

# Optimized Propulsion Efficiency with Cylinder Bypass Valve (CBV)

## Operation of Controllable Pitch Propeller (CPP) in enhanced combinator mode

### Go slow and save fast – even faster with increasing fuel oil prices and CO<sub>2</sub> charges

In general, turbocharged medium-speed diesel engines operate particularly economically in the upper power range. This is exploited by designing the engines accordingly.

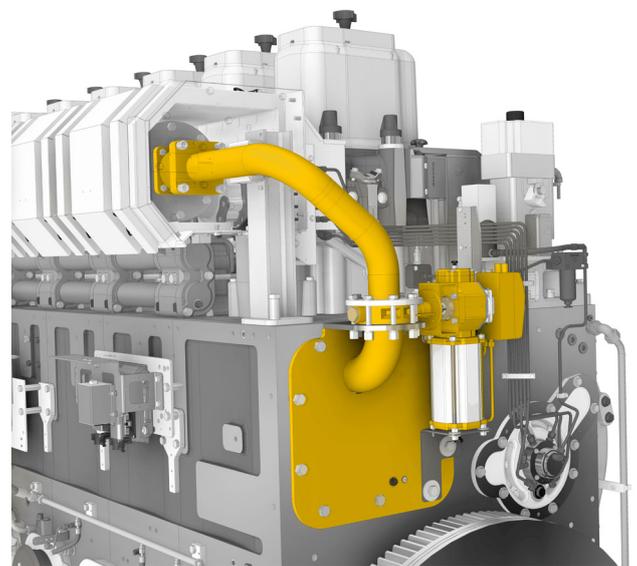
But the requirements on the load profile have changed due to slow steaming\*. In case of standard equipped engines, the efficiency is lower at reduced power with variable speed.

Installing a CBV allows the engine to run at variable speed without a loss of efficiency.

For vessels with CPP this means the engine can be operated in a mode similar to a FPP (Fixed Pitch Propeller) application.

Instead of operating on constant speed, the engine speed is reduced by a defined percentage, or the engine is operated in an extended combinator mode. This reduces the required power whereas the ship velocity remains.

This results in a significant reduction of fuel oil consumption of up to 20 %.



CBV assembly

\*reduced cruising speed

### Benefits of Retrofitting CBV to achieve variable speed operation in CPP assets



Timetable designed for cruising speed in the area of slow steaming



- Up to 20 % less fuel consumption
- Improved Carbon Intensity Indicator (CII) rating
- Lower harbor fees and port dues
- Government aid or subsidies

Higher boost pressure

Reduced engine vibration in part load

Improves surge margin

Engine does not stall in the lower speed range

Reduced exhaust gas temperatures

Reduced wear of turbocharger components

## Key Requirements:

- CPP (Controllable Pitch Propeller)
- Constant pressure charged engine
- Shaft generator capable of variable engine speed\*

## Compatibility:

- Feasible for engines with any control & safety system
- No impact on existing systems:
  - Wastegate
  - Flexible Camshaft Technology (FCT)

\*retrofit of frequency converter may be necessary

## The CBV solution is available for following engines:

Engine	Number of Cylinders					
	6	7	8	9	12	16
M 20 C	✓		✓	✓		
M 25 E	✓		✓	✓		
M 32 C/E	✓		✓	✓		
M 43 C	✓	✓	✓	✓	✓	✓



**Are you interested in optimized propulsion efficiency  
or need further information?**

Please contact your dealer or your responsible Solution Sales Manager.

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