Azipod Propulsion System Features

- Electric Propulsion System
- High Efficiency
- Excellent Manoeuvrability
- Increased Transportation Capacity
- About 7 million operating hours (Nov.2011)
Azipod® XO System is designed to provide

- Reduced life cycle costs
- Minimized emissions
- Enhanced maintainability
- Flexible integration to ship hull
- Improved reliability
Azipod® XO System Features

- Freely 360 degree rotating Azipod unit
- Fixed pitch pulling propeller
- Undisturbed water flow to propeller
- Extremely low vibrations
Efficiency development history (Azipod® V and X)

- **First cruise liners**
- Added fin
- New profile on strut and fin
- New profile and geometry optimisation
- Azipod XO development
- ADO**)
- X-tail, modified fin

Cruise liner with DE shaftline

First generation Azipod

- Designed for fuel saving up to 20%! *)

*) Compared to reference diesel – electric shaft line cruise liner

**) Azipod Dynamic Optimizer

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Azipod® XO

- Azipod Interface Unit
- Electric Steering Control Unit
- Local Backup Unit
- Steering Drives
- Steering Module Air Duct (out)
- Cooling Air Unit
- Air Duct (out)
- Air Duct (in)
- Slipring Unit
- Shaft line Support Unit
- Propulsion Module
- Support Unit
- Propulsion Module
Main Components and new features

- Advanced condition monitoring
- Steering torque reduced over 20%
- Easy and safe access to Azipod unit
- Interspace seal arrangement
- Non drive end hybrid bearing
- Synchronous machine
- Excitation machine
- Drive end bearing
Advanced Condition Monitoring

- Remote Diagnostics
  - Preventive maintenance
  - Troubleshooting

- Monitored Systems
  - Propulsion and steering systems
  - Bearings
  - Seals
  - Lubrication
Interspace - Revolutionary Shaft Seal Arrangement

Seal change possible inside the Azipod unit (*)

Simple, robust and proven technology

(*) depending on frame size

Patent pending
Interspace - Revolutionary Shaft Seal Arrangement

- Bearing oil seal separated from water seal
- Lubrications optimized for bearing and sealing – long lifetime
- Capacious void space with drainage for occasional leakages
- Designed for maximum reliability
- Designed to operate without harmful external leakages
- Protect the sea – biodegradable lubrication

No water to bearing oil – no bearing oil to the sea!
Hybrid Bearing, innovation which combines the advantages of two different types of bearings

Well known and proven technologies

Thrust pad change inside Azipod unit

Non-drive-end radial roller bearing

Slide thrust bearing

Redundant lubrication

Designed to be robust with minimum maintenance cost
Electric Steering

- Steering drives
- Low noise
- Low vibration
- Easy Installation
- Proven Solution from Azipod® C
- Redundant steering drive system
- Environmentally friendly

Electric steering control unit

Steering motors
Steering Module

Design based on proven technologies

Designed for improved maintainability of slewing bearing and seals

Air-actuated seal for emergency cases
Intelligent Bridge Control Interface, Enhanced usability of Azipod® user interface on bridge

- Real time information for optimized operating practices
- Improved presentation of system state for deck officer
- Fieldbus-based modular system architecture
Intelligent Bridge Control Interface
Azipod® XO Product Series
## Azipod® X References

<table>
<thead>
<tr>
<th>Owner</th>
<th>Ship type</th>
<th>Power/ship</th>
<th>Azipod Type</th>
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<tbody>
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<td>1 pc Cruise vessel</td>
<td>2 x 17.5 MW</td>
<td>XO 2100</td>
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<td>2 pcs Fast ferries</td>
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NCL cruise vessel, picture by Meyer Werft
Summary for Azipod® XO

- Power up to 20+ MW per unit
- Energy efficient
- Designed for extended docking intervals of future needs
- Electric steering and intelligent control systems
- Optimised maintainability
- Advanced condition monitoring

...Steering to Success!