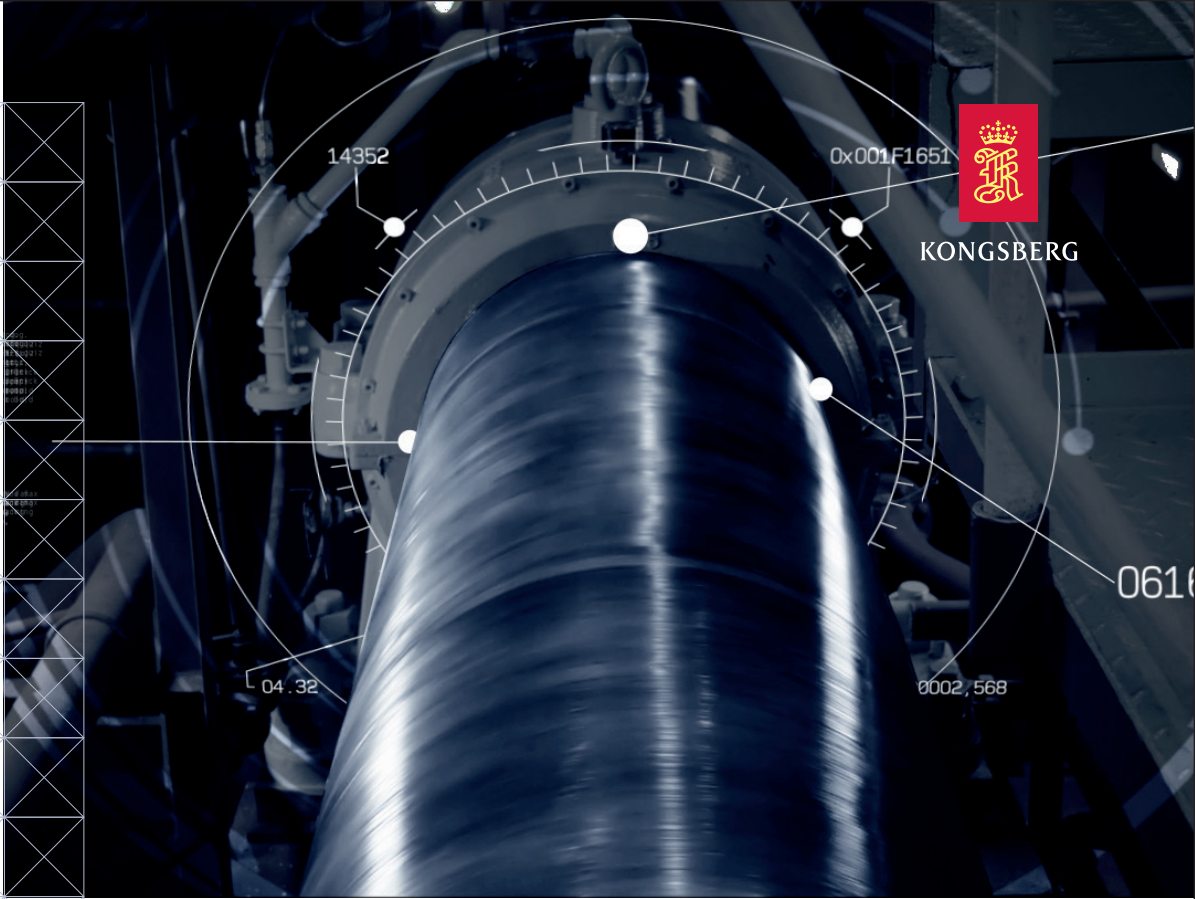


CONDITION MONITORING



BENEFITS

- Increased asset availability
- Improved performance
- Safer operation
- Reduced operational expenditure (OPEX).

Safeguard engines and rotating equipment to maximize uptime and minimize maintenance cost

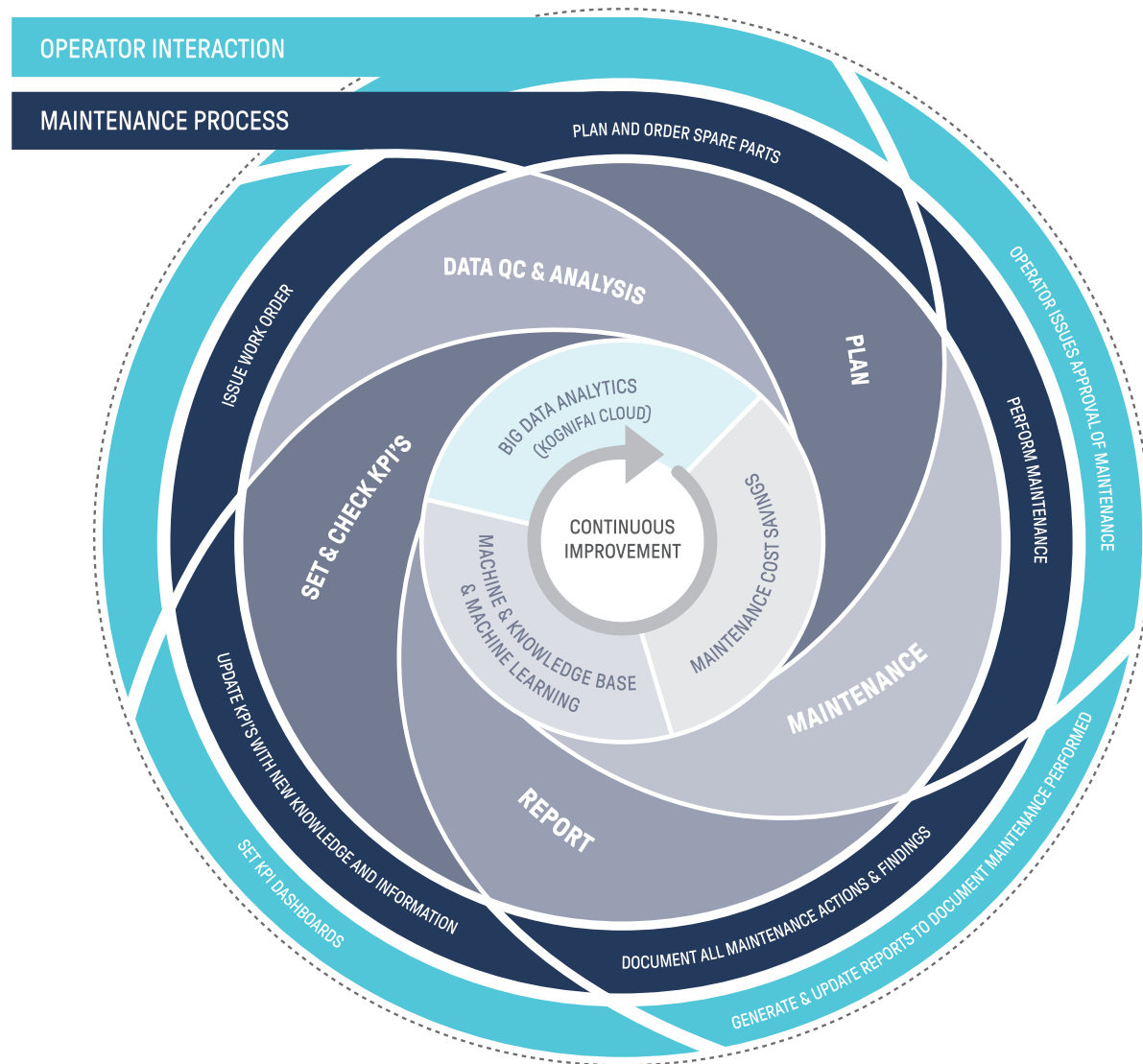
KONGSBERG Condition Monitoring solutions provide vessel owners with the ability to improve asset performance, ensuring safe operating conditions of engines and rotating equipment to reduce operational expenditure (OPEX).

KONGSBERG's comprehensive knowledge of sensor technology, secure data handling and high-speed processing technology underpins our Condition Monitoring solutions. The solutions measure and evaluate all integrated asset sensors while in operation to extract information such as the asset's Remaining useful Lifetime (RuL), predicting its condition and maintenance cycle. Together with the vessel operator, our service engineers work to build and integrate available technologies to deliver the most effective decision support information and controls to manage the vessel or fleet.

KONGSBERG's Condition Monitoring solutions provide a holistic view of the current asset condition, making it possible to evaluate local maintenance plans and perform fleet-wide comparisons and benchmarking. All services are made using a secure network and cloud applications. Automatically-extracted reports and online KPI dashboards can be used by offshore and onshore personnel to set up a Condition Based Maintenance strategy.

The KONGSBERG CBM Decision Support Wheel

INPUT: ALL DATA FROM THE AUTOMATION SYSTEM IN REAL-TIME, AND CONDITION MONITORING DATA FROM SENSORS SUCH AS; VIBRATION, ACOUSTIC EMISSION AND ELECTRICAL READINGS. EVERYTHING IS TIME STAMPED BY THE MASTER CLOCK.



The KONGSBERG CBM Decision Support Wheel illustrates the workflow that shapes a modern Condition Based Maintenance strategy. By using big data analytics, the condition monitoring system detects abnormalities which in turn initiates work orders. The ability to plan and conduct 'in-time' maintenance leads to reduced cost. Documentation of all maintenance actions and findings increases process knowledge, leading to continuous improvement of your analysis.

Predictive maintenance

AVOID EXPENSIVE AND TIME-CONSUMING OPEN-UP INSPECTIONS OF BEARINGS

Temperature monitoring is, in addition to vibration, a key factor for detecting damage or wear in bearings. KONGSBERG provides wireless temperature sensors for cross and crank bearings as well as Bearing Wear Condition Monitoring for two-stroke engines. Monitoring these parameters makes it possible to avoid expensive and time-consuming open-up inspections of bearings.

REDUCE OPERATIONAL COST WITH RUL AND PREDICTIVE MAINTENANCE

KONGSBERG's Condition Monitoring solutions use real-time analysis of sensor values combined with an immense machine knowledge base to predict asset conditions. Visual status panels and reports are always kept updated with the current condition of your machinery as well as expected RuL. By comparing the operation of identical equipment on different vessels the solution can increase predictability and advise on proactive maintenance measures. The results are presented to help you prioritize service resources and maximize your return.

CONDITION BASED MAINTENANCE (CBM)

KONGSBERG Condition Monitoring applications are developed in close cooperation with class societies and can act as a catalyst for changing from interval-based to condition-based maintenance. With KONGSBERG as a partner and in dialogue with class societies, our solutions can assist you in migrating to a reliable and cost-effective maintenance program for your assets.

Turbine	Gearbox	Generator	Main Bearing	Rotor	Yaw	Last change
TUR43	> 18					Gearbox (a month ago)
TUR45	> 18					Gearbox (a month ago)
TUR46		> 18				Generator (10 months ago)
TUR47		> 18				Generator (5 months ago)
TUR48	> 18	> 18				Gearbox (25 days ago)
TUR49		> 18				Generator (4 years ago)
TUR51						Yaw (a year ago)
TUR52						Rotor (5 days ago)
TUR54						Rotor (a month ago)
TUR57		> 18				Rotor (3 days ago)
TUR58						Yaw (a year ago)
TUR61						Rotor (a month ago)
TUR62						Yaw (a year ago)
TUR67						Yaw (a year ago)
TUR68		> 18	1 ±1			Main Bearing (9 months ago)

The TUR68 asset shows that an alarm was raised 9 months ago for the Main Bearing. The RuL is predicted to 1 months +/- 1 month. Replacing the bearing is critical.



EXPERT SERVICES

KONGSBERG, together with our partners, can help you to plan and implement KPI driven condition monitoring solutions to support your condition based maintenance strategy and vessel management.

Our experienced engineers provide guidance on data collection, sensor technology and deployment, providing an open integration platform that incorporates all available technologies.



APPLICATION AREAS FOR ALL VESSELS

- Diesel and dual fuel engines
- Generator sets
- Compressors
- Thrusters
- Pumps
- Fans, blowers and chillers
- Gears and bearings



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