Optimization of Fuel Consumption for M 32 Engines

Medium Speed Engine Services Solution

System Description

A system conversion is available that will optimize fuel consumption. The main approach of this system conversion is to change the configuration of the engine so that the efficiency of the engine in the part load range will be significantly improved. This leads to a substantial reduction in fuel consumption at both constant and variable speed.

For turbocharged, medium-speed four-stroke engines, the interaction between engine speed, load and exhaust gas turbocharger plays a vital role. In the part-load, the air ratio is often insufficient, combustion ratio deteriorates, and the fuel is not burned completely. This may lead to increased stress of components due to vibration and in the long term, possible damage and failure of components.

Therefore, we offer a conversion with a part-load optimized turbocharger and thereby increase the boost pressure in the part-load range. This results in higher efficiency with subsequent benefits in environmental aspects and less specific fuel oil consumption (SFOC). Fewer nitrogen oxides are emitted, so the engine will reach IMO Tier II after the conversion.

To realize a decrease in absolute fuel oil consumption beyond the already achieved SFOC reduction by part-load optimization, the propulsion system equipped with controllable pitch propellers is used in an operating mode similar to that of a fixed pitch propeller configuration. This results in synergy effects: Not only is the engine driven in its most efficient range, but the variable propeller speed (which is lower in part-load range) also drives the ship more efficiently than would be possible with constant speed.

The combination of benefits results from reduced SFOC in the power range below 70% MCR (maximum continuous power), as well as absolute fuel savings, since the ship can be propelled in combinator mode with reduced power at the same ship speed.

A reduction in fuel consumption directly leads to lower CO_2 emissions.

This system offers its operators a cost-effective solution for medium-speed engines of the Cat® and MaK™ brands.

System Requirements

This system is available for

- In-line M 32 C engines
- Equipped with Napier turbocharger and pulse charging exhaust manifold
- Vessels with CPP, operating continuously and at part load between 40–70% MCR

For more detailed specifications and information contact your authorized Caterpillar dealer.

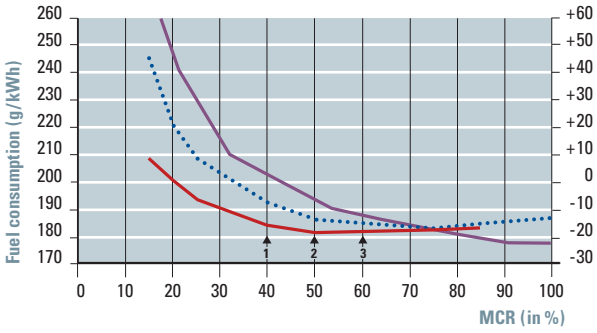
Benefits

- Constant ship speed at reduced engine power
- Further SFOC reduction of 10% possible by variable speed similar to FPP application*
- Significant decrease of CO_2 and NO_x emissions
- IMO II conditions are meet
- Further additional reduction of certificate power in IMO II group after retrofit
  - EEXI improvement of up to 20%
  - CII improvement: significantly lower fuel consumption and thus lower CO_2 emissions
- Third party benefits
  - Lower harbor fees and port dues
  - Government aid or subsidies

* Depending on MCR

Expected Fuel Savings

Expected fuel savings			Expected decrease in CO_2 emissions		
	1	18 g/kWh		1	58 g/kWh
	2	12 g/kWh		2	38 g/kWh
	3	4 g/kWh		3	13 g/kWh



Expected Fuel Savings

- Constant speed (320 x 16) 60 Hz – part load optimized
- Constant pitch mode (320 x 16) – part load optimized
- Standard 480 kW 600 rpm

Faster. Less Expensive. Damage-Free parts.

All of our genuine MaK parts are easily available via the dealer network

Services for the lifetime of your engine – when you choose Caterpillar, you get that and much more. Our global network of local and certified dealers is available to support you with solutions and genuine expertise. The network offers you consistent availability of genuine parts and services worldwide while contributing to meeting your environmental and operational goals.

To find your local dealer, please visit our Dealer Locator:
https://www.cat.com/en_US/by-industry/marine/mak-dealer-locator.html

Global dealer network

Caterpillar Motoren GmbH & Co.KG
Falckensteiner Str. 2
24159 Kiel/Germany

Phone: +49 431 3995 01
Telefax: +49 431 3995 2193

For more information please visit our website:
cat.com/marine

Contact your local dealer:
https://www.cat.com/en_US/by-industry/marine/mak-dealer-locator.html

Visit us on Shipserv at:
https://www.shipserv.com/brand/mak

Check out our MaK LinkedIn page to stay up to date:
https://www.linkedin.com/showcase/caterpillar-mak/

Subject to change without notice.
Leaflet No. 436 · 07.22 · e · L+S · AD
LEBM0082-03