Being in tune reduces fuel consumption

MAERSK MAN Diesel

Auto-tuning ensures that the combustion process of a MAN Diesel engine is always optimized. This allows for continuous adaptation to wear, changed fuel properties and operating conditions. The result is a reduction of fuel consumption, CO_2 emissions and particulates.

Today, tuning of the engine performance is a process done manually by the marine engineer. Typically, it takes some hours once a month or whenever required, e.g. after engine overhaul. The tuning will make the engine run safely within recommended load limits but still leaves a margin for performance optimization as operating conditions and fuel oil properties change over time.

With Auto-tuning, this margin can be harvested by continuously and automatically tuning the engine for best performance, a task that is not feasible to be done manually.

Constant measuring and tuning

The Auto-tuning concept is based on online measurements of the combustion pressures in the cylinder chambers. This is an extremely harsh environment for a sensor to function in as the exhaust gas passes with high temperature and at high pressure. However, sensor technology has reached a point that allows for constant measuring for more than 4 years of engine running. In comparison, a standard car engine will, in its lifetime, not run much more than a total of one year.

The developed engine control system constantly monitors and compares the measured combustion pressures to the reference value. Hereafter, the control system will automatically adjust the timing of the fuel injection in accordance with the deviation between the measured value and the reference value. This is done in order to reach the optimal combustion pressures during the next firings.

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The constant and automatic tuning to best engine performance allows for continuous adaptation to wear, changed fuel oil properties and operating conditions, e.g. sailing in cold or warm climate. This offers a wide range of benefits, namely reduction in fuel consumption, CO_2 emission and carbon particles, as well as reduced maintenance costs and risk of damage.

The reduction in fuel consumption for the average vessel is expected to be above 1%, whereas some vessels will have a potential of more than a 3% reduction.

If Auto-tuning is installed on the more than 10,000 MAN Diesel two-stroke engines in service world-wide, the total fuel consumption will be reduced by estimated 2 million tons. This is equivalent to 5 million tons of CO_2, or about 10% of the total annual Danish emission of CO_2.

Retro-fitting without docking

The Auto-tuning system is simple to install, also as retrofit on vessels already in service. Installation does not require docking but can be done while in normal service.

Pay-back time is estimated to 5 - 20 months of operation, depending on engine size and operation schedule. Thus, with the MAN Diesel Auto-tuning concept, shipowners are being offered an easy way to reduce vessel operating costs and at the same time contribute significantly to the reduction of CO_2 emissions.

Project facts

Category: **Machinery**

Emission reductions:

CO_2	1-3 %
NO_x	1-3 %
SO_x	1-3 %

Partners:

A.P. Moller-Maersk
MAN Diesel