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Abstract
The aim of this paper is to present how to achieve a reduction of fuel oil consumption and maintenance cost through carried out optimization of diesel engines. Further more the paper also will handle combustion related problems of Marpol Annex VI emission TIER I low NO(x) settings of Diesel Engines and Diesel Engine optimisation in general. All presented cases are real and are backed up with real combustion diagrams, measurements and calculations carried out during Performance & Energy Audits onboard Stolt Tankers vessels by the Author of this paper. The Author has as well attended several Factory Acceptance Tests for Diesel Engines. A 'diesel engine combustion analyzer instrument' is used when carrying out the performance tests of the diesel engines onboard vessels. Based on the results from the combustion diagrams achieved from the combustion analyzer and other relevant performance data's the diesel engines are optimized for improved performance. The work process in the combustion diagrams will be explained and also how the diagrams should look like to achieve the most efficient combustion. The paper will show examples of diesel alternator engines with Marpol TIER I Low NO(x) emission settings. The paper reveals that newly installed diesel engines on vessels optimized in compliance according to low NO(x) emission limitations can be poorly optimised and therefore in a state of combustion unbalance. The paper shows that it is possible to optimize these poor factory adjusted diesel alternator engines to achieve a more efficient combustion and thereby a reduced fuel oil consumption and maintenance cost and still comply with the low NO(x) emission limitations. One special case of wrongly designed diesel alternator engines in compliance with low NO(x) emission limitation installed on the new vessels in the fleet is presented. In connection to this special case an older diesel alternator engine was optimized to make it possible to compare the design of the fuel injection on the two engines. Further on there will be examples of optimization of older diesel engines that don't need to be in compliance with Marpol TIER I low NO(x) regulation, both a 2-stroke main engine and a 4-stroke diesel alternator engine. The Author believes that the paper can be enlightening for both Ship Owners and Engine Makers.

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