A new era of marine fuels: what it means for engines, ship management and lubrication

1st September 2022 • 09:00-09:45 BST

Panelist Documents:

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Webinar Week

30 August – 1 September 2022

marine propulsion & auxiliary machinery

A NEW ERA FOR MARINE FUELS

Alternative Fuels and Cylinder Lubrication
Riviera Maritime Media - 1 Sept 2022 (Webcast)

Dirk Hoek
Technical Product Manager

Shell Marine

FORWARD TOGETHER

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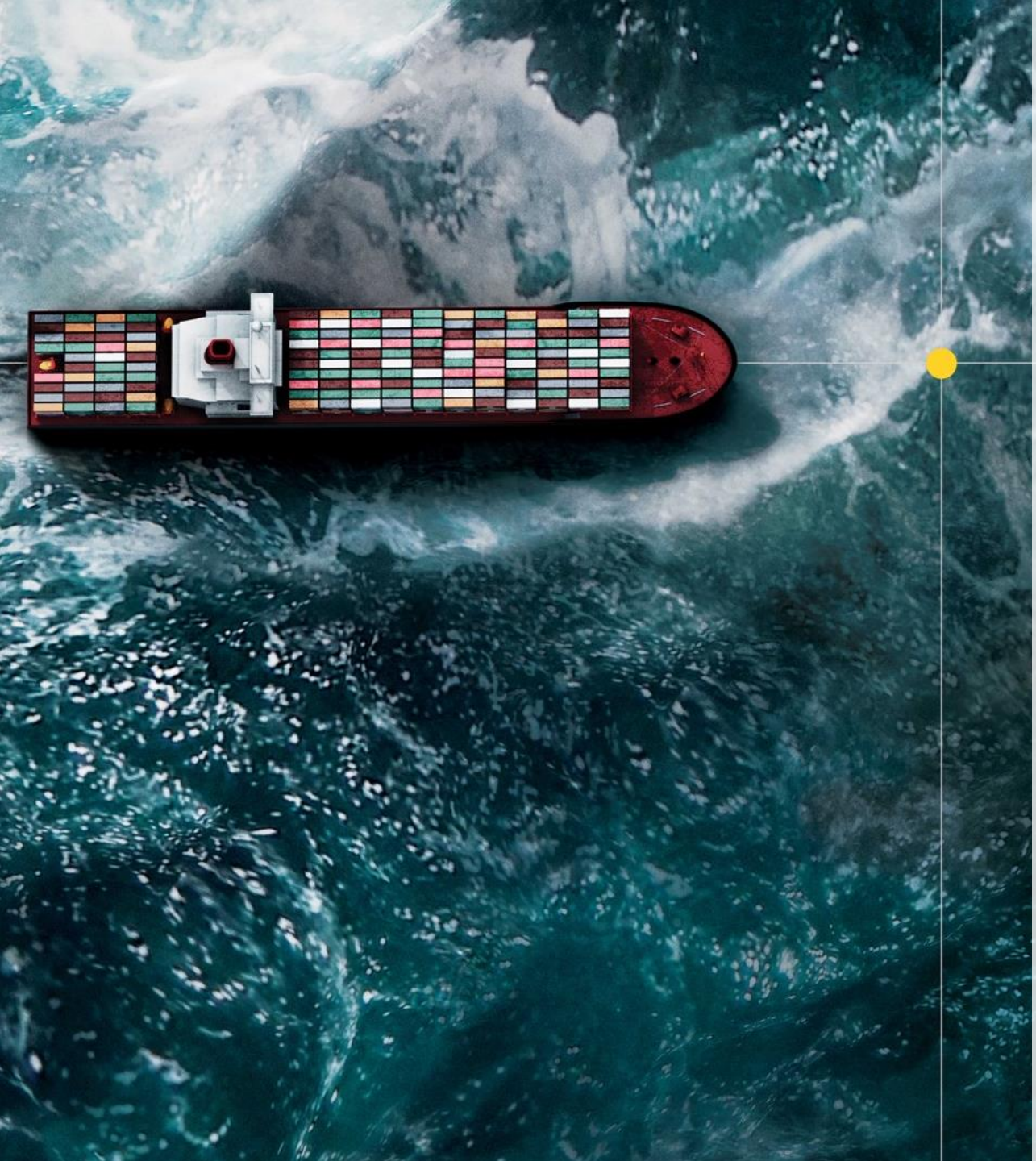


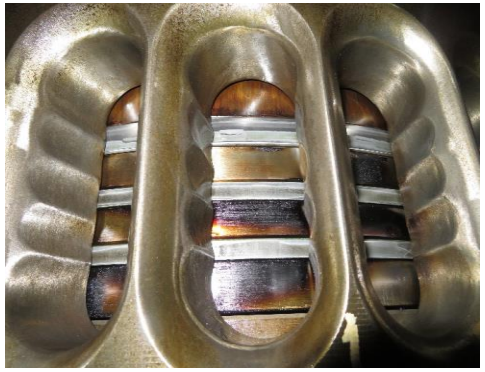
Agenda

- Challenges in the field
- The role of lubricant as engine component
- Monitoring is more important than ever
- Assessing Cylinder Condition
- Ring/Groove Clearance
- Coating Thickness
- Condition Based Maintenance
- Shell LubeMonitor – a Shell expert at your fingertips

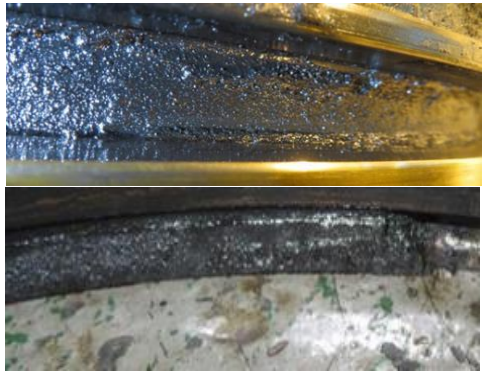
Challenges in the field

Controlling cylinder condition is about confirming the balance is right throughout the operational conditions

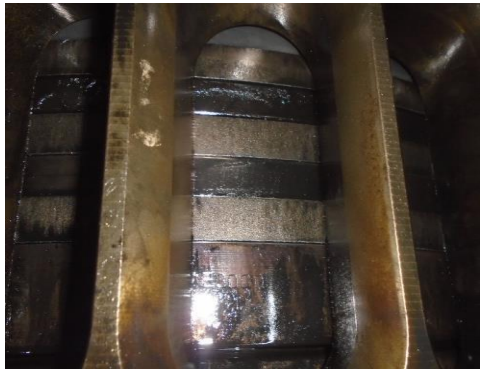
Cold corrosion

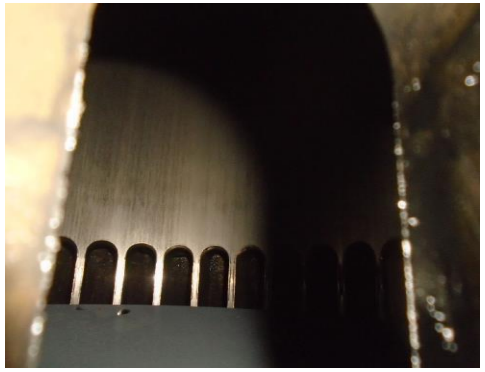


Deposits



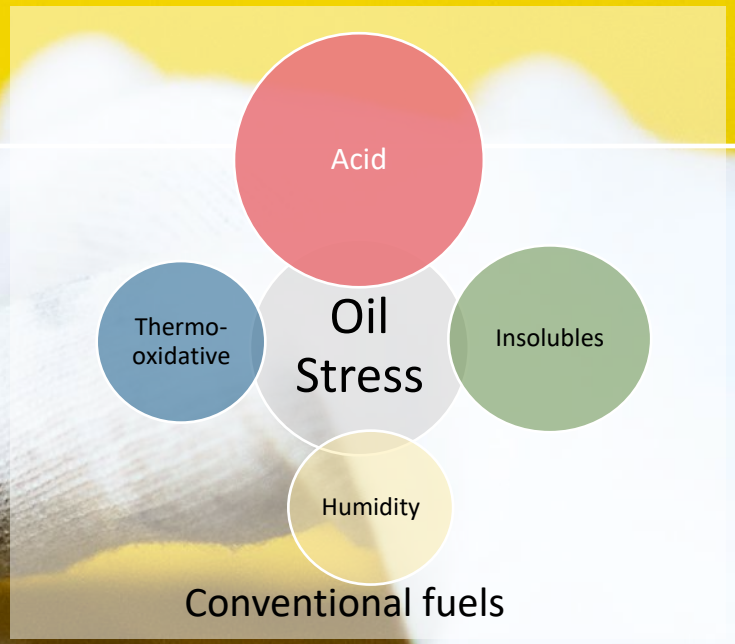
Scuffing



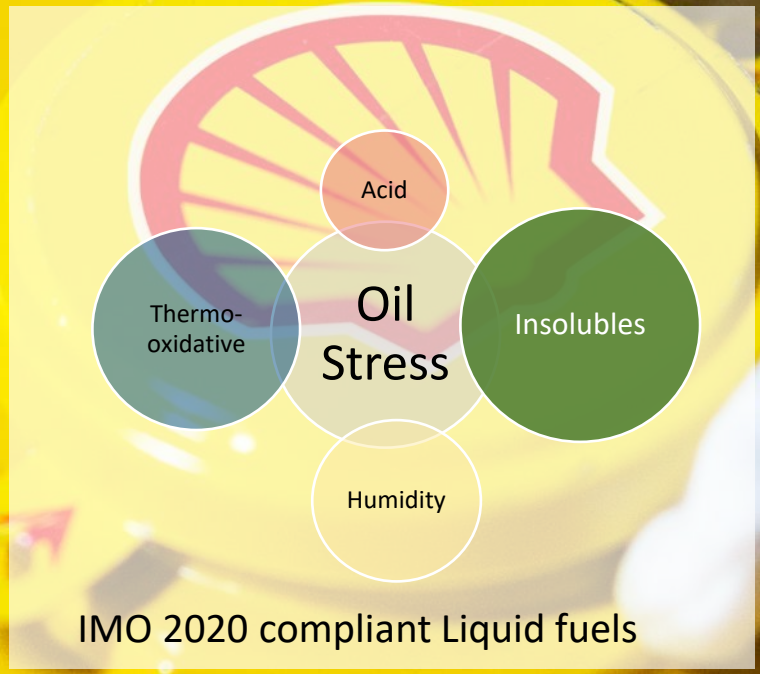


The role of a Cylinder Lubricant

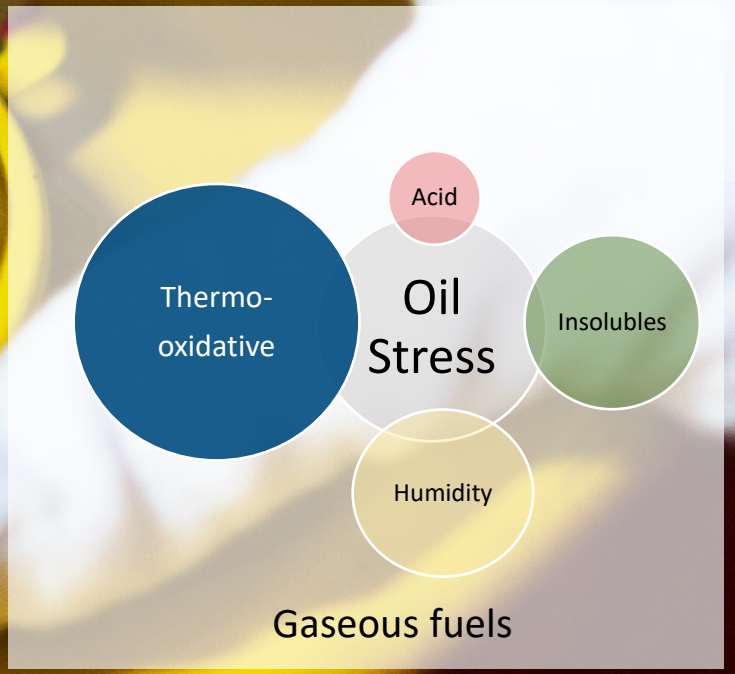
- Cooling
- Reduces friction
- Prevents (chemical) wear
- Withstands thermal stress
- Prevents deposit build up
- Removes of contaminants
- Carries Information



Conventional fuels



IMO 2020 compliant Liquid fuels



Gaseous fuels

Shell Alexia 40 XC

Shell is prepared: Its R&D team has been continuously monitoring industry challenges and has developed the right solutions

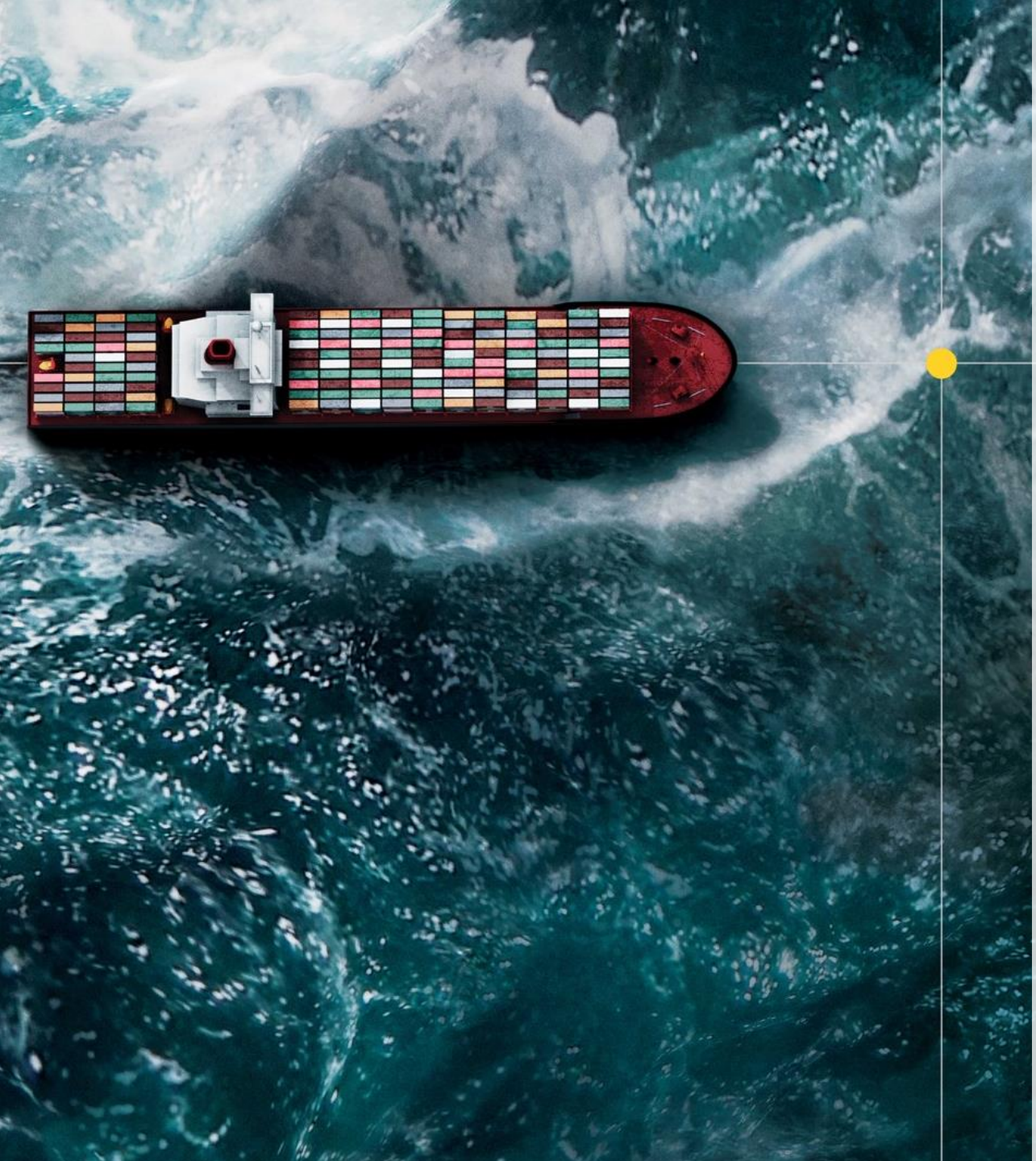
The development process involved the devising a proprietary formulation and stringent testing and extensive field trials with > 6,000 hours of rigorous testing on the latest engine types with IMO 2020-compliant fuels

The goal: To develop a cylinder oil that…

Is low BN + Provides a cleanliness benefit similar to BN100 oils

The result: Shell Alexia 40 XC oil

A low-BN, high-performance cylinder lubricant designed for modern low-speed two-stroke marine engines using low (< 0.5%) sulphur fuels



Monitoring is important

Cylinder condition monitoring by drain oil analysis and scavenge port inspection more important than ever!

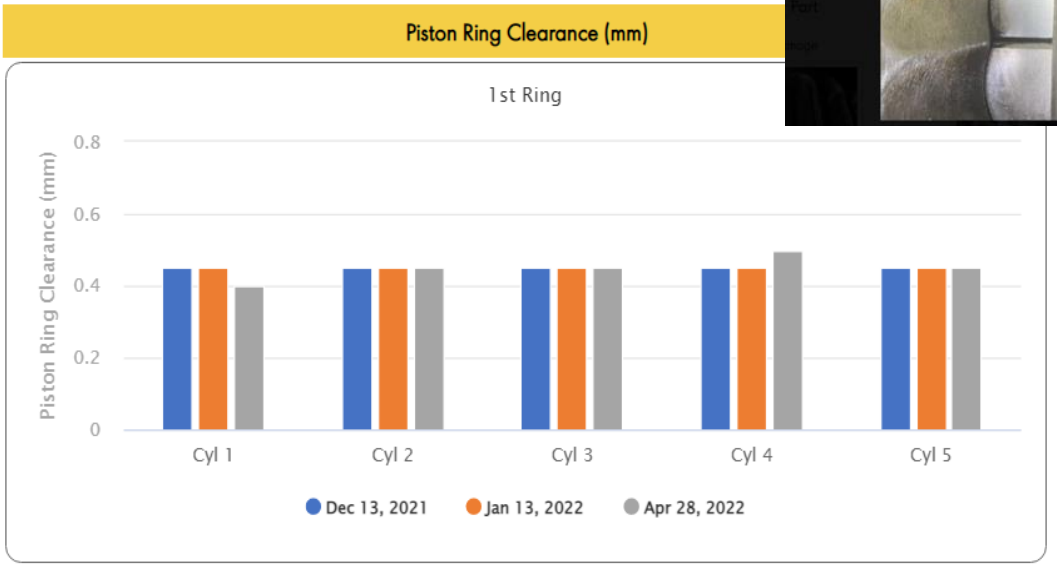
- Cylinder condition monitoring
- Monitor ring clearance!
- Monitor ring coating thickness!
- Monitor deposit formation on top land and ring lands!
- Take the following pictures
- Top land
- Ring lands
- Close up of piston ring surface
- Liner and piston crown.
- A visual history to observe trends and changes is critical to take correct actions.

Piston Ring Clearance

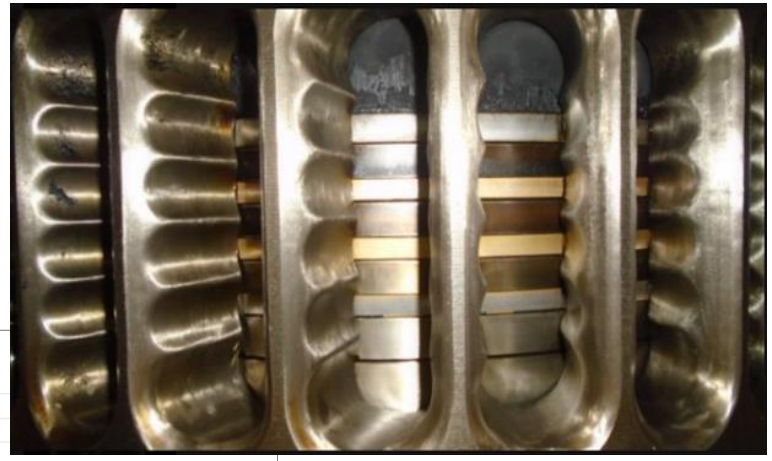
Engine Model: 5X72DF

Gas operation: 13612 HRS

Cylinder Oil: Shell Alexia 40 Feedrate: 0,8 g/kWh



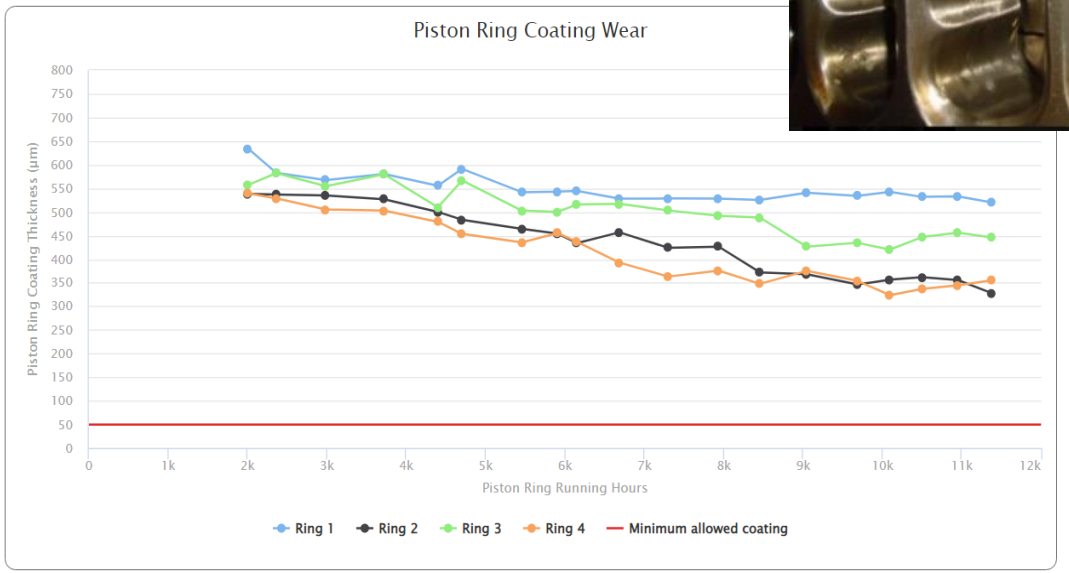
Piston Ring Coating Wear



Engine Model: 6G50ME-C9.2

Gas operation: 13612 HRS

Cylinder Oil: Shell Alexia 40 Feedrate: 0,9 g/kWh

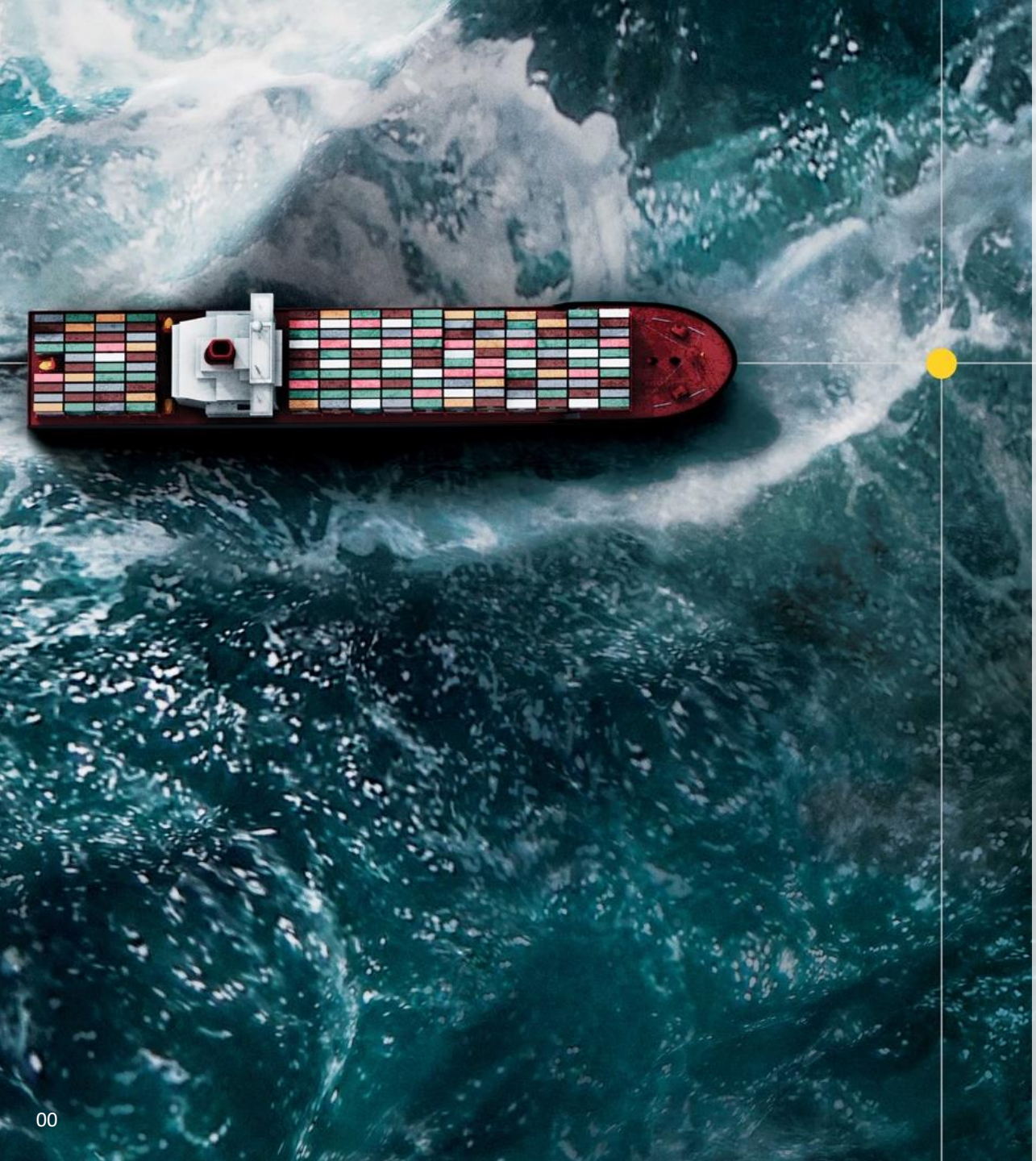


Condition Based Maintenance

Engine Model: 6G50ME-C9.2

Gas operation: 13612 HRS

Cylinder Oil: Shell Alexia 40 Feedrate: 0,9 g/kWh

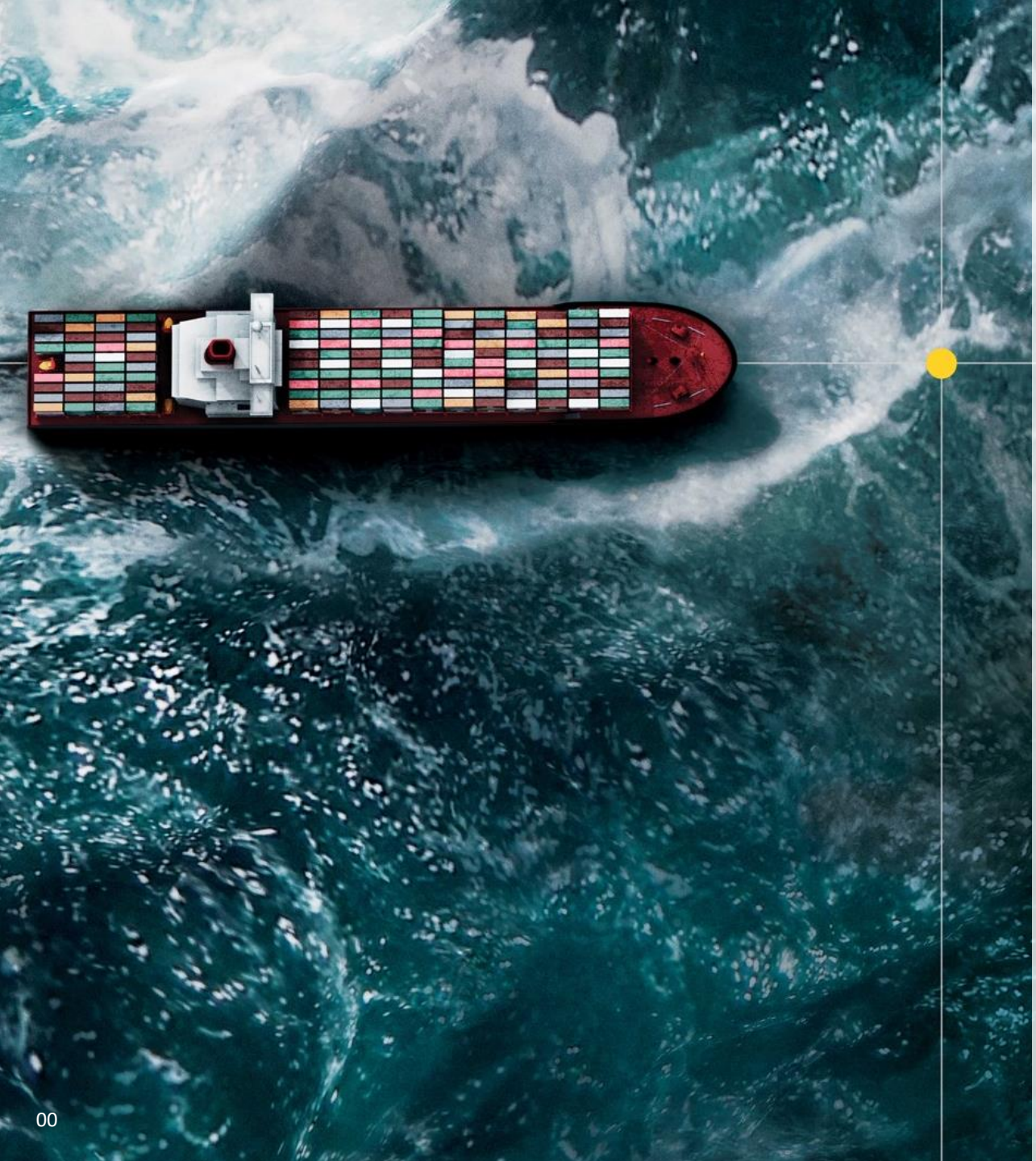


Shell LubeMonitor

A Shell expert at your fingertips

The solution

- OEMs recommend regular engine monitoring.
- Regular engine inspections and scheduled maintenance are critical to keep a vessel operating safely, efficiently and reliably.
- Shell LubeMonitor service is a single platform that generates insights and recommendations to optimize engine performance and feed rate.
- Shell LubeMonitor combines for the drain oil samples the onboard - and laboratory test results. Verify onboard test results and procedures against laboratory data. Eliminate bias of results. Insight into abrasive wear versus corrosive wear from laboratory WPI data.



Shell LubeMonitor

A Shell expert at your fingertips

What’s in it for users

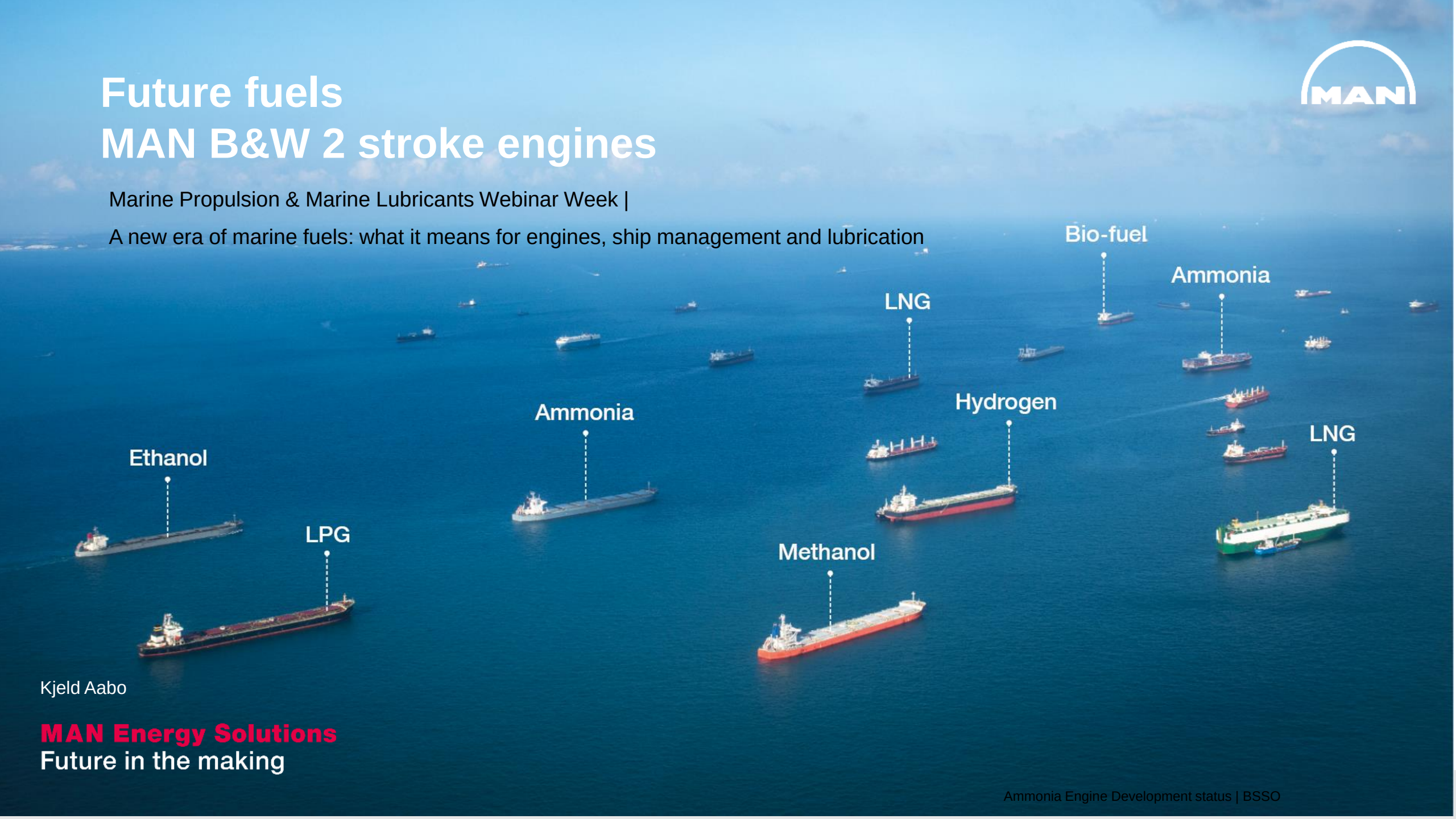
- The Shell LubeMonitor Engine Inspection feature guides you through an engine inspection. Automatically produces a professional format report, including measurements and observations, which can easily be shared with all relevant parties.
- The App supports crew doing engine inspections, share the data in a structured way and allows support and service functions such as Shell Technical Advisors or OEM engineers to give meaningful advice.
- https://lubemonitor.shell.com

Q&A

Future fuels
MAN B&W 2 stroke engines

Marine Propulsion & Marine Lubricants Webinar Week |

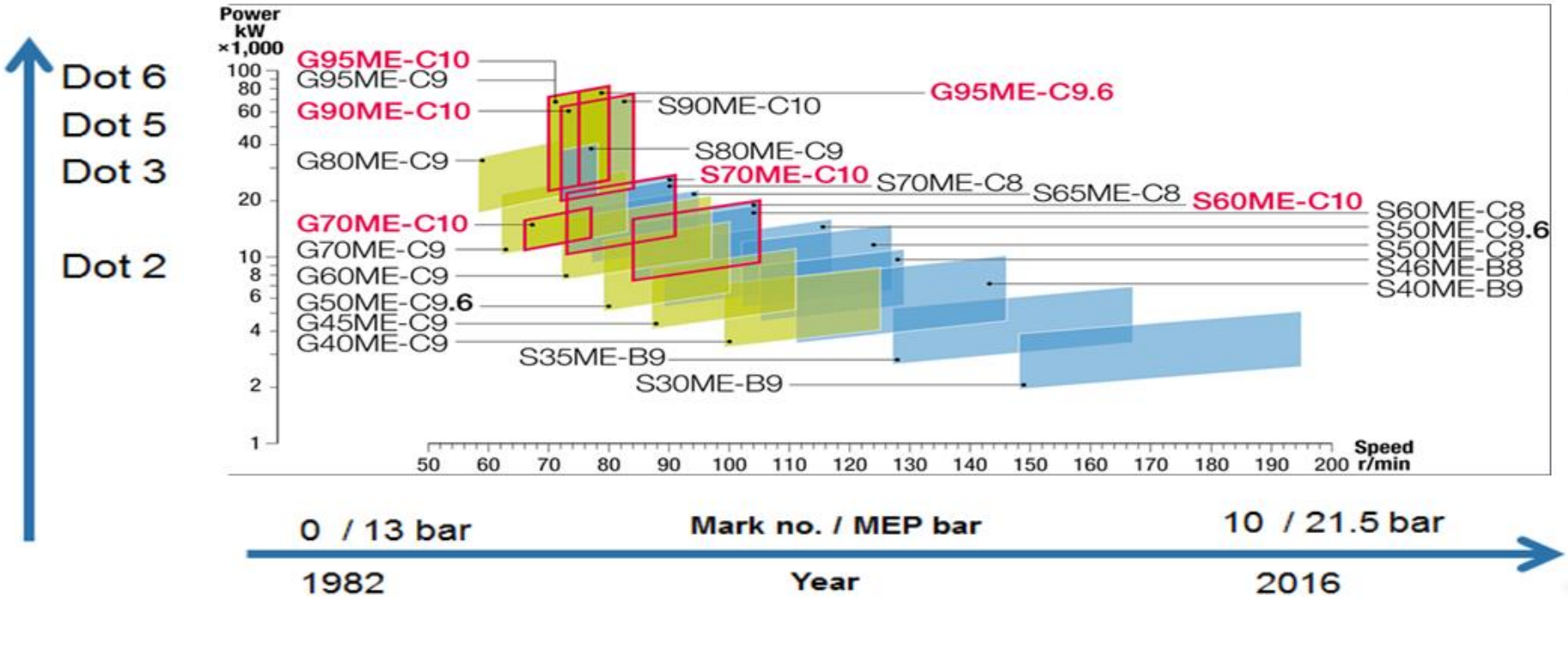
A new era of marine fuels: what it means for engines, ship management and lubrication

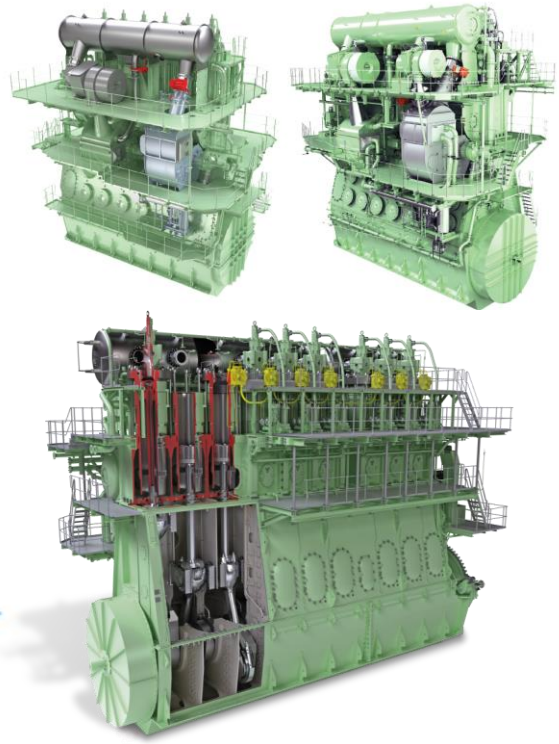


Kjeld Aabo

MAN Energy Solutions
Future in the making

Engine Programme Development

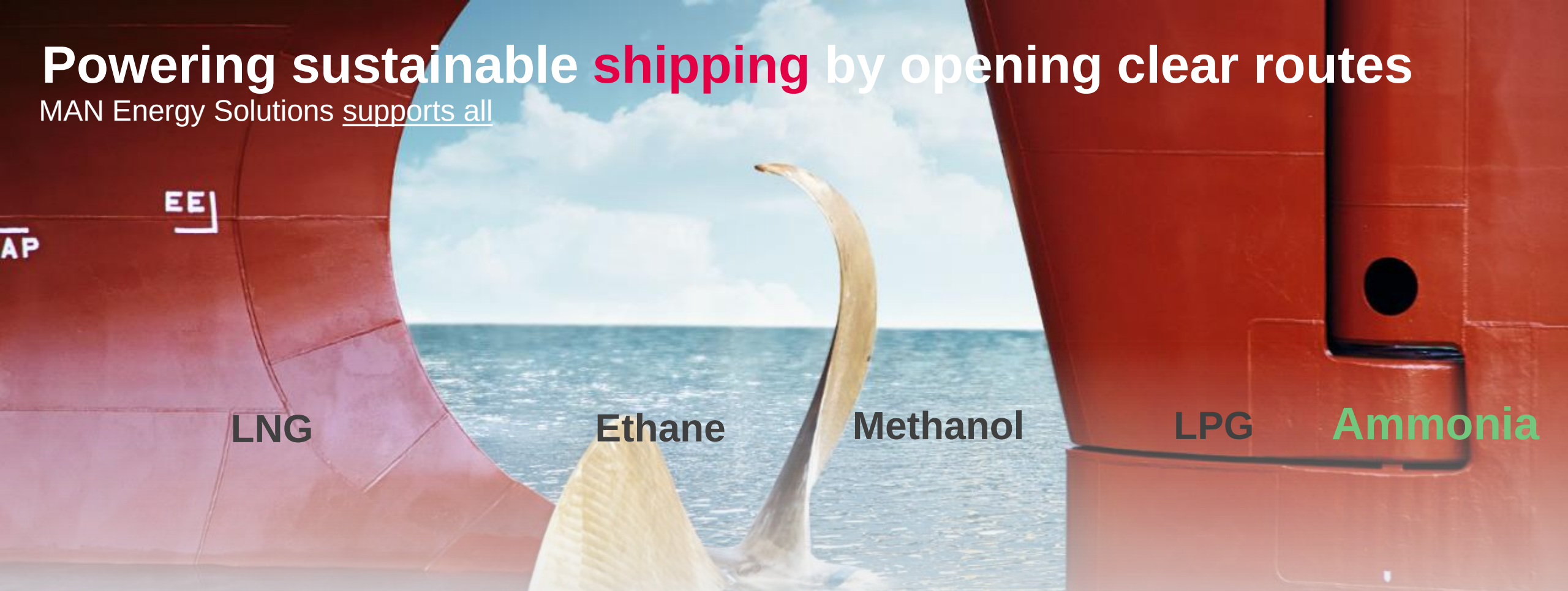




Mission: Meet any combination of propeller power and speed the naval architects will need

Powering sustainable shipping by opening clear routes

MAN Energy Solutions supports all



LNG	Ethane	Methanol	LPG	Ammonia
ME-GI 459 engines	**ME-GA** 192 engines	**ME-GIE** 31 engines	**ME-LGIM** 72 engines	**ME-LGIP** 124 engines

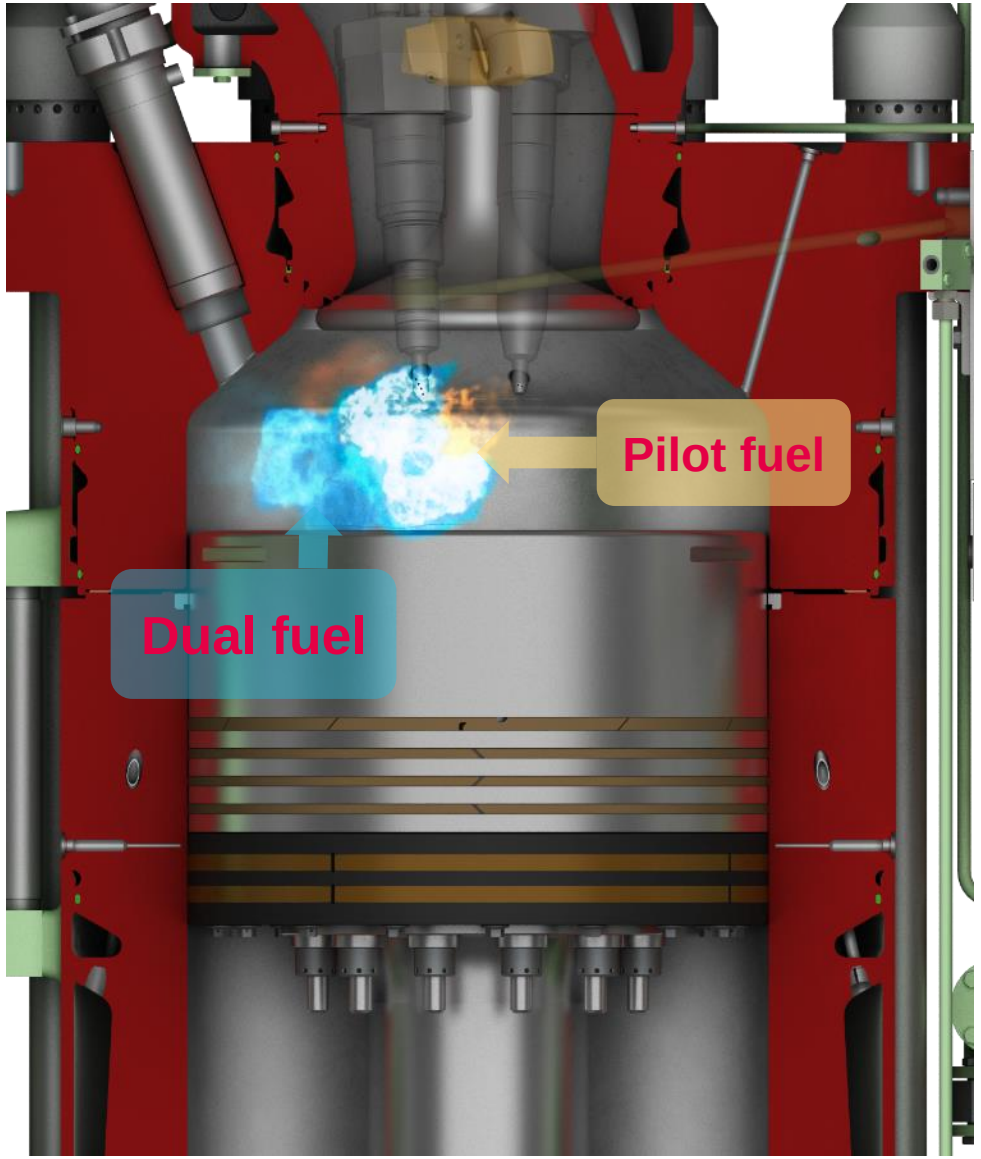
→ 2024

The Diesel combustion principle

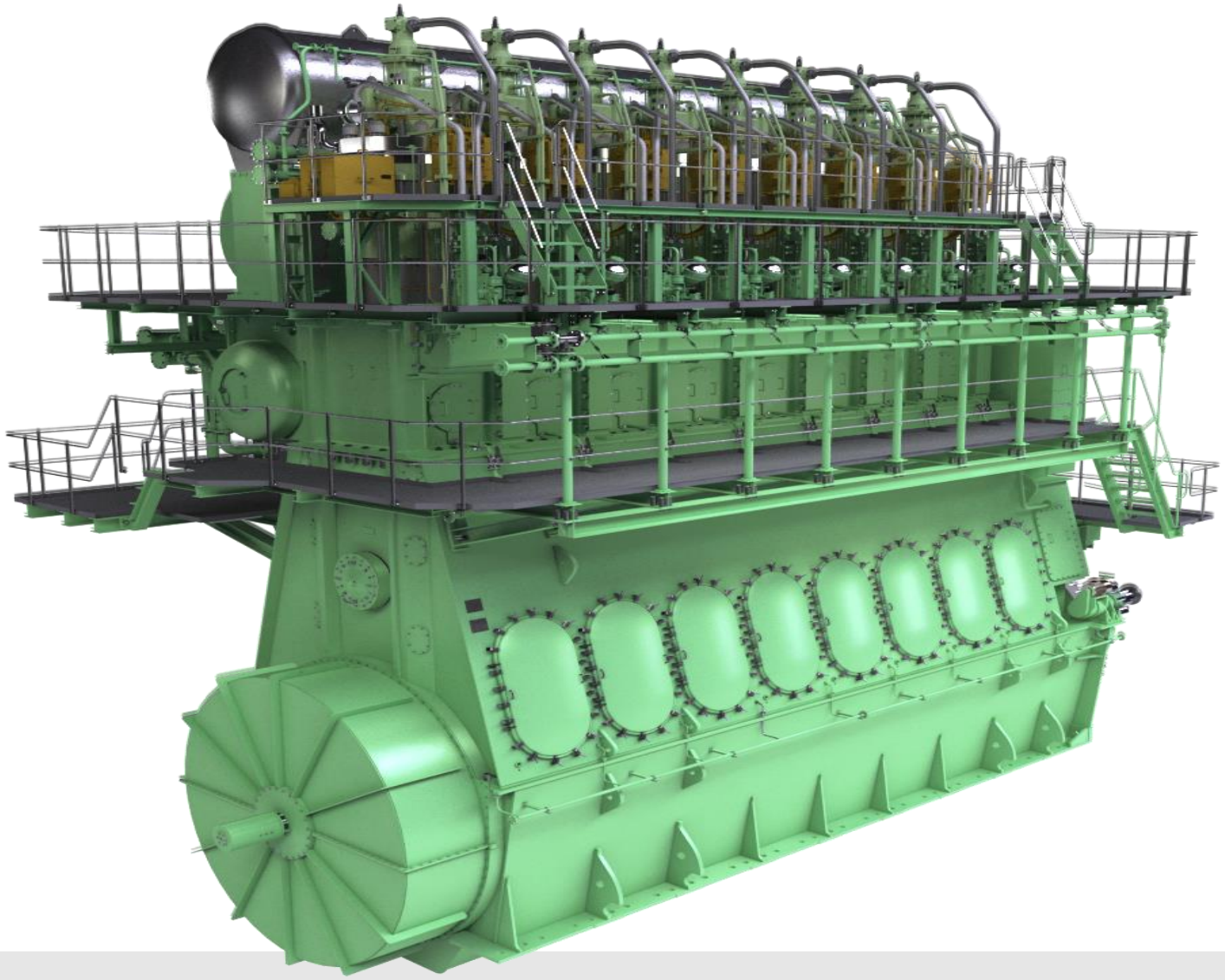
ME-GI and ME-LGI

2 running modes

1. “ Dual fuel mode”:
   - Small pilot flame (hydrocarbon fuel)*.
   - Dual fuel ignited by the pilot flame.
2. “Liquid fuel mode”:
   - Identical performance as conventional fueled Diesel engine.

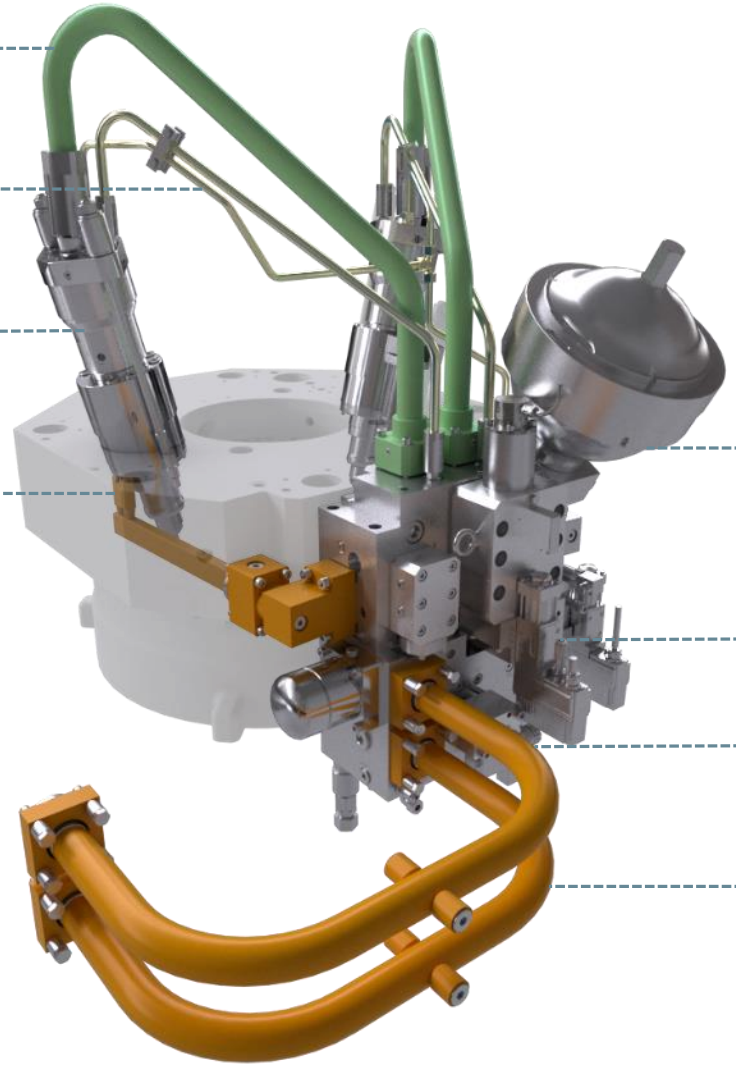


ME-GI and ME-LGI engines for future fuels



Ammonia engine development

The LGI injection system



Ammonia engine development

The LGI combustion principle

Ammonia combustibility

- Ammonia is not a hydrocarbon.
- It doesn't burn like hydrocarbons.
- It reacts much slower than hydrocarbons.

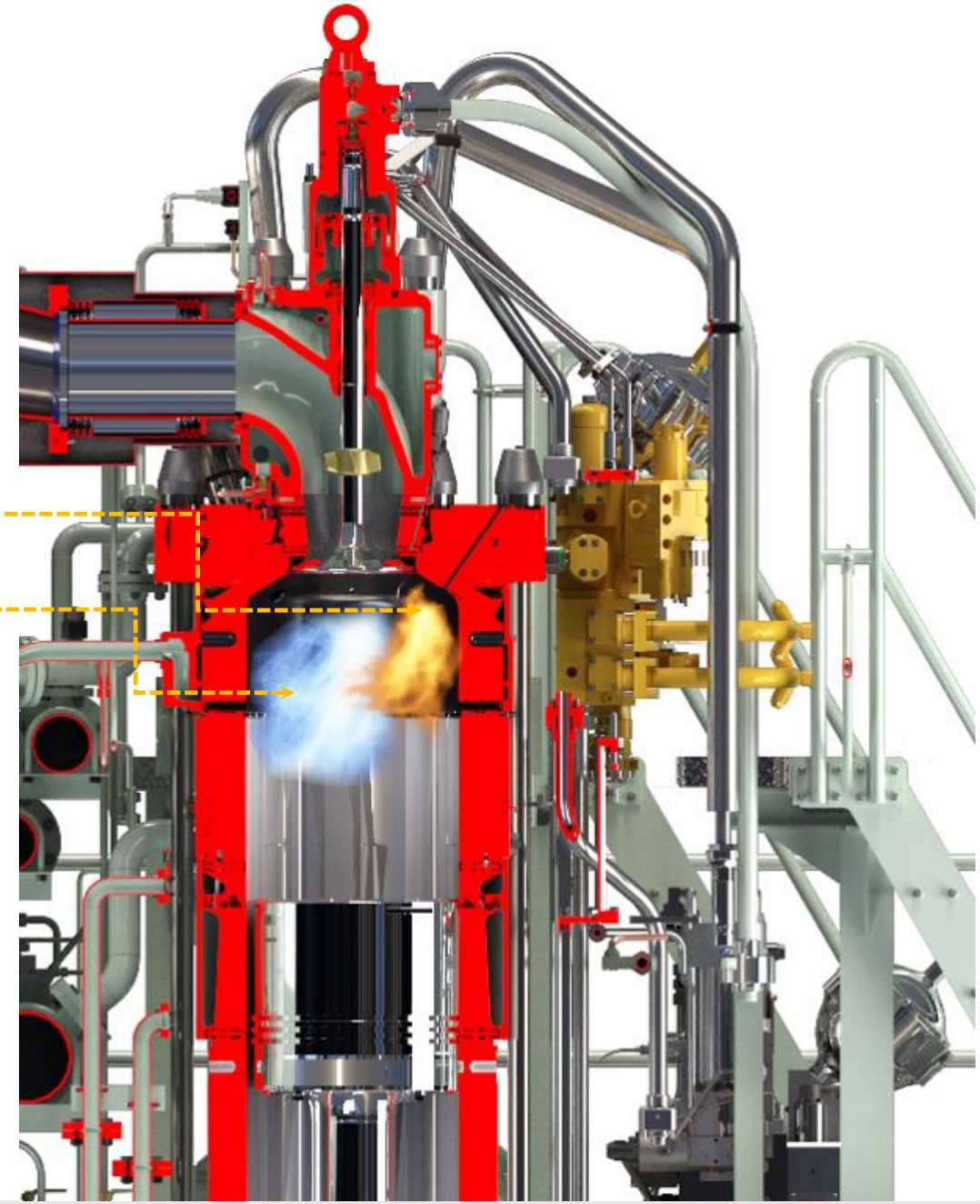
The MAN B&W ammonia engine design philosophy

"Ammonia mode":

- Small pilot flame.
- Ammonia ignited by the pilot flame.

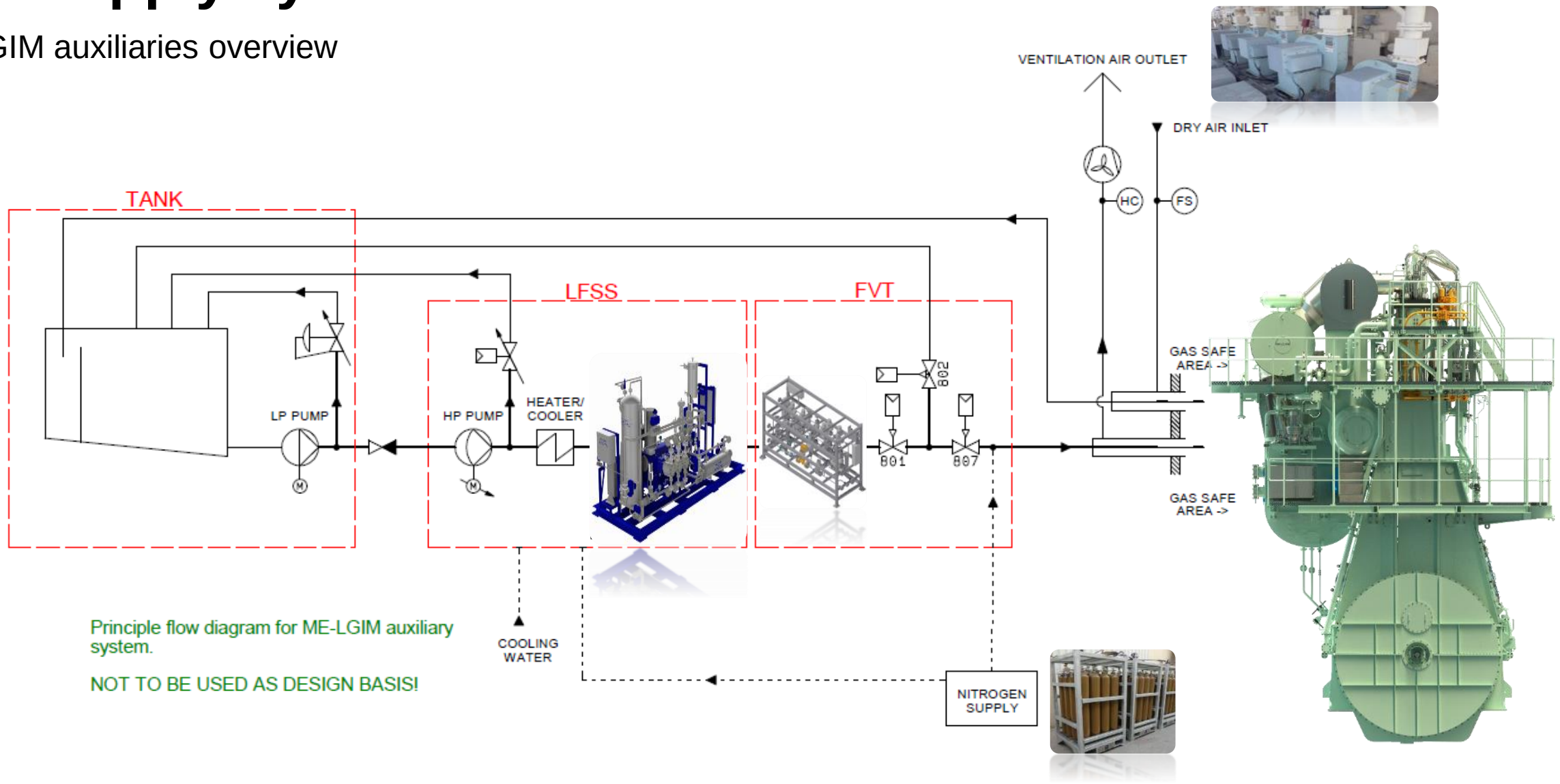
"Liquid fuel mode":

- Identical performance as conventional fueled Diesel engine.



Fuel supply system

ME-LGIM auxiliaries overview



Principle flow diagram for ME-LGIM auxiliary system.

NOT TO BE USED AS DESIGN BASIS!

Components at RCC for ammonia engine development

Modular design enables extensive retrofit options

By ensuring full fuel flexibility and extensive retrofit capabilities with a proven record, MAN Energy Solutions future proof your investment

Fuel types	ME-C	ME-GI	ME-GA	ME-GIE	ME-LGIM	ME-LGIP
Fuel oil	✓	✓	✓	✓	✓	✓
LNG	Retrofit	✓	✓	Retrofit	Retrofit	Retrofit
LEG (Ethane)	Retrofit	Retrofit	-	✓	Retrofit	Retrofit
Methanol	Retrofit	Retrofit	-	Retrofit	✓	Retrofit
LPG	Retrofit	Retrofit	-	Retrofit	Retrofit	✓
Ammonia	Retrofit	Retrofit	-	Retrofit	Retrofit	Retrofit

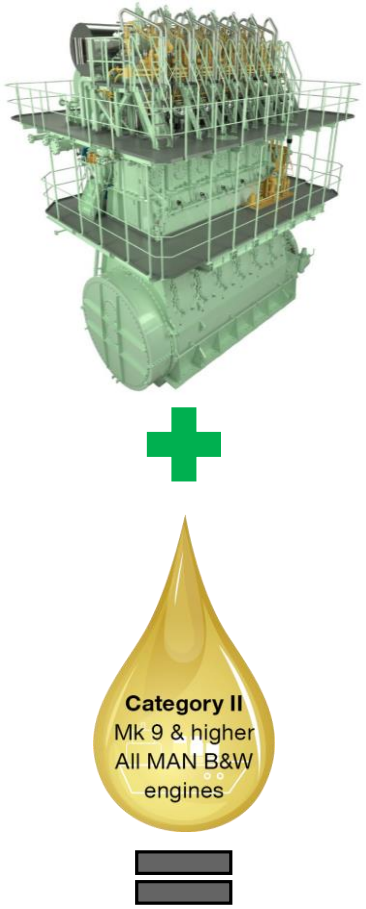
Category II 40 BN Cylinder oils - Explained

What is Category II 40 BN?

- Excellent overall performance with a special focus on cleaning ability.
- Aim: 40 BN cylinder oil that performs equal or better than a 100 BN oil in regards to cleaning.

Why

1. Some lubricants aimed for low Sulphur applications were not adequately able to prevent and manage the deposit formation in especially newer engines types.
2. Operation on low Sulphur fuels is the most predominant way of operating.
3. Fuel-efficient engines with higher pressures and temperatures require lubricants with matching performance.
4. Clean piston rings, lands and grooves and crowns are important in order to secure an acceptable time between overhaul of the cylinder units.



Reliable and Clean Engine!

Where to use Category II 40 BN oils

Applicable for All engines mean that

A Cat II 40 BN may also be advantageous for engines such as mark 8 and lower.

Fuel

- 0.50% S fuel
- 0.10%S fuel
- LNG
- Methanol
- LPG
- Ethane

MAN ES recommends using a 40 BN Cat II cylinder oil for the ME-GA engine.

A few examples of engines that could benefit of 40 BN cat II

ME-GI 8.2

ME-C9

ME-GI9.5

Lubricants to the ammonia engine

Cylinder oil –
Lubrication of piston and liner.

System oil –
Lubrication of crankshaft, cooling of piston etc..

Sealing oil –
Keeps the NH_3 in place in the Fuel Booster injection valve.

Category II 40 BN is here

SL2022-728/JUSV Cylinder and system oils

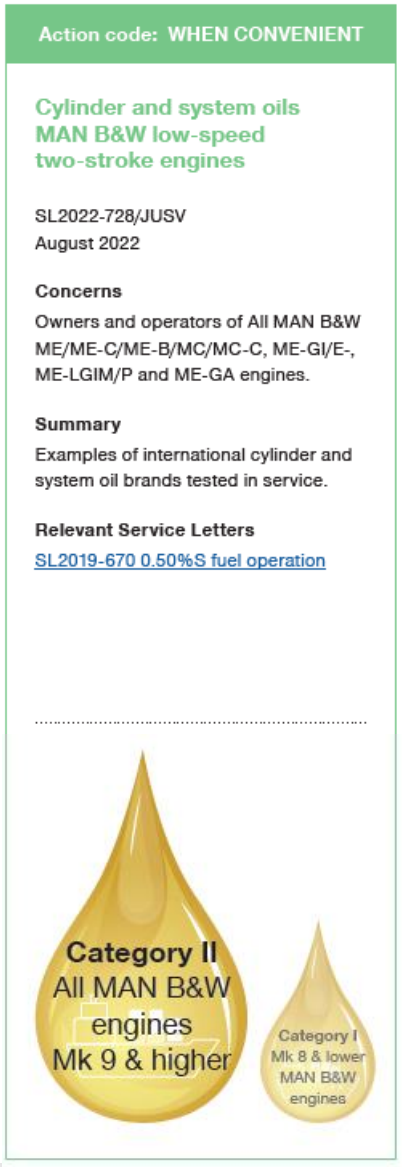
Cat. II cylinder oils are applicable for **ALL** engines and recommended for MAN B&W two-stroke engines Mark 9 and higher.

Suppliers with a **Category II 40 BN**

- ✓ Castrol – Cyltech 40 XDC
- ✓ Chevron Lubricants - Taro Ultra Advanced 40
- ✓ ExxonMobil – Mobilgard 540 AC
- ✓ Gulfoil Marine – Gulfsea Cylcare XP 5040X
- ✓ Shell – Shell Alexia 40 XC
- ✓ TotalEnergies Lubmarine – Lubmarine Talusia HD 40

We expect that the oils become available Q4 2022.

Due to the volatility in the world changes may occur fast.



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MAN Energy Solutions
Future in the making

Thank you very much

Critical Steps to Delivering Effective Marine Engine Lubrication

Serge Dal Farra, Lubmarine Global Marketing Manager

Marine Propulsion and Marine Lubricant Webinar Week – Sept 1, 2022

01.

Selecting the Right Cylinder Lubricant

Selecting the Right Cylinder Lubricant

Lubmarine

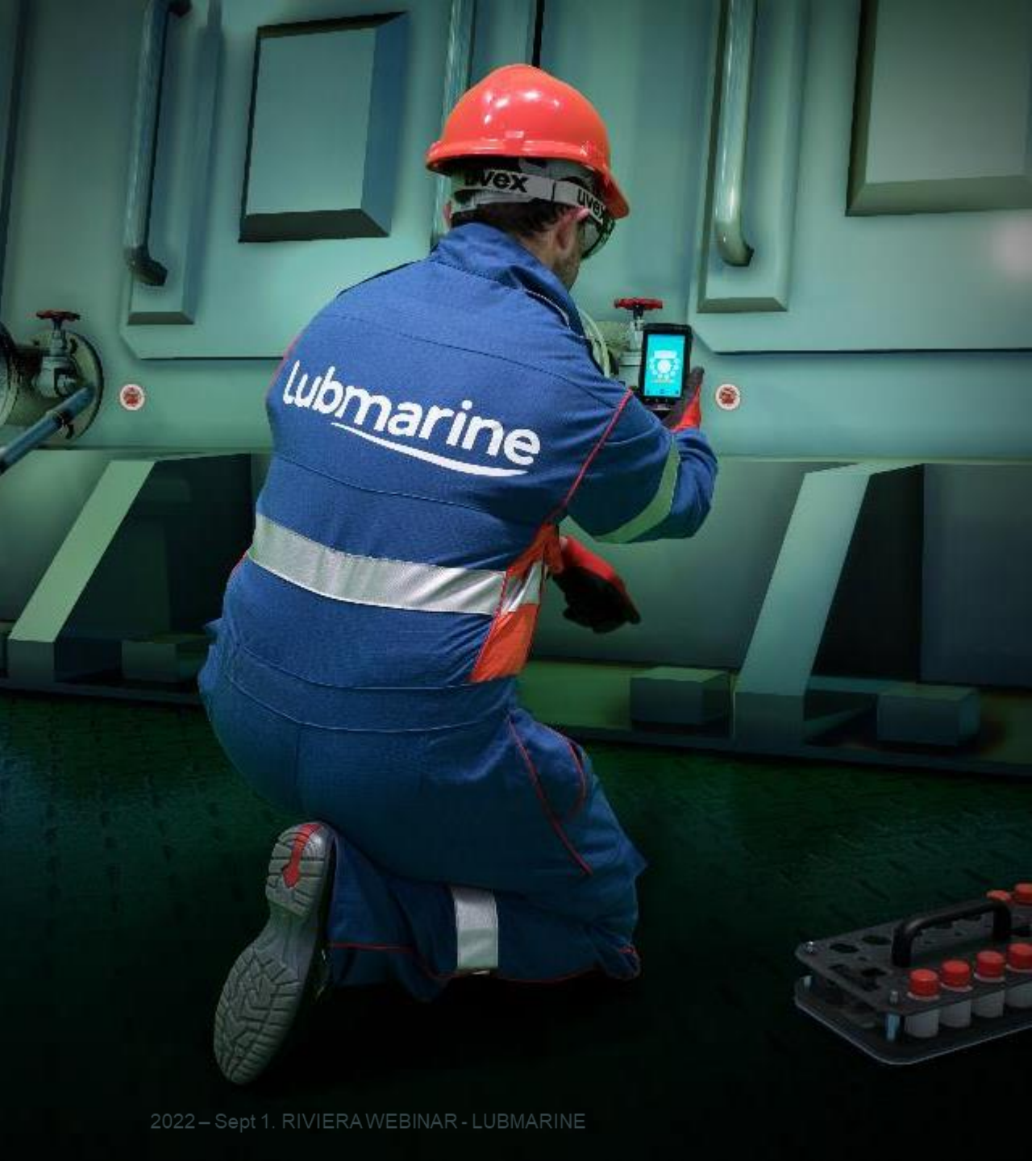
- Post IMO 2020 landscape
- Clear benefits and new challenges
- **Importance of cleanliness**
- **DF / LNG** growing uptake
- IMO 2030-2050 **decarbonization** targets
- New fuels incl. biofuels
- Shift in CLO portfolio

- Talusia Range continuous evolution :
  - Full requalification of **Talusia Universal**
  - MAN ES Cat II NOL granted for **Talusia HD 40**
  - Continuity supply for 40 – 70 – 100 – **140** BN

TotalEnergies

02.

Implementing a Robust Monitoring Strategy



Implementing a Robust Monitoring Strategy

Lubmarine

- **Better understand** operating parameters
- Perform **Drain oil** Analysis
- Visualize **data** and interpretation
- Perform engine **inspections**
- **Detect** abnormalities
- Plan **trouble shooting** with the teams
- **Stay safe** in OEM limits
- **Optimize feed rate**

TotalEnergies

3.

Fully Digitalized journey: LubInsight neo

LubInsight neo
Fully digitalized journey

LubPortal
MyLubmarine

Digitalized Sampling

Analysis Modules
+ Control Pad

XRF Kit
BN, Iron, S%

04.

The human element : Specialist Knowledge and Interpretation

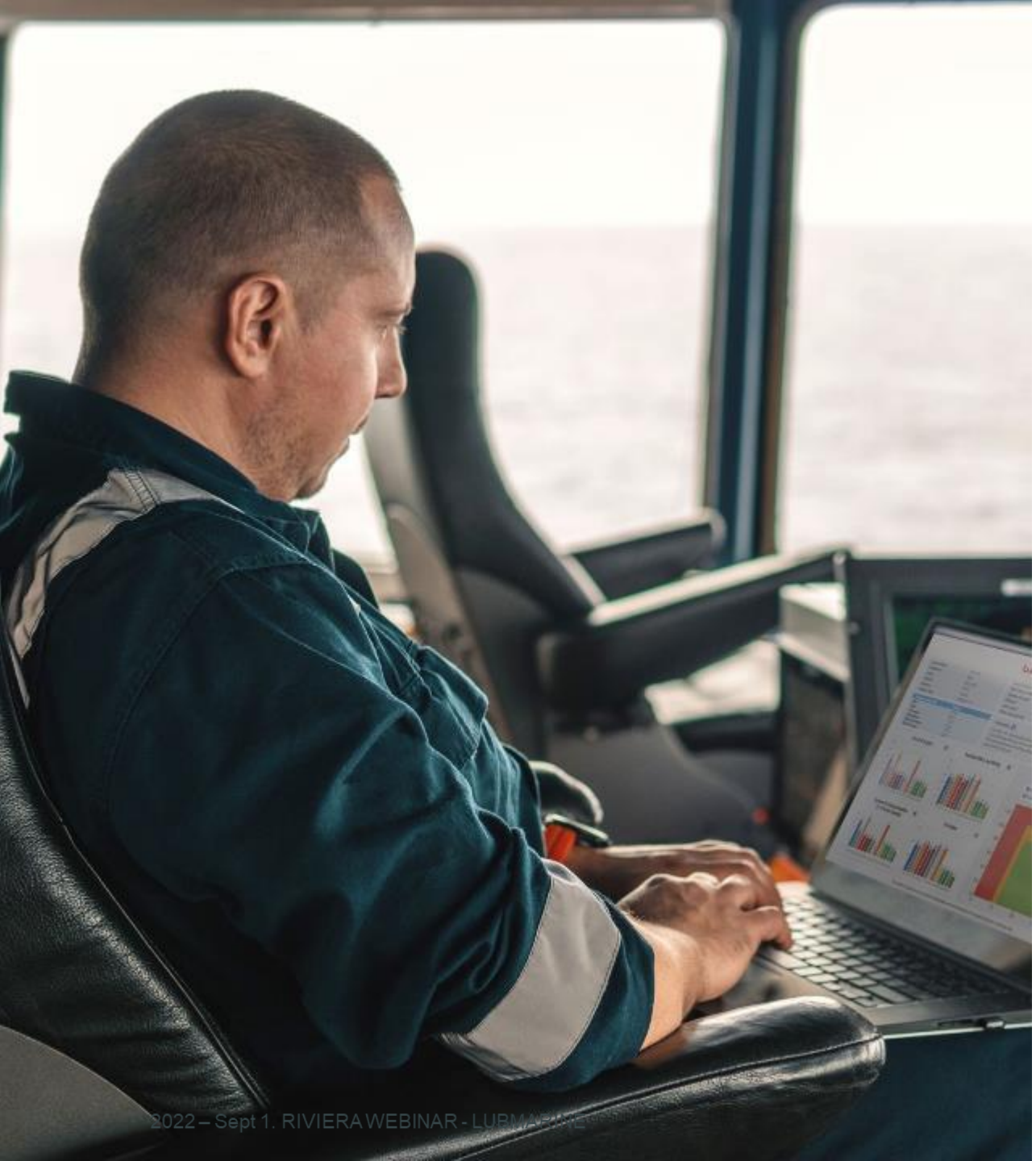
Specialist Knowledge and Interpretation

- Importance of **crew support**
- Analysis interpretation
- Feed-rate optimization
- Ship visit
- Engine Inspection
- Technical Investigations
- Training

- Team of Marine Lubrication Engineers

05.

Conclusion



Conclusion

- Achieving effective marine engine lubrication requires a multi-layered approach

  - The **right supporting experts**
  - The **right Product**
  - The **right monitoring routine**
  - The **right tools**
  - The **right feed-rate**

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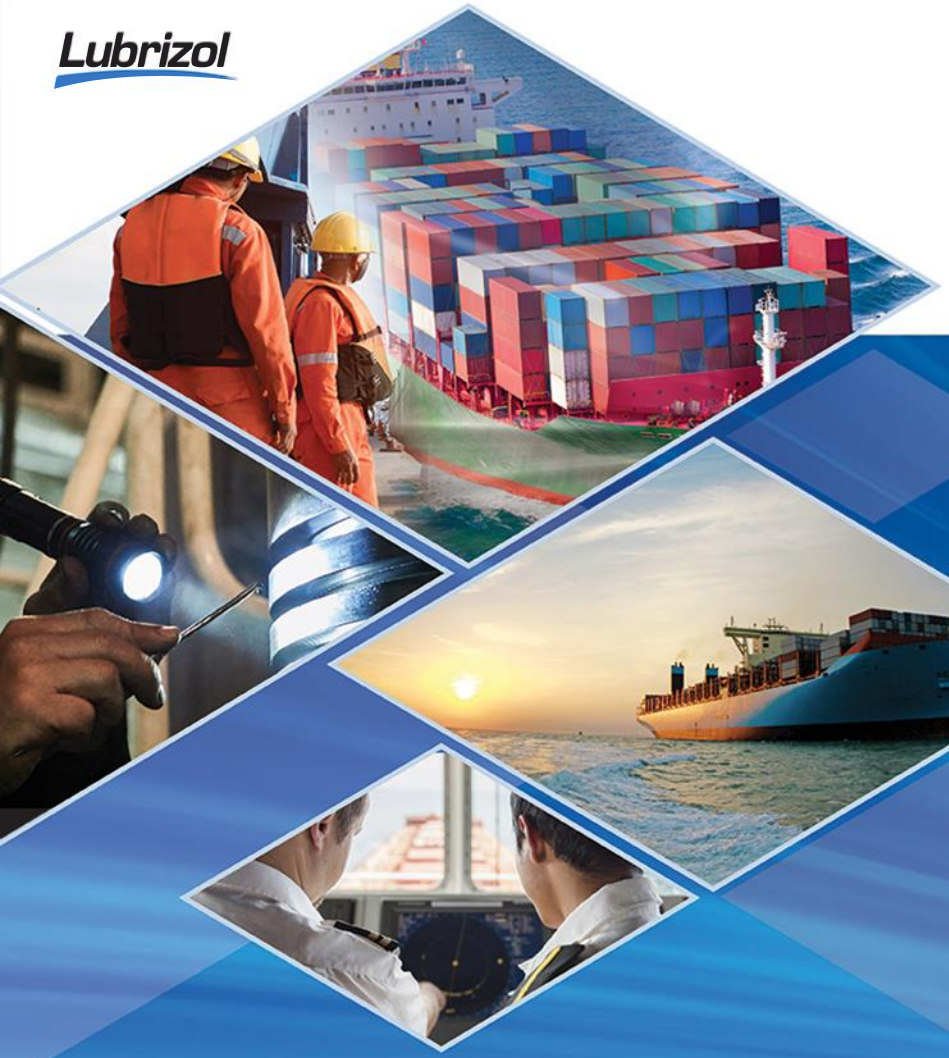
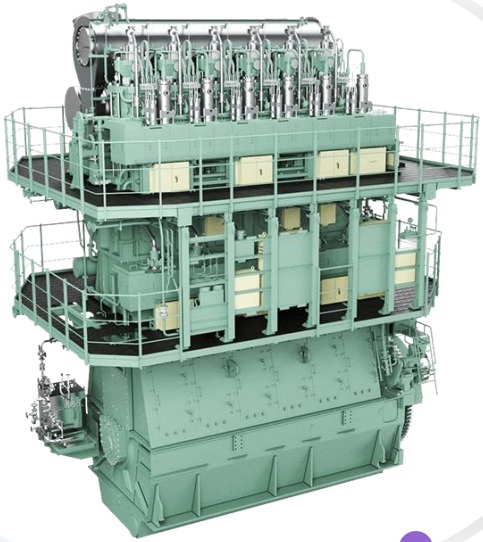


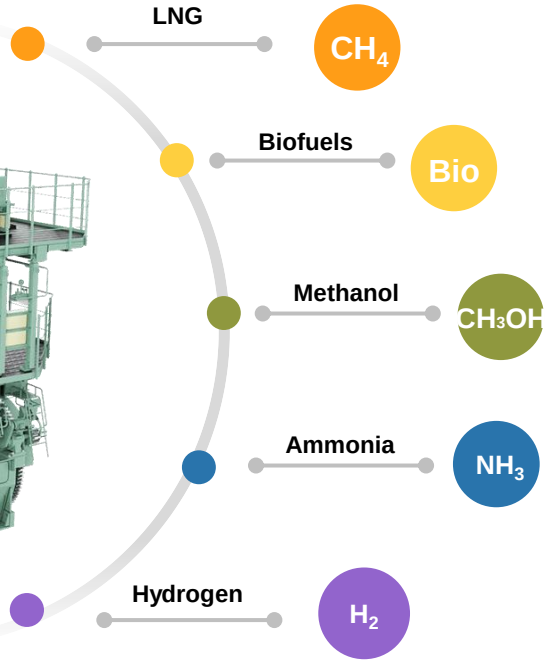
A new era of marine fuels: what it means for two-stroke engine lubricants

Simon Tarrant

1st September, 2022

In the Future | A Pathway to Enabling Alternate Fuels





Inherent Fuel Characteristics

ICE Modification

Operational Impacts

Lubricant Requirement

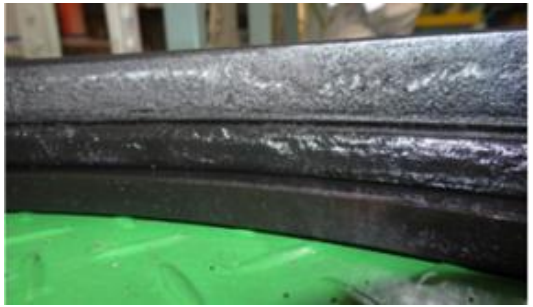
Alternate Fuels | LNG

- Gaseous fuel presented additional challenge to lubricant
- 25BN oils were under performing
- Interim lubricant switching operating protocol

Lubricant Solution:

Thermal robustness
Excellent cleaning ability

Erosion on piston ring fingers



Piston ring back deposit formation

Transition fuels providing key learnings for future fuels lubricant requirements

Alternate Fuels | Biofuels

- Automotive experience of deposits
- Limited marine usage >7% content
- Long term impact on lubricant unknown

Lubricant Requirement:

Excellent deposit control
Cleanliness

Oxidation test with fuel dilution demonstrates propensity for deposits

ULSD

B100

Bio-fuel viewed as ‘drop in’, but has potential challenges to engine lubricant

Alternate Fuels | Methanol

- Limited number of ships and service experience
- Impact on lubricant performance unknown

Fuel dilution and compatibility? → Potential wear and emulsion formation

Lubricant Requirement:

Excellent cleaning ability
Enhanced wear protection
Demulsification

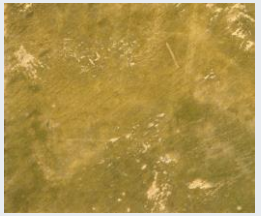
Also viewed as ‘drop in’, but poses other potential challenges to engine lubricant

Alternate Fuels | Ammonia

- First engine 2025
- Limited engines in service by 2030
- Safety, Toxicity, Corrosivity, Combustibility, Compatibility…

Lubricant Requirement:

Corrosion handling
Engine cleanliness
Complex acid neutralisation

Test coupon before exposure to ammonia	Test coupon after exposure to ammonia
Brass	
	
Copper	
	

Evolving knowledge space

Summary

- New high performance cylinder oils support new engine designs and interim / transition fuels

- Research & Development is progressing at pace for Ammonia

- There will be a ‘mosaic’ of fuels through to 2050

- Some alternate fuels likely to require new lubricant solutions

Enhanced lubricant chemistry for alternate fuels, enabling shipping’s journey to decarbonisation

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