



## THE USER PAIN

TOTAL Lubmarine





Minimize engine wear



Minimize the risk of sudden failure



Extended components lifetime





Minimize lube oil feed rates



Simplified lubrication management



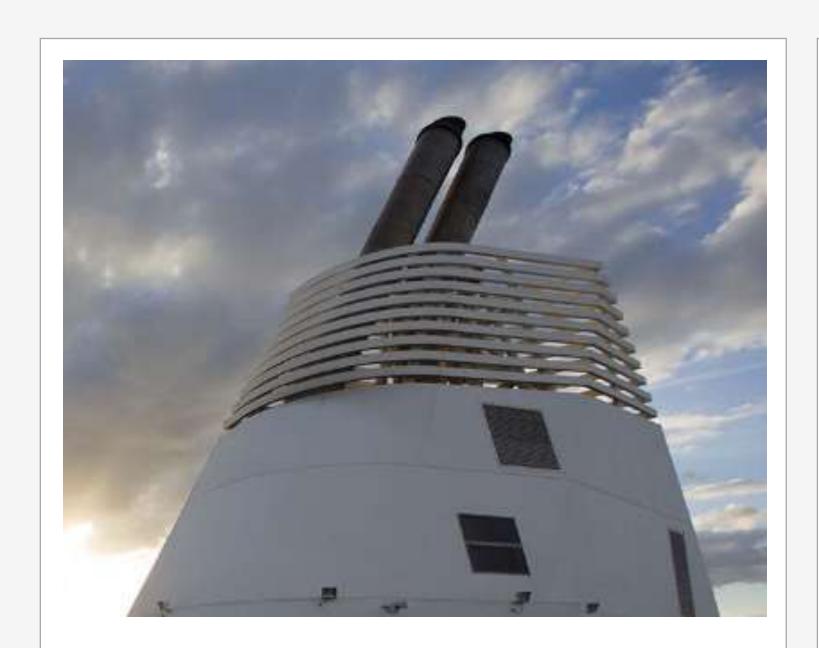
Adaptability to a larger fuel mix





## THE RIGHT TIMING

TOTAL Lubmarine





#### **REGULATIONS**

- •SO<sub>x</sub> are to be limited worldwide
- •NO<sub>x</sub> are now at Tier III stage
- •CO<sub>2</sub> is under pressure





#### **ENGINE TECHNOLOGIES**

- Peak pressure increases to minimize SFOC
- •Temperature range is wider





#### **EMISSION CONTROL**

- Scrubbers option
- •EGR/SCR influences lubrication
- •Alternative fuels (LNG, MeOH...)





# NEW CHEMISTRY: ASHFREE NEUTRALIZING MOLECULES (ANM)

WHY NOW?



### ANM are pure organic molecules of high BN



Enable high BN finished CLO with reasonable treat rate



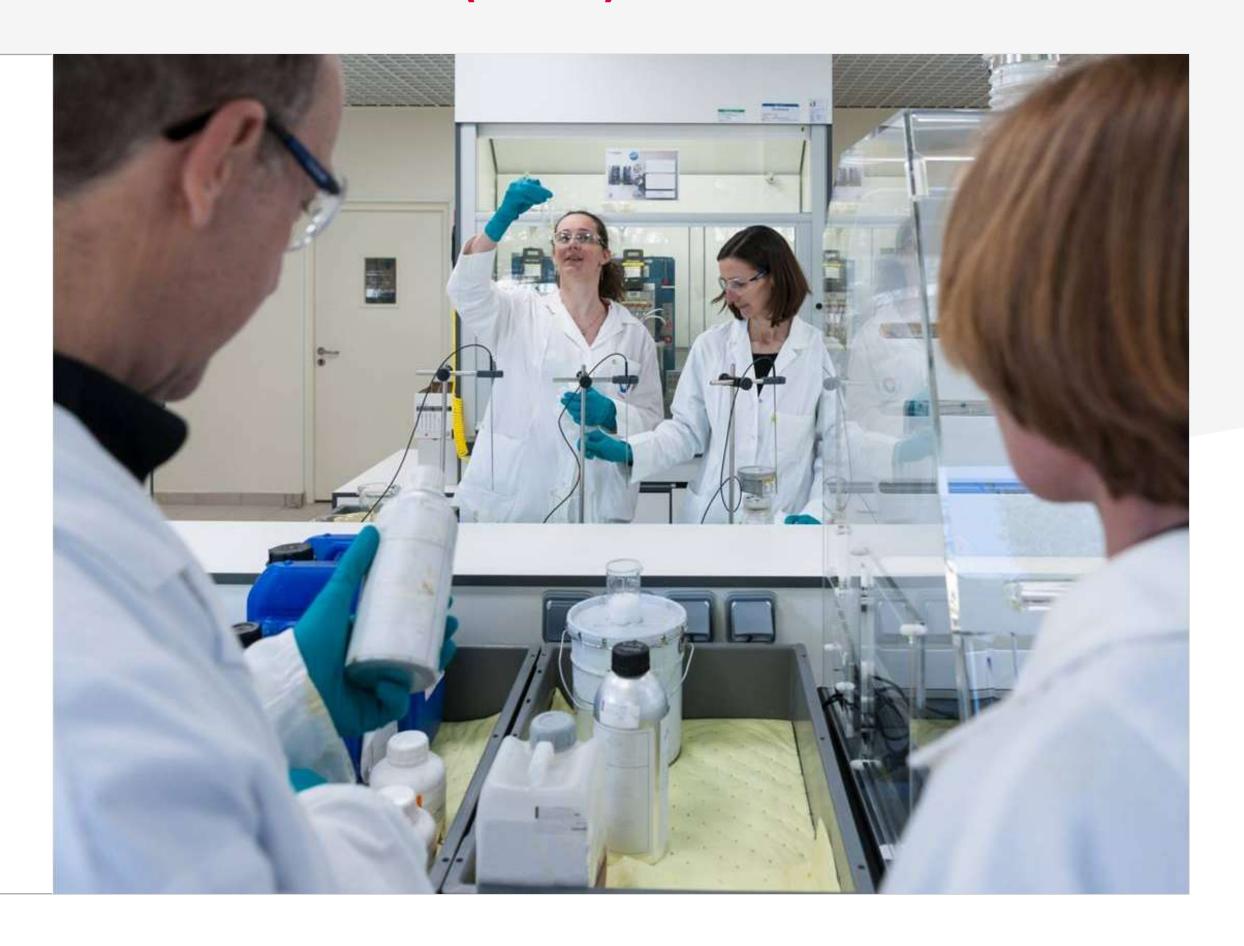
Minimize the <u>mineral</u> source of deposits hence avoid deposit build-up



Provide exceptional neutralization efficiency and passivation of surfaces



Show very high thermal resistance and detergency potential







### TALUSIA OPTIMA – THE FIRST CYLINDER LUBE OIL USING ANM

- Selection of ANM suitable for lubricant matrix
- Evolution of specifications with engine technologies and users practice
- Agreement for non conventional operation of 2-stroke engine bench
- Definition of the testing procedures for HFO and MDO operation
- First demonstration of ANM chemistry reliability
- Completion of comparisons with conventional chemistry

Specifications & Formulation

- Defined with OEM/users
- New components from innovative Chemical Company
- Regularly updated specifications along the time

Bench testing

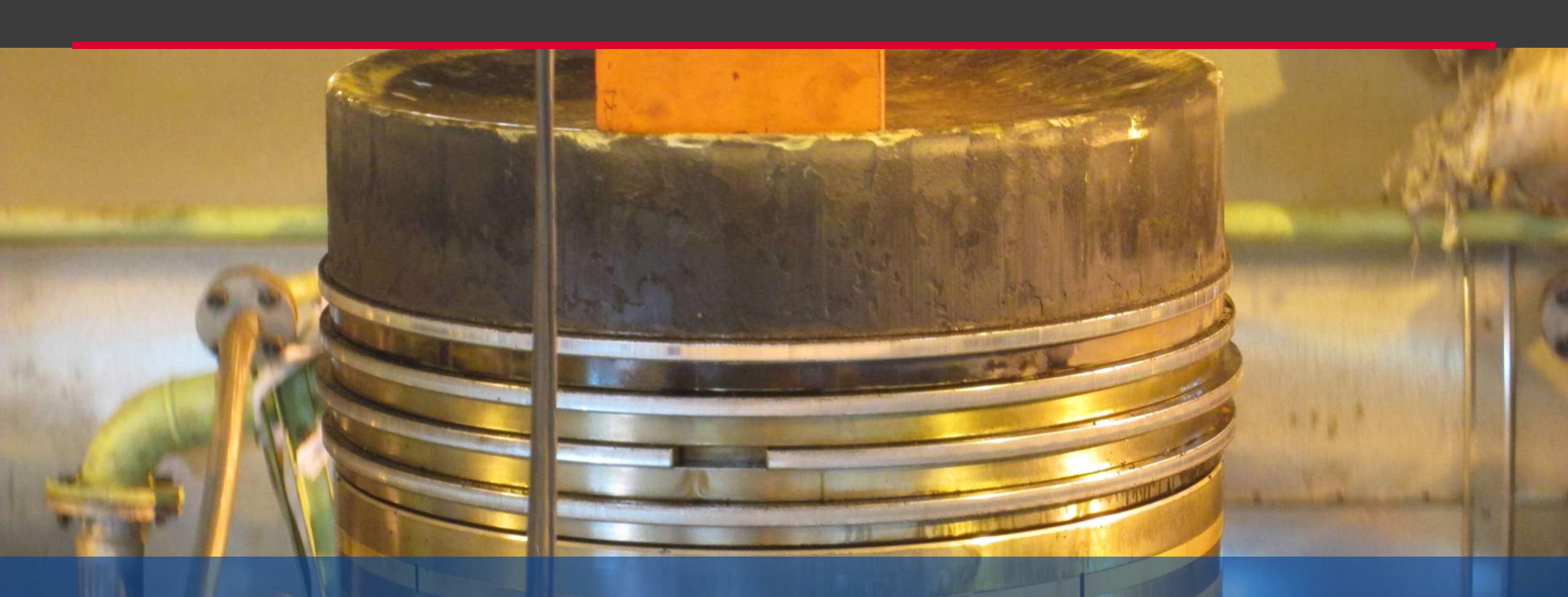
- Procedures definition
- Multicandidate testing
- Test implementation with HFO and MDO

Field testing

- Demonstration of chemistry reliability (> 8000 h)
- Approval with HFO (> 8000 h)
- Approval with MGO/MDO (> 700 h)

FULL DEVELOPMENT PROCESS





TALUSIA OPTIMA HAVE COMPLETED 4331 H OF TEST ON WÄRTSILÄ 14 RT-FLEX 96C-B ENGINE, INCLUDING ABOUT 300 H IN ECA.

TALUSIA OPTIMA IS CURRENTLY IN TEST (> 2000 H ACHIEVED) ON MAN 11 S90ME-C10.2 ENGINE.





