How to handle 2020 fuels on board?

Adaptive Fuel Line

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BU Marine Separation
Onboard Fuel Oil Cleaning, the Ever Neglected Process.

How to Restrain increasing Cat Fine Damage in Two-stroke Engines

Seize of Embedded Cat Fines in liners:

- Most Cat Fines by number were found in the range of 5 – 15 µm
- Since the oil film thickness between engine parts goes down towards 1 µm, also small Cat Fines contribute to wear
- Therefore, increased Separation Efficiency and regular efficiency monitoring is necessary

Source: MAN D&T

www.alfalaval.com/marine
Certified Flow Rate (CFR)
Separator performance validation

- Certified Flow Rate is defined as the flow rate where the separation efficiency is 85%, 30 minutes after a discharge.
- Test method uses Dino-spherical 5 µm particles in synthetic oil to simulate conditions of cat fines in HFO (380 cSt and 700 cSt).

If you can separate this particle... you can also separate this one.

- It is proven and repeatable method to evaluate and optimize separator performance adopted by European Committee for Standardization.
For the latter specific gravities, the manufacturers have developed special types of centrifuges, e.g.:

Alfa Laval.................................................. Alcap
Westfalia.................................................. Unitrol
Mitsubishi.............................................. E-Hidens II

The centrifuge should be able to treat approximately the following quantity of oil:

0.23 litres/kWh in relation to CFR
(certified flow rate)

This figure includes a margin for:
• Water content in fuel oil
• Possible sludge, ash and other impurities in the fuel oil
• Increased fuel oil consumption, in connection with other conditions than ISO standard condition
• Purifier service for cleaning and maintenance.

CFR according to CEN, CWA 15375
CFR range of S9x8 separators

- CFR is to provide customers a fair and objective way of comparing separators from different suppliers.
- Work initiated in CEN/TC 313 and CIMAC WG7 (Fuels) to develop a new CFR test standard, also taking care of 2020 fuels.
Understandings the disc stack

- Particle flow pattern
- Multiphase flow pattern
- Pressure drop
- Re-mixing

Poorly design separator will not maintain good efficiency for the period
Inside separator bowl

Liquid levels what determine interface between Oil and Water

- Level of water
- Level of clean oil
- Level of dirty oil

In conventional purifier the correct size of Gravity Disc is essential for efficient separation
S – separator ALCAP type
S – separator ALCAP type
Density
The density of the fuel is important for the fuel cleaning. Correctly sized gravity discs should be used in classic separators. The gravity disc in a classic separator must be changed when the density of the fuel changes. If the gravity disc is not suitable for the fuel in use, the oil-water interface in the separator will not be correct, and the fuel will not be cleaned. Water may be led with the fuel to the engine or the fuel will be led to the drain with the water.

The most commonly used type of separators, in newer ships, automatically adjusts the oil-water interface without the need of gravity discs. To support optimal fuel cleaning, automatic separators are recommended by MAN Energy Solutions.
OPEX

Input data

Main engines
- No. of engines: 1
- Total engine power: 10.0 MW
- LO passes: 3.0 / 24 h
- SFOC: 193 g/kWh

Life cycle cost - over 20 years
- Total investment
- Parts & service
- Electric energy
- Fresh water
- Sludge disposal
- Oil losses

Refine data: Ship set, Fuel oil, Distillate oil, Lube oil main engines, Lube oil auxiliary engines
S – separator minimized wear and tear
System control
Plug & Play installation

Standard Modules

- Complet system with heater, pump and ancillaries
- Fast and easy installation
- Flexible configuration
- Fixed foot print and connections
- Tested at factory
A conventional fuel system

- Fuel feed to separator is independent from engine load
- Large portion of oil recirculates during slow steaming
- Recirculation adds to energy costs
- The high flow rate leads to less efficient separation and an increased risk of engine damage
One Separator – Slow Steaming

Fuel cleaning process
Conventional layout

Operating principle: Single
Flow control: FlowSync installed

Engine data:
- Average power: 60%
- Installed engine power: 50.0 MW

Media data:
- Separator feed temperature: 98 °C
- Bunker feed temperature: 50 °C
FlowSync

- FlowSync is automatic feed pump control system
- It adjusts the flow to separators to actual fuel consumption
Separation efficiency v/s flow

100% of design flow rate
Separation efficiency v/s flow

By reducing the flow rate, the separation efficiency increases

50% of design flow rate
FlowSync – Operating Principle

Controller

Multiple separators – One controller

Pump Rate

Engine Load

Flow Transmitter

www.alfalaval.com/marine
One Separator – with FlowSync

Fuel cleaning process

**Operating principle**
- **Single**
- **Parallel**

**Flow control**
- FlowSync installed

**Engine data**
- Average power: 60%
- Installed engine power: 50.0 MW

**Media data**
- Separator feed temperature: 98 °C
- Bunker feed temperature: 50 °C
Developing the future

- Increased separation performance
- Reduced energy consumption
- On-line measurement
Summary
Alfa Laval Separation, link to 2020 Fuels

- CFR certified HSS
- FlowSync to optimize performance
- Superior bowl design

Engine Protection

Cat Fine Issues

More fuel variations

Fuel Flexibility

- ALCAP System to handle viscosity variations
Alfa Laval Adaptive Fuel Line
– be a step ahead

Thank you for attention