



Managing the Challenge of Cost Effective Lubrication & Prolonging Engine Lifetime

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Agenda

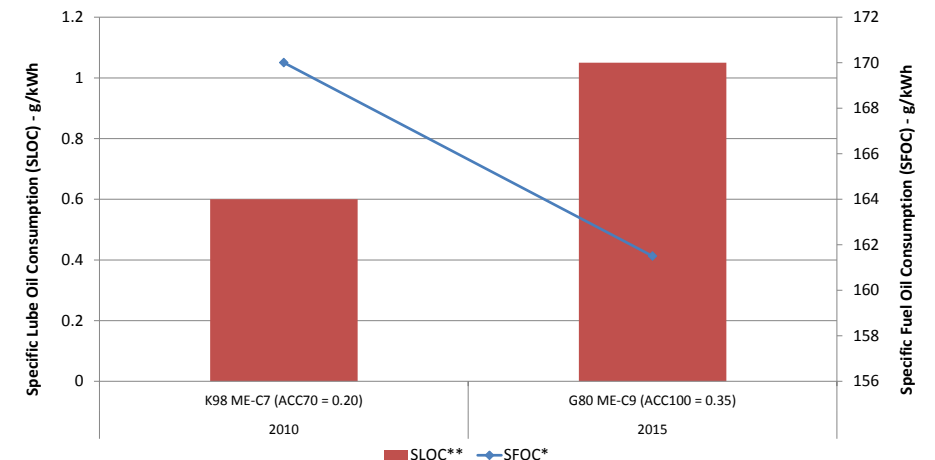
- Latest engine designs have a clear impact on operational cost
- How to manage cost of lubrication and increase simplicity
 - Mixing of cylinder oils
 - Latest cylinder oil development
 - Technical service
- Summary

Fuel efficiency is key for modern 2-Stroke Marine Diesel Engine

How has engine design changed between 2010 and now?

- Newer engine designs have successfully reduced fuel consumption by up to 5%
- But cylinder oil consumption at least 50% higher when high Sulphur fuel oil used due to cold corrosion

Modern efficient engine designs have evolved with significant fuel savings but requiring higher fuel sulphur dependent lubricant feed rates - Higher BN Cylinder Oil could restore previous feed rate levels in new engine designs



* Min. Specific Fuel Oil Consumption at 50% Engine Load with Part Load Tuning in L1L3 Layout

** Specific Lube Oil Consumption - ACCxS% - S%=3

The case for a higher BN Cylinder Oil Cold Corrosion

- Newer engine designs show signs of cold corrosion even with high feedrate and BN*100 cylinder oil
- These engines would benefit from a higher BN product to reduce feedrate
- Need for a different cylinder oil when operating in ECAs** !

*BN= Base Number (mgKOH/g)

**ECA = Emission Control rea





New Technologies

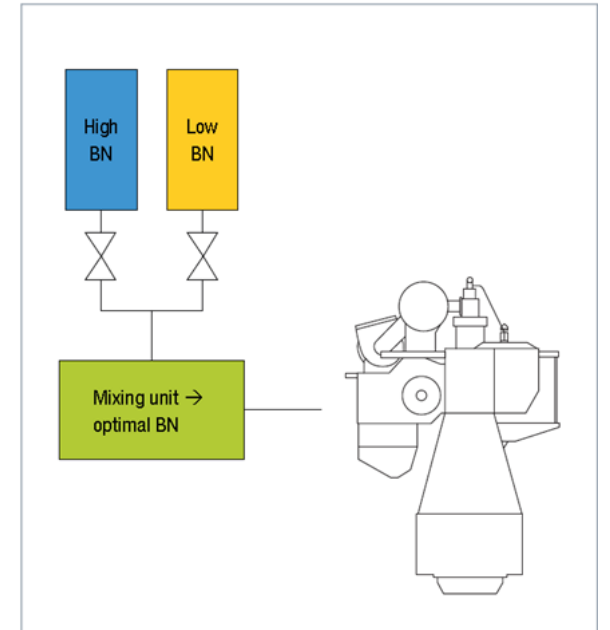
Mixing of Cylinder Oils on board

Mixing Devices

Different mixing systems have been around for some years now in one form or another, just to mention one:

Cylinder Lubricant Mixing, in particular ACOM (Automated Cylinder Oil Mixing) from MDT

- Mix two cylinder oils proportionately to achieve the target BN
- Under testing now



What is Automated Cylinder Oil Mixing (ACOM)?

- ACOM is a cylinder lube-oil delivery system that:
 - Simplifies cylinder lubrication by mixing fully formulated cylinder lube oils.
 - Ensures a suitably low feed-rate.
 - Aims to optimise the lubrication both technically and economically.

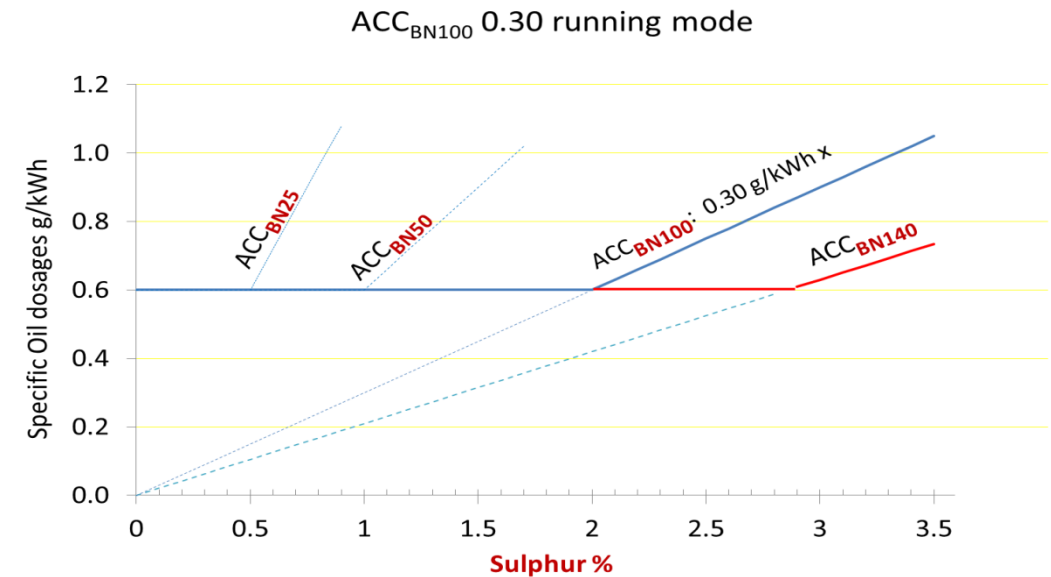


Mixing Cylinder Oils in operation

MAN DIESEL & TURBO
ACOM

FIRST ACOM TRIAL

- MAN 6S50ME-B engine
- MCR 9,480 kW @ 124 rpm
- Alexia S6 (100 BN) & Alexia S3 (25 BN)
- Total ACOM operating hours >3,500 hours





Shell Alexia 140

The latest Cylinder Oil under development

Shell Alexia 140

The new lubricant under development, Shell Alexia 140, is an ultra-high BN oil with a BN of 140. It is targeted for use on its own or as part of an onboard lubricant blending or mixing system.

- Close cooperation with MAN Diesel & Turbo
- Exhaustive laboratory testing in 2015
- Successfully completed over 6 months of shipboard trials with a Shell Marine customer

NEWS RELEASE

“We are responding rapidly to the changing needs of the industry, helping our customers to cope with their full range of operating conditions,” said Jan Toschka General Manager of Shell Marine.

“This latest development underpins our commitment to the industry and its future. We have our own in house testing capability and extensive field experience, coupled with the monitoring, analysis and advisory services to respond to the market with proven and comprehensive solutions.”



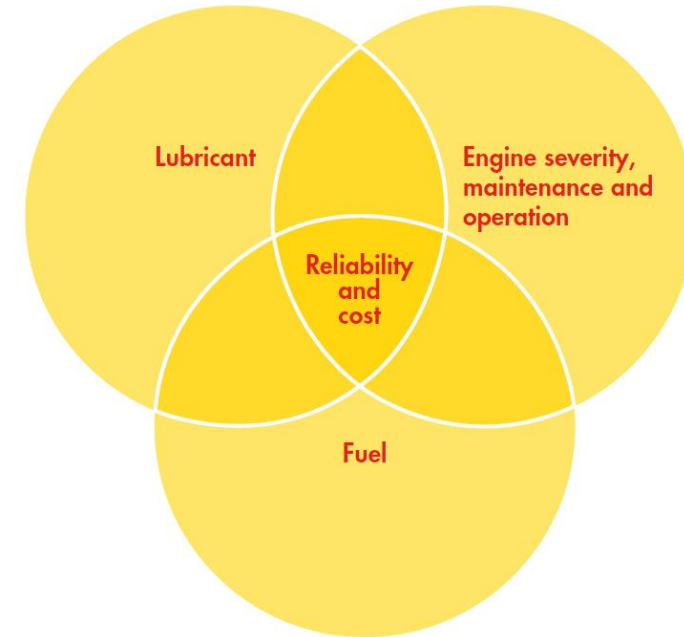
Shell
Lube**Monitor**

Best balance between lubricant costs
and wear-related spare parts expenses.
Faster, simpler, better.

Why Shell LubeMonitor

Shell LubeMonitor is a cylinder condition monitoring programme for two-stroke marine engines. It includes access to Shell tools and advice to help customers strike and maintain an acceptable balance between cylinder oil costs and wear-related cylinder maintenance expenses.

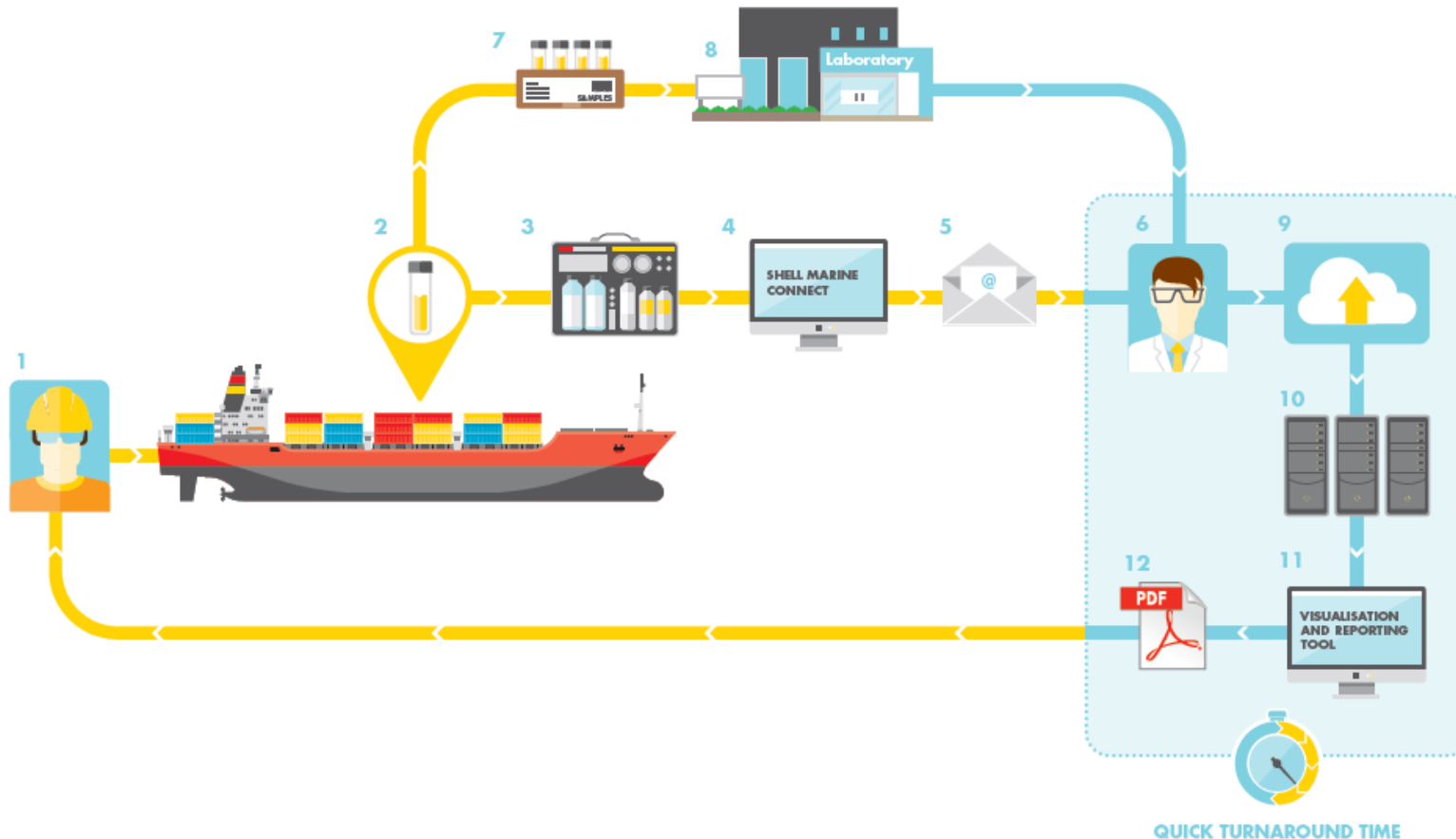
LubeMonitor in combination with Alexia cylinder oils, can help vessel operators to gain several benefits when compared with ship operators that are not performing regular monitoring



LubeMonitor – E2E Process

VESSEL/CUSTOMER OFFICE

SHELL BACK OFFICE



1. The customer takes samples onboard the vessel (2).
3. The samples are analysed using the Shell Onboard Alert and Shell Onboard Plus tools (4).
5. The report is then emailed to the Shell Marine manager (6).
7. The sample is also sent to one of six Shell laboratories worldwide (8).
9. The results are uploaded to the LubeMonitor database (10).
11. Our visualisation and reporting tool is used to analyse the data. From here a pdf report is produced.
12. The report is emailed to the customer.



Summary

Shell`s contribution to:

Managing the Challenge of Cost Effective Lubrication & Prolonging Engine Lifetime

- Support of innovative technology to mix two cylinder oils onboard
- Development of ultra high BN cylinder oil
- Introduction of a completely new service offer – “LubeMonitor”

Questions and Answers

Q&A

