Green- and High-Tech for

Maritime Propulsion

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Agenda

- Green- and High-Tech
 - Motivation
 - Exhaust gas after treatment
 - Alternative fuels
 - Electrification
 - Digitalization
 - Future propulsion systems
- Summary



Megatrends



Megatrends are leading to an increasing demand of efficient and environmental friendly solutions.



Green- and High-Tech-Program





Exhaust gas after treatment



- > New emission regulations require exhaust gas after treatment
- \succ Reduction of NO_x emissions by 80% necessary
- > Engine and EAT is one integrated system.



Alternative fuels: marine gas engine

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Engineerin	ng Targets:
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Application	Marine Commercial
Emissions	IMO3 / EPA T4
Base-Engine	Series 4000 M64
Power	16V: 2000 kW
Engine speed	600 1800 rpm
Engine Mapping	like Diesel engine
Engine Dynamics	like Diesel engine
Gas Quality	MN > 70



Electrification of propulsion





Digitalization – Intelligent systems

- Sensors of engine control and monitoring
- Data acquisition of ECU-Values with data logging hardware (~500 values, 10kHz)
- Interface for cell phone, LTE or Satellite

- Intermediate storage
- Individual access rights

2 Cloud-data storage

- Data acquisition 1 Digitalization will improve the system availability, robustness
 - and efficiency.

3 Customer access

- Damage prevention with early detection: Availability
- Wear analysis / Maintenance as required: operating costs
- Service-Support (Service history, guided diagnose)
- Emission compliance
- Field approval /best practise concept

Intelligent Applications





- Bring-Your-Own-Device (BYOD) approach
- Customized usage (fleet management, plant monitoring,..)



Next generation propulsion systems





Green- and High-Tech for maritime Propulsion

- ✓ With EAT Diesel engines become a green propulsion solution
- ✓ With the availability of renewable fuels like Power-to-Gas or Power-to-Liquid internal combustion engines will become CO₂neutral
- Digitalization will improve the system availability, robustness and costs of propulsion systems.
- ✓ Green- and High-Tech will evolve the classical combustion engine to a fully integrated and intelligent hybrid propulsion system.

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Thank you for your attention!