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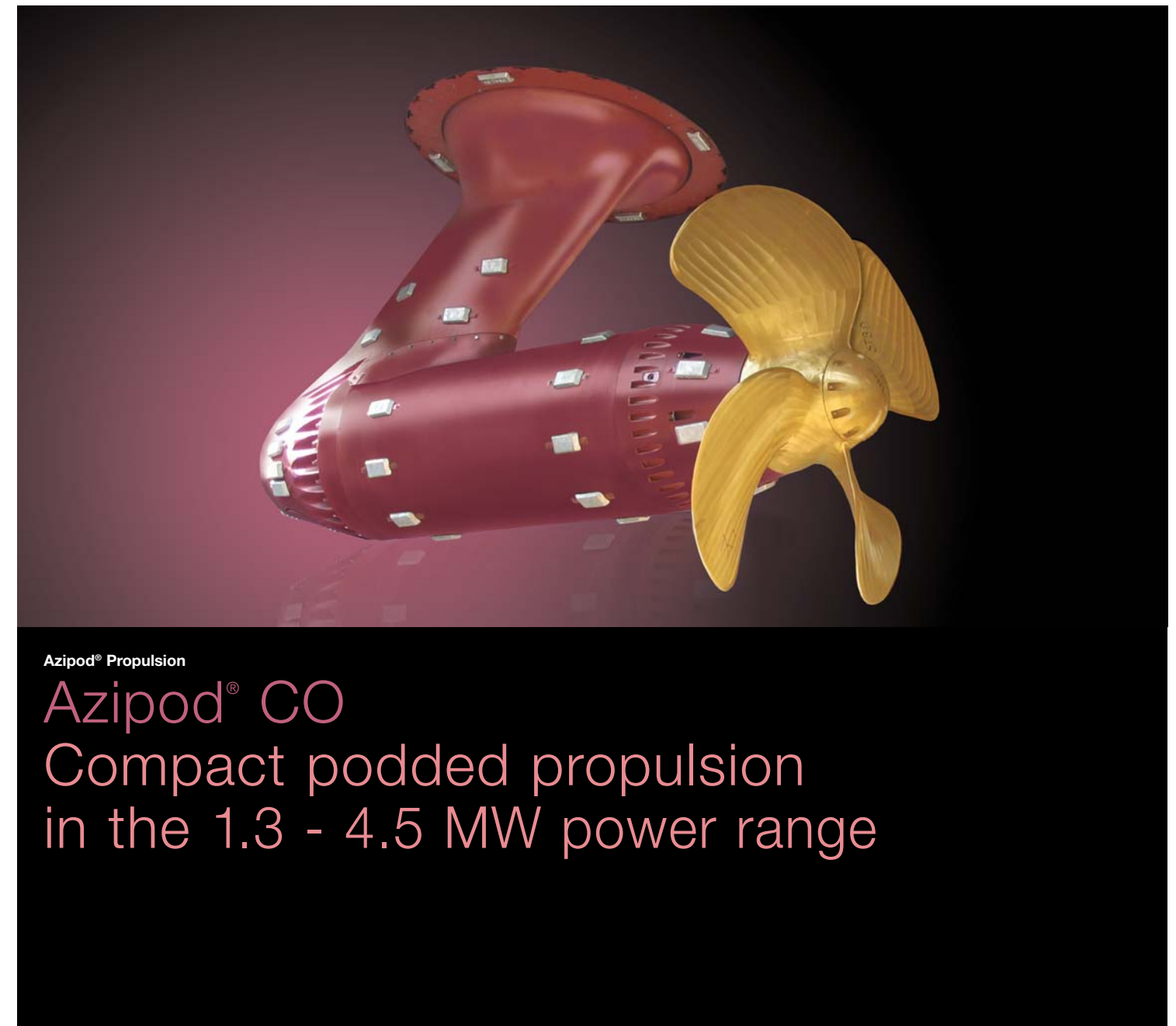
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Azipod® Propulsion

Azipod® CO  
Compact podded propulsion  
in the 1.3 - 4.5 MW power range

Power and productivity  
for a better world™



Power and productivity  
for a better world™



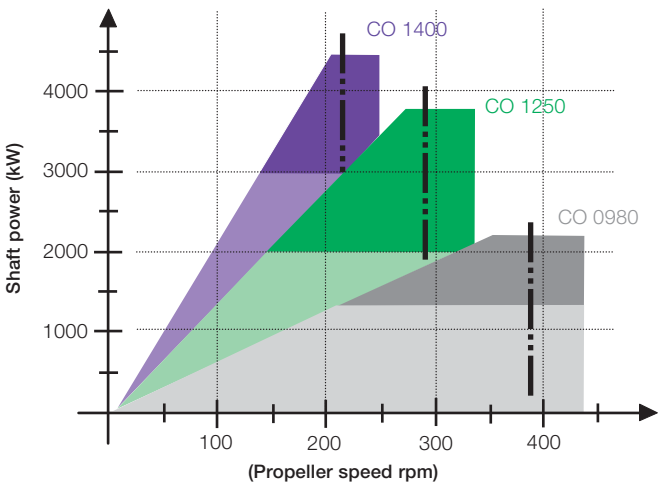
# Azipod® CO - bringing the benefits of podded propulsion to a whole new range of vessel types

Azipod® CO is an azimuthing propulsion system providing high overall propulsion efficiency and fuel savings for modern, environmentally-friendly ships. With a power range from 1.3 to 4.5 MW, Azipod® CO is an attractive propulsion solution for a wide range of vessel types.

Based on ABB's successful Azipod® propulsion technology, Azipod® CO is the smallest member of the Azipod® family and covers the power range up to 4.5 MW, from where the larger Azipod® XO starts. The compact Azipod®C series includes two design versions; the CO propulsion version for open water ship applications and the CZ version, which is a thruster unit with nozzle for offshore drilling applications (see separate Azipod® CZ brochure for more information).

**An all-in-one steering and propulsion system**  
Azipod® CO is an all-in-one steering and propulsion unit that stands out from other propulsion solutions due to its built-in high-efficiency electric propulsion motor. With the propeller mounted directly to the motor shaft, all mechanical transmissions are eliminated. The result is a highly simplified structural design with few moving parts and minimal mechanical stress and wear. Propulsion speed and steering are controlled by frequency converters and the Azipod® CO is connected by cabling only.

Model sizes in the Azipod® CO series



Azipod® CO is available in three model sizes with maximum rated propeller power up to 2.2 MW, 3.8 MW and 4.5 MW.

## Flexible ship design

Azipod® CO gives great freedom in ship design and creates opportunities to develop new green ship concepts through:

- Cleaner hull design and improved hydrodynamics
- Flexible machinery arrangement and placement
- Increased payload, typically 5 to 10%
- Safety through machinery redundancy
- Environmental diesel-electric or gas-electric operations

## Simplified ship construction

The Azipod® CO is delivered to the yard in two complete ready-to-mount modules; the Steering module, which is installed inside the ship, and the Propulsion module, which is mounted from under the hull. The remaining work involves only electrical connection. Cooled by surrounding seawater, Azipod® CO needs no cooling system, and the absence of mechanical gearing means a minimum amount of oil is required. This plug-and-play concept allows fast, simple mounting and ensures a high quality installation.

## High fuel efficiency - low emission

The Azipod® CO unit is a pulling propeller system designed for maximum hydrodynamic efficiency. The pulling propeller works in an optimum environment where the water inflow is homogenous and undisturbed. Driven by an advanced permanent magnet motor and with no mechanical transmission losses between motor and propeller, the overall propulsion efficiency is very high.

## Outstanding maneuverability

Outstanding maneuverability is a hallmark of Azipod®, providing major benefits for ships frequenting areas with heavy traffic and restricted passage. With 360° azimuthing capabilities, the highly responsive Azipod® CO provides a tight turning radius, short crash-stop distance and thrust in all directions at any speed.

## Low noise and vibration

Crew welfare and passenger comfort are increasingly important priorities in ship operations. By eliminating cavitation due to good water flow to the propeller and by locating the propulsion motors in a submerged pod, onboard noise and vibration are practically eliminated.



The upper photo shows the train ferry *Zhong Tie Bo Hai 2*, equipped with 2 x 4.1 MW Azipod® CO propulsion. The lower photo shows the multi-functional offshore vessel *Boa Rover*, equipped with 2 x 2.3 MW Azipod® CO propulsion.

Azipod® CO brings unique advantages to ship types such as offshore vessels, ferries, mega yachts, research vessels, small- and medium-size tankers and other coastal vessels.



# Azipod® CO technical concept

## -standardized, modular and energy efficient

A highly developed module-based design makes Azipod® CO easy to install, use and maintain. This simplicity ensures high quality throughout the entire product lifespan and provides low lifecycle costs.

### Design principles

Azipod® CO consists of two main modules, the Steering module and the Propulsion module, which are both delivered pre-tested and ready for installation. The Propulsion module incorporates a low-voltage permanent magnet synchronous motor, and utilization of permanent magnet technology is a core element of the Azipod® CO design. These advanced motors offer higher efficiency and smaller dimensions than traditional electric motors. In addition, they do not require a cooling system as they are cooled only by the surrounding seawater. These characteristics enable a slim and hydro-dynamically optimized pod design.

With the fixed-pitch propeller attached directly to the motor shaft, all gears and mechanical transmission losses are eliminated - as well as thousands of liters of lube oil. This gives clear energy- and environmental benefits as compared to traditional mechanical thrusters. To prevent seawater from seeping into the Propulsion module, the motor has positive air pressure against the sea. Emissions to the sea are prevented by a multi-step shaft seal system with two grease-lubricated inner seals and a water-lubricated outer seal.

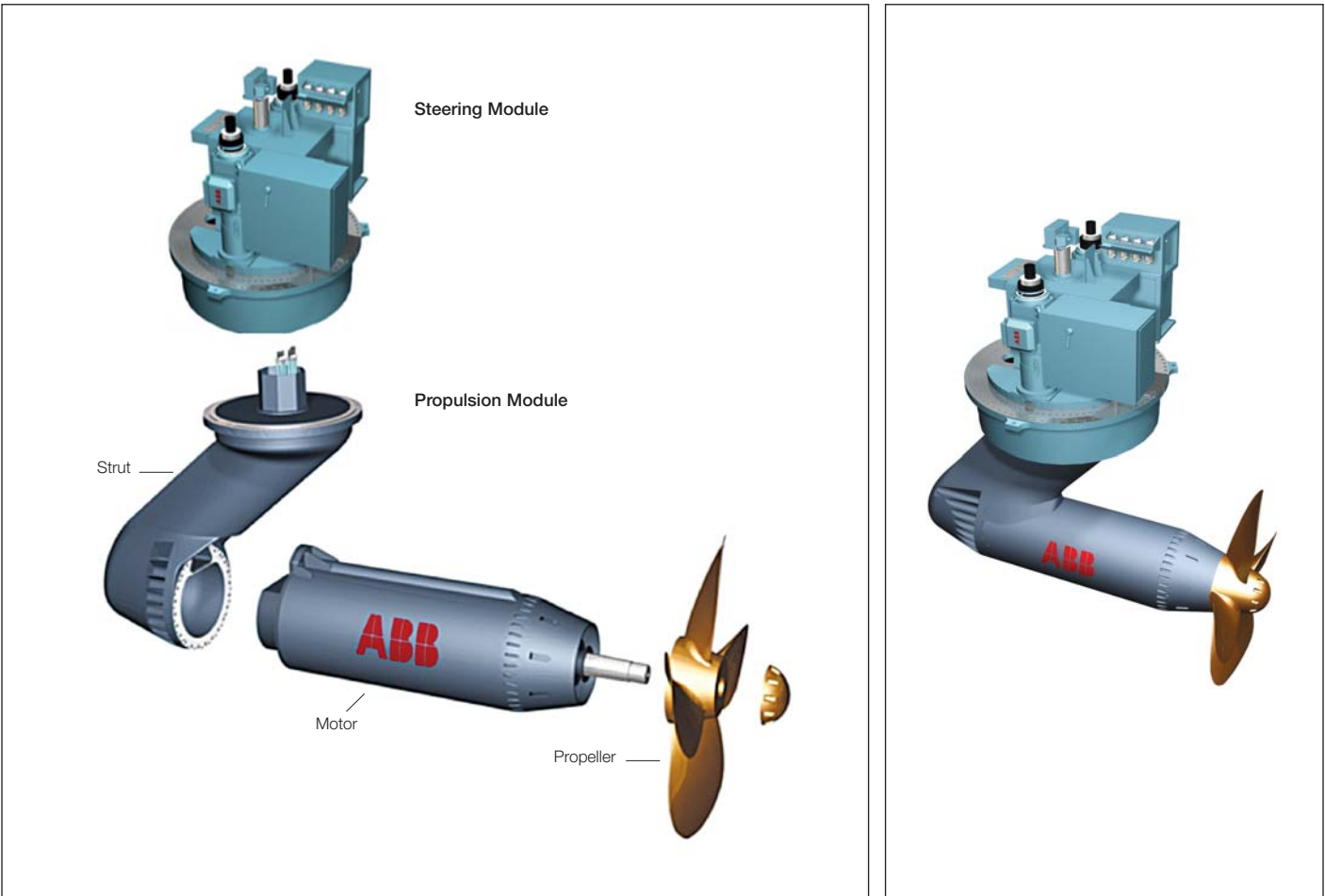
The strut is the connective element between the motor and steering modules. Control cables, piping and power supply cables for the propulsion motor are located inside this single-piece cast strut.

The Steering module installs into the ship's hull and acts as the structural interface with the Propulsion module. The Steering module includes a fully electric steering system, a local steering panel and all functional accessories and connection points for propulsion and steering.

### Operation principles

A full Azipod® CO ship system consists of the required number of Azipod® CO units and one ABB ACS series marine drive per each Azipod®. The low voltage variable speed drive controls the motor, which gives full nominal torque in both directions over the entire speed range.

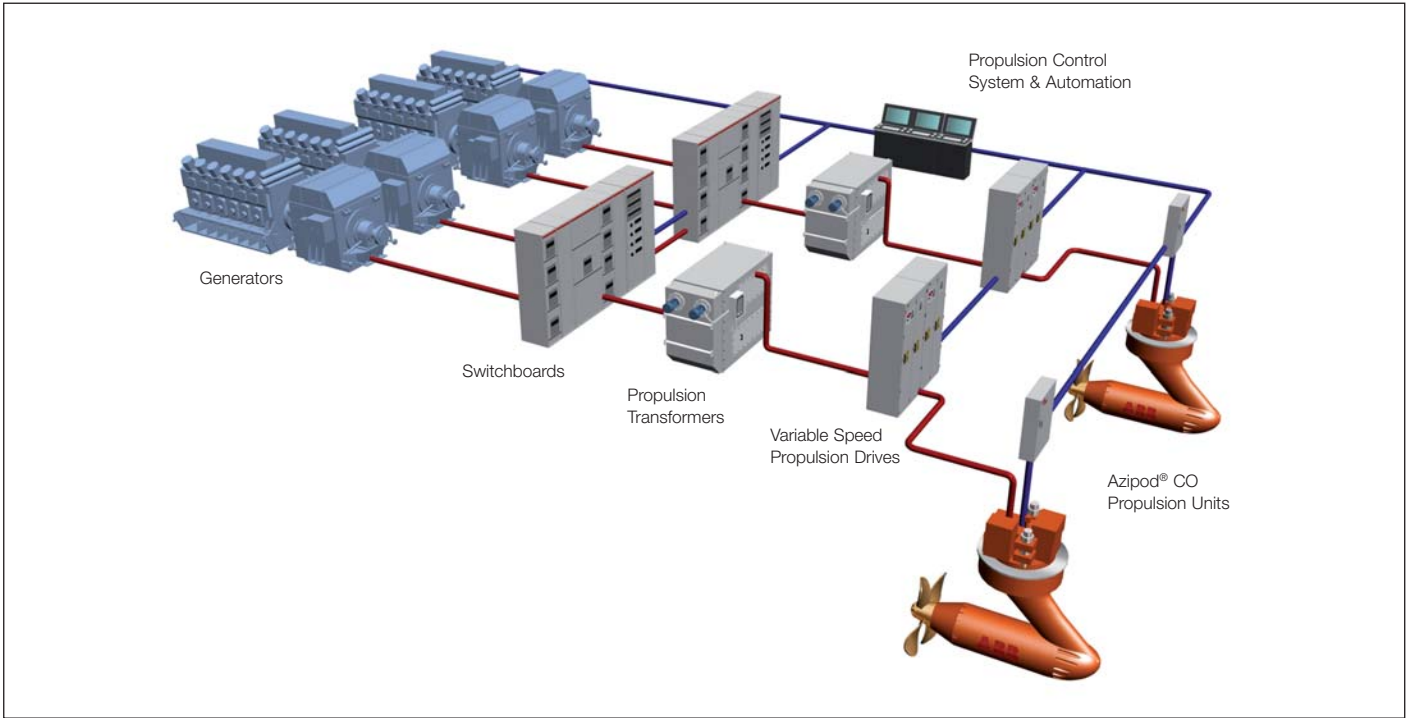
In addition, an electric power plant is needed to feed the propulsion system and other onboard power consumers. The power plant includes generator sets and switchboards, and propulsion transformers are often required as well. Azipod® CO has standard interfaces for simple connection (serial data link and hard-wired) to the ship automation and propulsion control system.



The propeller, motor and strut are assembled in the factory to form the Propulsion module, which is mounted to the Steering module during installation.

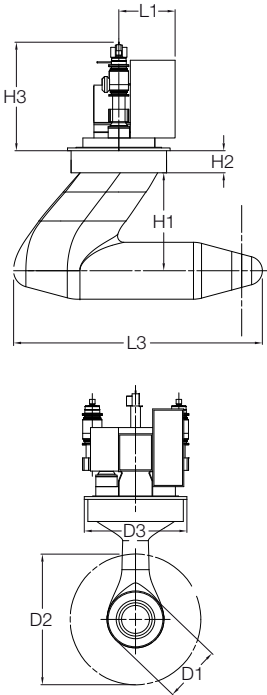
The Azipod® CO utilizes a modular “plug and play” design principle to simplify construction and installation and to ensure high lifetime quality.

With long experience and high expertise, ABB can take responsibility for the complete electric power plant and the Azipod® CO propulsion system.



Azipod® CO - main specifications			
Model size	CO980	CO1250	CO1400
Propeller type	Pulling	Pulling	Pulling
Power [kW]	1300 - 2300	2100 - 3900	2200 - 4500
Rotation speed [RPM]	240 - 365	160 - 280	120 - 205
Motor current [A]	1400 - 2100	2200 - 4200	2300 - 4800
Weight [kg]	27000	47000	59000
Max ship speed [knots]	18	19	19/21*)
H1 [m]	1.95	2.71	3.09
H2 [m]	0.5	0.65	0.65
H3 [m]	1.98	1.98	1.98
L1 [m]	1.3	1.5	1.5
L3 [m]	4.8	5.73	6.2
D1 [m]	1.04	1.31	1.47
D2 [m]	1.9 - 2.6	2.4 - 3.5	2.7 - 4.0
D3 [m]	2.3	2.78	2.78
Steering radius [m]	2.7	3.05	3.35
Displacement [m³]	4	8.5	11

\*) With passenger SOLAS requirement, special arrangements for 21 knots





# Working with our customers in ship design, building and operations

ABB supports our customers all the way - from the early design phase to daily operational support throughout the life of the vessel. To achieve high cost-efficiency and quality from the start, ABB has opened a new dedicated Azipod® CO fabrication facility in Shanghai, China, from where Azipod® C series units are produced.

### Throughout the design phase...

Although Azipod® propulsion has operated successfully for around 20 years, podded propulsion is still considered new technology by many ship owners, designers and yards. Therefore, ABB offers broad support including pre-studies, analysis and evaluations to help customer get off to a good start with Azipod®. Areas of special focus include Azipod® and the ship aft body, critical hydrodynamic aspects and the complete electric power plant.

### ... the construction phase

During the transition from design to construction and through- out the construction phase, ABB provides supervisory services and all necessary drawings and instructional material to ensure a successful installation and commissioning. The complete Azipod® unit can be installed quickly, typically taking about half a day for a Steering module and 1- 2 days for a Propulsion module.

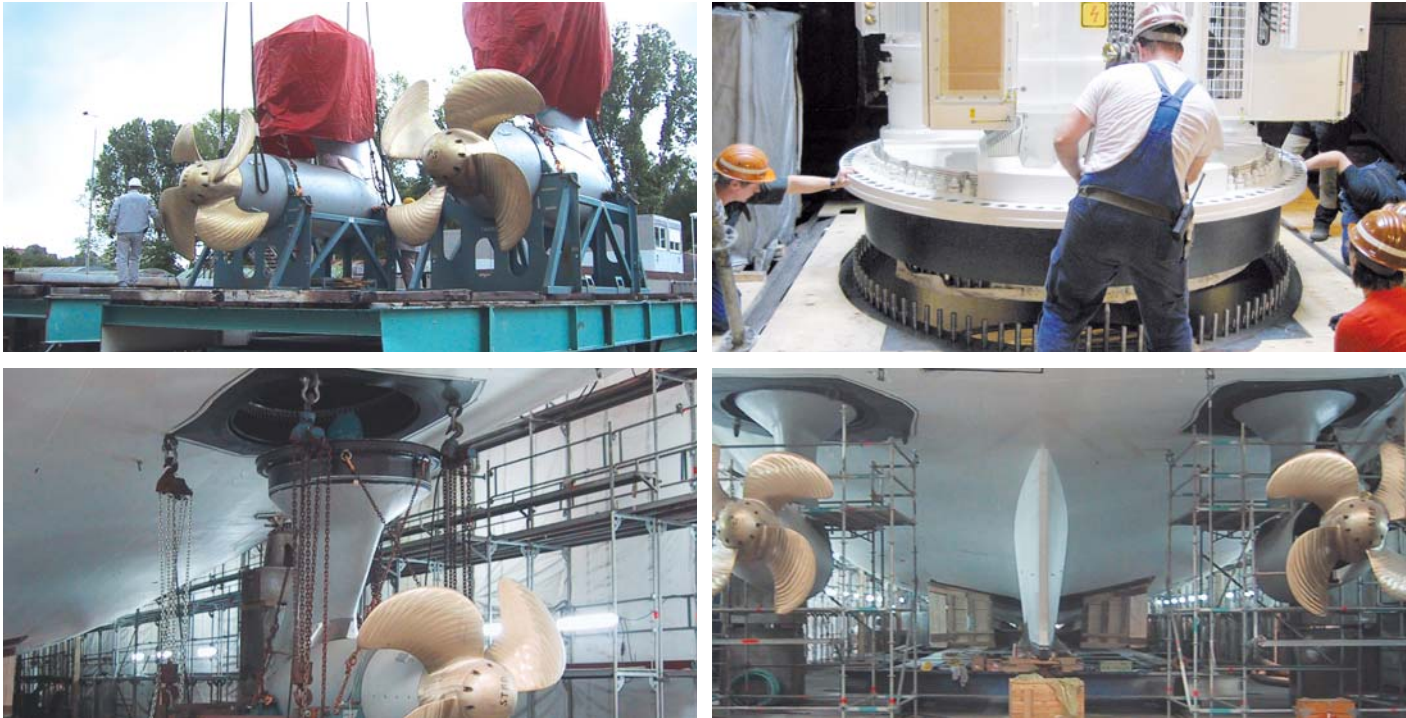
### ... and ongoing operations

To meet the support and maintenance demands of our customers, ABB has established a worldwide network of Marine Services Centers that provide specialized after-sales services. ABB Marine Services include Preventive Maintenance Planning, Planned Repair and Dry-docking, On-call Services, Commissioning, Spare Parts Management and Modernizations. Onboard, classroom and on-line training are available through the ABB Marine Academy.

### Azipod® Service Centers

To further strengthen our Azipod® service and support capabilities, ABB provides a network of dedicated Azipod® Regional Service Centers located in Helsinki, Houston, Murmansk and Shanghai. The Azipod® Regional Service Centers provide dedicated Azipod® service personnel, workshops and tooling. Each Regional Center is capable of leading large Azipod® service projects as well as providing service support to ABB Marine Services Centers. These locations provide specialized Azipod® services, spare parts and local contacts for Azipod® customers in the area.

The photos below show a typical installation from delivery of the pods, installation of the Steering module, mounting of the Propulsion module and the completed propulsion system.



The upper photo shows the mega yacht *MY Ice*, equipped with 2 x 2.5 MW Azipod® CO propulsion. The lower photo shows the advanced research vessel *Zhong Guo Hai Jian 83*, equipped with 2 x 1.9 MW Azipod® CO propulsion.

Today, an ever increasing number of vessel types are being designed and built with Azipod® CO propulsion.