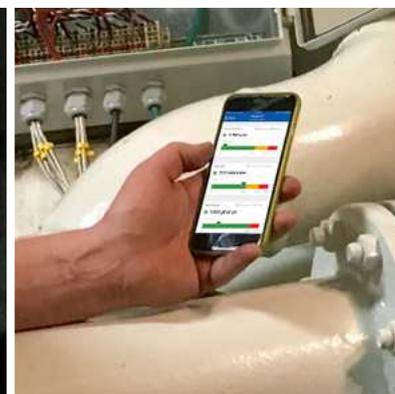
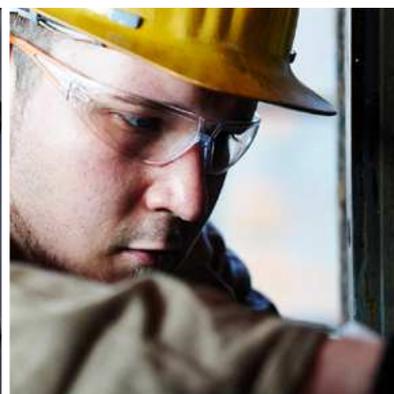
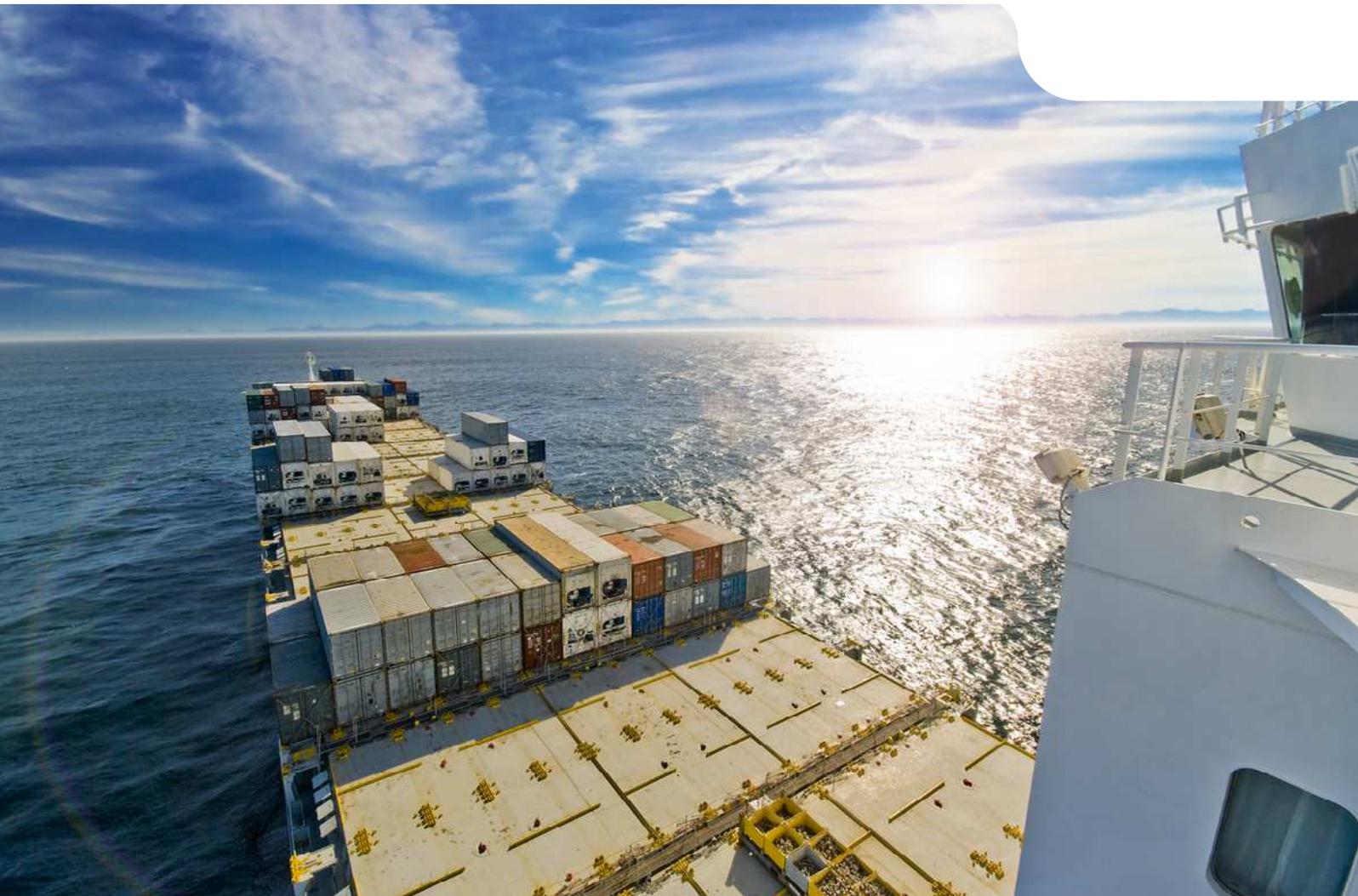


SKF Marine online monitoring for critical applications



Online monitoring for critical applications

Driven by the marine industry's continuing focus on higher ship and machinery availability, today's ship operators are looking at and investing in solutions that maximize uptime and minimize the need for dry-docking – and receive early warning if anything is going wrong.

In parallel with a general industry trend toward condition-based maintenance (CBM), major classification societies have adapted rules and regulations to recognize a properly implemented CBM programme as an accepted tool for verification of machinery condition. This results in increased ship availability and revenue earning capacity for the ship operator. SKF has been in the marine industry for more than 70 years, applying innovative thinking and expertise to rotating critical machinery. As one of the leading condition monitoring providers, SKF offers a full range of marine CBM solutions to help operators to maximize fleet availability. SKF has significant knowledge and experience in the area of critical applications, supported by decades of close collaboration with OEMs and end users.

Drawing on this expertise, SKF online monitoring solutions were developed to help ensure maximum customization and integration possibilities for end users. This monitoring solution is based on enabling the potential monitoring of a wide range of data, including vibration, lubrication, process and electrical functions. This capability, combined with certified data analysis services available from SKF's globally class approved service supplier, creates a unique value-adding option for market leaders in the marine industry, supporting their goal of achieving an approved CBM programme.

Cut costs and downtime

- Improved machine and ship availability
- Extended survey intervals
- Reduced need for dry-docking
- Optimized machinery operation
- Enough data storage capacity on board (no permanent internet connection needed)
- Ability to view the data on mobile devices – mobile APP

SKF online monitoring applies to any ship type with critical assets installed. The solution is fully applicable to generators, propulsion systems (such as reduction gearbox and shaftline) and positioning thrusters (such as tunnel and azimuthing thrusters) and the monitoring systems can also include other critical machinery, making the SKF solutions fully scalable.

Typical ship types using SKF online monitoring include:

- Offshore support and supply vessels
- Cruise and passenger ships
- Drilling ships and rigs
- FPSOs
- Shuttle tankers
- Offshore rigs such as floating hotels and service platforms
- Ro-Ro ships and car carriers
- Tugboats



MAXIMIZING AVAILABILITY

Solutions for the complete value chain

SKF online monitoring solutions are applicable to the full marine industry value chain, including:

- OEMs
- Shipyards (new-build and repair)
- Ship owners and operators

Depending on the specific project and customer needs, SKF can provide solutions for new buildings or aftermarket installations.

Shipyards

SKF provides complete online monitoring systems integrated by the shipyard, upon request by the ship owner. Included in the scope of supply, SKF typically provides the designed commissioning services, including setting up the condition monitoring database according to class requirements.

Ship owners and operators

SKF online monitoring can add significant value for the end-user: the ship operator. Working closely together when defining the specific requirements, SKF can offer a fully customised solution and provide third-party specialist recommendations to the machines condition, maintenance requirements and possible improvements.

Monitoring based on the user's needs

The SKF online monitoring solutions are fully customized and based on a range of criteria: the specific end-user needs and requirements, actual machinery arrangement and design, monitoring purpose (class or reliability-driven), and class agency requirements. The online system installations integrate vibration, lubricant and process data. The installations are tailored according to specific needs and include parts of - or all of - the following components:

- Reliability engineering – based on ship type, class, machine arrangement and design
- Condition monitoring hardware/software selection – based on specific customer and class requirements
- Service delivery – engineering, supervising installation and commissioning
- Analysis and reporting

Typical applications using SKF online

The monitoring can include critical applications such as:

- Machines with complex designs such as thrusters or gearboxes
- High speed machines and all kind of assets where failure can occur very fast
- Supplementing oil monitoring, including particle counter, water content and oil condition oxidization

Typical installation and benefits

SKF Online monitoring for critical applications:

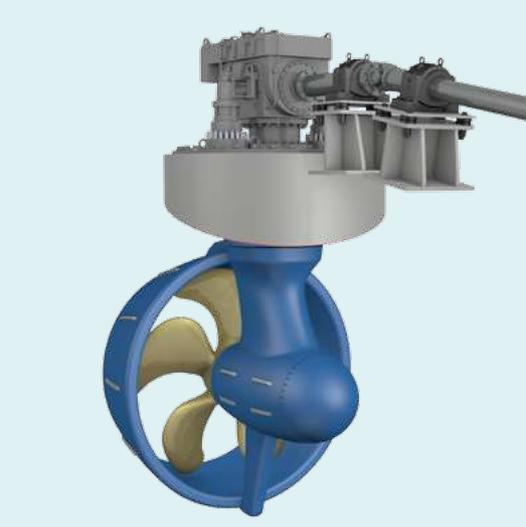
Whether reduction gearboxes or thrusters, SKF online monitoring is customized to the specific application type, as well as ship operator and class requirements.

Solutions can include:

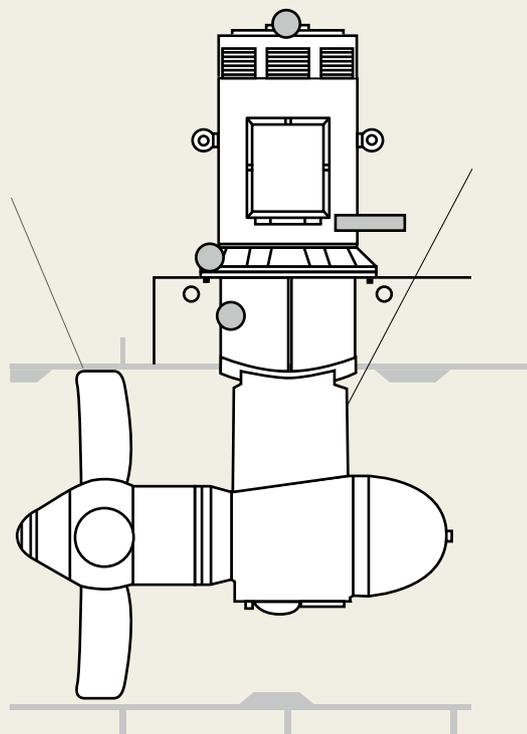
- Condition monitoring hardware and software selection:
 - Vibration
 - Lubrication
 - Process
 - Electrical
 - Inspection
- Installation and commissioning
- Analysis and reporting
- Reliability improvements

Early detection with an integrated system

The risk of unexpected downtime and associated costs can be minimized through the early detection of deviations in the condition of an asset, enabled via full integration of online process, oil and vibration condition data into the SKF IMx Online Monitoring System. The monitoring system itself is designed to fulfil and exceed classification society requirements.



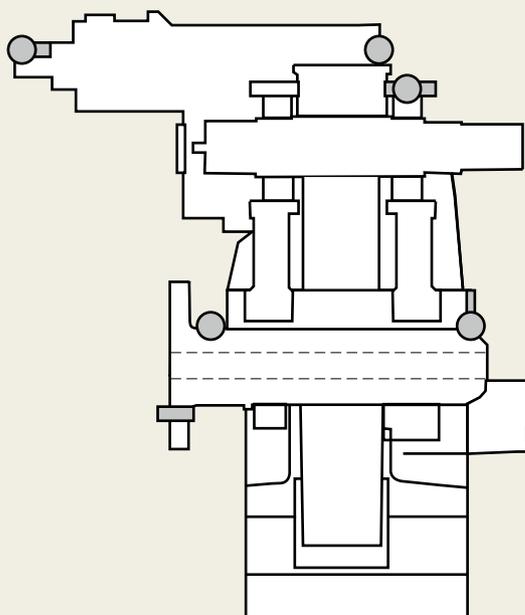
Thruster model equipped with the SKF Marine online monitoring solution.



EXTEND THRUSTER
MAINTENANCE FROM
5 TO +7 YEARS



Reduction gearbox model equipped with the SKF Marine online monitoring solution.



○ Vibration measurement point ▭ Speed sensor

SKF Multilog Online Systems IMx

The SKF Multilog Online Systems IMx series are powerful, cost-effective solutions for a variety of condition monitoring applications. Together with SKF condition monitoring, SKF Multilog Online System IMx series provide a complete system for early fault detection and prevention, automatic recognition to facilitate the correction of existing or impending conditions, and advanced condition-based maintenance for improving machine reliability, availability, and performance.

The SKF Multilog Online Systems IMx series offers hardware solutions with a range of channels starting from 8.

Key features IMx-8:

- 8 analogue inputs and 2 digital inputs
- True simultaneous measurements of all channels, true synchronous measurements programmable for up to 8 analogue channels
- Multi-parameter gating
- Communication interface - MODBUS (RS 485 and Ethernet)
- Multiple acceleration enveloping filters
- Adaptive alarm levels
- Redundant power capability
- Data buffering in non-volatile memory when Ethernet communication is down to the cloud
- Connectivity to the SKF One Global Cloud

- 3 output relay drivers (1 system failure normally closed) 2 general purpose relays
- Compatible with SKF condition monitoring software (Observer)
- DIN rail or wall-mounted, could be fitted in an existing cabinet
- If 8 more channels are needed a second SKF Multilog Online System IMx-8 devices can be added

The SKF Multilog Online System IMx-8 has a large internal memory. Thus the unit can remain without connection to the cloud for several months. This means that no data is lost if communication to the cloud is bad or even down. In normal practice 2 - 3 megabytes of data is sent per day. The actual amount depends on the monitored application.

Intelligent data storage:

The SKF Multilog Online System stores overall vibration levels from the connected sensors typically every 5 min. In addition, the full FFT spectra is stored twice a day.

The reason for this is to keep the amount of data to a minimum, but still sufficient to perform high quantitative condition monitoring.

In the event high vibration levels are detected, the SKF Multilog Online System IMx-8 will store the full FFT spectra from all sensors. This is done in addition to the scheduled ones.

Another feature is that the SKF Multilog Online System IMx-8 permanently stores data in the background, so in the event of a problem the system

supplies the signal just before the alarm limit is reached. This holds valuable information when performing the analysis.

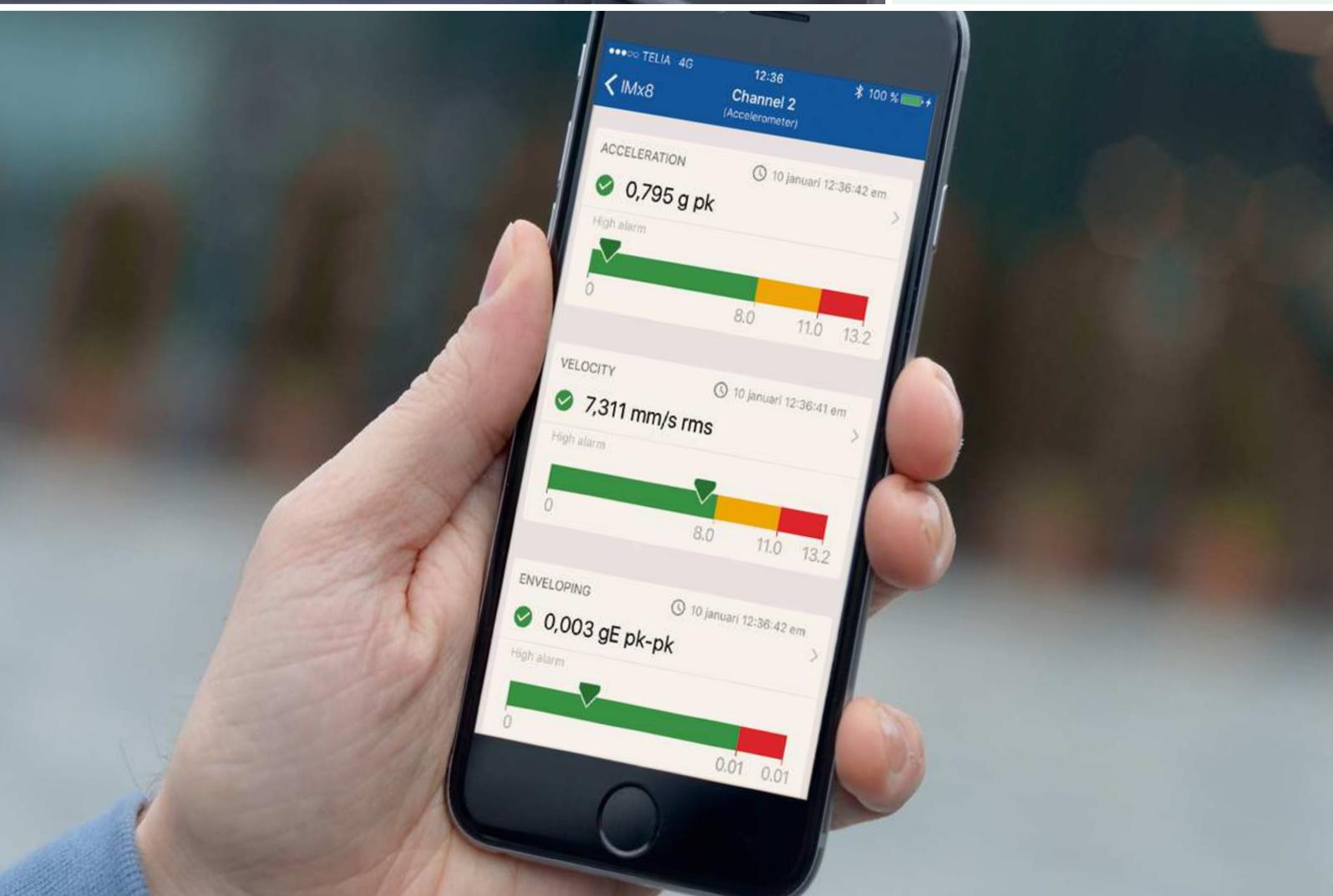
The SKF Multilog Online Systems IMx-8 is type-approved by the major classification societies.



8

ANALOGUE CHANNELS,
COMPACT DESIGN AND
CLOUD CONNECTIVITY

All data can be transferred to a mobile phone via Bluetooth. The app allows the results to be presented in various views.



Improve maintenance planning with customized reports

With SKF condition monitoring, ship operators can plan maintenance well in advance and focus resources where needed. The thruster condition is visualized both on board the vessel and summarized in customized reports shared with the on-board and land-based teams. SKF remote monitoring uses the SKF One Global Cloud server technology, enabling data to be easily accessed 24/7 worldwide.

Reporting

Event reporting is used to document the particular asset condition at a given moment in time. Furthermore, you can clearly improve maintenance planning with the customized reports, prepared by SKF remote diagnostic experts. The team of specialists works in full accordance with the global SKF standard for delivering and operating condition-based maintenance (CBM) as well as condition monitoring services to the marine industry worldwide. The reports help to detect early component failures, even if they wouldn't lead to extended maintenance intervals as prescribed by the class requirements. The reporting service contains monthly status reports as well as full analysis reports, depending on your individual preference and class requirements.

The implementation of a condition-based maintenance programme refers to the rotating equipment performance (REP) approach. This means you will be supplied with exactly those replacement parts, bearings, seals and lubrication

systems which you currently need. Furthermore, the service provided by the SKF remote diagnostic experts includes reconstruction consultation and suggestions for an optimized spare parts and maintenance strategy.

Thruster – a prime example for a critical application

The special challenge in thruster monitoring is, on the one hand, the difficult accessibility of the components. On the other hand, the functioning of the thruster is of course vital for the ship's manoeuvrability. For these kinds of application, SKF online monitoring helps bring maintenance efficiency to a new level.

Extend class survey intervals with a customized monitoring system

To help ensure maximum thruster availability, SKF online monitoring is customized to the specific thruster type, ship operator and class requirements. Through clearly documented predictive and proactive maintenance procedures, including regular vibration and oil analysis, ship operators can verify the thruster condition based on readings rather than physically accessing it for visual inspection. The SKF monitoring suite offers great flexibility, as it can cover parts - or the complete - thruster driveline, and can also be expanded beyond the thruster to include other critical machinery.

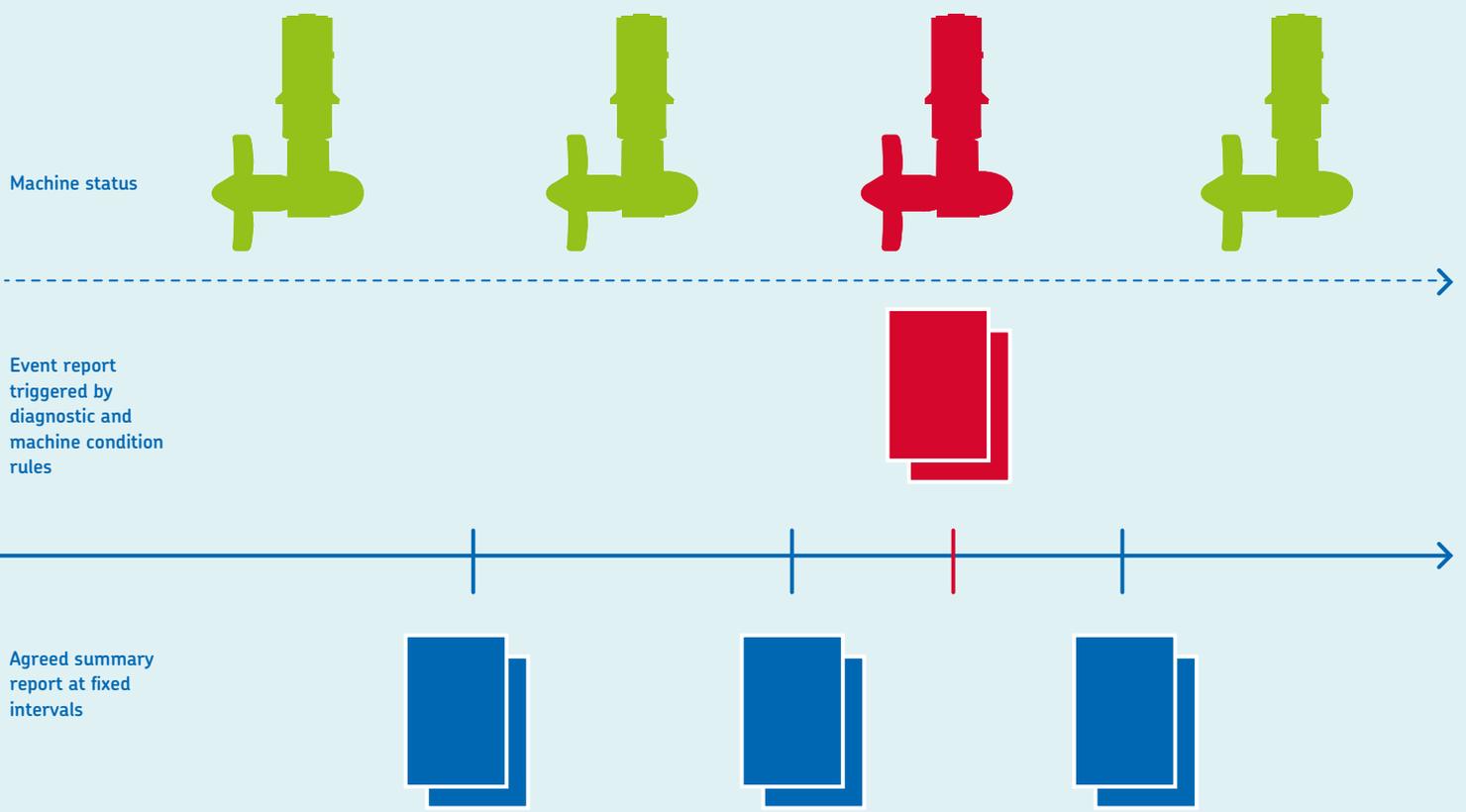
With SKF online monitoring of the thruster, you can achieve deferrals of maintenance ranging from 5 to 7 years and beyond. By using the reports – typically 4 reports per year – delivered by the SKF remote diagnostic experts, you gain significantly greater flexibility. For instance, you can coordinate the maintenance of the thrusters with other maintenance required on other machinery.



CUSTOMIZED REPORTS



Online system typical workflow



SKF – sets global standards for maintenance services

SKF Marine, the Marine Business Unit of SKF, has implemented a global SKF standard for condition-based maintenance (CBM) as well as condition monitoring services. This includes delivery standards and operating standards which are also aligned with ISO and class societies' requirements. The quality control of our services is exceptionally high. Each SKF location needs to pass a certification training course and an internal audit before being approved. SKF is one of the first companies in the world to hold a global class-approved service supplier certificate.

Service performed by experts

The SKF remote diagnostic experts help you to set up an individual condition-based maintenance strategy, customized to the special needs of your fleet. Therefore an efficient condition monitoring program will be implemented. It can also be integrated seamlessly into the ship's current maintenance management system.

Worldwide support for the marine industry

SKF Marine consists of SKF experts with decades of relevant experience. You can benefit from their know-how by using a complete range of SKF products and services, delivered with world-class logistics through the industry's best and most reliable distribution system.

Areas of expertise:

- Classification societies
- OEMs
- Ship designers
- Shipyards
- Ship owners and operators
- Technical managers

Whatever your location or wherever your operations take you, SKF Marine assures timely accessibility to the services, products and solutions needed to optimize ship performance, safety and reliability. With a presence in more than 130 countries, 110 production sites in 28 countries and distributors, sales agents and service stations in more than 15,000 locations, SKF can deliver the right solutions anytime, anywhere around the globe.

To find locations that are approved by SKF Marine to work to the standard, take a look at www.skf-marine.com or scan the QR code below.



24/7
SERVICE



Contact

For any requests, feedback, suggestions or complaints, please send an email to: marine.support@skf.com

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skf-marine.com

or scan the QR code below.



Ordering information

CMON 4108 (SKF Multilog Online System IMx-8 DIN rail)

CMON 4150* (IP65 cabinet)

*To obtain an SKF Multilog Online System IMx-8 IP65 cabinet version, you must order the CMON 4108 + CMON 4150

The SKF One Global Cloud needs to be ordered separately.

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PUB 43/P2 17205 EN · February 2017

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