

Customer Technical Service

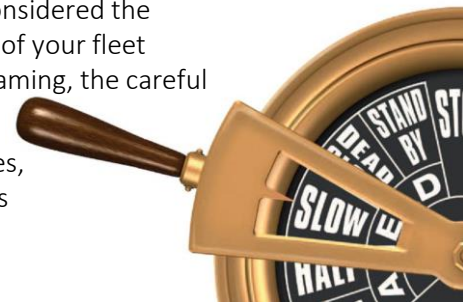
SLOW STEAM AHEAD

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Why Slow Steaming?

To overcome both economic and environmental challenges, slow steaming is often considered the easiest solution however, doing so without risking the safety and long term efficiency of your fleet needs careful consideration. This Technical Bulletin will explore the need for Slow Steaming, the careful considerations required and possible solutions.

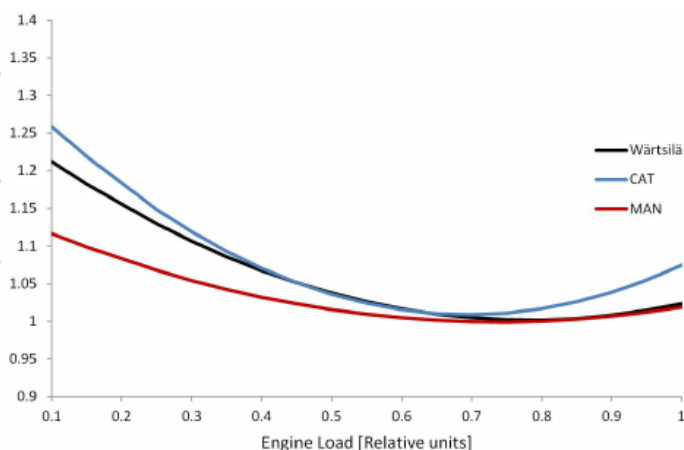
Slow Steaming, amongst other solutions such as limiting the shaft power, fuel additives, voyage optimisation and lowering the cruising speeds are some of the many methods for reducing CO₂ emissions approved by the IMO.



Regulated Slow Steaming advantages

- It is the most cost effective way to reduce ship emissions
- It is cost free to the shipping industry regulated slow steaming ensures that emissions in the shipping sector will be reduced, regardless of the fuel price and demand for shipping
- Regulated slow steaming is relatively easy to monitor and enforce, and may have a lower administrative burden than some of the recently proposed market-based measures

There is a speed vs. fuel consumption curve on every engine, the most economical fuel consumption is when running at the bottom of the curve. Sometimes also called the ECO/economic speed.



- The fuel efficiency of every engine, its operational parameters, propellers, turbochargers, coolers etc. are optimised for a normal load range
- Vessels operating outside of this load range are not efficiently converting fuel into energy
- During slow steaming, the fuel consumption is lower in totality however the energy efficiency is lower and SFOC (fuel consumed per unit of energy) is higher at part loads

Importance of Slow Steaming

According to the manufacturers, every vessel has an optimum engine load where the combustion is almost complete and the SFOC (Specific Fuel Oil Consumption) is at minimum level. Reducing speed in order to get a better CII rating may lead to energy and combustion efficiency losses that cause preventable damage to vessel machinery.

Vessels with high engine output will need costly retrofit solutions with high CAPEX in order to work permanently at lower loads.

Octamar™ Ultra HF & Octamar™ Complete are groundbreaking fuel treatment systems with Class Verification which are designed to allow smart steaming by minimising the adverse effects

Poor Atomisation

Higher volume of fuel trapped at the injector tip (sac) delivering uncalculated fuel to the cylinder and increasing the likelihood of dripping. Increased fouling and carbon deposits all contribute to poor atomisation and subsequent drop in performance.

Poor Combustion Characteristics

At reduced ME load operation, inadequate turbo charger speeds are generated to provide adequate air to the combustion chamber, leading to lower combustion efficiency, unburnt fuel and the formation of harmful emissions.

Reduced Air Flow

Reduces engine efficiency and causes fouling in the air supply/scavenge system. Subsequently this can lead to very high differential and exhaust temperatures which can damage engine components and lead to burned exhaust valve as one example.

Cold Corrosion

Corrosive wear on the cylinder liners caused by acid condensation due to the drop in engine operation temperature caused by slow steaming operation.

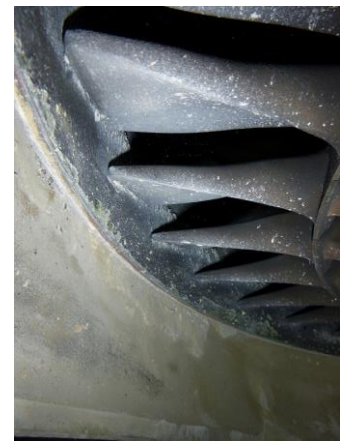
Fouling Effect

On Turbocharger (turbine side),

- On Exhaust Gas Boiler (heat exchanger pipes)
- On Injector (clogged nozzles),
- On Piston rings (deposit accumulation - lack of sealing)



T/C Untreated fuel



T/C treated fuel with Octamar™

Slow Steaming with associated benefits

Octamar™ Ultra HF & Octamar™ Complete improve energy efficiency of your fleet by reducing ignition delay, cleaning injectors and reducing afterburn to mitigate all the issues associated with slow steaming. By using an organic combustion improver we can achieve reduced combustion properties, early max of heat release and maintain energy efficiency.

Performance	Octamar™ Ultra HF	Octamar™ Complete
Class verified	✓	✓
Reduction of T/C & EGR Fouling	✓	✓
Ignition delay improver	✓	✓
Combustion efficiency catalyst	✓	✓
Maintaining of injector performance	✓	✓
Stable fuel – reduced sludge	✓	✓

73% reduction in unburnt fuel leaving the engine

22% reduction in PAH as measured in scrubber wash water

60% reduction in PM (Particulate Matter) across every size range

Associated benefits of reduced black smoke and carbon



In addition to allowing vessels to slow steam more effectively, Octamar™ actively reduces fuel consumption. Class NK verified several trials conducted over a decade that demonstrated the active fuel consumption and emissions reduction of Octamar™ technology.

Unique solution with ClassNK Verification

- ✓ Improvement of fuel (residual) economy **2.3 - 3.9%** (average **2.7%**)
Measured over 8 field trials, 16 vessels & test best data
- ✓ **60% reduction** in Particulate Matter and associated emissions e.g. soot, black smoke and carbon

Please contact your local sales representative for more information.

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