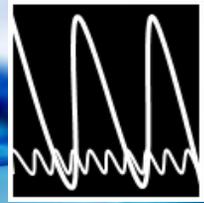
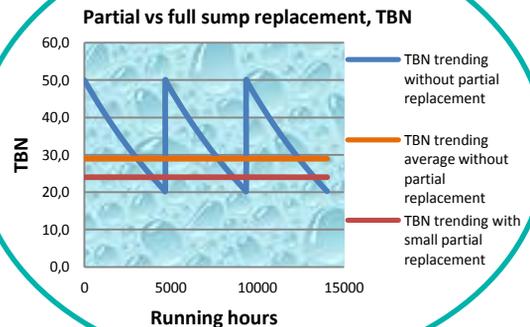


Lubetimizer

*Saving by Automated
Partial Replacement*



Lubetimizer is a system to automate partial lubricant replacements of medium speed engines running on heavy fuel oils. Automated partial lubricant replacements, based on fuel sulphur % and engine load, create a balanced lubricant quality and better lubricant consumption control, resulting in overall lubricant consumption savings.



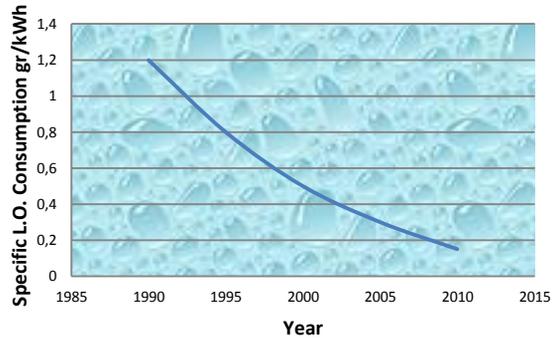
Lubetimizer enables you to control your partial lubricant replacements, top-up your engine lubricant consumption, and stabilize the lubricants quality. It tackles TBN depletion, and or viscosity increase due to fuel contamination. Guaranteeing a constant lubricant quality and minimum lubricant consumption despite a frequent changing engine room crew.

20 years of experience in the marine industry, working with marine engine lubricants, and lubricant optimization in particular, lead to the development of the Lubetimizer. The Lubetimizer is developed to make efficient partial replacements and optimize main engine lubricant consumption control.

Lubricant Consumption Trending

Medium speed engine development over the last two decades resulted in extreme reduction of lubricant consumption down by 90%. This decrease in consumption on heavy fuel operated engines, in combination with the increase in engine load is leading towards a continuous increasing stress on the lubricant, resulting in severe TBN (Total Base Number) depletion and viscosity increase due to fuel contamination.

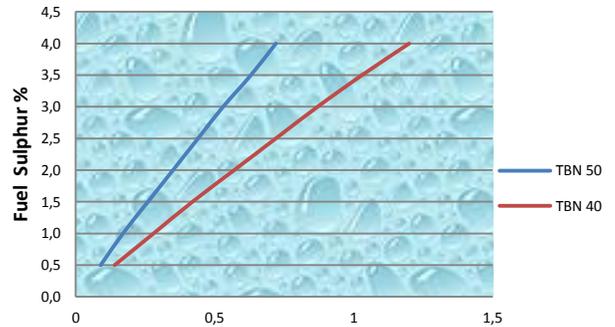
SLOC trend in recent years



Specific L.O. consumption trending over the last 20 years

During the last 15 years lubricant manufacturers introduced TBN 50 medium speed engine oils to deal with these trends. However for a TBN 50 oil in combination with higher than 1% Sulphur fuels, the modern engine oil consumption is insufficient to create an acceptable TBN equilibrium, resulting in the need for partial or full sump replacement.

Fuel Sulphur vs SLOC

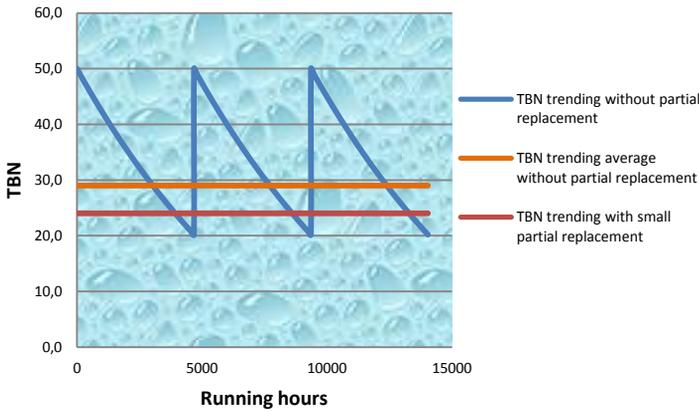


Specific L.O. Consumption in gr/kWh for acceptable TBN

Saving by Partial Replacement

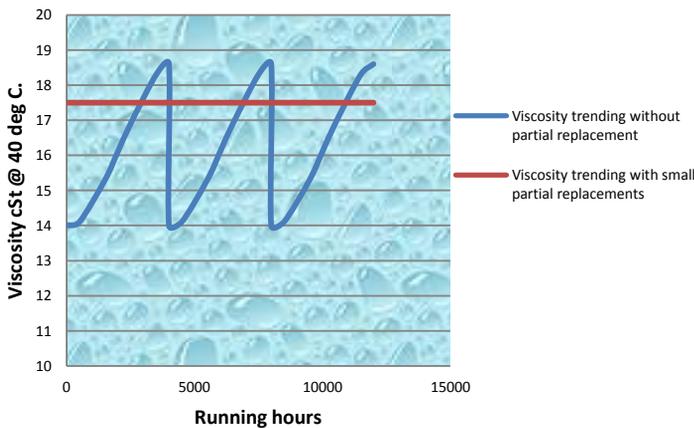
To create an acceptable TBN equilibrium or lubricant viscosity level within the engine builders limits, a regular full or partial lubricant sump replacement is needed. More frequent and small partial replacements result in a stabilized lubricant quality, optimized towards the engine builders limits, resulting in the lowest overall lubricant consumption. In combination with the constant rise of lubricant cost, the frequent partial replacement method is certainly a way to cut the overall lubricant and engine maintenance budget.

Partial vs full sump replacement, TBN



The graph on the left shows the TBN trending of full sump replacement vs. frequent partial replacement. The TBN of the frequent partial replacement is stabilized close to the maximum lubricant analysis caution limit (TBN 24), whereas the average TBN of the full sump replacement is far higher, resulting in a higher overall lubricant consumption. The same is valid for viscosity.

Partial vs full sump replacement, viscosity



The graph on the left shows the viscosity trending of full sump replacement vs. frequent partial replacement. The viscosity of the lubricant with frequent partial replacement is stabilized close to the maximum lubricant analysis caution limit, whereas the average viscosity of the full sump replacement is far lower, resulting in a higher overall lubricant consumption and fluctuating lubricant quality.

Automated Solution

Lubetimizer B.V. developed a unit, the “Lubetimizer”, enabling you to easily control your partial replacements automatically by introducing very small lubricant replacements (used lubricant drain, and fresh lubricant filling) on a hourly basis.

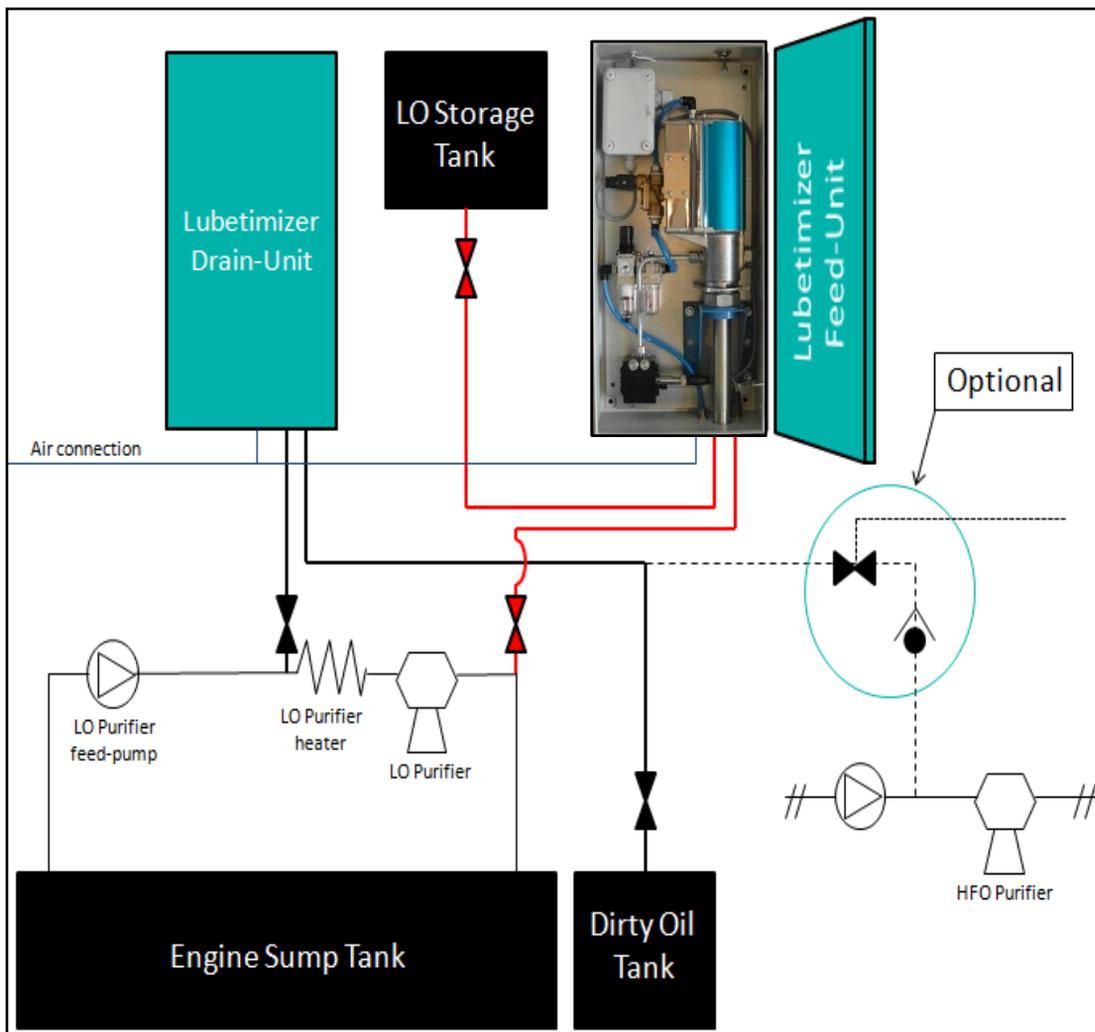
The amount of the partial replacement for optimizing the TBN equilibrium is depending on the fuel Sulphur % and engine power, therefore the Lubetimizer’s PLC is controlled by a fuel Sulphur dependent HMI setting and the engine load. The HMI setting is shown on a HMI setting table for Sulphur % ranging from 0,5% - 3,5%, and adjusted via a HMI setting with + or – buttons. In auto HMI modus there is a selection of low sulphur fuel 0,1%, and a partial replacement selection in ltr/24h to tackle viscosity increase by fuel contamination. Additionally the engine consumption can be automatically added, resulting in a stabilized engine sump level, and easy engine consumption monitoring. The drain and feed volumes and running hours are stored for your lubricant consumption reporting.



Lubetimizer control unit

Lubetimizer Installation

The Lubetimizer is compiled of 3 separate units, the control, drain & feed unit, offering maximum flexibility to find the optimum installation in your engine room. The control unit is controlling the air driven pumps from the drain and feed unit, which pump used- and fresh lubricant through a robust volumetric measurement unit, reporting the pumped volume back to the control unit's plc. Installation of the unit is straight forward and can be executed by the vessels crew, or we can arrange the installation for you.



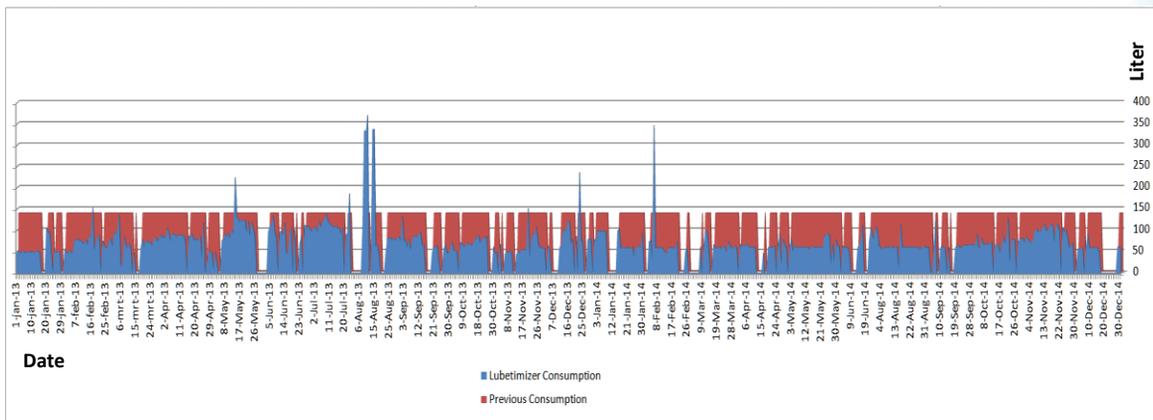
Lubetimizer piping system arrangement

The Lubetimizer control unit can be installed in the control room, whereas the pump units can be installed in the purifier room for easy connection to the lubricant purifier feed line and the dirty oil tank, or to the fuel purifier feed line, depending on your wishes. The fresh lubricant unit can be connected to the lubricant purifier return line, and is completely separated from the used lubricant unit to avoid any possible mixture. For the operation of the Lubetimizer only a 230V AC or 24V AC/DC (at customers request) power, and an air connection of 6-8 bar is needed.

Test Results

The Lubetimizer was tested and further developed for 1 year onboard of the mv Andesborg from the Dutch shipping company Wagenborg Shipping B.V. resulting in significant savings.

The Andesborg is equipped with a Wärtsilä 6L46F engine of 7500 kW running on heavy fuel and a TBN 40 lubricant, sailing between North Western Europe and the West Coast of South America. Introduction of the Lubetimizer resulted in a lubricant saving of up to 38 % compared to the previous partial replacements by the vessels crew. These huge savings are the result of the balanced partial replacements corresponding the varying Sulphur and engine load %.



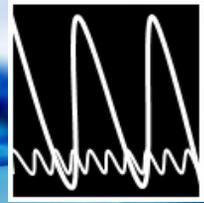
The graph above shows clearly the effect of the Lubetimizer on the lubricant consumption effected by the varying fuel Sulphur and engine load %, resulting in the lowest lubricant consumption whilst assuring the lubricant quality.

Corporate Social Responsibility

The Lubetimizer is reducing the overall lubricant consumption of a vessel, and thus reducing the overall used lubricant flow in your company, contributing to a better environment. To acknowledge the positive effect of the Lubetimizer on the environment the Dutch government awarded it with the addition of the Lubetimizer to its MIA & VAMIL tax regulations. For vessels sailing under Dutch flag this results in a tax reduction of 27% on the amount of the total investment, and a flexible write off up to 75% of the investment.

Lubetimizer

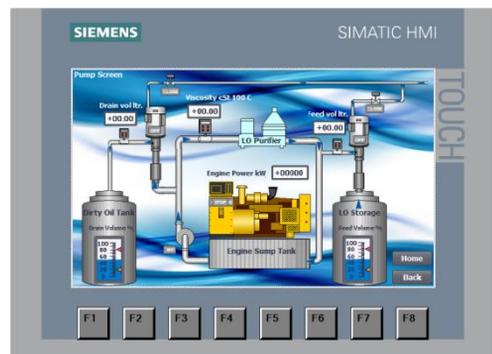
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Lubetimizer B.V. Is a Dutch engineering company with over 20 years of experience of lubrication in the shipping industry, we supply and develop lubrication solutions, and can help you solving your lubrication issues, by means of advice or development and production of specific lubrication equipment.

Viscomizer

On modern medium speed engines lubricant viscosity increase due to partial or uncombusted heavy fuel is becoming a more frequent issue. Viscomizer is a new development of Lubetimizer B.V. The Viscomizer combines the Lubetimizer with an automated lubricant viscosity control, monitoring the viscosity of the lubricant inline in the system and creating additional partial replacements if needed to keep the lubricant within viscosity limits. The Viscosmizer is creating savings on lubricant consumption and stabilizing the lubricants quality even if your engine's lubricant is suffering from contamination with uncombusted fuel.



If you have any specific lubrication issue,
please contact us at:

Tel: +31-575-547678
Fax: +31-575-547904
Email: info@lubetimizer.com
Internet: www.lubetimizer.com

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Think Solutions
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Lubetimizer B.V.
Zutphenseweg 39
7211 EA Eefde
The Netherlands

T +31-(0)575-547678
F +31-(0)575-547904
info@ridair-brema.nl
www.lubetimizer.com