties of low and ultra-low Sulphur fuels. The ISO 8217 standard specifies a lubricity limit for distillate fuels with less than 500 ppm Sulphur. TRIBOCARE's laboratory is fully equipped for testing low and ultra-low Sulphur gasoil.





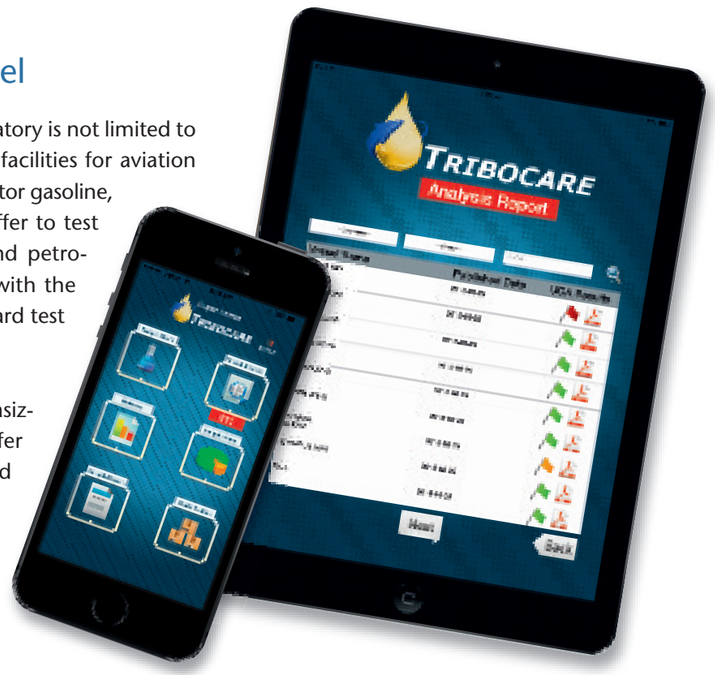
TRIBOCARE's laboratory is not limited to aviation and marine fuel analyses; we also analyse the quality of fuels for automotive and stationary engines of power generation plants in accordance with the latest industrial standards.



We analyse Your Fuel

TRIBOCARE's fuel testing laboratory is not limited to marine fuels; we have testing facilities for aviation kerosene, aviation gasoline, motor gasoline, diesel, biofuels etc. We also offer to test crude oil, naphta, base oil and petroleum solvents in accordance with the internationally accepted standard test methods.

We never grow tired of emphasizing that all the services we offer are of reproducible quality and at reasonable cost.



Aviation Fuel Analysis

Aviation Kerosene

Safety is the most important aspect of any flight. Therefore, the analysis and quality assurance measures for aviation fuels are stricter than the ones for non-aviation fuels. The basis for aviation turbine fuels is mainly straight-run kerosene. In the past, illuminating kerosene was sufficient as aircraft fuel. But modern flight engines demand high quality fuels of similar quality in every aspect although there are different suppliers at different airports. Jet fuel quality is subject to specifications by the International Air Transport Association, Engine manufacturers and test method standardisation bodies such as IP and ASTM.

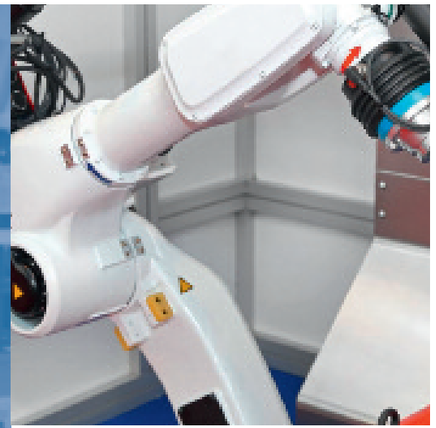
In many airports around the world jet fuel is supplied from a joint fuelling system which contains fuels from various suppliers. The aviation fuel mix in these systems has to meet the quality requirements according to the parameters, methods and limits stated by the AFQRJOS checklist, which covers the critical requirements suggested in the major aviation fuel standards.

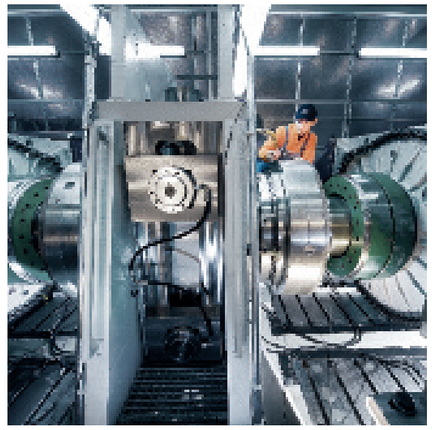
Aviation Gasoline

Aviation Gasoline is a highly purified form of gasoline used in small piston engine aircrafts. Its properties differ from those of aviation kerosene. Critical properties for AVGAS quality are volatility, calorific value, antiknock ratings and gum values. Careful handling is required not only during the manufacturing process but also during storage and distribution in order to protect AVGAS from contamination.

LUBRICANT ANALYSIS

With an increased focus on environmental laws as well as tougher Port State Control and oil major inspections, owners and managers are placing more emphasis on predictive maintenance practices. Oil analyses at regular intervals and correct data analysis ensure equipment reliability and keeps maintenance costs under control.





TRIBOCARE is an independent laboratory providing all analysis services required by our customers according to industry standards. We provide our services to major oil companies as well as global and local companies worldwide.

The oil condition is determined by many parameters and its impact on equipment varies over a period of time. Therefore comprehensive testing and trending of the results is important.

We offer two Levels of Service:

Standard – analyses the condition of the lubricating oils, focusing on large systems such as main engines and hydraulic systems to ensure that the oils are fit for continued service.

Enhanced – monitors the condition of the equipment in addition to analyzing the condition of the used oils. Analyzing the oil which is in contact with the machinery enables you to monitor the performance of this machinery. The oil of a small system can be easily replaced but for a critical system it might still be a useful service to prevent machinery breakdown.

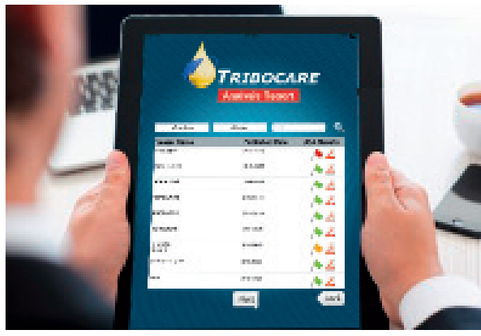
In general, the service describes the key oil characteristics such as kinematic viscosity, base and acid numbers. It evaluates the external contaminants, the trends of different wear elements, the size of particles, the ISO cleanliness index as well as the water content. The analysis reports also show new oil characteristics and OEM limits, which serve as a reference and form the basis for interpreting the Used Oil Analysis results in accordance with industry standards.

With the help of a colour system for quick and easy orientation the analysis reports provide an immediate overview of oil condition and trends.

LUBRICANT ANALYSIS

With the help of a colour system for quick and easy orientation the analysis reports provide an immediate overview of oil condition and trends.

The trending feature is also incorporated in our UOA application, which enables our customers to choose and compare various parameters with a single click.



Interpretation of the Results

TRIBOCARE's Used Oil Analysis (UOA) reports are based on the hands-on experience of our analysts and associated engineers and their in-depth knowledge of the manufacturing process and application of lubricating oil, especially in the marine sector.

Our UOA reports present the results in such a way that all end users – with or without technical background – can easily understand even highly technical aspects and implement the necessary preventive and predictive maintenance measures in order to protect their machinery and avoid expensive breakdowns.

For quick and easy orientation and assessment whether the oil is fit for continued service, the oil condition is rated in three color coded categories: Normal (green), Warning (yellow) and Critical (red).

In addition to the oil rating, our test reports contain a unit rating, which provides insight into wear and tear as well as any abnormalities that might occur in the machinery, which can be diagnosed from the oil sample from the relevant piece of machinery.

On the basis of the latest sample test data and the trending results, we include a recommendation of corrective action in our test reports if necessary.

Used Oil Trend Analysis

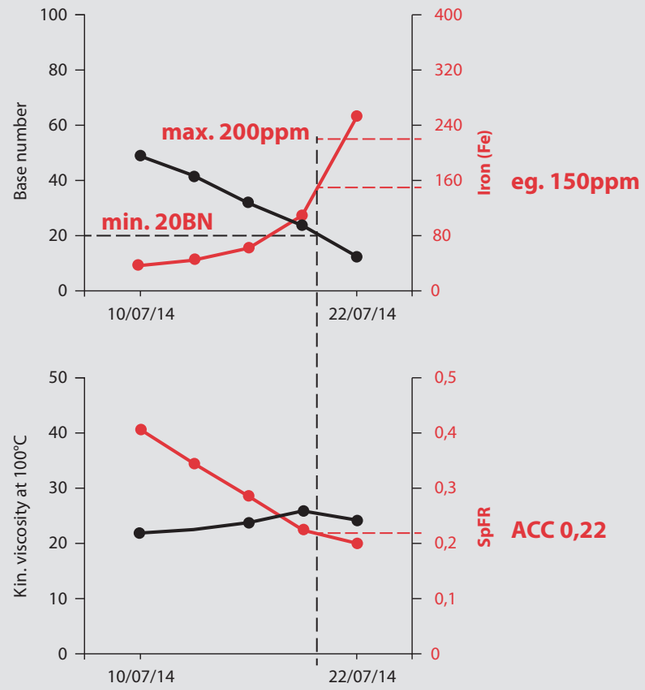
The trend analysis is a tool to monitor how the oil quality in various applications changes over a period of time compared to the levels which are considered critical for this particular application. A consistent rate of change leads to the conclusion that the machinery and the lubricating oil is functioning normally. In order to derive sound data it is very important to work with representative samples, always taken from the same sampling points. It is equally important to provide correct sample data, e.g. service hours of unit and oil, sampling date, oil grade and brand, oil volume and information on environmental conditions such as humidity and temperature. Warning and critical levels are specified for each individual parameter but beyond that wear and contamination patterns can be established by evaluating a combination of the data of different parameters. One example of this approach is the evaluation of saline water ingress, which is deduced from parameters such as Sodium, Magnesium and Chloride in combination.

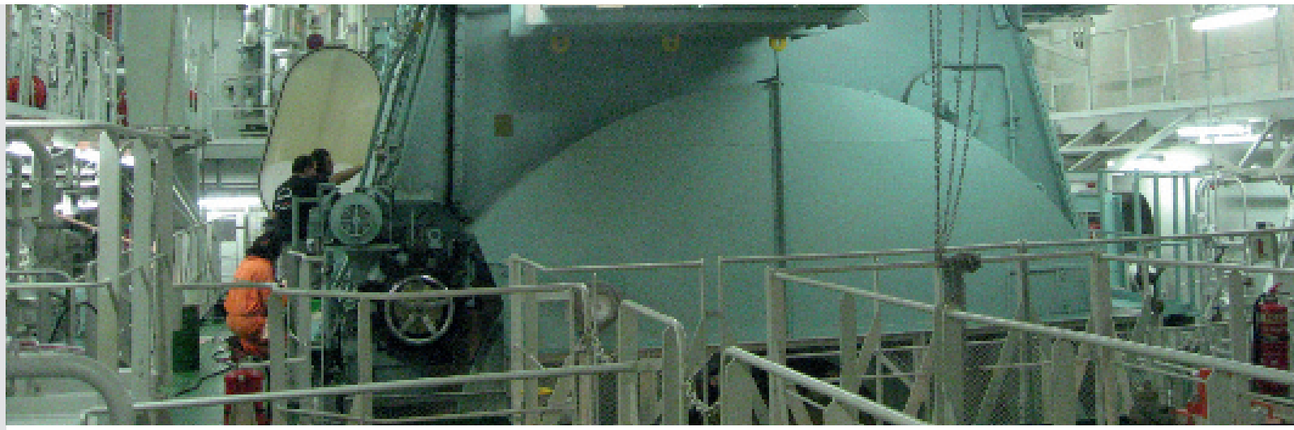
CYLINDER SCRAPEDOWN ANALYSIS

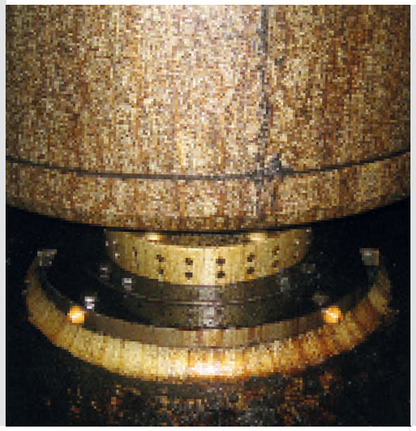
Regular visual inspection is essential in order to ensure safe engine operation.

Optimizing the cylinder oil feed rate means optimizing the engine's operational safety and efficiency.

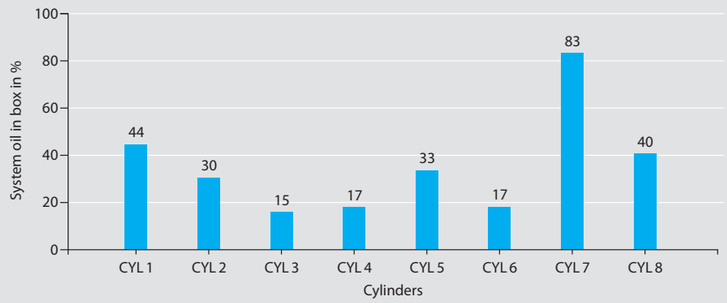
Optimizing feed rate by using the sweep test







Example of stuffing box performance by system oil leak rate per unit



Close attention needs to be given to the cylinder lubrication of low-speed two-stroke engines in order to ensure engine lubrication and prevent corrosive wear of the cylinder liner.

The Sulphur content in the fuel composition in use may be as high as 4%. Burning high Sulphur fuels leads to the formation of highly acidic components, which cause severe corrosion when making contact with the metal surface of the cylinder liner. Wear on cylinder liners and piston rings is mainly attributed to these acid attacks and is called corrosive wear. Under slow steaming conditions the risk of corrosive wear is even higher. The need for correct cylinder oil lubrication is evident, which is the need to choose a lubricant with an alkalinity reserve that matches the Sulphur content of the fuel.

A different form of wear generally occurs from rubbing surfaces of moving metallic components, which can lead to adhesive and, finally, abrasive wear and scuffing. Possible causes of liner polishing and scuffing are inadequate oil film formation, water ingress or oil film disturbance by either poor injection or combustion quality or excessive deposits on the top land of the piston.

In addition to choosing suitable lubricants, optimizing the feed rate is another critical factor of wear control. Excessive feed rates and the resulting over-lubrication are equally harmful as a lack of neutralization capacity and inadequate oil film distribution caused by insufficient feed rates or inadequate lubricants. Feed rate optimization is done by a set of tests during a procedure which is called the Sweep Test.

During this test the engine is run at different feed rates while all other operational conditions remain unchanged. Ideally, the test is carried out while running on high Sulphur fuel (around 3.5%) and at high load to make sure the established feed rate covers the entire load and fuel range.

Considering the complex chemical properties of modern lubricants, major engine manufacturers recommend to assess the individual feed rate for each oil brand, viscosity class and BN level.

Benefits of CSA

- Optimized engine operation though oil condition monitoring
- Improved operational safety with reduced risk of machinery breakdown
- Savings on cylinder oil and system oil costs
- Extended time between overhauls
- Savings on spare parts and maintenance
- Reduced risk of off-hire

Environmental Quality Analysis

Ambient air consists of 21% Oxygen, 78% Nitrogen and the remaining 1% is Argon, Carbon dioxide, Neon, Helium, Methane and others. In addition to these components, there are trace amounts of pollutants in the air.

The fact that we can survive about five weeks without food, five days without water but struggle to survive even five minutes without air underlines its significance. Air is essential for smelling and hearing and it is of such vital importance that air pollution has come to everyone's attention.

Air pollution can be defined as the presence of polluting constituents in concentrations above average and high enough to have harmful impacts on human, plant or animal life. These constituents are generated by natural processes or by human activity. Soil and water pollution occurs in similar ways.

Environmental pollution can be counteracted by the environmental protection rules and requirements (tolerable limits, monitoring frequency) for certain contaminants identified by environmental control bodies. Well-equipped and experienced third party laboratories play an important part in pollution monitoring studies.

TRIBOCARE's Environmental Analysis Services

- Ambient air quality monitoring
- Stack emission monitoring
- Fugitive emission monitoring
- Landfill gas monitoring
- Potable water quality tests
- Bathwater and swimming pool water tests
- Ground water monitoring
- Soil and sediment tests
- Effluent water tests

Fire Fighting Foam Tests

The Maritime Safety Committee recommends a periodical quality check to determine the suitability of the foam concentrate stored onboard to continue in service. We offer this service in line with MSC guidelines.

Scuba Air Quality Analysis

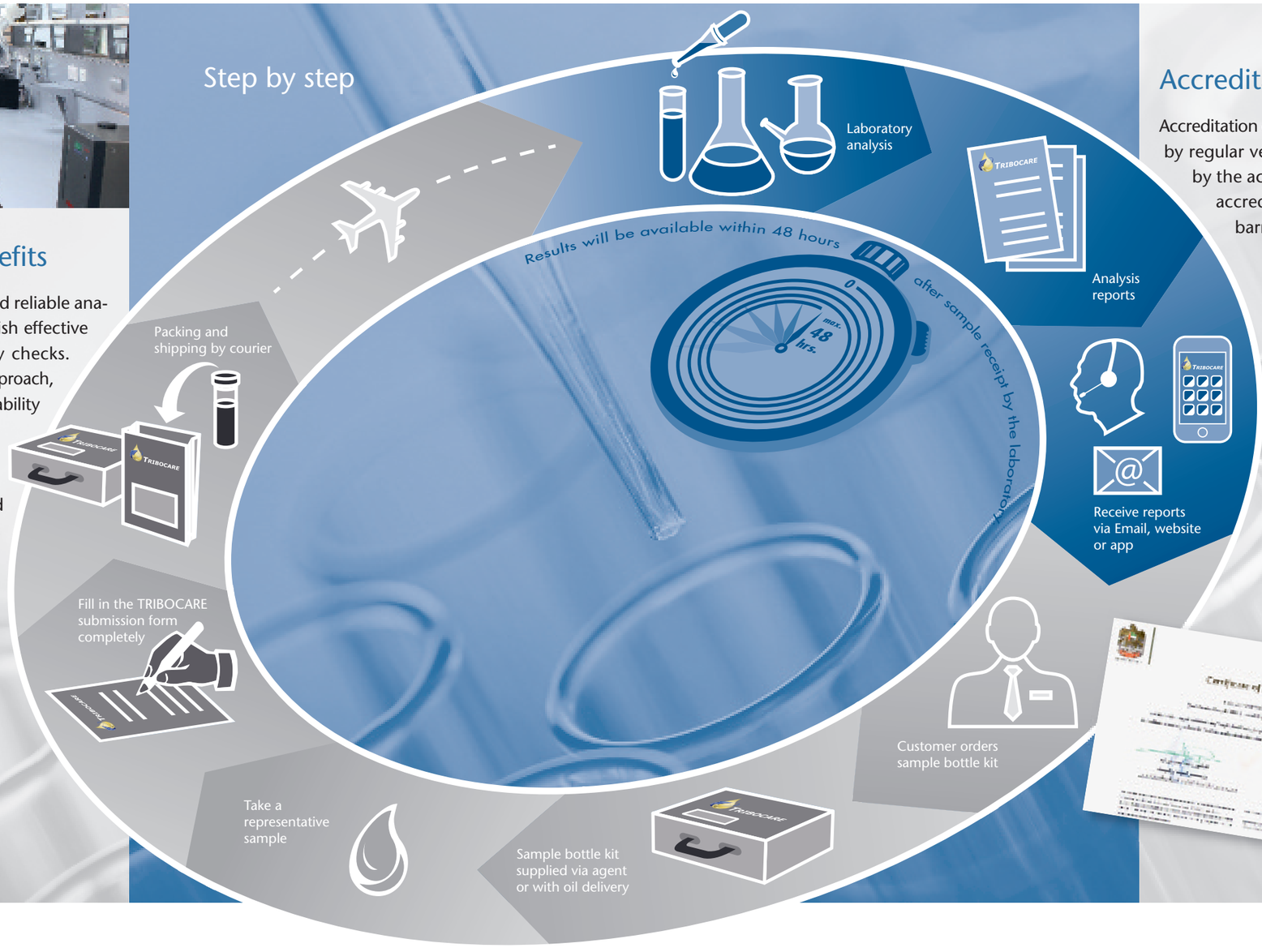
TRIBOCARE is capable to test the compressed air used by divers for its Oxygen, lubricant, Carbon dioxide, Carbon monoxide and Moisture content according to the BS EN 12021 standard.

TRIBOCARE – YOUR PARTNER

TRIBOCARE – Your Benefits

Our customers benefit from quick and reliable analysis results, allowing them to establish effective maintenance schedules and quality checks. These form the basis for a proactive approach, resulting in improved equipment reliability and a reduction of maintenance costs.

The TRIBOCARE analysis program helps to understand data trends and recommends appropriate solutions to prevent common quality issues from recurring.



Accreditations

Accreditation enhances the confidence in a laboratory by regular verification of its technical competence by the accreditation body. WTO has identified accreditation as a tool to remove technical barriers in international trade.

The technical competence of our laboratory has been verified by the Emirates Authority for Standardization & Metrology and was awarded the ISO/IEC 17025. Apart from this, our company is holding the ISO 9001:2008 certification from DNV.

Bunker Fuel Analysis in accordance with latest ISO standards

Lubricant and Fuel Blend Studies

Lubricant Condition Monitoring Program

Cylinder Scrapedown Analysis

Environmental Quality Analysis

Potable and Effluent Water Analysis

Fire Fighting Foam Test according to MSC guidelines

Air Quality in accordance with EN 12021