CYLINDER LUBRICATION TECHNOLOGY

Hans Jensen Lubricators

PART OF G&O MARITIME GROUP

LEADING CYLINDER LUBRICATION TECHNOLOGY
BY DEDICATED SPECIALISTS

WE REDUCE CYLINDER OIL CONSUMPTION AND IMPROVE ENGINE CONDITION DURING THE GREEN TRANSITION OF SHIPPING.

LOWER CONSUMPTION AND EMISSION

Hans Jensen Lubricators A/S is the leading global provider of cylinder lubrication systems for two-stroke marine engines.

Our solutions significantly reduce the cylinder lube oil consumption and extend the lifetime of liners and rings. Hans Jensen technology supports the use of greener fuels and switching between fuel types.

We recognize the need for climate friendly measures and our solutions reduce CO_2 and particle matter emission in particular.

PATENTED TECHNOLOGY

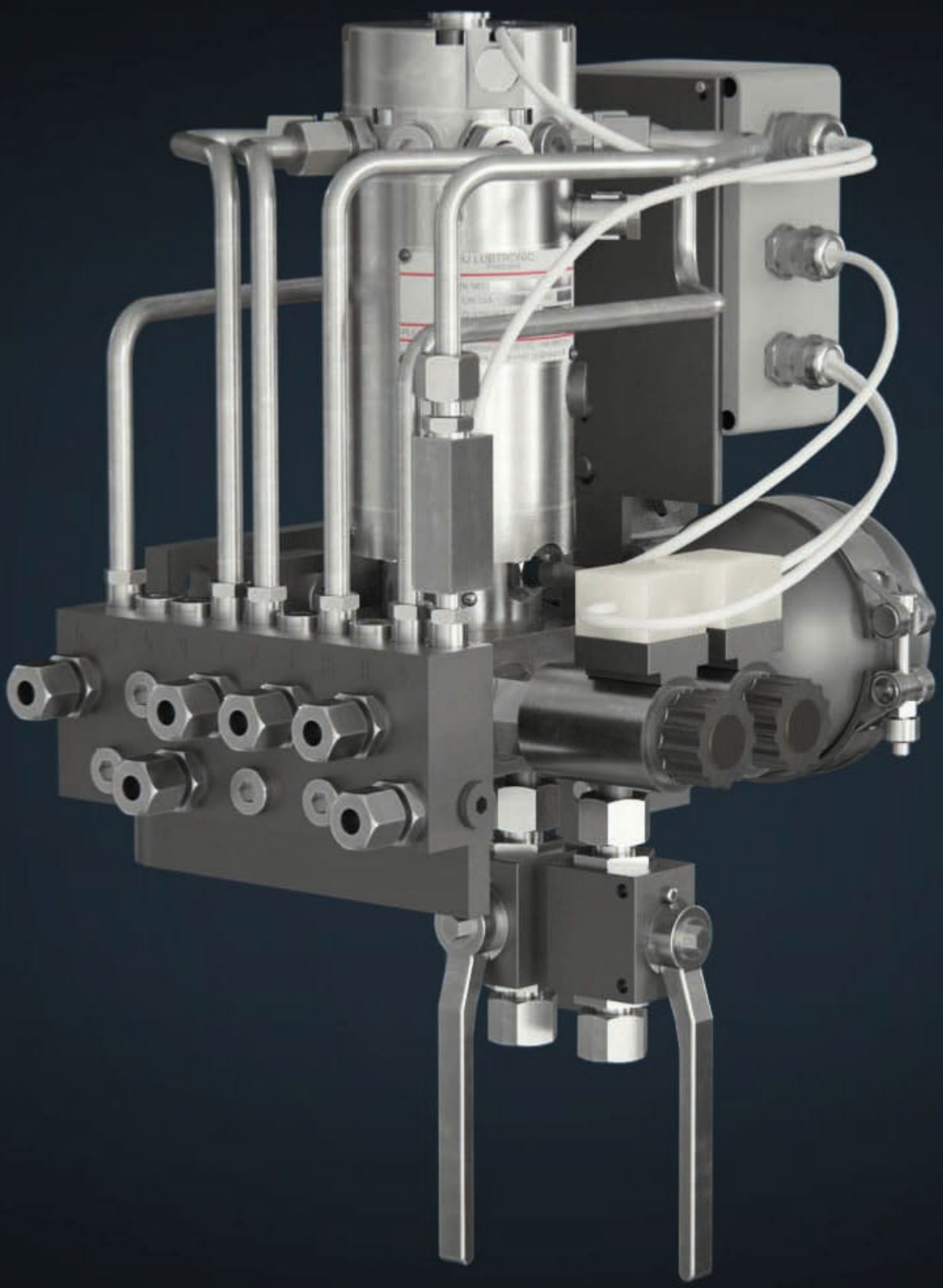
HJL technology injects fresh cylinder lube oil during each piston stroke and utilizes atomizing spray of lube oil for optimal cylinder lubrication. Our products are installed both as retrofit and in new builds.

We hold the patent to make stepless quantity adjustment in the lubrication system. Our lubricators inject fresh cylinder oil in each piston stroke and make possible multiple injections per revolution.

LEADING EXPERTS

With approximately 100 years of experience, innovation is in our DNA and therefore we push cylinder lubrication technology forward in close collaboration with universities doing scientific research on mathematic spray modelling, cavitation in cooperation with oil makers and engine designers.

Welcome aboard!

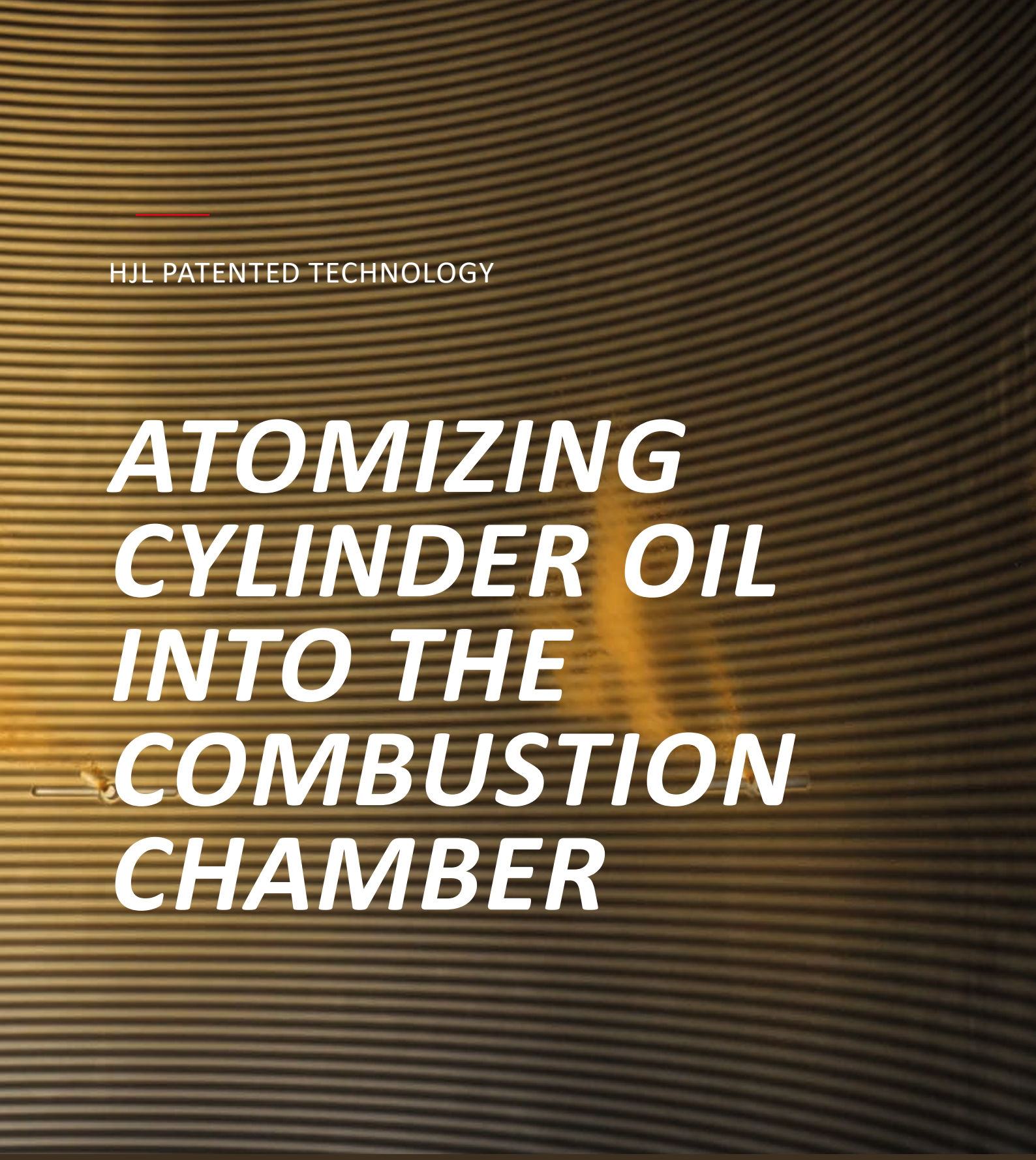


HJL PATENTED TECHNOLOGY

CYLINDER OIL INJECTION IN EVERY PISTON STROKE

A unique feature of Hans Jensen Lubricators is the ability to inject fresh cylinder lube oil during each piston stroke to reduce wear and corrosion. The dosage of oil is adjusted for optimal effect and typically there is a significant reduction in lube oil consumption – sometimes up to 60% savings.

The technology is patent protected by HJL.

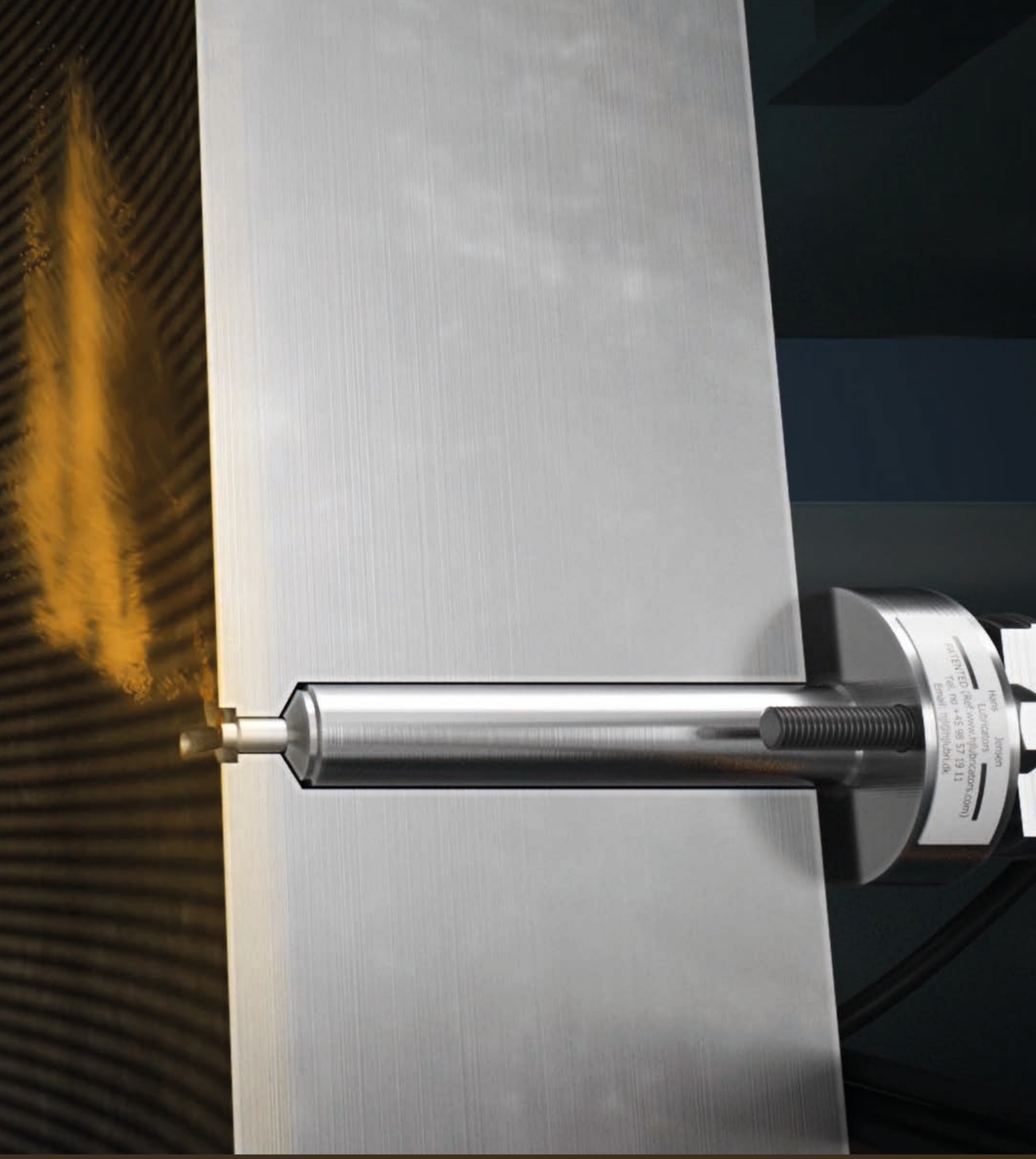


HJL PATENTED TECHNOLOGY

ATOMIZING CYLINDER OIL INTO THE COMBUSTION CHAMBER

HJ SIP (Swirl Injection Principle) is the principle of atomizing cylinder oil and injecting it into the scavenge air swirl at a high pressure. The result is an optimal distribution of the cylinder oil on the entire upper liner surface (combustion area) which is the most exposed area in the engine.

The technology is patent protected by HJL.


Hans Jensen
Lubricators
PATENTED (Ref.:www.hjlubricators.com)
Tel. no. +45 96 57 19 11
Email: hj@hjlub.dk

TOPIC:

EEXI

The most common method (for compliance) is assumed to be Engine Power Limitation (EPL) by re-setting the fuel index, by limiting the fuel rack using either mechanical stop or setting the control system in combination with an approved override functionality as defined in the IMO guidelines.

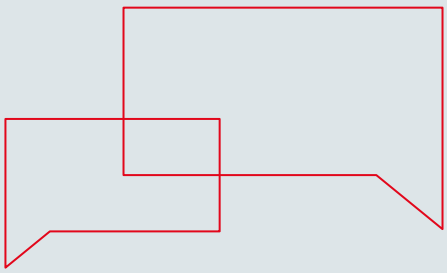
Permanent modifications of engines, for example by permanent cut-out of one turbo charger, is another alternative... Another method could be to install energy saving devices like rotating sails, bulbous bow or propeller fins.

Source: dnv.com

An possible consequence of Engine Power Limitation is that it threatens cylinder condition...

Source: HJL Engineer

In June 2021, the IMO adopted extensive new CO_2 regulations applicable to existing ships. The Energy Efficiency Existing Ship Index (EEXI) addresses the technical efficiency of ships and is a one-time certification targeting design parameters. First periodical survey is in 2023.



Overlooked problem:

EEXI CHALLENGES CYLINDER CONDITION

FAQ

– WHAT'S THE PROBLEM?

There is a clear connection between low load operation and an increased risk of deteriorated cylinder condition.

When the temperature inside the cylinder drops as the engine speed is reduced, condenzation of water increase which may lead to corrosive wear on the upper liner wall.

Proper distribution as well as frequent injection becomes even more important at part load operation

– WHAT IS THE CONNECTION BETWEEN EEXI AND CYLINDER LUBRICATION?

If you implement EPL to comply with EEXI, it most likely means that you reduce the load of the engine. When the load is reduced, the OEM cylinder lubrication systems reduce the injection frequency of the cylinder oil. In other words, the engine will run on "old" oil, during an increased number of dry piston strokes.

The cylinder oil deteriorates fast in the liner, so it is crucial to inject "fresh" oil as often as possible. Our approach is therefore injection of oil in each stroke, which prevents a deteriorated cylinder condition even at reduced loads.

– WHAT IS EFFICIENT LUBRICATION?

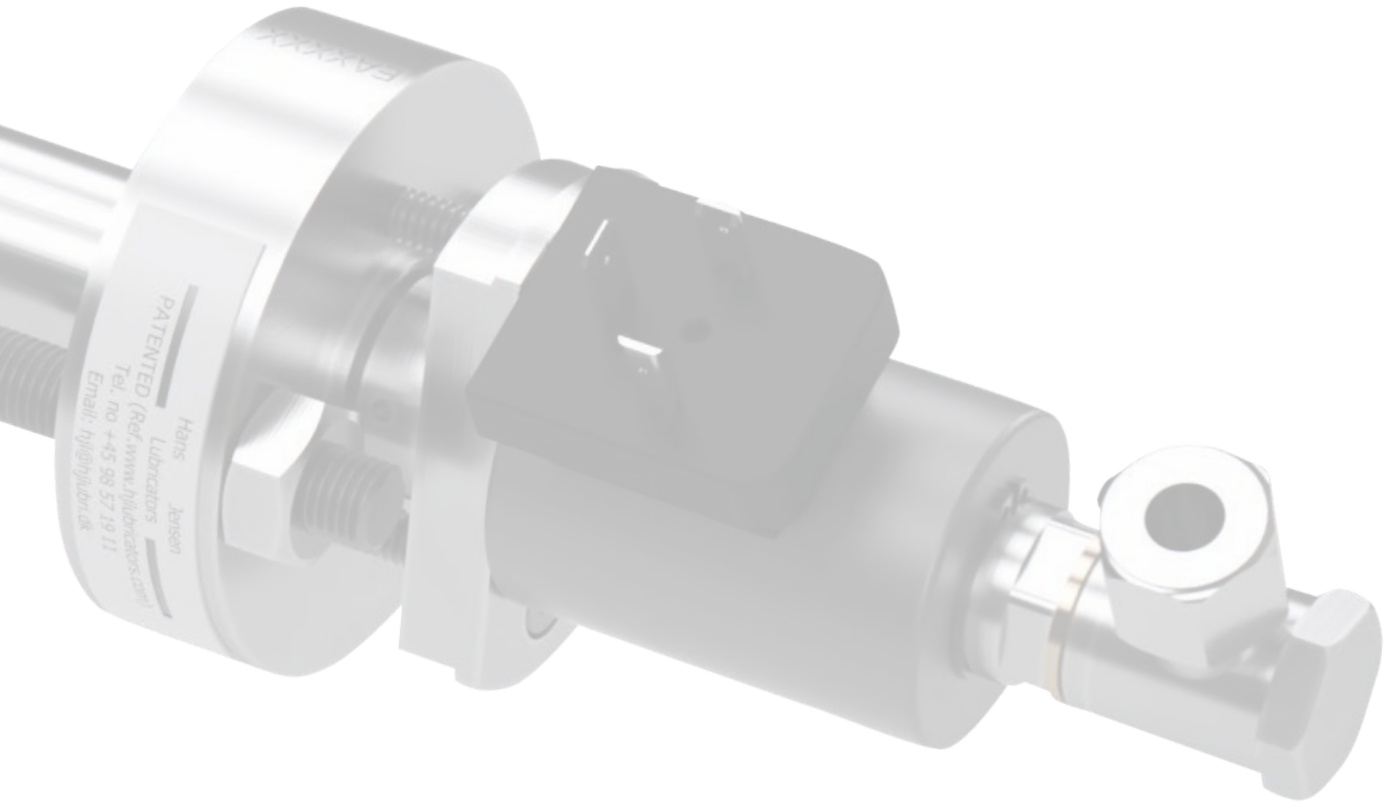
Efficient cylinder lubrication reduces the friction between the piston rings and the liner which preserves fuel. This also minimizes the wear inside the cylinder which extends TBO.

Then there is the distribution of the lubricant inside the cylinder, which is important, because it helps neutralize acids forming during combustion. Furthermore proper lubrication cleans the cylinder from deposits and maintains a gas tight seal for better engine efficiency.

– SO WHAT ARE THE BENEFITS OF USING HJL TECHNOLOGY?

It all comes down to optimizing productivity, reducing OPEX and lowering emissions. Regardless the age of your fleet, you can reap the benefits and with high probability reduce oil consumption by up to 60% using HJL technology. CO_2 and especially black carbon emission is also reduced significantly.

PRODUCTS AND SERVICES



1. LUBRICATORS

More than 100 years of experience with cylinder lubrication, positions HJL as the leading brand on cylinder condition. HJL lubricators provides variable oil injection during each piston stroke, Multi-Timing and Automatic Cleaning Sequence. We say: No more dry strokes!

2. VALVES

The unique feature of our valves is the atomizing of cylinder oil in the combustion chamber using the 'Swirl Injection Principle'. Enjoy the benefits of better distribution on the cylinder liner, a more stable oil film and lower CLOC of up to 60%.

3. SERVICES

HJL offers a range of services around cylinder condition and efficiency. The Cylinder Condition Optimization Program improves engine performance setting optimal feed rate, extends TBO, reduce consumption and early detection of wear. Other offerings are SIP valve service, reconditioning and crew training.

4. SMARTLINK™

Takes cylinder lubrication online and monitors key lubrication data remotely for optimizing engine condition.

Realize the full potential of your lubrication system by monitoring realtime performance and streamline maintenance.

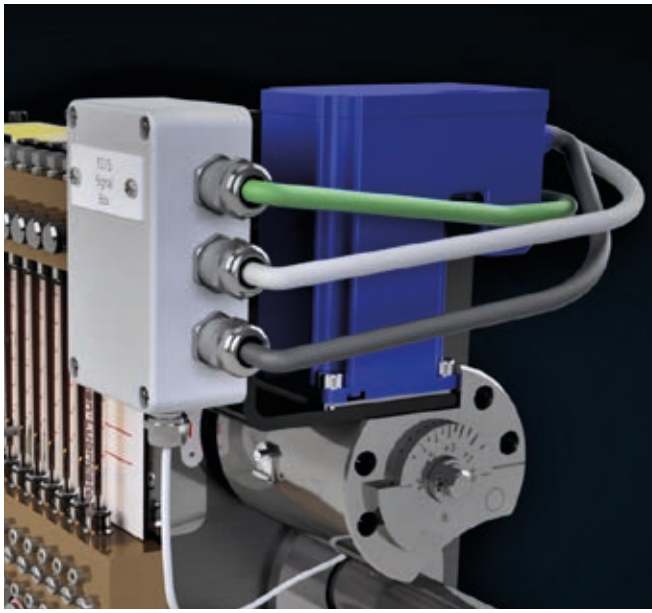
1. HANS JENSEN LUBRICATORS

The Hans Jensen product line includes both cylinder lubricators and SIP valves, which are designed to ensure utilization of the revolutionary SIP lubrication principle. Our lubricators can be combined with both non-return valves and SIP valves.

HJ MECTRONIC

Electronic control system that can be retrofitted to existing mechanical lubricators, making the lubrication system electronically controlled with load and Sulphur regulation.

Regulation of consumption is achieved by a solenoid valve on each lube point.



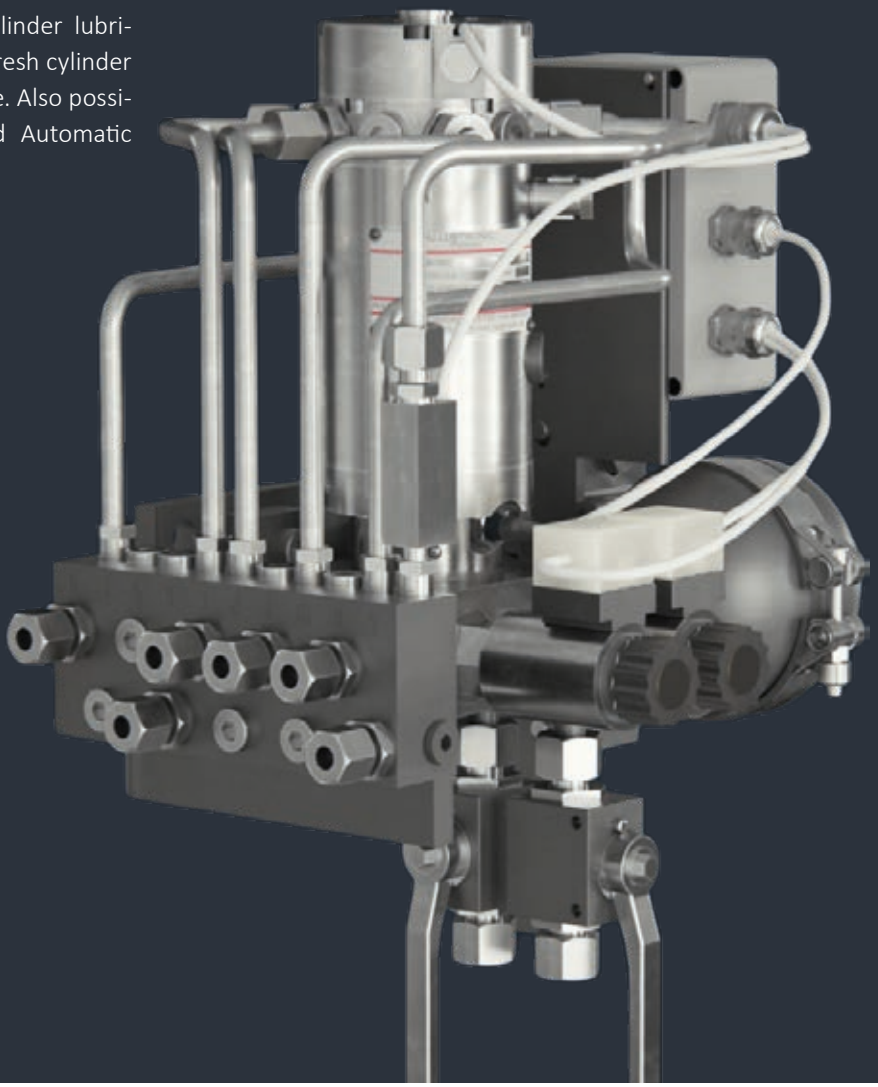
HJ X-TRONIC

Electronic control system that can be retrofitted to existing mechanical lubricators, making the lubrication system electronically controlled with load and Sulphur regulation.

Regulation of consumption is achieved by an actuator which adjusts the stroke length automatically.

HJ LUBTRONIC 2.0

Electronically controlled cylinder lubricator allowing injection of fresh cylinder oil during each piston stroke. Also possibility for Delta-Timing and Automatic Cleaning Sequence (ACS).



HJ SMARTLUBE 4.0

Advanced common rail technology without individual lubricators, where every valve injects the oil independently based on an algorithm.

Multiple injections per piston stroke.

2. HANS JENSEN
SIP VALVES

SIP

'Swirl Injection Principle' utilize the engine scavenge air to distribute the cylinder lubricating oil. For each piston stroke the engine takes, a small amount of cylinder lubricating oil is sprayed out of the HJ SIP valves.

HJ SIP VALVES IN COMBINATION WITH ALPHA LUBE

HJ SIP valves are mounted in the liner, in the same holes as your current non-return valves. HJ SIP is a high-pressure injection lubrication system that injects the cylinder oil as a spray (small oil droplets) above the piston.

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3. HANS JENSEN SERVICES

We are with you all the way.

CYLINDER LINER WEAR MEASUREMENT (VAK)

HJL offers an accurate measurement of cylinder wear that shows the actual cylinder condition. The VAK measuring process is time efficient as it takes one person approx. 1½ hour of work per unit and removal of cylinder cover is unnecessary, so cylinder condition can be determined quickly with minimal disruption. In addition, using a Ninja DS-cam provides a clear and reliable picture of the entire combustion space with 3D images.

CYLINDER CONDITION OPTIMIZATION PROGRAM (CCOP)

Running a two-stroke engine efficiently is becoming increasingly complex. That's why working with cylinder lubrication specialists is more important than ever. We conduct root cause analysis, taking ALL parameters into consideration such as lubrication system, engine design, piston ring design, SDA, scavenge port inspection, fuel and cylinder oil in use and much more. In other words, we offer a comprehensive 360-analysis to make the optimal recommendations.

LUBRICATOR RECONDITIONING

We offer renovation of HJL cylinder lubricators. Our lubricators have a durability as long as that of the diesel engine, but our cylinder lubricators require careful maintenance at regular intervals to ensure optimal performance.

SIP SERVICE

You can join our maintenance program for SIP valves. Service is scheduled at regular intervals eg. 12- or 15.000 hours of operation. You switch the used vales with a new set and let us check pressure and overall performance before returning them to the vessel reconditioned.

CREW TRAINING

As technology evolves and the need for further specialization arise, we offer our clients crew training. It can take place onboard your vessel, via webinar or a seminar in a physical location if that is most convenient. Our technicians are experts in lubrication and cylinder condition.

For more information please go to our website: www.hjlubricators.com

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4. HANS JENSEN Smartlink™

HJ Smartlink™ takes cylinder lubrication online and presents the data you need for running an efficient engine with lower cost and reduced particle emission.

Data access brings you full transparency of the lubricator performance on several parameters. Enjoy the benefits from remote monitoring of:

- Feed rate
- Average oil consumption
- Fuel index
- Engine load
- Engine speed RPM
- Alarms and notifications
- Route and location on a map
- API integration to other systems

BOOST EFFICIENCY

HJ Smartlink™ opens up for predictive maintenance of the cylinder lubrication system and the engine. This helps your team, and you reduce costs on maintenance and avoid expensive breakdowns, delays and loss of income.


Details
Total amount of errors
Last 24 hours
Last 30 days
Slowdowns
Last 24 hours
Last 30 days
Alarms
Last 24 hours
Last 30 days
Warnings
Last 24 hours
Average feedrate
0.53 g/kWh
Feed rate, 08-11-2022 - 14-11-2022
Filters
Motor

PEOPLE
KNOWLEDGE & COLLABORATION

Our team of engineers and service coordinators specialize in cylinder lubrication and condition for 2-stroke marine engines. Whether you are a ship owner or Technical Manager you can let us take care of cylinder lubrication and condition, thereby utilizing our experience acquired over 100 years and freeing your time for other important tasks.

At Hans Jensen Lubricators we constantly push the boundries of lubrication technology. Sharing our knowledge by educating employees and customers is a key part of our success. We collaborate with universities internationally which enables us to transform knowledge into cutting edge products and services that lowers operational cost and emissions for shipping companies.

Working with Hans Jensen Lubricators is your guarantee for premium solutions and value.

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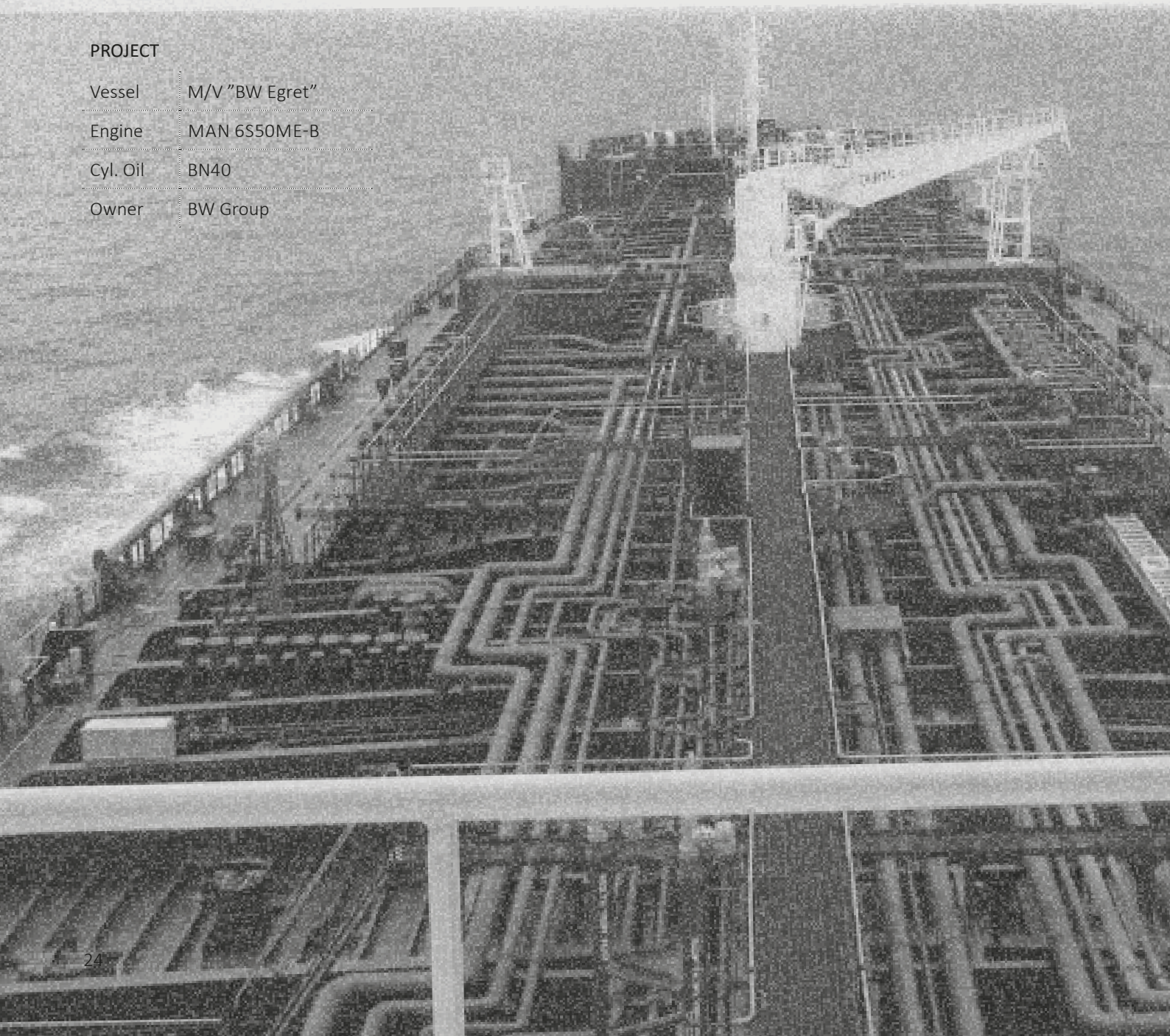
CASE: BW EGRET
EXTENDS CYLINDER LINER LIFETIME

Hafnia, member of BW Group, upgraded the engine's cylinder lubrication system onboard their Medium Range Product Tanker, "BW Egret" (6S50ME-B) in January of 2020.

The lubrication system was upgraded, as the liners had a wear rate that exceeded the maximum allowable limit.

PROJECT	
Vessel	M/V "BW Egret"
Engine	MAN 6S50ME-B
Cyl. Oil	BN40
Owner	BW Group



REPLACING THE ORIGINAL LUBRICATORS

The existing lubrication system was a conventional electronic lubrication system. Hafnia investigated the issues, and it was decided to replace the lubrication system with a more flexible and sophisticated lubrication system from HJL.

The upgrade took place during the vessel's first special survey docking, and was closely followed up on, in cooperation between the technical departments of Hafnia and HJL.

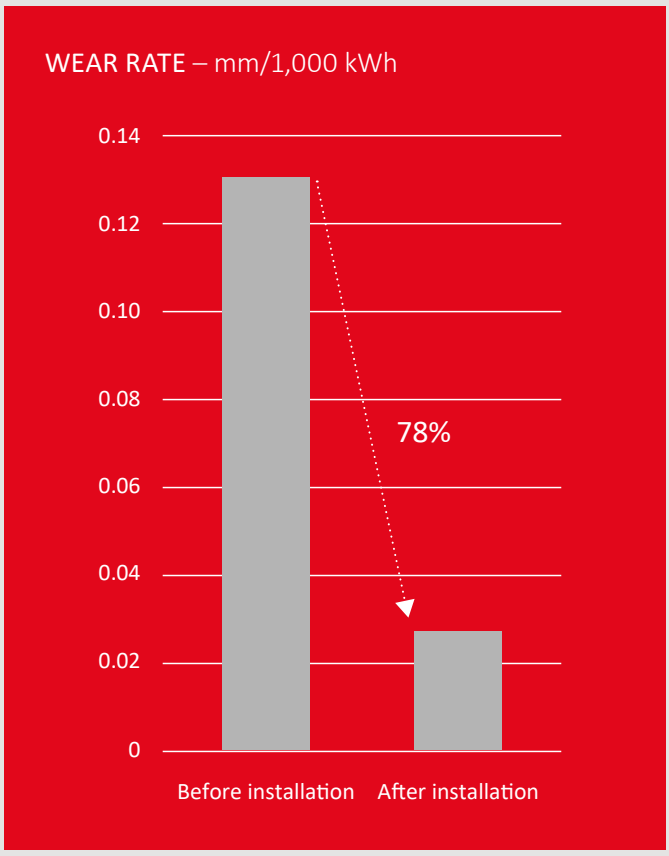
CONVINCING RESULTS

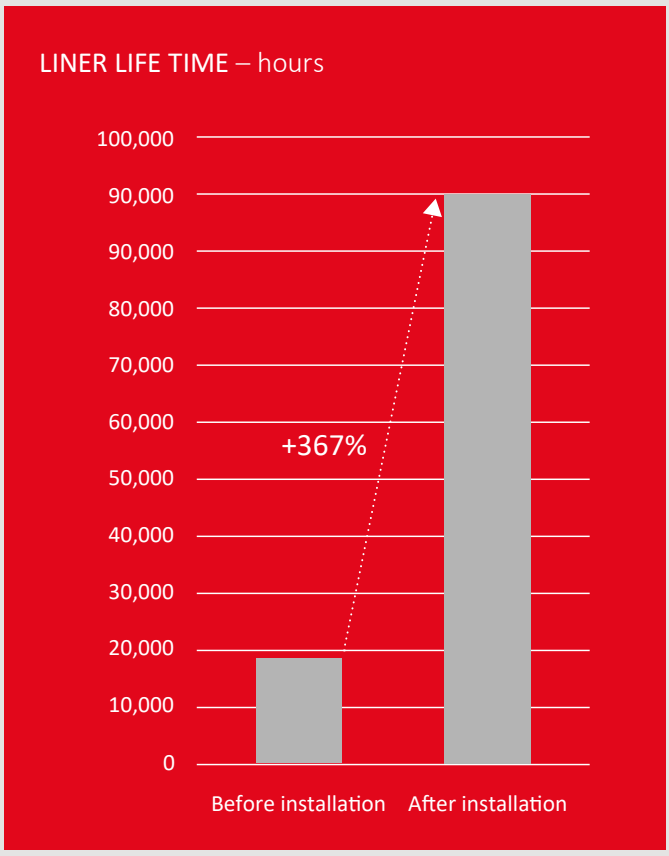
After two years of operation, the conclusion is that the upgrade has been a success; The wear rate has been reduced significantly, while at the same time achieving a feed rate reduction of more than 40%, from 1.17 g/kWh down to 0.7g /kWh. Hafnia noted, that after the upgrade, "BW Egret" is the engine with the lowest cylinder oil feed rate amongst all the sister vessels.

"The cooperation with Hans Jensen Lubricators on the BW Egret has been a great success.

Already from the initial discussions, we were advised by HJL what the possible root causes to our issues could be – and what the proposed solutions were. The importance of cylinder condition cannot be understated as it directly affects the vessel's efficiency and profitability."

– Ralph Juhl, Technical Director





CASE: BW EGRET

BEFORE HJL UPGRADE

Clear signs of contamination that can cause scuffing over time.

Piston rings seen through scavenge ports of cylinder.

High degree of visible contamination on the piston rings.

AFTER HJL UPGRADE

5,970 running hrs. with new hj system (0.7 g/kwh) shows a healthy condition of all the piston rings and the cylinder liners.

Piston rings of cylinder 1

Healthy cylinder liner with wave cuts visible.

CASE: M/V AZOV
REDUCES CYLINDER WEAR

A joint test with MAN Diesel & Turbo (MDT) and Hans Jensen Lubricators for determining the effectiveness of HJ Lubtronic SIP on a new, super-long stroke, electronically controlled engine which was prone to a high cylinder wear rate, cold corrosion and high feed rate.

PROJECT

Vessel	M/V "Azov"
Engine	MAN 9S90ME-C9.2
Load avg.	35%
Cyl. Oil	BN 70/100
Owner	Costamare Inc

COSTAMARE INC.

HEAD-TO-HEAD TEST OF HJL VS. STANDARD LUBRICATION SYSTEM

The nine cylinders were setup differently using lubricators and valves from MAN or HJL:

CYLINDER	LUBRICATOR	INJECTOR TYPE	QUELL POS.
1-2	HJ Lubtronic	HJ SIP	1/8 th
3-4	HJ Lubtronic	HJ SIP	1/3 rd
5-6	HJ Lubtronic	MDT NRV	1/3 rd
7-9	Alpha	MDT NRV	1/3 rd

SIGNIFICANT IMPROVEMENT

MDT attended the vessel several times and was responsible for all data collection. MDT analyzed the test results and found that cylinders equipped with HJ SIP valves and HJ Lubtronic lubricator in combination is remarkable in terms of reducing cylinder liner wear and lube oil consumption thereby improving the cylinder condition.

Wear rate as low as 0,018 mm/1,000 hrs. in operation.

Feed rate down to 0.3 g/kWh.

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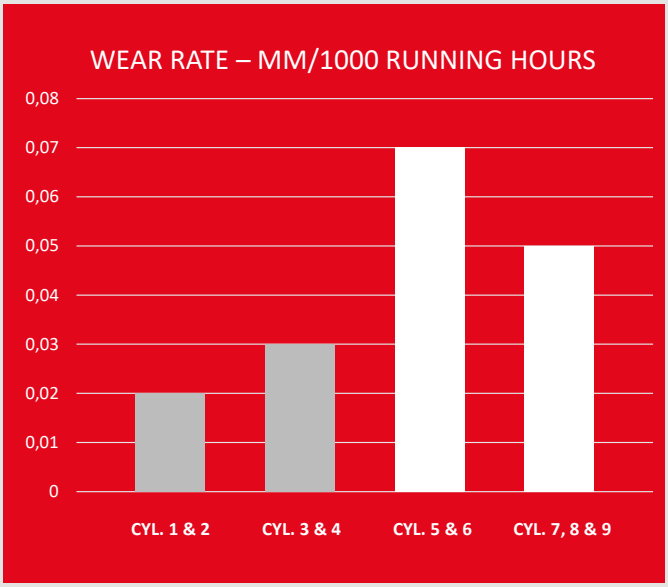


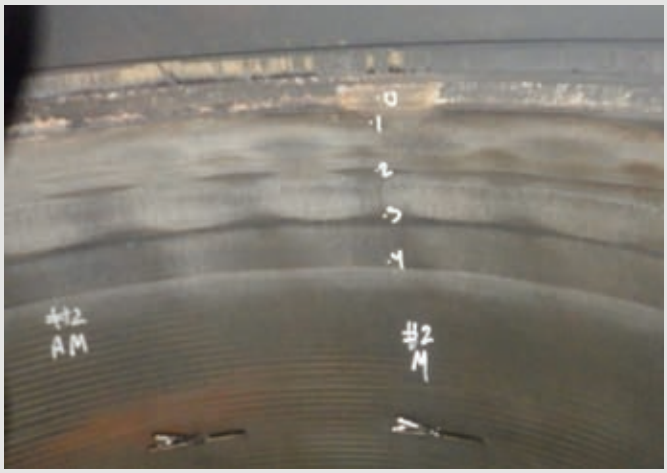
" – Unit no. 1 and 2 (SIP in 1/8 stroke position) were found in very good condition with too little wear, and therefore the vessel will be recommended to lower the feed rate to 0.6 g/kWh".

- Gert Rosing, MAN Diesel & Turbo

CASE: M/V AZOV

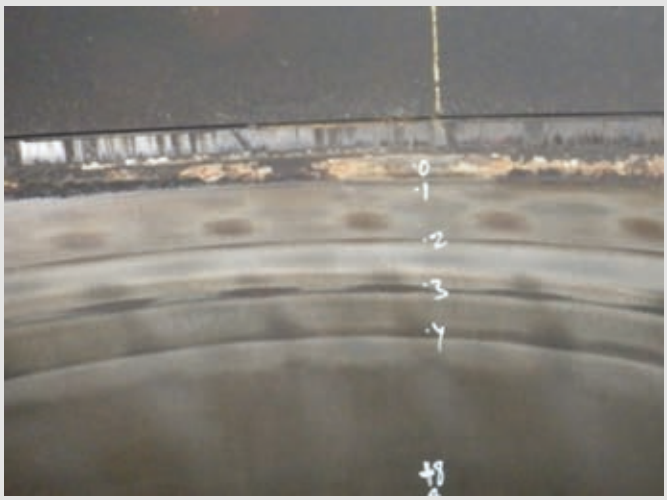
CYLINDER LINER COMPARISON
AFTER 4,000 RUNNING HRS.

Cylinder 1 equipped with HJ Lubtronic SIP
- wave cuts still visible.



Cylinder 2 equipped with HJ Lubtronic SIP
- wave cuts still visible.

Cylinder 7 equipped with standard electronic lubrication
- wave cuts not visible.



Cylinder 8 equipped with standard electronic lubrication
- wave cuts not visible.

AFTER 7,400 RUNNING HRS.

Cylinder 1 equipped with HJ Lubtronic SIP
- wave cuts still visible.

AFTER 10,498 RUNNING HRS.

Cylinder 1 equipped with HJ Lubtronic SIP
- wave cuts still visible.

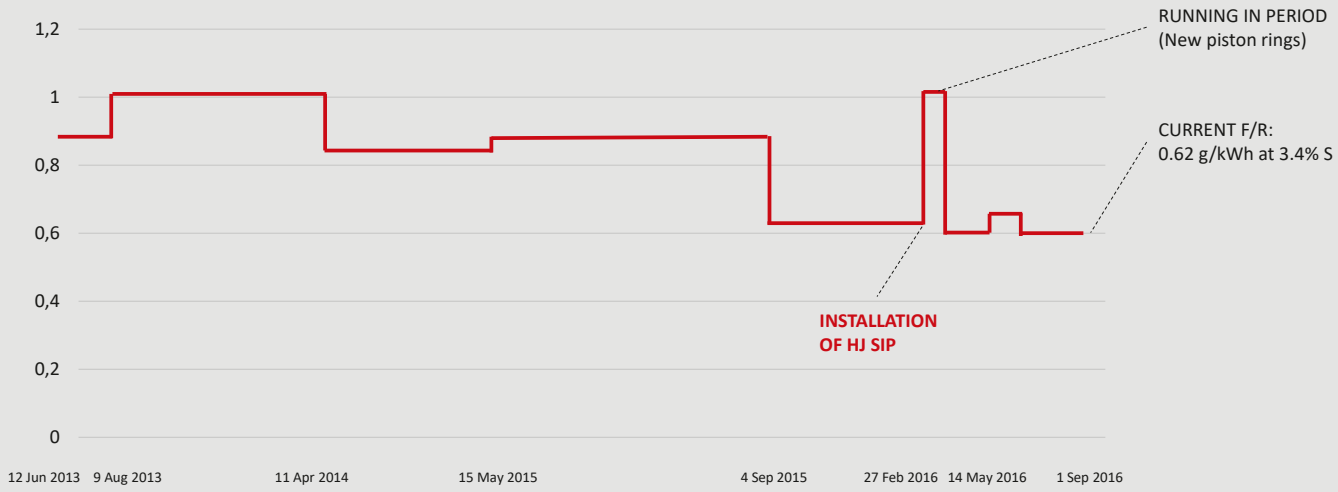
CASE: M/V EAGLE VARNA
REDUCTION OF CLOC

The marine vessel Eagle Varna was experiencing a high feed rate of the cylinder lube oil. Hans Jensen installed HJ SIP valves on MAN Alpha, which resulted in a significant reduction of cylinder lube oil consumption.

PROJECT	
Vessel	M/V ”Eagle Varna”
Engine	MAN 7S80MC-C
Cyl. Oil	BN 70/100
Owner	AET SHIPMANAGEMENT
Product	HJ SIP VALVES

FEED RATE

22,272 running hrs. (3,166 running hrs. with HJ SIP)



REDUCED FEED RATE

New HJ SIP valves were installed during overhaul and the piston rings were changed. After a running period of 3,100 hours the feedrate was lowered to 0,62 g/kWh with a re-commendation of reducing to as low as 0,55 g/kWh.

SIGNIFICANT YEARLY SAVINGS

This corresponds to yearly saving in lube oil of 156L/24hrs. or $100,000 in yearly savings for the vessel (price est. $2,1/L).

Furthermore, the iron value measured in the lube oil 3 months after the overhaul was reduced by 25% compared to before changing the rings.

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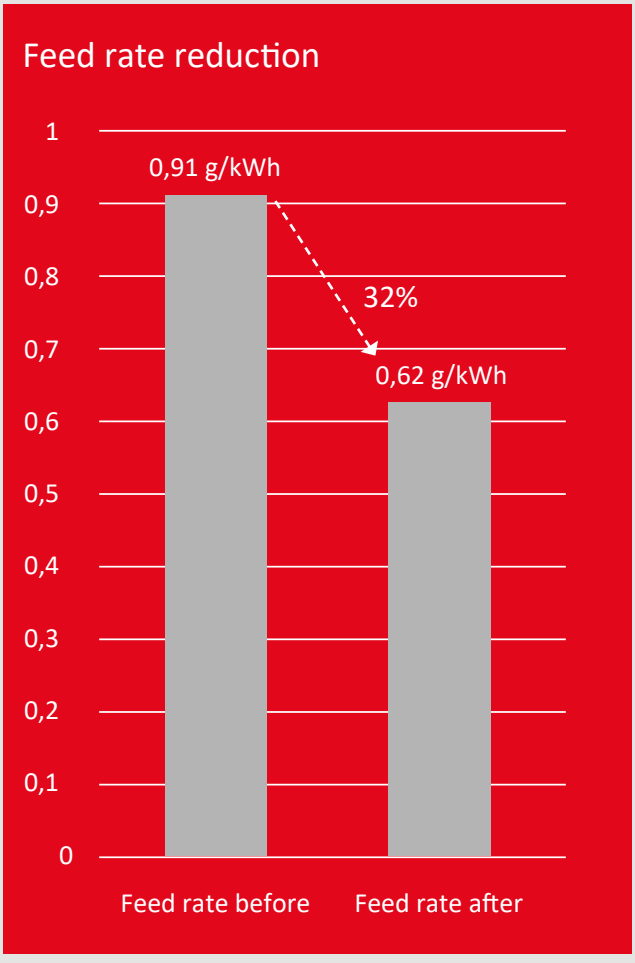
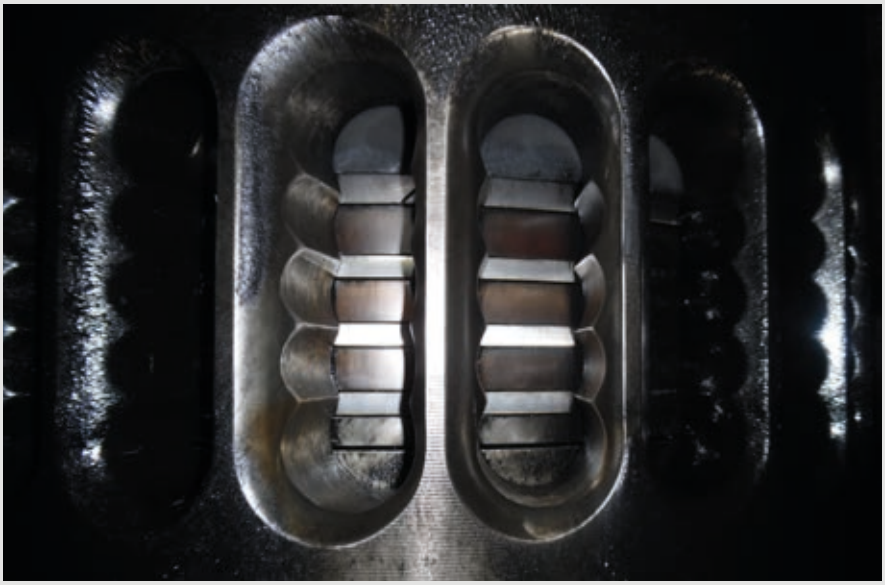


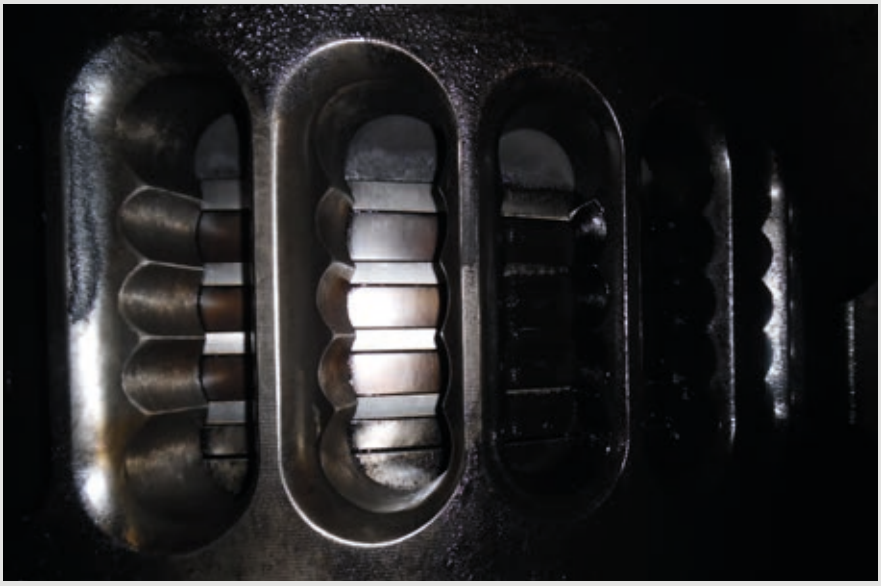
CASE: M/V EAGLE VARNA

UNIT 2
31. AUGUST 2016

22,272 RUNNING HRS.
(3,166 RUNNING HRS.
WITH HJ SIP).



Smooth piston rings.



Half cleaned – smooth piston rings.

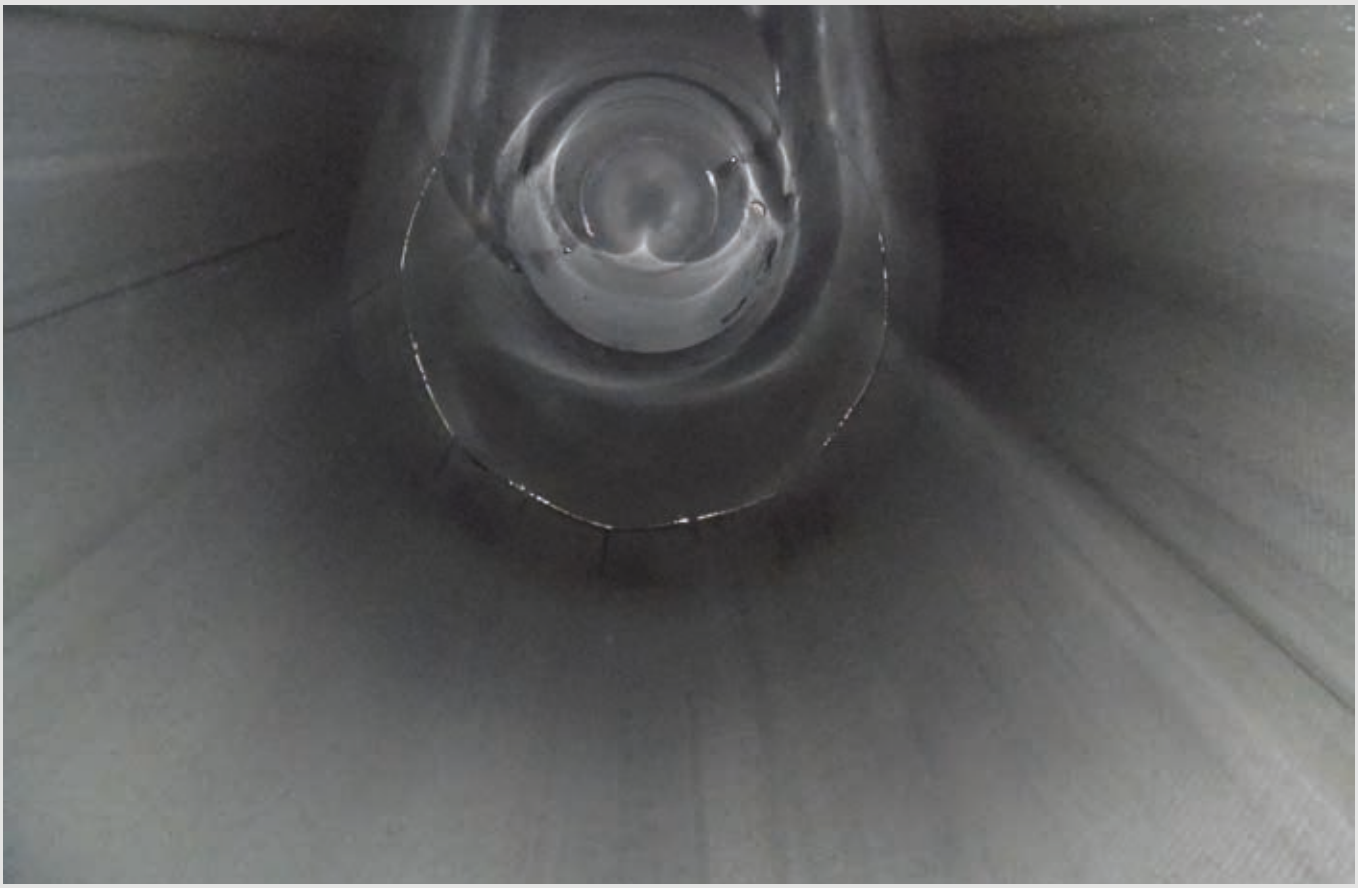
Well lubricated piston rings.

UNIT 4

Smooth piston rings.

Well lubricated piston rings.

Smooth liner surface



”K” LINE BULK
REFERENCES (ME AND MC-C)

Albion Bay

Clifton Bay

Britain Bay

Europa Bay

Cape Normandy

Cape Valencia

Lily Atlantic

Vittoria

Falmouth Bay

Primrose Atlantic

”K” LINE TESTIMONIAL

– I wish to thank you on behalf of ”K” Line Bulk Shipping (UK) and also our two shipmanagers Fleet Management and ”K” Line RoRo Bulk Shipmanagement, Manila for the extra care of your team dedicated to this project.

Our ship managers, who are the engineering experts, speak highly about HJL technology.

We are able to confirm beyond doubt that this was the right decision and the project has been a great success.

Please pass our appreciation to all members of your team.

– Georgi Yorgakiev, General Manager at ”K” Line

MILESTONES

1917: Hans Jensens Maskinfabrik is founded by chief engineer Hans Peter Jensen in Copenhagen.

1923: Hans Jensens Maskinfabrik begins the development of cylinder lubricators for B&W Ship yard.

1947: The founder's son, Kjeld Hans Jensen becomes co-owner.

1972: Hans Jensens Maskinfabrik establishes new facilities for production in Hadsund, Jutland.

1973: Third generation becomes part owner. Hans Peter Jensen is taken in as part owner of Hans Jensens Maskinfabrik I/S on January 1st 1973.

1973: The company purchases the first NC machine – a precursor to the later CNC technology.

1992: ISO 9000 is introduced at the factory. This adjusts working processes, procedures and routines around the production and order handling.

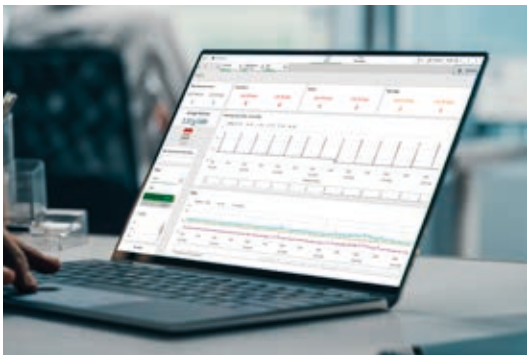
The company changes its name to Hans Jensen Lubricators.

1997: HJ SIP valve is born. 'Swirl Injection Principle' refers to the principle of using the scavenging air swirl in the cylinder to distribute the lube oil more efficiently.

2009: HJ Lubtronic and HJ Mechtronic lubricators are introduced. This presents the possibility of optimising cylinder lubrication with delivery of fresh cylinder oil with every piston stroke.

2014: Hans Jensen Lubricators A/S establishes a sales- and service office in Singapore.

2020: Hans Jensen Lubricators launches HJ Smartlube 4.0 which is the pinnacle of lubrication technology leading the way into the next decade.



2022: HJ Smartlink™ goes live for the first time. The platform takes cylinder lubrication online offering optimized performance and improved remote supervision.

PART OF
G&O MARITIME GROUP

In 2022 Hans Jensen Lubricators was acquired by G&O Maritime Group. This drives new opportunities for the company and underpins the group's growth strategy.

ABOUT G&O MARITIME GROUP

We are a group of sub system providers to the maritime industry, all developing high quality products and enabling our customers through the green transition in the maritime industry.

Our brands are divided into 3 divisions:

Propulsion management

Offers vibration compensators, cylinder lubrication systems and piston rod stuffing boxes. We cooperate with engine manufacturers and shipping companies to optimise main engine operations and support the important task of utilizing new environmentally friendly fuel types.

Water & Waste management

Includes incineration plants and biological water purifying plants, securing that waste water is purified before discharge while solid waste and oil sludge is incinerated at high temperatures to reduce SOx and NOx emissions.

Tank management

Provides PV valves and protects tank vessels against unintended overpressure or vacuum while simultaneously protecting against fire risk and ensuring that emissions from the cargo is kept to a minimum in accordance with IMO standards.

G&O MARITIME GROUP

OTHER GROUP MEMBERS

Atlas Incinerators

Atlas Incinerators is the first choice among Ship Owners and Power Plant operators looking for quality 3 chamber incinerators. The products are considered the most reliable and operationally cost-efficient incinerators on the market.

www.gomg.dk/atlas

Heco International

Supplier of high-quality piston rod stuffing boxes and spare parts to engine builders and designers world wide. The company is positioned as an important partner in the new-building market for two-stroke diesel engines.

www.gomg.dk/heco

Pres-Vac Engineering

Pres-Vac is the world's leading supplier of high-velocity pressure/vacuum valves, and around 50% of all tanker vessels worldwide use Pres-Vac equipment with more than 100,000 valves installed.

www.gomg.dk/presvac

Gertsen & Olufsen vibration compensators

The market leader in vibration compensation onboard maritime installations. The compensators are renowned for their extreme operational excellence and reliability.

www.gomg.dk/compensator

Gertsen & Olufsen Bioreactors

Gertsen & Olufsen deliver systems for wastewater treatment that can handle all grey and black water from any vessel or offshore facility. The process is 100% biological with no dilution, consumables or chemicals.

www.gomg.dk/bioreactor

BOARD OF DIRECTORS

Our board is represented by a group of highly experienced profiles with roots in the maritime sector and business development.

For more information please go to our website:
www.hjlubricators.com

CHAIR

Jesper Lok

Jesper Lok has dedicated his career to a wide range of companies and ventures, including 25 years in the Maersk group, CEO of Svitzer.

BOARD MEMBER

Thomas S. Knudsen

With a total of 36 years at MAN ES, Thomas S. Knudsen brings unprecedented experience within management, engineering and shipbuilding to the G&O Maritime Group Board.

BOARD MEMBER

Kristian V. Mørch

CEO at J. Lauritzen

35 years of experience in the marine shipping industry of which he spent 6 years based in Asia. Also former CEO of Odfjell SE.

BOARD MEMBER

Bernd Bertram

VP Propulsion at Wärtsilä

Bernd Bertram brings experience from the global market leading technology company Wärtsilä since 2012 and Maersk Line before that.

BOARD MEMBER

Rasmus Hans Jensen

Working at HJL since 2004. Until 2012 as head of sales. From 2012 to 2024 as CEO.

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