

# Saving 22 tonnes of fuels per day with PMI

MAN PrimeServ

Going from 106 tonnes to 84 tonnes of fuel per day speaks for itself. After having retrofitted five tankers with PMI VIT and PMI Autotuning, Chevron has seen the impact of continuously monitoring and tuning their MAN B&W two-stroke engines.



Wear on engine components, changes in ambient conditions and changes in fuel bunker quality can negatively affect the engine efficiency, resulting in higher fuel consumption and increased engine wear. The way to counter this problem is to continuously monitor and tune the engine, but doing this manually can be both troublesome and time-consuming. The solution provided from MAN Energy Solutions to avoid manual monitoring and tuning of the engine is called a PMI system.

Chevron retrofitted five of their vessels, Arcturus Voyager, Aquarius Voyager, Aries Voyager, Antares Voyager and Andromeda Voyager with the PMI system and gave MAN Energy Solutions the opportunity to review data regarding the improvement in fuel consumption

# What is PMI VIT & PMI Autotuning

In short, the PMI system is a system for semi or fully automatic measuring and tuning of the engine. There are different variations of the PMI system and Chevron chose to install the premium, fully automatic PMI systems, PMI Autotuning and PMI VIT

These systems are built around the same basic setup which consists of a unit that monitors the cylinder pressure (Pcomp, Pmax) via a fixed cylinder pressure transducer on each cylinder. The data from this measurement is then used to automatically balance and tune the engine, and this is where the two systems are different.

PMI Autotuning is used for MAN B&W two-stroke electronically controlled engine types (ME, ME-C, ME-B, etc.), where it adjusts the fuel-injection timing and the opening of the exhaust valve to ensure the correct cylinder pressure. The PMI VIT system is used for mechanically controlled MAN B&W two-stroke engine types (MC, MC-C) and controls the timing of the fuel-injection with an electronic actuator on the VIT (variable injection timing) rack, to ensure the correct cylinder pressure.

## How much does the PMI system improve the fuel consumption?

It is difficult to determine how much you can improve the fuel consumption of the engine by installing a PMI

system, as this is determined by how well and how often the engine was tuned before installing the PMI system. In theory the engine consumes 0.20-0.25 g/kWh extra fuel for each bar the cylinder pressure is below the reference Pmax at a given load.

By looking at the examples from Chevron, we can get a better idea about the fuel savings that can be obtained by installing a PMI system.

## PMI VIT on a mechanically controlled MC engine

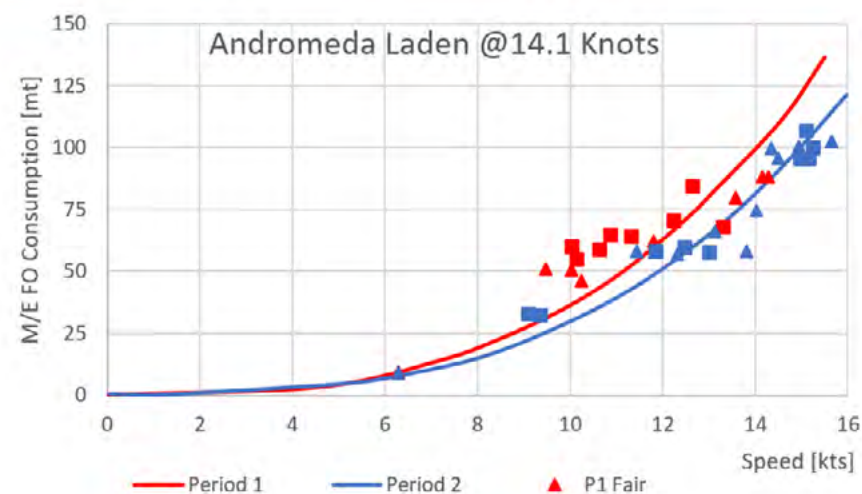
On the vessel Andromeda, Chevron installed the PMI VIT system on a 6S90MC-C engine while in dock. It is

important to note that they also cleaned the hull and installed propeller boss cap fins, which is of course also an important parameter for fuel savings.

The data we got from Chevron show an 18% improvement in fuel consumption, where the vessel, at a speed of 14.1 knots, was using 97.7 tonnes of fuel per day before, and 80.1 tonnes per day after its docking. Chevron estimates that approximately half of the fuel saving derives from the retrofitting of the PMI system, while the other half comes from the propeller boss cap fins and the hull cleaning.

ANDROMEDA LADEN (@14.1 Knots Before 97.7 After 80.1T/Day or 18% Improvement)

### Speed vs Consumption



## PMI Autotuning on an electronically controlled ME engine

The picture is very much the same when we look at the vessels with electronically controlled ME engines. The best example is Aries Voyager, where the PMI Autotuning system was installed during docking. Again, this vessel also had the hull cleaned and propeller boss cap fins installed.

For Aries Voyager, the data from Chevron show a huge difference in the fuel consumption before and after docking. Before docking, Aries Voyager's MAN 6S90ME-C engine was consuming 106.4 tonnes of fuel per day at a speed of 14 knots. After docking,

the same speed required only 84 tonnes of fuel per day, which is an impressive 20% improvement.

Chevron estimates that approximately half of the fuel savings come from the retrofitting of the PMI system, while the other half comes from the propeller boss cap fins and the hull cleaning.

The data from the three remaining vessels, Arcturus Voyager, Aqarius Voyager and Antares Voyager, all equipped with MAN B&W 6S90ME-C engines, also confirm the importance of continuously tuning the engine. On these three vessels, a significant improvement took place after the modifications and installation of PMI

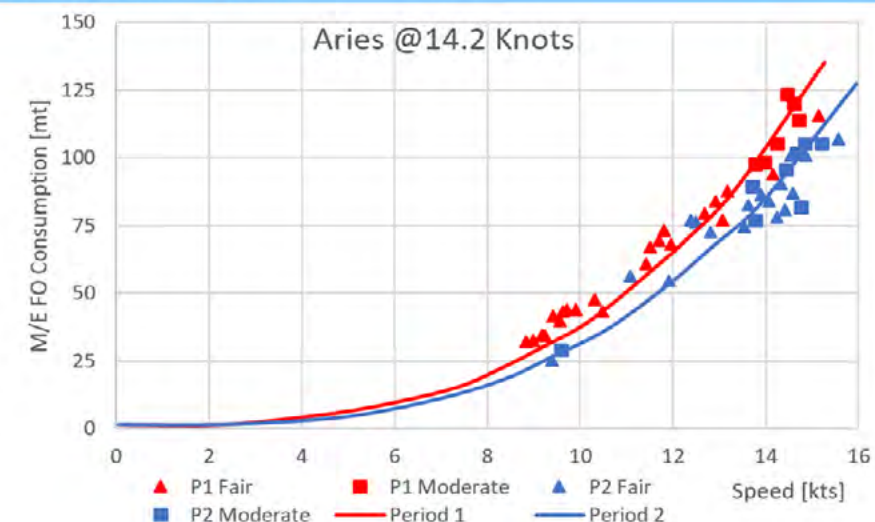
Autotuning, with an improvement of at least 8.6% in fuel consumption.

## How can the PMI system help you?

The MAN PrimeServ 2-stroke Retrofit & Upgrade team has created a tool to calculate how much fuel the PMI system can help you save, based on your vessel-specific data. If you want a vessel-specific calculation and wish to know more about how you can ensure continuous monitoring and tuning of your engine, then please contact your local MAN PrimeServ office.

ANDROMEDA LADEN (@14.2 Knots Prior 106.4 and 14 Knots After 84T/Day or 20% Improvement)

### Speed vs Consumption



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