Use case I Commercial Marine
Tugboat operator

Comparison specification:

Tugboat	Low load	25 years	2 x 2,560 kW / 1,800 rpm
Application	Load profile	Avg. lifespan of the vessel	Engine

Peer group comparison: *mtu* Series 16V 4000 M65L vs. competitor

Time Between Overhaul (TBO) in hours calculated:

mtu **Series 16V 4000 M65L**	54,000*
Competitor	37,000

TBO in years calculated:

mtu **Series 16V 4000 M65L**	27 years*
Competitor	18.5 years

* ***mtu*** engine overhaul is recommended at **25 years**

46%

more utilization than competitor before overhaul

Zero

overhauls during a 25-year operating lifecycle **

** depending on load profile and yearly operating hours

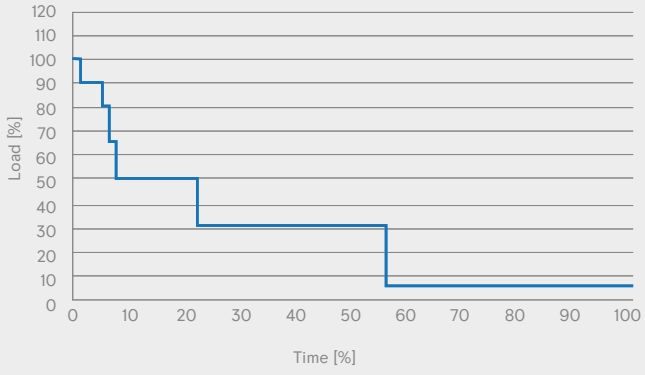
OPTIMIZED TBO CAN PROTECT AGAINST TIME-CONSUMING OVERHAULS

Lifecycle cost optimization of ***mtu*** Series 4000 M65L marine engines

Executive summary

Engine overhauls spell downtime and loss of revenue. ***mtu*** Series 4000 M65L engines, however, have a much longer TBO than a comparable one of the competitor, as the following use case illustrates. Assuming an average tugboat lifespan of 25 years and 2,000 hours per year, they practically eliminate the need for a major overhaul altogether.

Underlying load profile for the comparison



Who: Tugboat operator

Why: Tugboat readiness and availability with minimal maintenance are essential requirements for harbor operations. Long downtimes for maintenance mean a loss of income and higher costs.

Main benefits:

- Lifecycle maintenance cost optimization
- Reduced tugboat downtime
- Increased utilization before major overhaul
- Allows some of the more complex maintenance tasks to be performed in the tugboat.

A Rolls-Royce solution

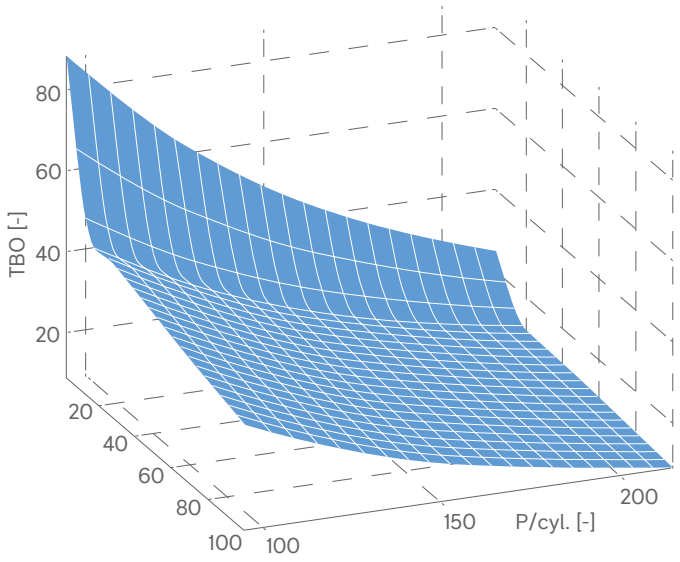
TBO OPTIMIZATION CALCULATION

A real data analysis of overhaul intervals using latest algorithms

We have combined 25 years of experience with the digital analysis of field data from over 50,000 data sets from 18,000 engines and used state-of-the-art calculation methods to optimize the load bands of the mtu engines.

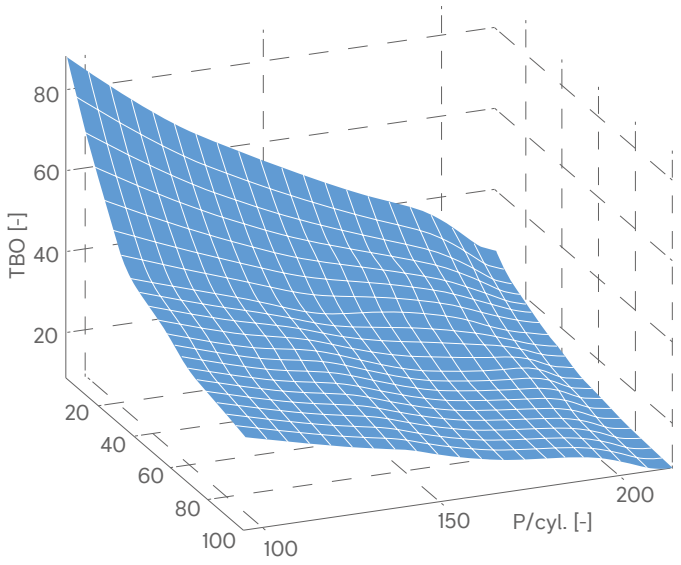
The load factor (LF) represents the average load of an engine, the load indicator (LI) describes the high load share in a load profile.

Load Indicator (LI)



The representative load profiles describe the average load profile per load band that best describes each load band. The real load profiles that can be assigned to this load band can therefore be above or below the representative load profile in the individual values.

Load Factor (LF)



The load band in which most of the engines of an application operate in the field is marked as standard.

Results of the comparison

Competitor engine

Power: 2,560 kW / 1,800 rpm
Operating hours: 2,000 (p.a.)
Average lifespan: 25 years
TBO: 37,000 hours

Requires overhaul after 18.5 years

mtu Series 4000 M65L

Power: 2,560 kW / 1,800 rpm
Operating hours: 2,000 (p.a.)
Average lifespan: 25 years
TBO: 54,000 hours

No overhaul required during lifetime of tugboat

Rolls-Royce Group
www.mtu-solutions.com/marine