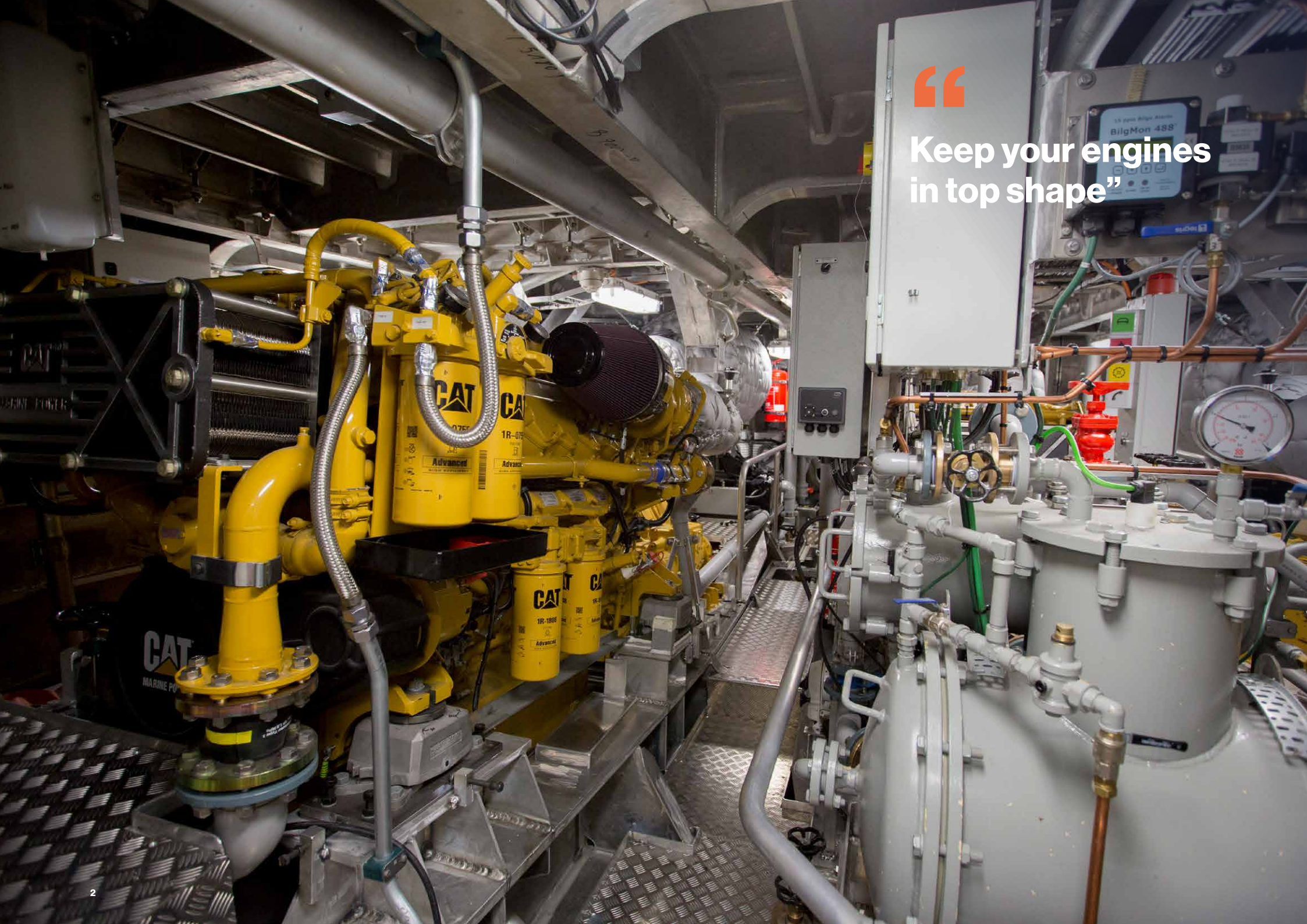




Caterpillar Services by Damen and PON CAT

CONDITION BASED MAINTENANCE

DAMEN



“

Keep your engines
in top shape”

BY DAMEN AND PON

Caterpillar Services

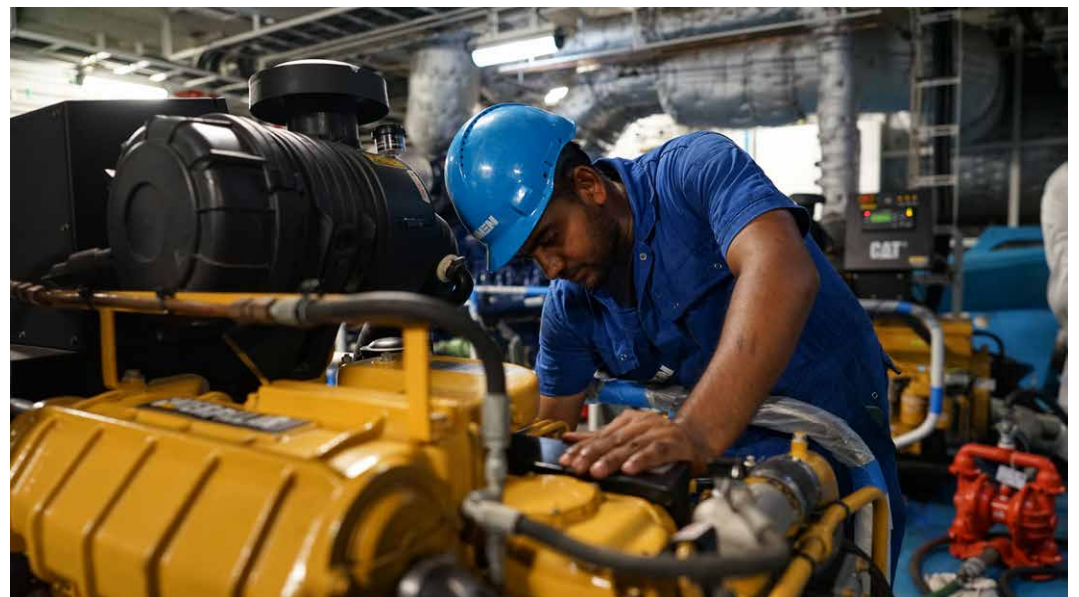
You obviously want to keep your machinery and equipment on board running for as long as possible. For this reason, proper and regular maintenance of your equipment is essential. Maintenance is necessary to keep the machinery in a technically sound and reliable condition and to enable the crew to operate the machinery on board in a safe manner.

To support the maintenance process, Damen and PON CAT work together to help customers maintain their Caterpillar equipment.

Damen, in partnership with PON CAT, offers services that help you reduce the total cost of ownership while increasing productivity and uptime. Our wide range of services covers every stage of a vessel's lifecycle and can be tailored to your needs by combining a selection of products.

Supporting vessels in the Middle East

Damen Services Middle East is a dedicated one-stop ship service location based in the United Arab Emirates that supports all types of vessels in the region. Offering shipbuilding and repair services, drydocking and marine technical assistance, our committed team has the capacity to handle all your vessel maintenance issues, in addition to offering continuous support throughout its operating lifecycle.





With the injector test it is possible to save these costs. The test is available for:

- › C4.4 series engines
- › C6.6 series engines
- › C7.1 series engines
- › C9.3 to C13 series engines
- › C15 series engines
- › C18 series engines
- › 3406E series engines
- › C27 series engines
- › C32 series engines
- › 3500 series engines

INSPECTIONS AND TESTS

Injector test

It's very important that the electronic injectors work optimally. A faulty injector will reduce performance, increase fuel consumption, increase

soot formation, increase visible smoke and increase emissions. Have the injectors tested so that you know in good time if they can still be used or

if they need to be replaced. All injectors are replaced during an engine overhaul. About 20% of the cost of an overhaul is spent on replacing injectors.



Overview of key benefits:

- › Guaranteed level of performance at start-up
- › Correct calibration of engine, gearbox and propeller
- › Prevents performance degradation
- › Efficient fuel consumption
- › Reduced maintenance costs
- › Longer service life
- › Better for the environment
- › Familiarity with the most efficient speeds
- › Avoidance of hazardous situations

INSPECTIONS AND TESTS

Performance Analysis Report

The PAR test includes a rigorous engine check as well as cooling water, ventilation and exhaust system tests. Fuel consumption is compared to original Caterpillar® specifications. It also checks that the engine,

transmission and propeller are tuned to deliver the right power and fuel economy.

Regular PAR testing keeps the system in optimum condition.

Any future defects can be identified in good time. This allows you to plan maintenance and repairs in good time, reducing the likelihood of downtime and costly repairs.





INSPECTIONS AND TESTS

TAM inspection

To ensure optimum engine performance, valves and injectors must be recalibrated after a certain number of hours, depending on the type of engine.

Pon CAT has extended this service to include a TAM inspection, which is a thorough check of all vital components in the engine system.

This inspection includes

- › Checking/adjusting valve clearance
- › Checking/adjusting injector clearances (if applicable)
- › Checking/adjusting alarms and shutdowns
- › Check cooling water quality
- › Checking the turbo for excessive backlash
- › Run engine under load (if possible)
- › Check for leaks





Benefits of this maintenance

- › High level of operational reliability
- › Minimum fuel consumption
- › Low maintenance costs
- › Insight into engine condition
- › Minimum harmful emissions
- › Longer service life
- › Maintain optimum product value

INSPECTIONS AND TESTS

Borescope inspection

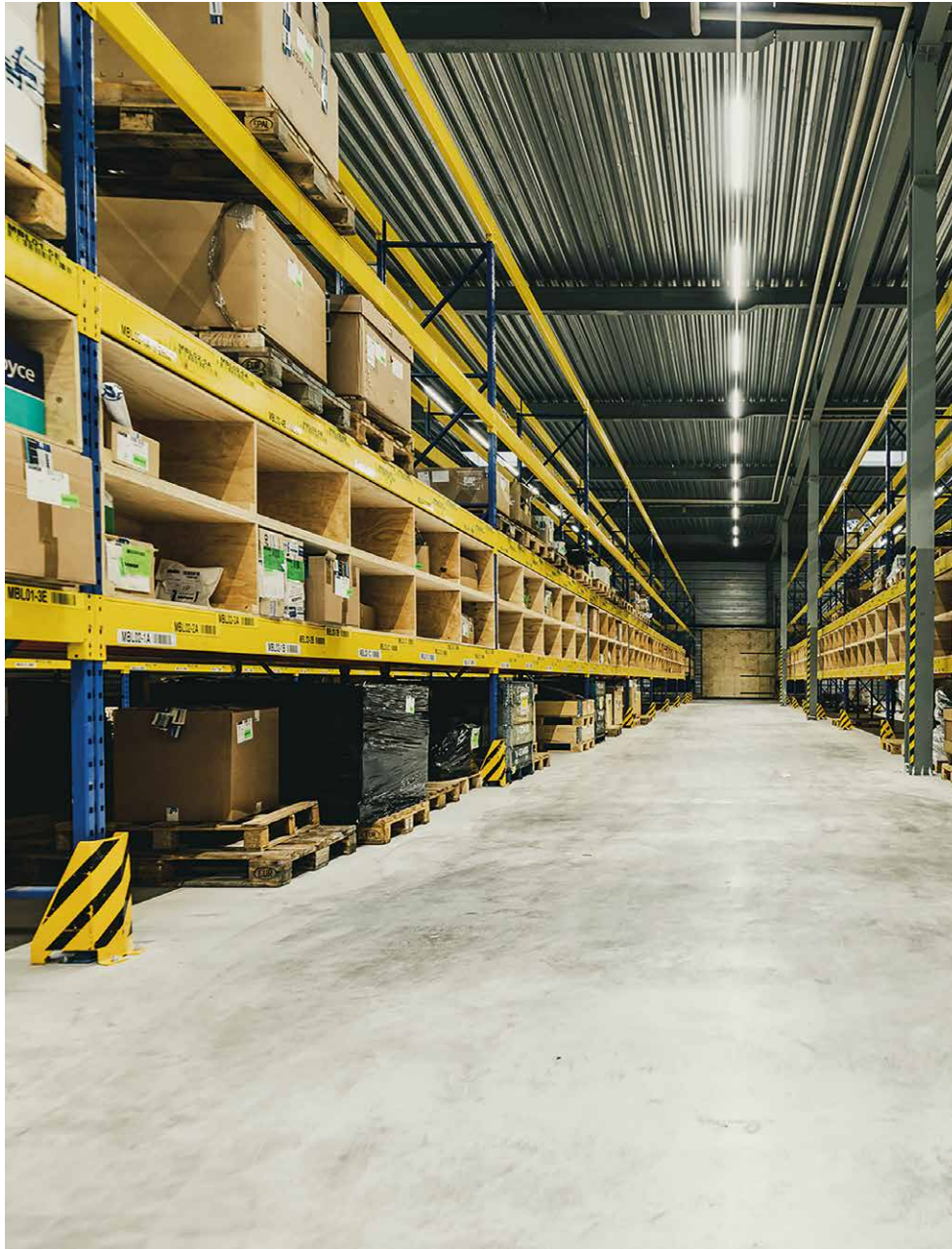
A borescope inspection is an internal inspection of the combustion chamber to determine the condition of the associated components.

Work required to carry out the borescope inspection:

- › Cylinder liner inspection (grinding pattern)
- › Piston crown inspection
- › Inspect valve seats in & out
- › Inspect valve stems in & out
- › Determine general condition of combustion area

Following this borescope inspection, a detailed report will be prepared. We will discuss any further action with you should any anomalies be found during the inspection.





Parts sales

Working closely with Caterpillar®, Pon Power offers the ultimate in efficient logistics, delivering 98% of parts within 24 hours. Pon Power staff have direct access to an endless stock of CAT parts. Pon Power has its own large warehouse with a stock of 10,000 different parts. In addition, Pon Power works closely with Caterpillar's central European warehouse in Grimbergen, Belgium, which stocks no less than 350,000 different parts.

Genuine CAT Parts

CAT engines are well designed and built. Using genuine CAT parts is an essential part of the maintenance process. All CAT diesel and gas engine components are fully compatible and meet the most stringent quality requirements. Therefore, proper maintenance and the consistent use of genuine CAT parts means that the engines deliver the best possible performance and enjoy a long service life. Genuine CAT parts supplied by Damen always come with a one-year warranty.

Reconditioned parts

Most engine components require preventive replacement after a certain service life. Remanufactured parts are a cost-effective alternative to new parts. These fully reconditioned parts meet the exact specifications of new parts. They are therefore supplied under the same warranty conditions. In addition to the competitive price, a major advantage is that remanufactured parts are almost always in stock.



CAT engine overhaul

Caterpillar engines are highly reliable. Timely overhaul of your CAT engine is essential to keep the engine in good condition and prevent engine

damage and downtime. CAT engine reconditioning can extend the life of your engines by up to tens of thousands of hours. To keep your engines in top

condition, a Caterpillar remanufactured engine is recommended. Even if the engines are in perfect condition.

The best care for your engine

A well-overhauled engine will last almost as long as a new engine. This makes a Caterpillar engine overhaul a good investment. CAT overhaul ensures

- › Lower fuel consumption
- › Better heat output
- › Smoother running of your engines



Damen Services is always available to maintain your engine. From CAT engine overhauls to complete engine maintenance, Damen is the place to go for good maintenance. With thousands of CAT engine overhauls, our highly experienced technicians know the machines like the back of their hand.



OIL ANALYSIS

Systematic oil sampling analysis tests (S.O.S)



Bad bearings, piston rings that won't move and high oil consumption. These are all symptoms of engine problems related to the condition of the engine oil. Three aspects play a role in ensuring that the engine oil is in top condition: using the right engine oil, regular maintenance of the oil system and regular oil sampling.

Such a check will give you an insight into how the engine is performing and will allow you to detect any problems early. If the test results indicate damage to your engine, Damen will contact you immediately to recommend immediate action. The SOS analysis consists of tests developed by CAT engineers and chemists that focus on determining the condition of the engine rather than the condition of the oil.



Extended warranty

Extended warranty for CAT engines and generators

When you bought your CAT engine or generator, you made a choice for reliability and peace of mind. If you want to protect yourself from unexpected repairs and associated

costs beyond the standard 12-month warranty period, you can choose Caterpillar Extended Warranty Coverage. There are several options and coverage levels to choose from. Contact Damen Services for more information.



Overview of key benefits:

- ▶ Direct help with urgent technical problems
- ▶ Direct access to our best experts
- ▶ Worldwide coverage
- ▶ You save costs as our engineers have no travel time

Damen Services Middle East, based in the UAE, is ready to answer your call 24/7/365 and always provide remote service support with engineers available. A resolution plan will be put in place based on the level of support required. In the unlikely event that our office is unavailable, the Pon Power Customer Support Centre will take your call. This arrangement ensures that your operation is covered 24 hours a day, all year round.

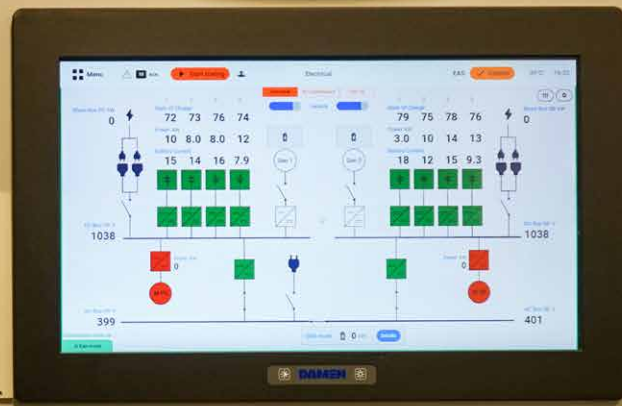
Remote assistance

You want to be able to rely on the expertise of your CAT dealer wherever in the world. This is now easier and more accessible than ever.

With Remote Assistance, Damen, in partnership with PON, offers you the expertise you have come to expect, available when you need it.

With Remote Assistance you get direct help from our technical experts.





Alarm monitoring system upgrade

This upgrade will replace the original Allen Bradley control system, for which parts are becoming increasingly difficult to find and expensive to procure, with a DCU-based Automaskin system. Replacement of the system includes the installation of a new control cabinet on the engine, including the panel and all associated engineering and labour costs. In addition, unlike the Allen Bradley system, the Automaskin system

fully automates start up and shut down, which was highlighted as a major drawback of the Allen Bradley system.

This upgrade is a great opportunity to bring your vessels up to the latest standard in the market, while improving serviceability, operability and reducing the potential for operator error and consequent breakdowns, consequential costs and downtime.

Upgrading from an Allen Bradley control system to the new Auto Maskin Panel would be the best option for your fleet. With this proposal, only one (1) conversion is required, money could be saved and your goal of having sufficient spares for the rest of the fleet is assured.

Benefits:

- › Automated startup/shutdown
- › Automated opening and closing times
- › 5.7" colour screen means clear, accurate displays
- › Spare parts availability (95% from stock)
- › Easy to maintain
- › Complies with the latest and most advanced alarm system on the market for these engines
- › Easy to use
- › Wide range of configurations
- › Compatible with remote monitoring

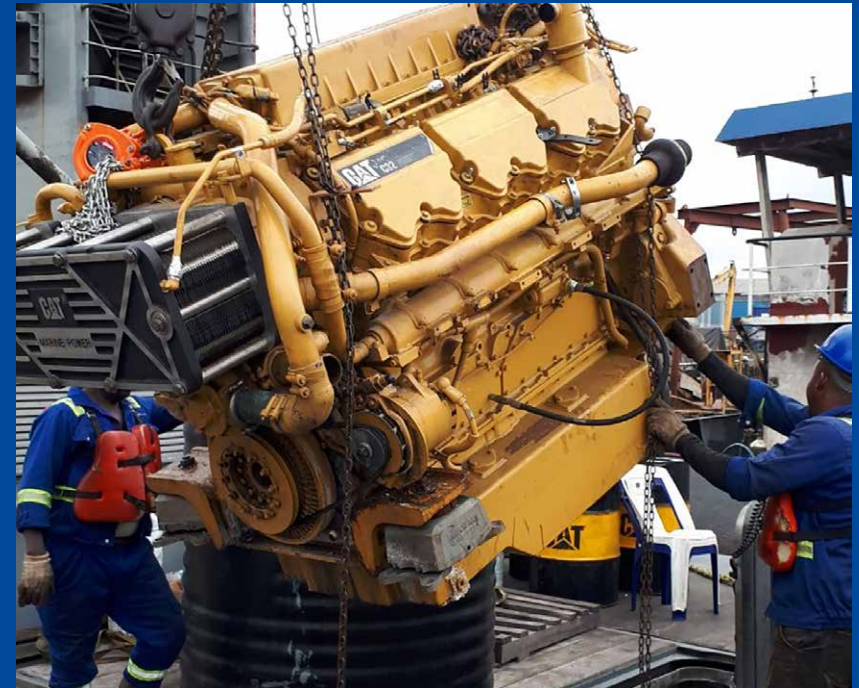


Engine mounts replacement / alignment



Any misalignment between two shafts increases the stress on the shafts and will almost certainly result in excessive wear and premature failure of components such as shafts, bearings and seals. This can be very costly.

A quick alignment-check and, if necessary, alignment correction can often be done in a matter of hours, while replacing shafts, bearings or seals is usually a time-consuming and therefore expensive operation.



Engine swap

Having spare engines available allows you to act quickly when major ship repairs, such as thruster repairs or voyage repairs, need to be carried out. To make this easy for you, Damen Services Middle East offers a range of engine exchange programmes that include both the supply of

reconditioned engines and a complete methodology for the efficient exchange of the engines while the old engines are prepared for the next "swap". This means that you always have the right critical components available and that your vessel's uptime is increased compared to conventional overhauls.

POWER BY THE HOUR

Damen and PON Power: A strong partnership

Based on years of experience, Damen Services Middle East has now introduced a “Power By The Hour” concept in the region, where we take full maintenance and responsibility for your engines in return for a competitive hourly rate. The Power By The Hour concept ensures that:

- › We closely monitor the condition of the engine through a remote monitoring system, regular oil analysis and regular inspections. Based on these analyses, we can identify potential maintenance needs and defects at an early stage.
- › All maintenance costs are based on an hourly rate. This ensures a predictable cash flow and no peaks in expenditure (typically associated with major overhauls, defects, etc).
- › All corrective failures (unforeseen defects) are covered by the contract. This is a kind of extended warranty for the entire duration of the contract.
- › The regular oil analysis allows an extended oil change interval. This results in significant oil savings with a very positive impact on costs, downtime and the environment.
- › Damen can provide fast response and service through local presence in the region through our Damen Middle East Service Hub.





DAMEN

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