WE Tech

CREATING SAVINGS

Zero Emission Shipping

WE Tech Solutions offerings to the industry are based on DC-link power distribution, variable speed power generation, energy storage and energy management systems. Our solutions substantially improve energy efficiency and decrease emissions and hence make us a corner stone in the sustainable future of shipping.

"WE Tech Solutions delivers energy efficient hybrid solutions for the global shipping industry. We bring together experience with innovation, state-of-the-art technologies and first-class services and deliver end-to-end solutions to the shipping industry."

Mårten Storbacka, CEO and founder of WE Tech Solutions Oy

MISSION Create savings and emissions reduction for the shipping industry through technology.

VISION Zero Emission Shipping.

VALUES Work Together, Efficiency, Teamwork, Environmental Sustainability, Customer Driven, High Innovativeness.

WATCH THE VIDEO!

Benefits

WE Tech's market leading energy-efficiency and decarbonisation Solutions create substantial fuel, OPEX and CAPEX savings for customers in addition to other benefits and are applicable to all fuel types.

LOWER CAPITAL EXPENDITURE

- Less installed power thanks to increased efficiency and flexibility of the electrical system
- Smaller footprint of Main Switch Board and less copper in cabling and bus-bars thanks to limited fault currents with DC-link power distribution. Less copper also means reduced weight of the electrical system
- Lower THD (Total Harmonic Distortion) in the electrical system thanks to Low Harmonic AFE (Active Front End) frequency drive technology.

LOWER OPERATIONAL EXPENDITURE

- Savings in electric power generation with shaft generator driven by the Main Engine in variable (optimal) speed
- Savings from reduced fuel and maintenance costs with stopped Auxiliary Generators
- Savings from reduced losses in electrical power distribution
- Savings from propulsion machinery and/or electrical power generating machinery always operating at optimal point.

IMPROVED RELIABILITY

- Take Me Home/Take Me Away operating modes
- Safe return to port with Auxiliary Propulsion Drive
- Boost modes: Low-load optimisation/Ice-boost mode
- Black-out prevention with battery packages connected to DC-link power distribution
- Possibility for dual or quad split of electrical power distribution.

REDUCED ENVIRONMENTAL FOOTPRINT

- Thanks to improved efficiency of propulsion machinery as well as electrical power generation and distribution, the environmental footprint will be reduced with lowered fuel consumption and, thus, lowered emissions.

BETTER DESIGN FLEXIBILITY

- Variable speed Shaft Generators, variable speed Auxiliary Generators and DC-link power distribution solutions remove traditional design limitations
- Propulsion machinery, cargo handling and electrical power distribution is always operating with high efficiency
- The utilisation of permanent magnet technology is further reducing the size and weight of the machinery thanks to unmatched power density.

SHORE CONNECTIVITY

- Shore power is conditioned for the vessel's electrical system via the WE Drive
- Vessels become unaffected by the variations in voltages and frequencies of the national power grids worldwide – shore power always matches
- Shore power is generated with at least 50% lower cost than electricity generated on-board the vessel
- Auxiliary Generators stopped at port reduce costs and environmental footprint.

ENERGY STORAGE SOLUTIONS

- Battery packages connected to DC-link power distribution systems provide an energy reserve that can be used for electrical load peak shaving and black-out prevention
- In connection with variable speed Auxiliary Generators the battery pack helps keeping generator load from surging during electrical load steps. Stable electrical load allows generating sets to stay within the optimal operation window
- Battery packs provide substantial fuel savings in DP (Dynamic Positioning) operations.

Solutions

SOLUTION FIVE	We Drive	Shaft Generator Motor	Hybrid Machinery	Ship wide DC Bus Power Distribution
SOLUTION FOUR	We Drive	Shaft Generator Motor	Hybrid Machinery	DC-Link Power Distribution
SOLUTION THREE	We Drive	Shaft Generator Motor	Boost Mode	
SOLUTION TWO	We Drive	Shaft Generator Motor	Take Me Home	
SOLUTION ONE	We Drive	Shaft Generator		

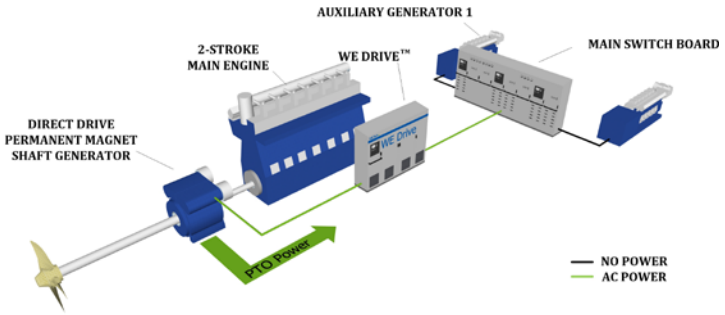
Economical Operations	Hybrid Machinery	Efficient Power Distribution	Hybrid DC Machinery

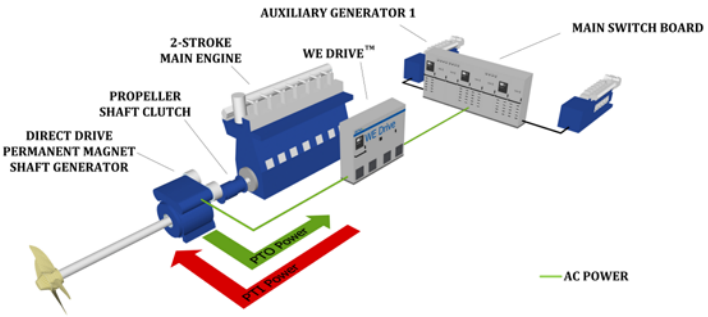
ENERGY EFFICIENCY

In the 2-stroke Main Engine vessels, the shaft generator permanent magnet rotor is mounted directly on the intermediate shaft of the propulsion system. Mass and inertia are very low and thus the impact on propulsion system torsional vibration calculations (TVC) remains minimal. No additional bearings are required, thus the propeller shaft system design remains uncompromised. During installation the shaft generator, including rotor and intermediate shaft, is lifted as a package into the vessel and positioned on the generator bed in the propeller shaft line.

With the WE Drive and direct-drive permanent magnet shaft generator in PTO mode, the ship's electrical power is generated by the fuel efficient 2-stroke Main Engine operating in variable speed.

Solutions One to Five are available for vessels with 2-stroke and 4-stroke Maine Engines.





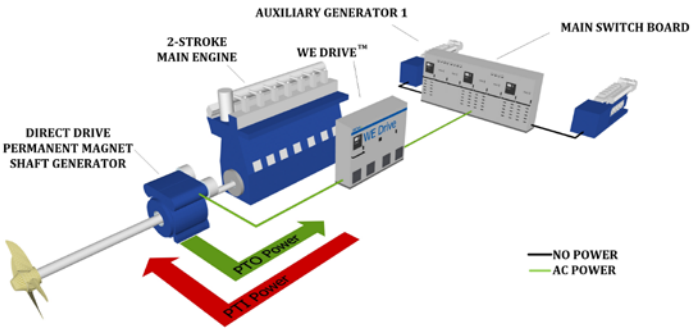
SOLUTION ONE – ECONOMICAL OPERATIONS

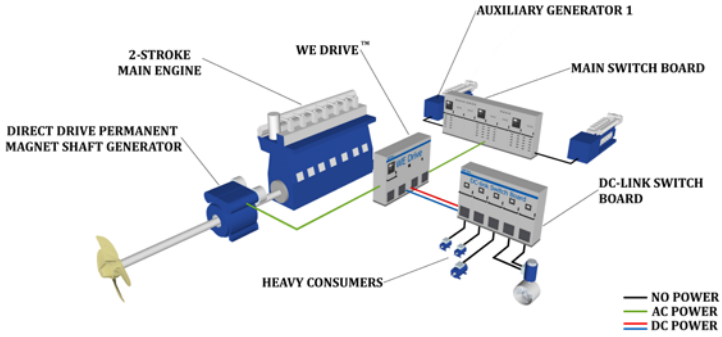
Solution One is a PTO (Power Take Out system) that enables propulsion machinery to operate in combinator/variable speed mode while the variable speed shaft generator produces the ship's electrical power. The variable speed shaft generator solution operates alone or in continuous parallel with Auxiliary Generators. Solution One can also be used for upgrading of existing vessels.

SOLUTION TWO – TAKE ME HOME

Solution Two is a PTI (Power Take In system) used for Take Me Home/Take Me Away operations. In PTI mode the shaft generator is operated as an electric motor which is controlled by the WE Drive. The two-stroke Main Engine is disconnected from the propeller shaft when in Take Me Home mode.

Our solutions build on widely proven technologies and are applicable to most ship types and propulsion machinery e.g., slow speed (2-stroke Main Engine) direct driven propeller or medium speed (4-stroke Main Engine) via reduction gear driven propeller.





SOLUTION THREE – BOOST MODE

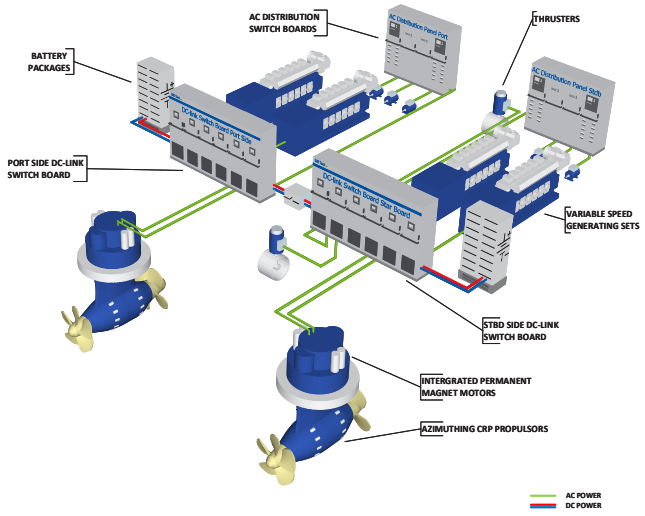
Solution Three is a PTI Boost system. The shaft generator is utilised as an electrical motor, driven by the WE Drive and provides additional torque to the propeller alongside the Main Engine. Solution Three is utilised as the Ice-Boost mode for ice-classed vessels when sailing in ice and for boosting the Main Engine when otherwise required. Boost mode allows for low-load optimisation of the Main Engine in normal conditions.

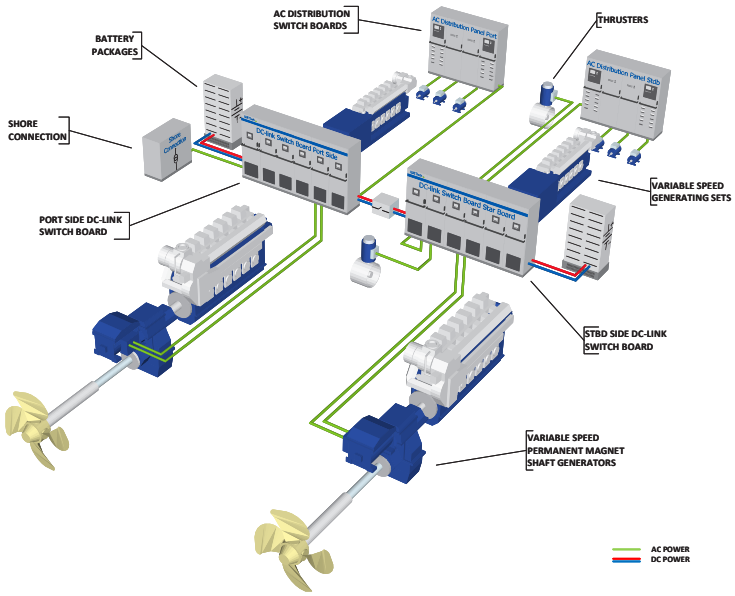
SOLUTION FOUR – EFFICIENT POWER DISTRIBUTION

Solution Four utilises the DC-link of the WE Drive thus enabling energy efficient and economical methods to distribute power. Large consumers such as bow thrusters and cargo pumps have their dedicated INU (Inverter Unit) connected directly to the DC-link of the WE Drive. In this way, harmonic distortion (THD) remains low in all operating conditions and fault currents in the Main Switch Board are limited.

Solutions

SOLUTION FIVE – HYBRID DC MACHINERY





DC ELECTRIC PROPULSION

DC Electric Propulsion uses all the energy efficient features of a Hybrid Propulsion Machinery plus a ship-wide DC-link power distribution system. With the DC-link distributing electrical power to all consumers, energy efficiency is increased by up to 35%. The Hybrid DC Machinery concept includes variable speed Auxiliary Generators and Permanent Magnet technologies for the rotating machines. With the ship-wide DC-link power distribution, fault currents are kept to a minimum thanks to the precise controls of the dedicated inverter units per consumer. The need for large switchboards and bulky transformers is therefore minimised, which means greater savings in space and weight as well as far better total efficiency.

DC HYBRID PROPULSION

DC Hybrid Propulsion utilises the Gen-sets to supply power to propulsion motors and to the vessel's electrical power distribution. The Energy Storage System (Battery packages) connected to the DC-link power distribution systems provides an energy reserve that can be used for electrical load peak shaving and black-out prevention. The ESS is re-charged utilising shore power. Shore Power can be conditioned for the vessel's electrical system via the WE Drive and thus the vessel becomes independent of the various voltages and frequencies of the national power grids worldwide. The ESS and the Shore Power Connection can be integrated with all our solutions.

Services

We offer project services and lifecycle support with expertise and responsibility to suit customer's individual requirements.

We provide end-to-end solutions with decades of experience and expertise.
We support ship designers with energy saving concept for creating future proof vessel designs.
We deliver domain expertise for propulsion machinery and electrical system efficiency analysis.
We provide sales, engineering, project management and delivery of energy efficient solutions for new build vessels.
We offer solution functional tests that are thoroughly conducted before delivery in order to ensure the best efficient performance of commissioning.
Our project management ensures a smooth, safe and efficient commissioning to satisfy customer's needs.

AFTERSALES SERVICES

Our Technical Support & Aftersales team offers training, 24/7 technical support, service agreements, maintenance and spare parts sales.

TRAINING
We offer comprehensive solution training to ship owners and operators, aiming to provide technical understanding and practical skills guaranteeing the functionality of our solutions. A continuous dialogue is also well maintained between WE Tech and customers to constantly improve our solutions performance.

24/7 TECHNICAL SUPPORT
WE Tech service team provides 24/7 dedicated technical support via our global network. Success is assured by our experienced service engineers, making WE Tech a lifetime partner in zero emission shipping.

SERVICE AGREEMENTS, MAINTENANCE AND SPARE PARTS SALES
Our maintenance plans can be customised based on the customer's operations. Response time and technical support are defined in the service agreements, as well as high quality spare parts sales tailored for each installation.

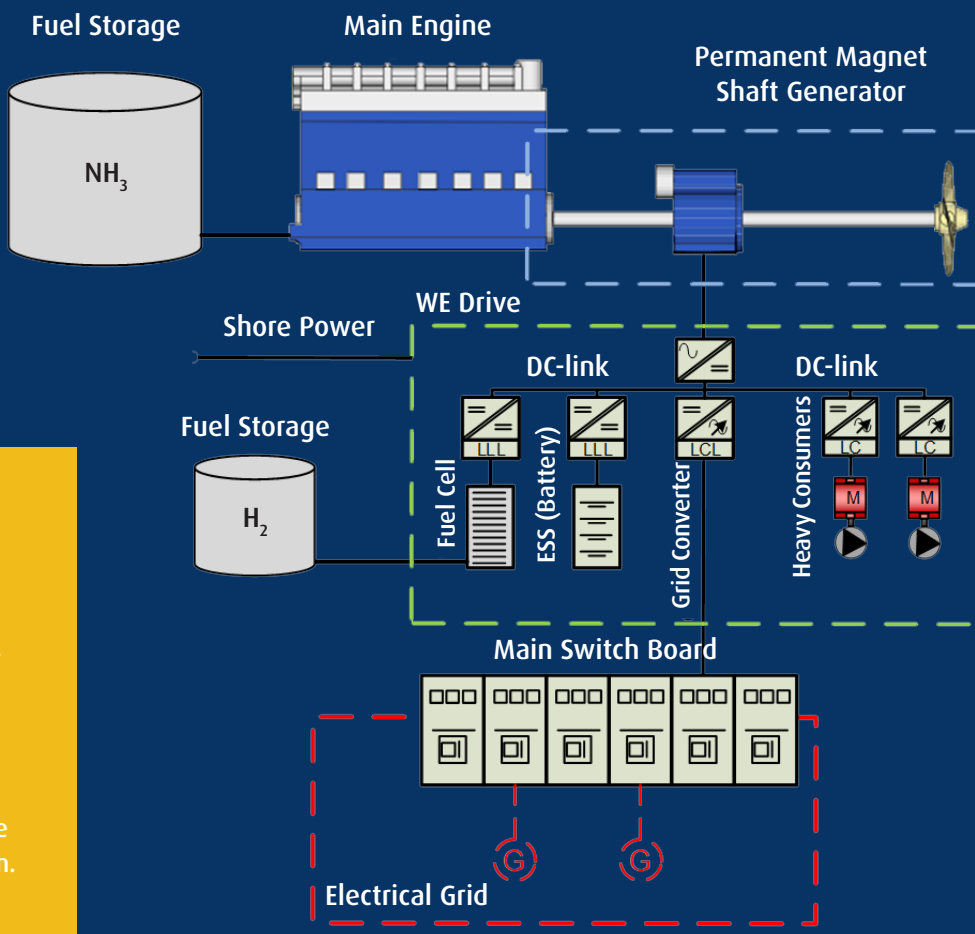
Global presence

WE Tech's sales agents and service stations cover the Seven Seas.
WE offer excellent services for your success in shipping.
WE provide expert support 24/7 in 3 time zones.
WE are rapidly expanding our business on a global scale, and we are the leading energy efficiency solution provider in the shipping industry.

Check our Sales Agents and Service Stations: www.wetech.fi/contact.

Domain Expertise

Domain Expertise visualised in an Ultra-efficient Zero-emission Merchant Vessel.



ZERO EMISSION FUEL DOMAIN

ALTERNATIVE FUEL POWER GENERATION EXPERTISE
Assurance of electrical load transient response capability while operating in E-fuel based zero emission modes.

DC-LINK FUEL CELL INTEGRATION EXPERTISE
Fuel Cell integration via DC/DC conversion to the ships energy efficient power distribution system. Seamless operations utilising Fuel Cells and ESS combinations for zero emission power.

ELECTRICAL GRID DOMAIN

VESSEL ELECTRICAL GRID/POWER DISTRIBUTION EXPERTISE
Electrical safety parameters and selectivity assessments of vessel AC energy distribution including efficient variable speed power generation.

VESSEL ELECTRICAL GRID/AUXILIARY GENERATOR EXPERTISE
Parallel loading parametrisation of Grid Converter as well as tuning of Auxiliary Generator speed/load controllers and AVRs for optimal load sharing with variable speed shaft generator solutions.

VESSEL ENERGY MANAGEMENT SYSTEM EXPERTISE
Optimised and model based energy usage utilising ultra-efficient variable speed power generation and DC-link power distribution. Real time system control and optimisation.

VESSEL REMOTE SERVICES EXPERTISE
Remote diagnostics with vessel specific process data collection and analysis. Crucial information gathering of operations related to vessel power distribution and power generation.

ME-SG-PROPELLER SHAFT DOMAIN

PROPULSION DRIVE-TRAIN EXPERTISE
WE Tech is modeling a fit-for-purpose shaft generator solution onto vessel specific propulsion drive-trains. Supporting ship designers and ship owners with the impact of an electrical load onto the drive train at concept stage is crucial for a successful overall design.

MAIN ENGINE LOAD CURVE EXPERTISE
WE Tech supports the main engine supplier and ship designers when it comes to incorporating a shaft generator load and this way ensure there is correctly selected margins for electrical power generation by the main engine.

SHAFT GENERATOR MECHANICAL EXPERTISE
Design support for fitting shaft generator into vessel hull, shaft bearing load and torsional vibration requirements assurance. Intermediate shaft mechanical interfacing, shaft generator alignment and shaft line alignment support to ship builder.

SHAFT GENERATOR ELECTRICAL EXPERTISE
Concept support to ship owner and ship designer when modeling main engine driven variable speed power generation. Design support to ship builder for integrating variable speed power generation to vessel electrical power distribution.

WE DRIVE/DC-LINK DOMAIN

WE DRIVE SWITCHGEAR EXPERTISE
Switchgear designs support that delivers standardised modular design of each drive switchgear, ensuring a globally compatible WE Drive design without vendor locking.

WE DRIVE/POWER ELECTRONICS COOLING EXPERTISE
WE Cool dedicated liquid cooling unit with advanced flow control for optimised power electronics cooling in all vessel operation modes. Design support to ship builder for power electronics cooling system integration with vessel machinery cooling system.

WE DRIVE SYSTEM CONTROL EXPERTISE
Total system control including Dedicated Power Management System (DPMS) and Energy Management System (EMS). Modeling from early concept stage to vessel specific actual operating modes and system control.

DC-LINK SWITCHGEAR INVERTER UNIT EXPERTISE
Design, dimensioning and parametrisation of heavy consumer specific functionalities in DC-link fed inverter units. Electrical and functional domain knowledge of consumers e.g. Bow Thrusters, Cargo pumps and compressors.

DC-LINK POWER DISTRIBUTION EXPERTISE
Dimensioning and DC level selectivity analysis for robust power distribution with limited fault current injections to consumers. Application specific redundancy options ensuring fail-safe operation profiles.

DC-LINK ENERGY STORAGE SYSTEM EXPERTISE
Energy Storage Systems (battery) integration via DC/DC conversion to the ships efficient power distribution system. Battery hybrid mode functionalities matching vessel specific operation profiles.

Selected References

We have been focused on lowering emissions for years by providing cost-effective and sustainable lifetime solutions to the shipping industry. Our benchmarking solutions have already been applied to more than 100 vessels worldwide.

See a complete reference list via http://wetech.fi/references/.

29 new building vessels

Type: 174,000cbm LNG Carriers
Owner: Knutsen OAS Shipping, J. P. Morgan Asset Management and Korea Line Corporation
Shipyard: Hyundai Heavy Industries Co., Ltd and Hyundai Samho Heavy Industries Co., Ltd
Solutions: Solution One PTO mode with Direct Drive PM Shaft Generator

2 new building vessels

Type: VLEC
Owner: Pacific Gas, China
Shipyard: Jiangnan Shipyard Group Co. Ltd, China
Solutions: Solution One PTO mode with the Direct Drive PM Shaft Generator

M/V Auto Advance, M/V Auto Achieve and M/V Auto Aspire

Type: Pure-Car-Truck-Carrier vessels
Owner: United European Car Carriers, Norway
Shipyard: Jiangnan Shipyard Group Co. Ltd, China
Solutions: Solution Four PTO, DC-link, ESS with the Direct Drive PM Shaft Generator

M/T Prospero and M/T Pacifico

Type: 22,000 dwt chemical and oil products tankers
Owner: Donsötank, Sweden
Shipyard: Wuhu Shipyard Co., Ltd, China
Solutions: Solution Four PTO, PTI, DC-link, ESS with the Direct Drive PM Shaft Generator

M/S Aurora Botnia

Type: RoPax
Owner: Kvarken Link AB
Shipyard: Rauma Marine Construction, Finland
Solutions: Solution Five Hybrid Electric Propulsion and ESS

M/V Titus, M/V Traviata, M/V Tannhauser and M/V Nabucco

Type: Post-Panamax sized Pure-Car-Truck-Carrier vessels
Owner: Wallenius Shipping, Sweden
Shipyard: Tianjin Xingang Shipbuilding Heavy Industry, Co., Ltd., China
Solutions: Solution Three PTO, PTI mode

M/T Sten Odin and M/T Sten Tor

Type: 17500dwt Chemical Tanker
Owner: Rederiet Stenersen AS, Norway
Shipyard: Taizhou Kouan Shipbuilding Co., Ltd., China
Solutions: Solution Four PTO, PTI, DC-link, ESS with the Direct Drive PM Shaft Generator

Series of 9 E-Flexer vessels

Type: ROPAX Vessels
Owner: Stena RoRo, Sweden
Shipyard: China Merchants Jinling Shipyard (Weihai)Co., Ltd., China
Solutions: Solution Four PTO and DC-link

M/V Tasmanian achiever II and M/V Victorian Reliance II

Type: 12000dwt RORO Vessels
Owner: Toll Shipping, Australia
Shipyard: Jinling Shipyard of Sinotrans & CSC SBICO, China
Solutions: Solution Four PTO and DC-link

M/V Ireland and M/V Donald M. James

Type: 68000 dwt SUL Bulk Carriers
Owner: Vulica Shipping, USA
Shipyard: Jiangsu Hantong Ship Heavy Industry, Co., Ltd., China
Solutions: Solution One PTO mode

M/T Damia Desgagnés, M/T Mia Desgagnés, M/T Paul A. Desgagnés and M/T Rossi A. Desgagnés

Type: 15100 dwt Asphalt Carrier/Chemical Tankers
Owner: Transport Desgagnés Inc., Canada
Shipyard: Besiktas Gemi Insa A.S., Turkey
Solutions: Solution Two PTO, PTI Take Me Home mode

2 new building vessels

Type: 90,000cbm LPG Carriers
Owner: Geogas Maritime S.A.S., France
Shipyard: Hyundai Samho Heavy Industry, South Korea
Solutions: Solution One PTO mode with Direct Drive PM Shaft Generator

M/V Bore Way, M/V Bore Wind and M/V Bore Wave

Type: 7000dwt RoLo
Owner: Bore Ltd, Finland
Shipyard: Wuhu Shipyard Co. Ltd, China
Solutions: Solution One PTO mode with Shaft Generator

M/T Bit Eco and M/T Bit Hero

Type: 9400 dwt Asphalt/Bitumen Tankers
Owner: Tarbit Shipping AB, Sweden
Shipyard: RMK Marine, Turkey
Solutions: Solution Four PTO, PTI Take Me Home mode and DC-link

M/T EK River and M/T EK Stream

Type:18600 dwt Chemical Tanker
Owner: EK Tanker AB
Shipyard: CSSC Chengxi Shipyard, China
Solution: Solution Four PTO, PTI Take Me Home mode and DC-link

"We have worked successfully on several of our vessels in the fleet with WE Tech team, and we have experienced huge benefits, such as decreasing of operation and service costs as well as increasing of vessel's energy efficiency and competitiveness. This is why we also awarded WE Tech the contract for our new projects."

Mr Jörgen Mansnerus
VP, Marine Management of Bore Ltd

WE Tech

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