

AZIPOD PROPULSION

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Azipod Propulsion

by

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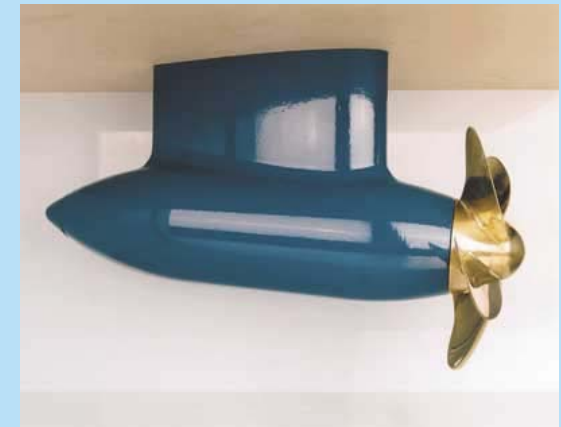
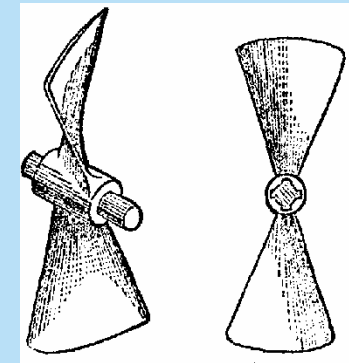
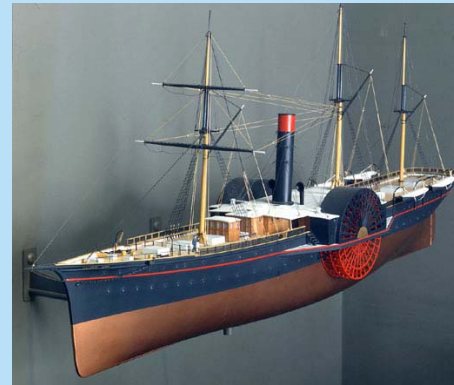
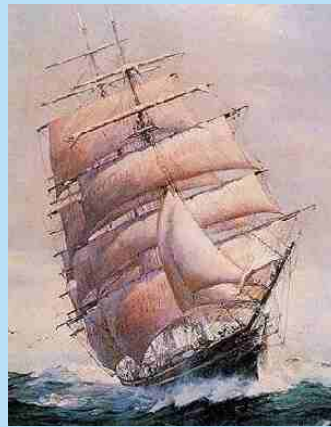
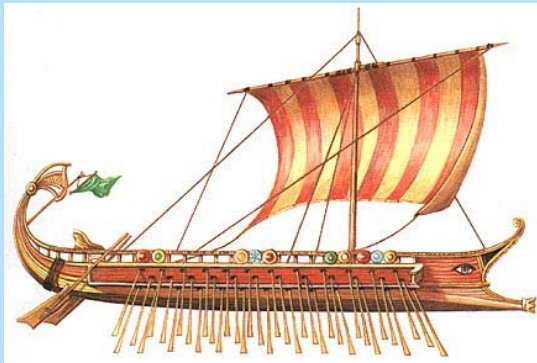


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Azipod Propulsion

- Introduction - History & Development
- What is an Azipod
- How does it work
- Manufacturers
- Types of vessels
- Advantages
- Manoeuvrability
- Disadvantages & Problems
- The Future
- Conclusions

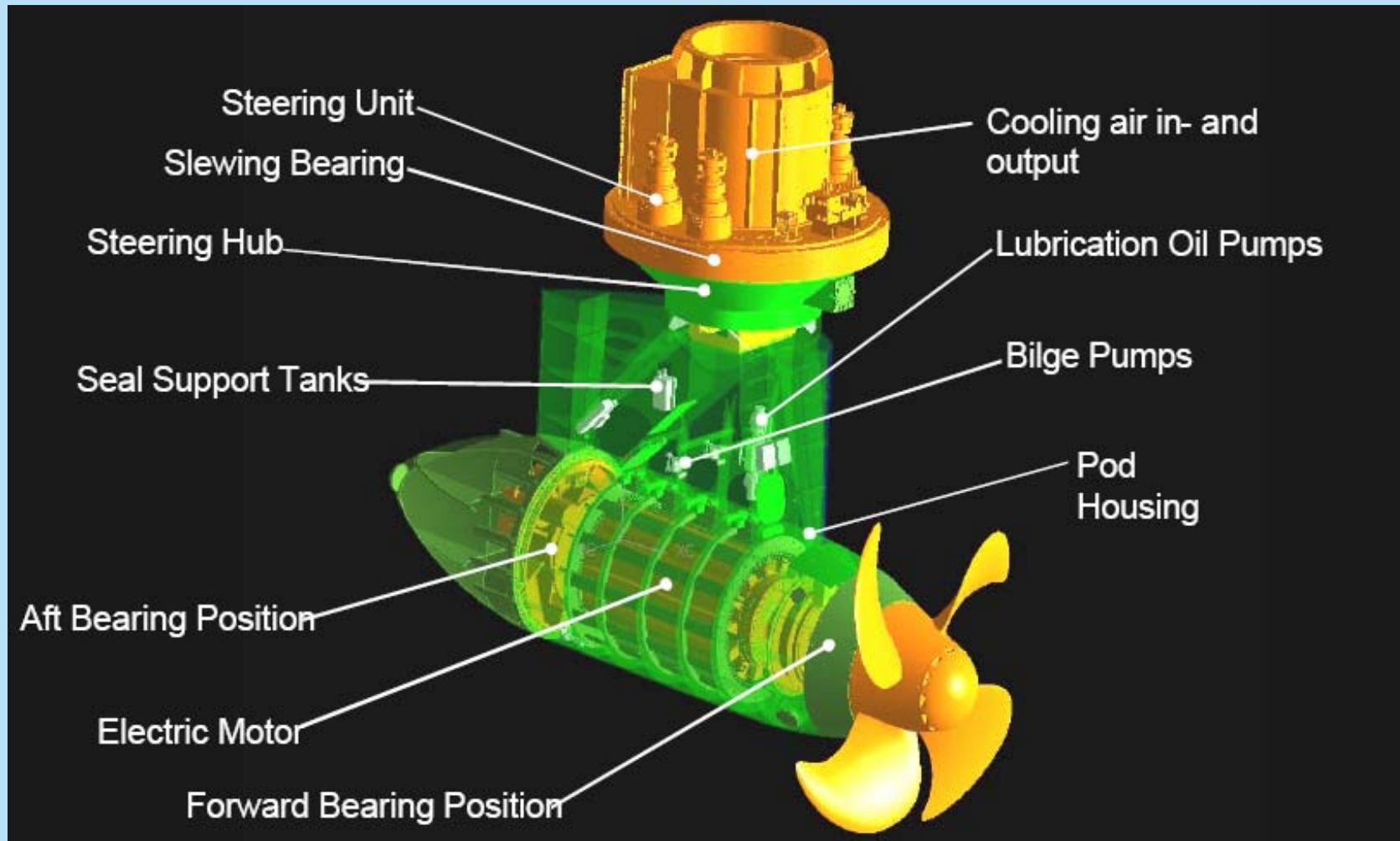
Introduction – History & Development



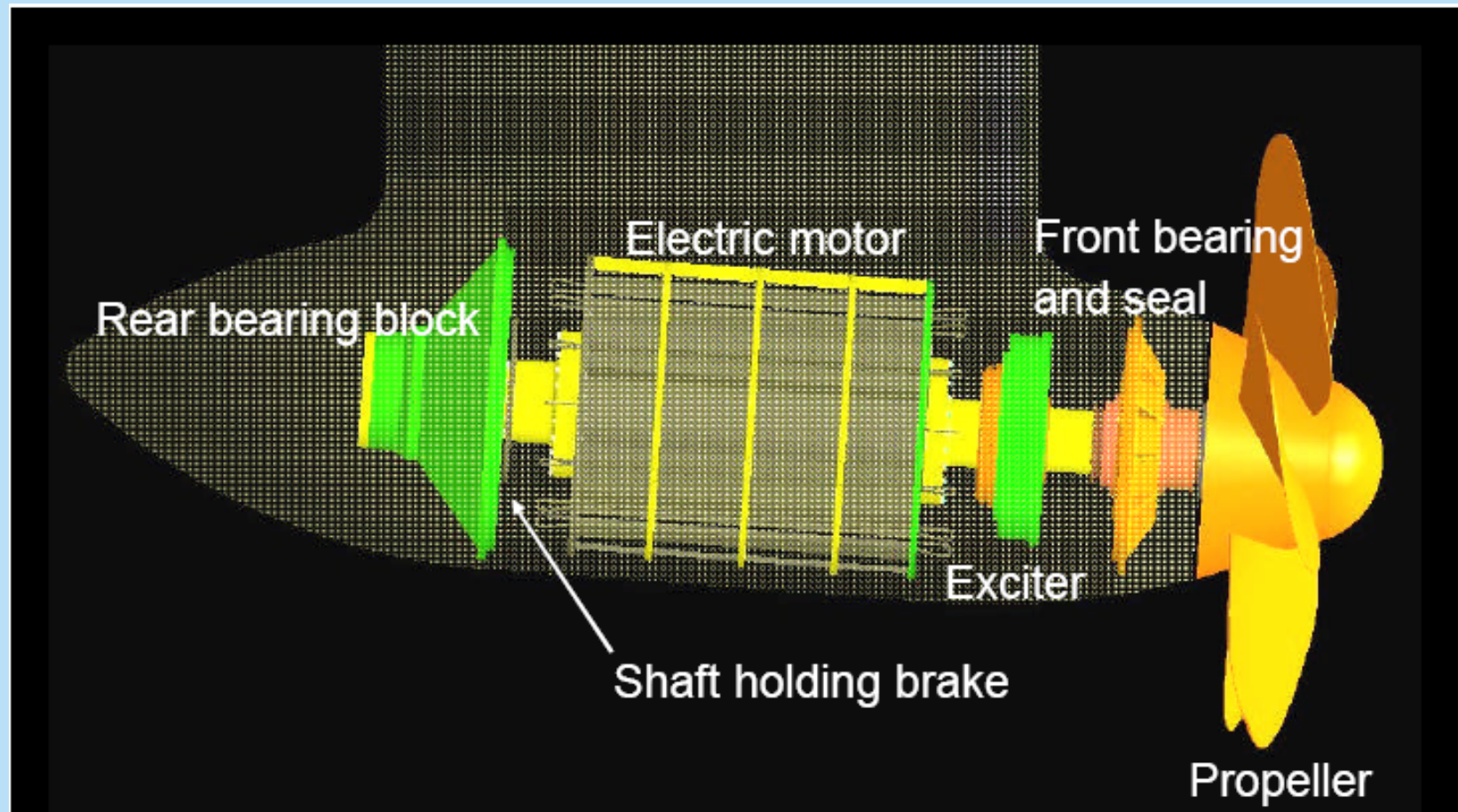
What is an azipod?

- “Azipod” is a registered trademark for ABB’s electrical propulsion systems
- azipod has become the generic name for all manufacturers systems
- An Azipod or podded propulsor to give it its technical name is a propulsion or manoeuvring device that is external to the ship’s hull and houses a propeller powering capability. This definition differentiates them from azimuthing thrusters which have their powering machinery within the hull and usually drive the propeller through a system of shafts and gearing.

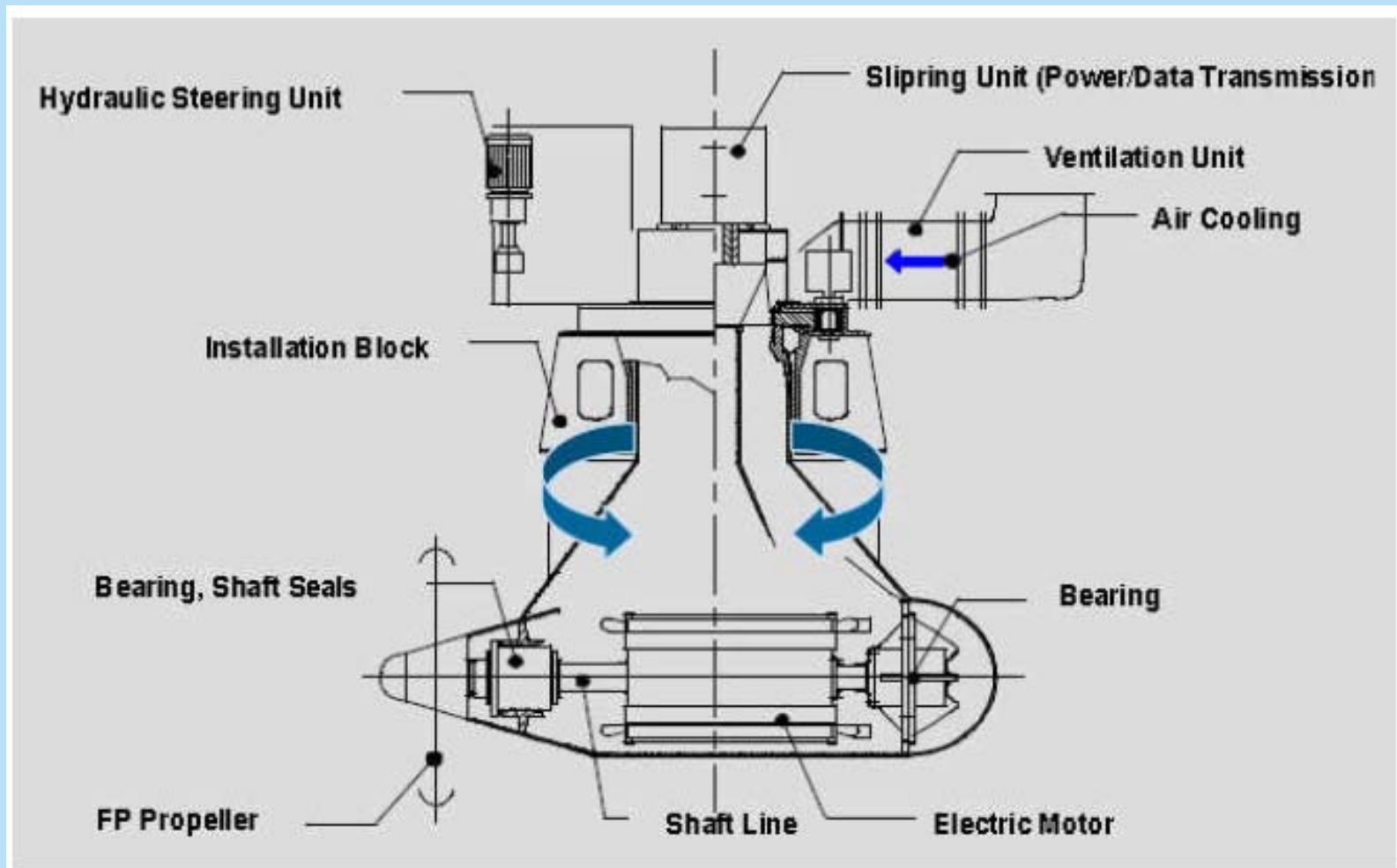
TYPICAL AZIMUTHING PROPULSOR POD



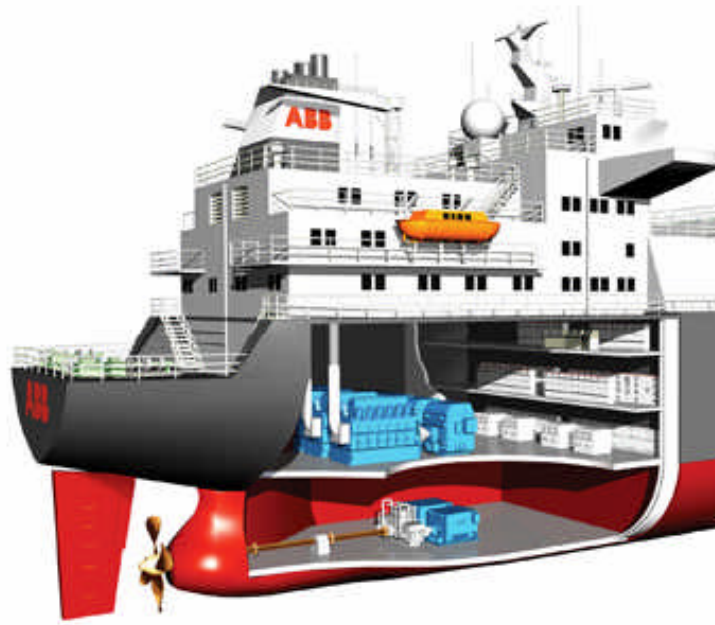
POD INTERNALS



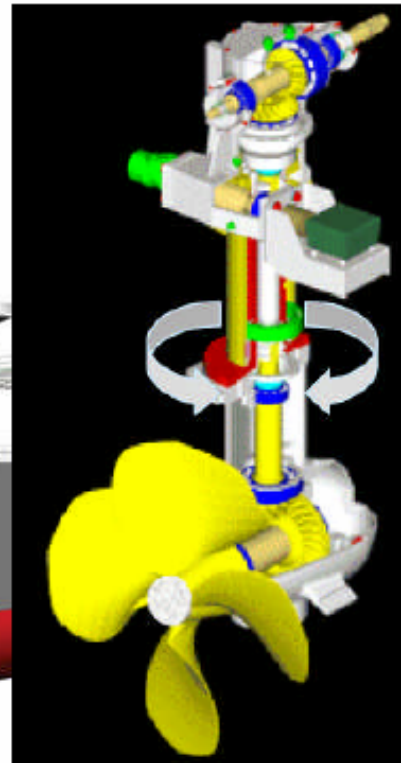
ARRANGEMENT – POD HOUSING



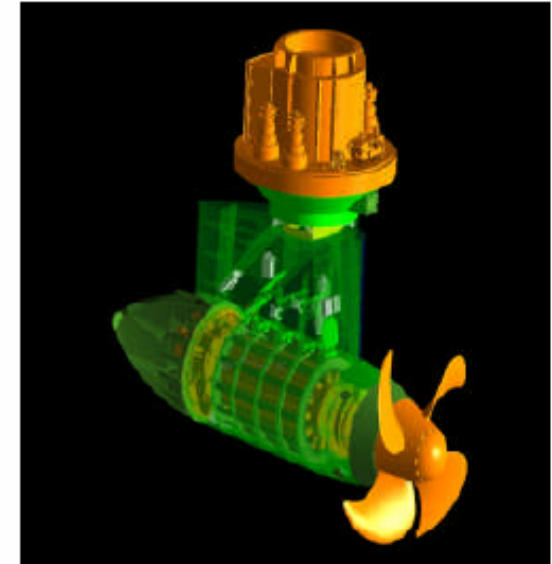
Electrical Propulsion



Shaft Line

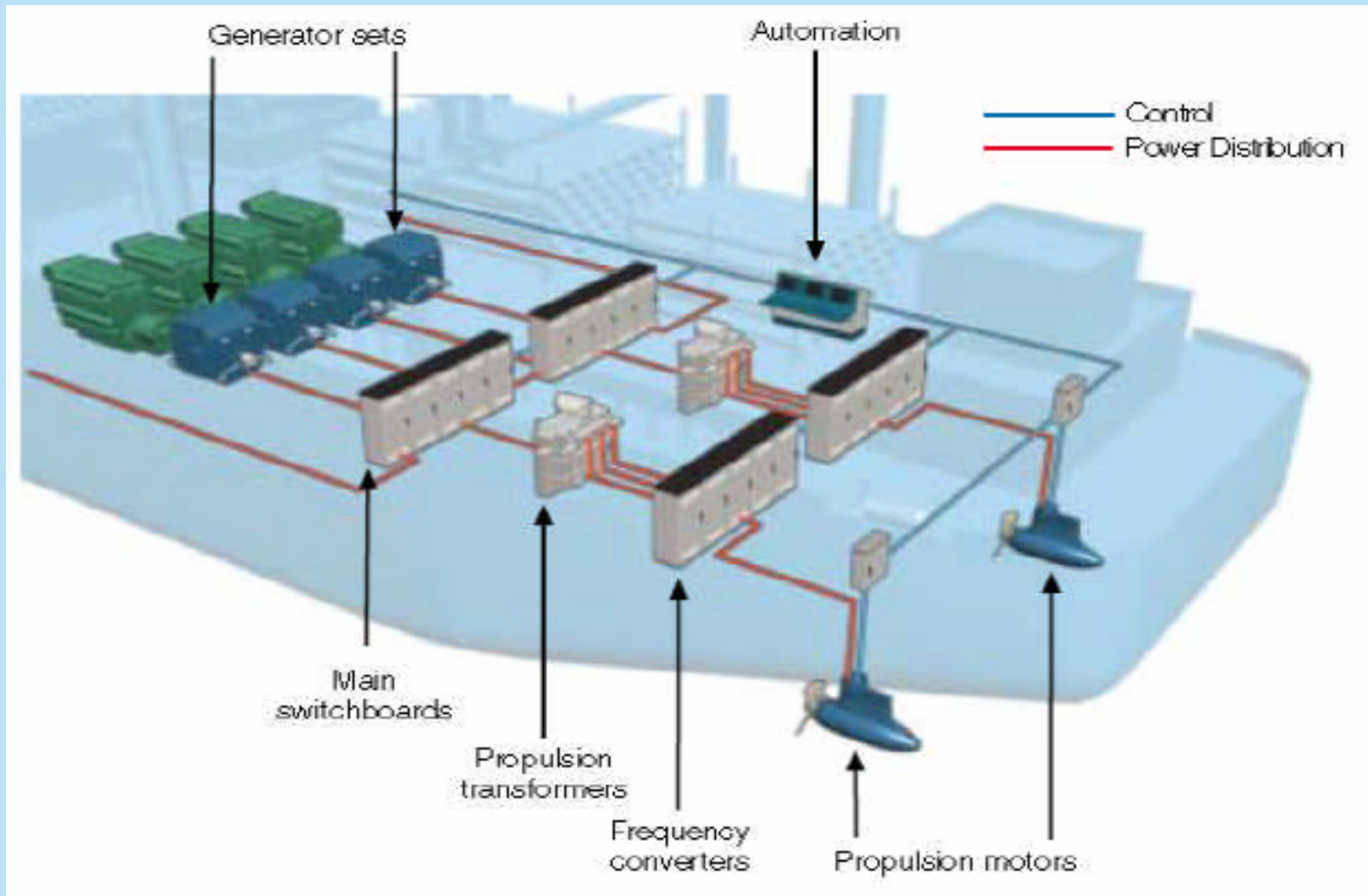


Azimuth



Pods

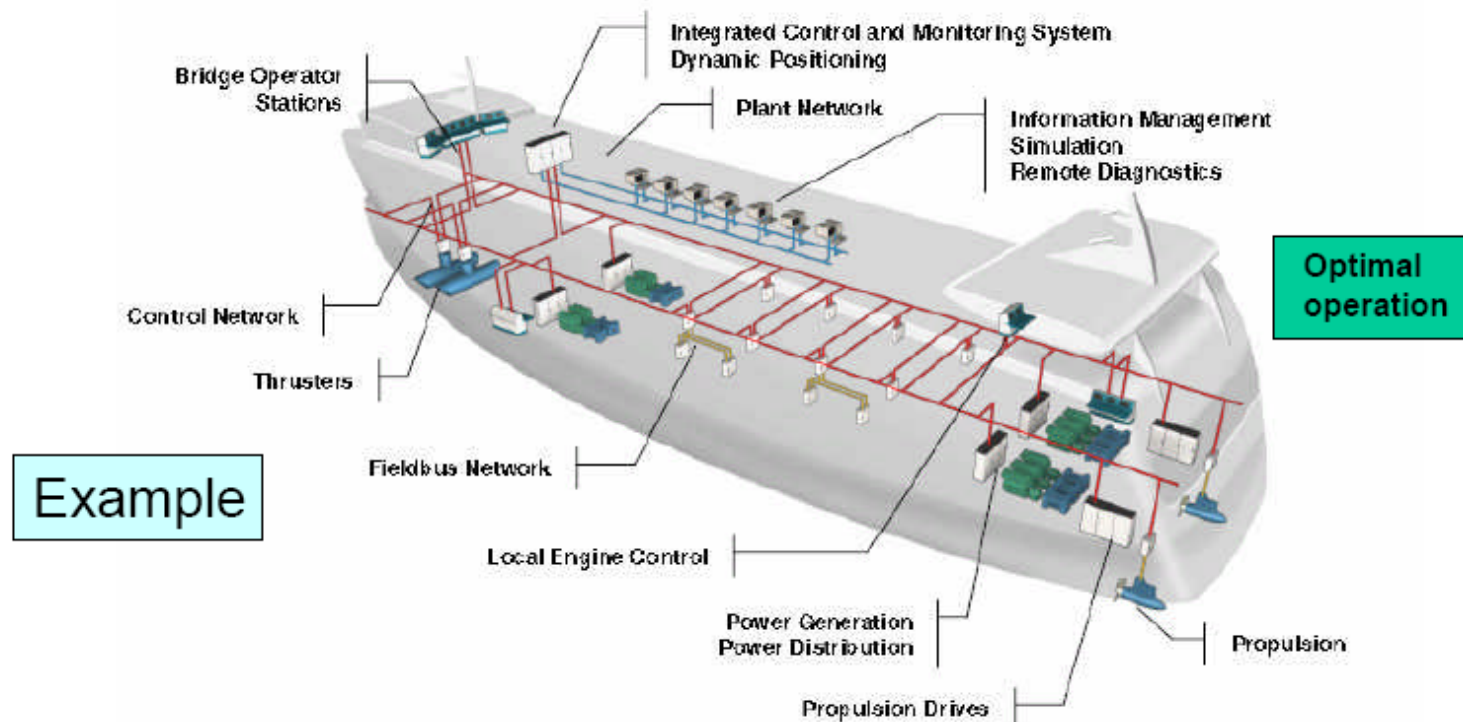
PROPULSION SYSTEM DESIGN



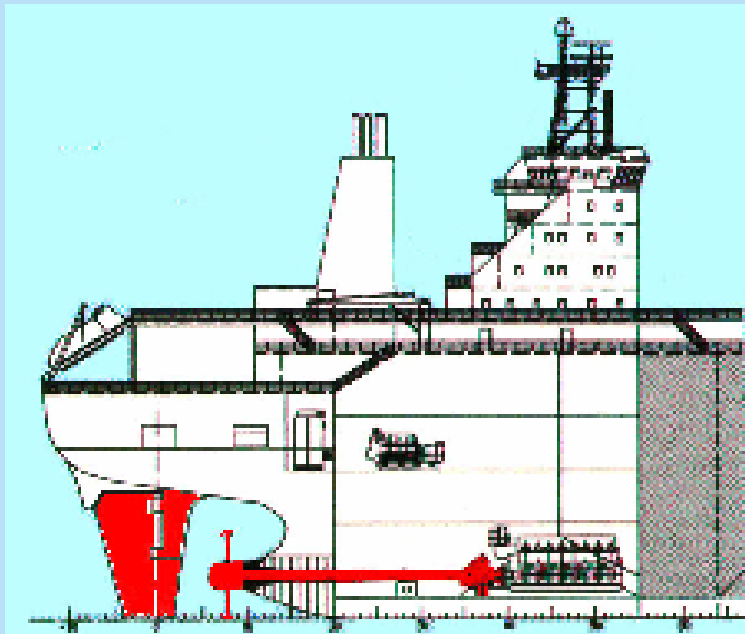
INTEGRATED ELECTRICAL POD PROPULSION

AES (All Elec. Ship) / IEP (Integrated Elec. Propulsion)

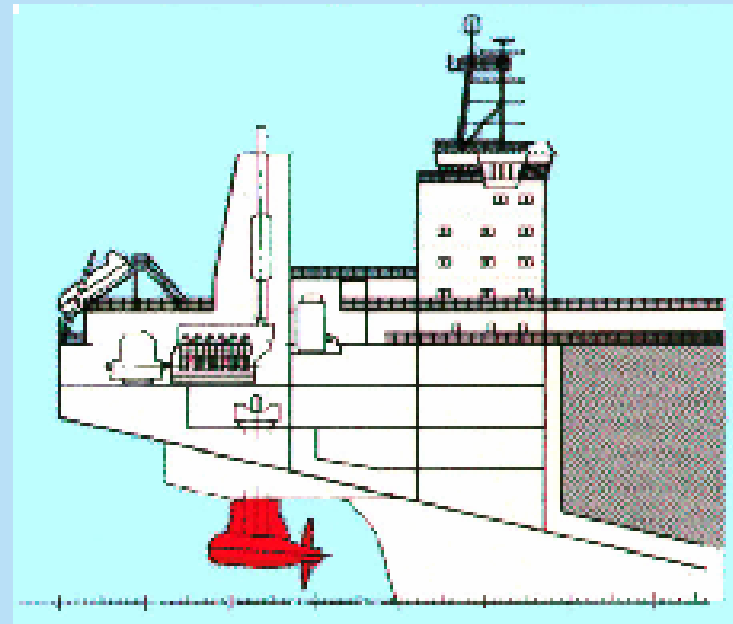
System consists of a centralized power plant (supplying propulsion and domestic services requirements) and a variable speed drive system connected to propeller. A comprehensive **Power Management System (PMS)** ensures that each prime mover operates at its optimal load.



DESIGN FLEXIBILITY

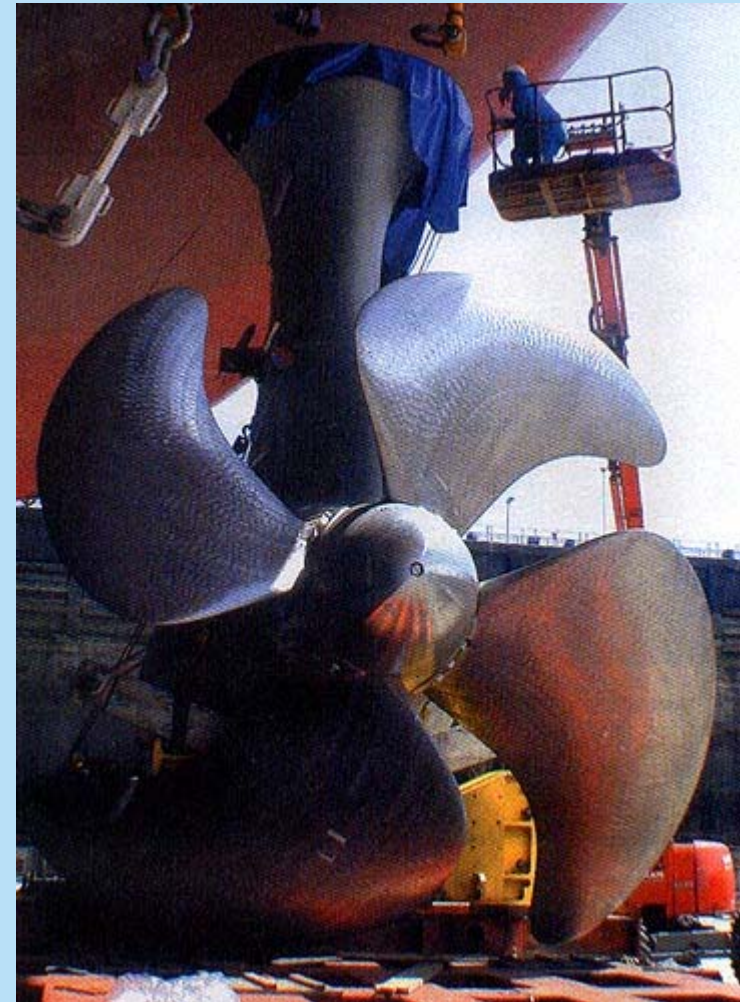


Conventional propulsion



Azimuthing podded propulsion

QUEEN MARY AZIMUTHING POD



QUEEN MARY II – FITTING OF PODS

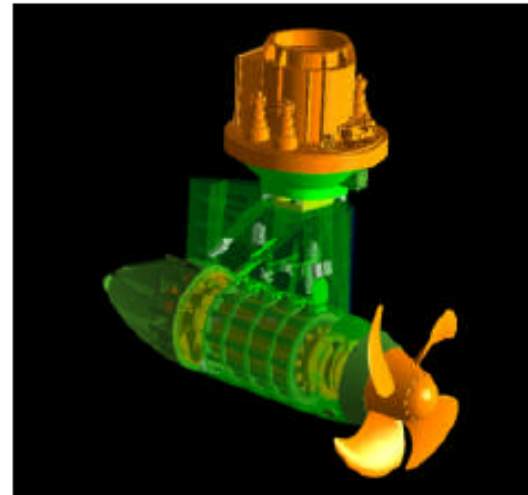


Different Makes of Pods

Azipod - ABB



SAM/JC-L - DOLPHIN



SSP



Compact Azipod - ABB



Mermaid - RR



Applications for Cruise Ships

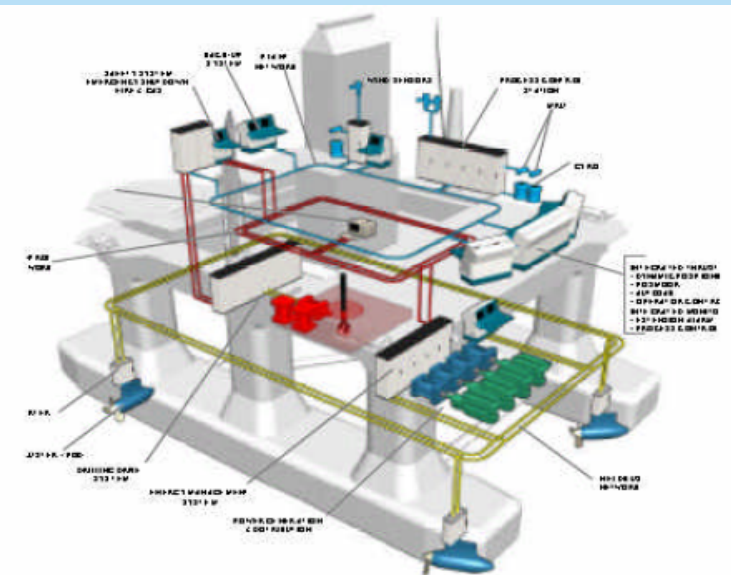
Increasing market – strong advantages

- Noise and vibration – comfort requirements
- Reliability and availability – Passenger safety
- Improved manoeuvrability gives greater safety & allows greater range of ports
- Increased propulsion efficiency – increase in speed
- Large non propulsion electric load (large cruiseliner ~ 10-15 MW)
- Use of DP mode for safety, reduces anchor damage to reefs
- Emission concerns, fines for smoke emissions, especially in coastal & recreational areas
- Frees up internal space for revenue generation



OIL RIGS, TANKERS, PRODUCTION VESSELS

- High demand of station-keeping & DP operation
- High electrical loads for production and drilling
- Typical installed electric power 25 to 55 MW
- All weather operational requirements



ICE BREAKERS

- Significant and rapid load variation – almost shock loading
- High dynamic performance required – tripping undesirable
- High torque at low speed
- Electric propulsion in new buildings since 1980
- Typical propulsion power 5 – 55 MW depending on ice-breaking capability
- High manoeuvrability and use of wash



FURTHER APPLICATIONS

Various other vessel types:

- **Freight & Passenger Ferries**
- **Tankers**
- **Research Vessels**
- **Yachts particularly megayachts over 130ft**
- **Pleasure Craft**
- **Warships**
- **Offshore supply vessels**
- **Dredgers**

Manoeuvrability

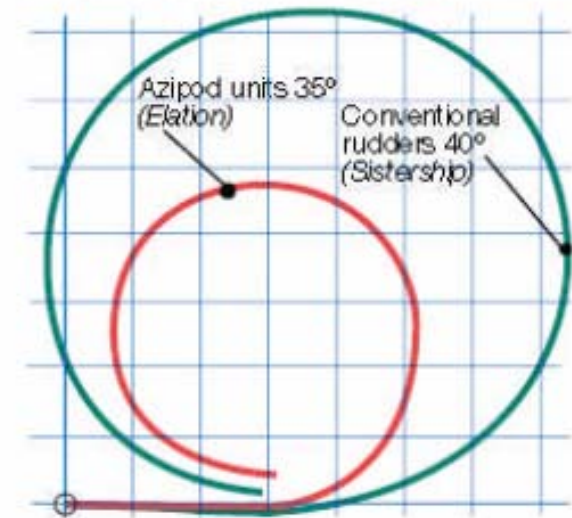
One of the big advantages of using azipod propulsion is the significantly improved manoeuvring ability of the vessel.

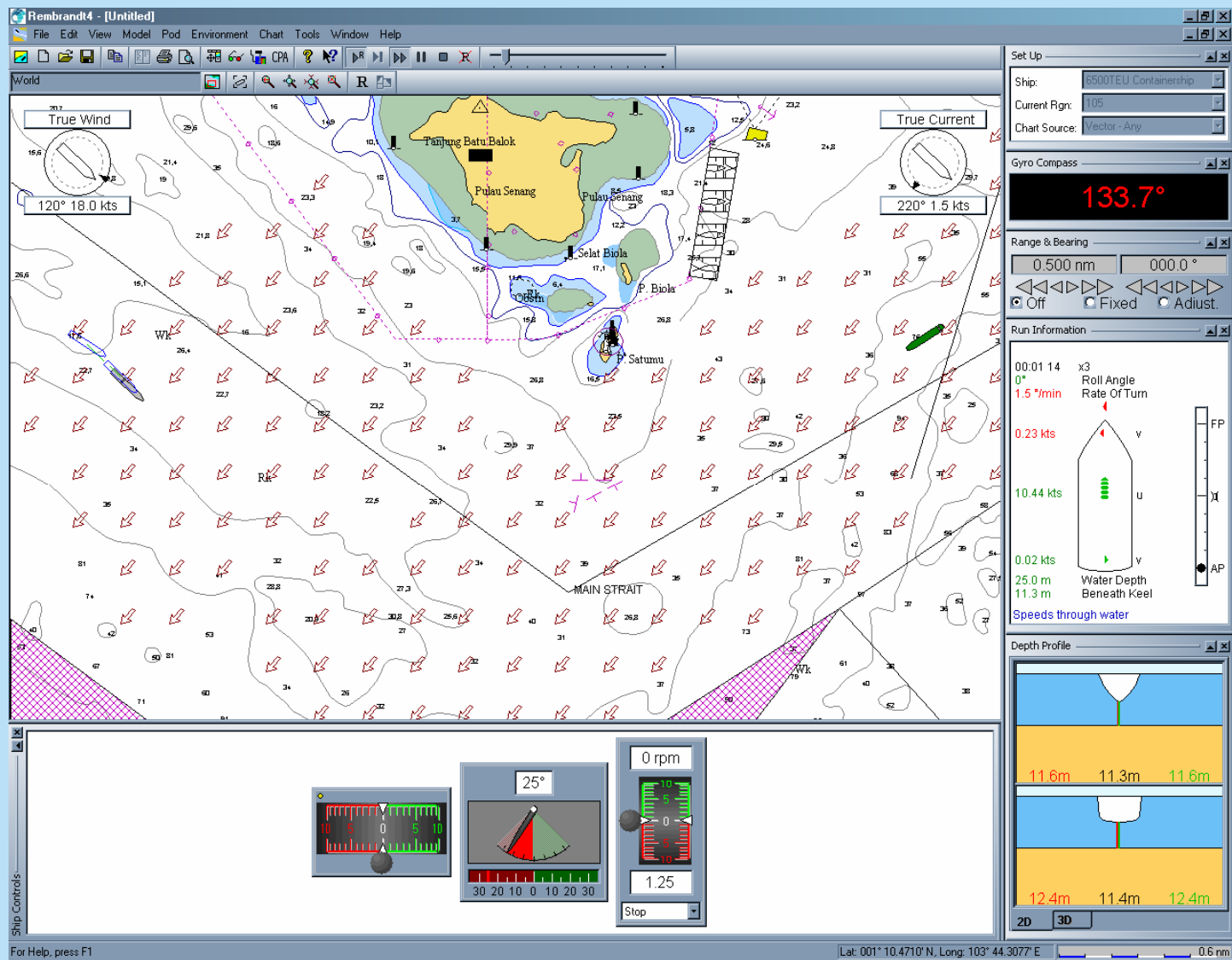
The ship is able to turn in its own length and move sideways. This ability reduces or eliminates the requirement for tug assistance and gives shorter berthing & unberthing times

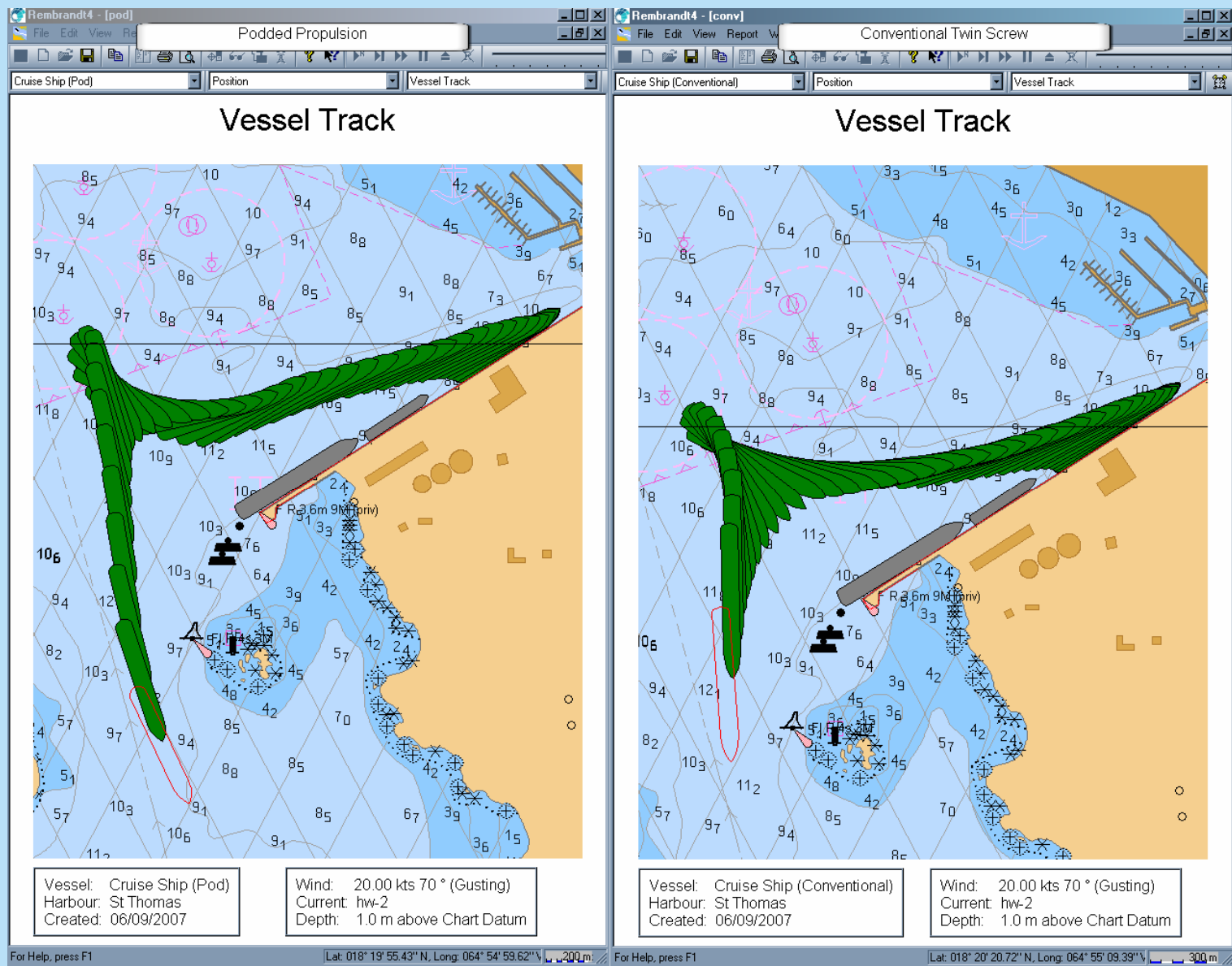
- Dynamic Positioning mode allows “hovering” in a fixed position
- Tighter turning circle (approximately 30% less)
- Emergency crash stops



Turning circle test at full speed







Disadvantages of azipods

- High initial capital cost
- Substantial cost of repairs
- Vessel crew training for new equipment
- Technology still needs to be made reliable and more predictable
- New ports may include new problems.

Problems and Failures

- **Bearing failures on some types of units**
- **Contacts & groundings resulting in major damage, particularly to propellers**
- **Maintaining watertight seals underwater**
- **Electrical motor windings failures**

Slewing ring for a 7.5MW azipod



Propeller repairs



Temporary replacement for damage pod



Electrical rotor under inspection & repair



The Future?

- Continued development of Azipods and other similar systems
- More power, greater efficiency, improving reliability, better hydrodynamics, etc
- ABB's CRP Azipod concept utilises a conventional shafted propeller with an azipod immediately aft of it
- Combines different power sources so if one fails then the other still provides propulsion
- Expected to be more economical for large vessels e.g new generation large Container ships



Conclusions

- **Generally successful propulsion and manoeuvring system**
- **Particularly popular with cruise ship operators**
- **Expect increasing use of azipods on numbers and types of future vessels**
- **Susceptible to contact damage due to external position**
- **Susceptible to some bearing, electrical and seal problems**
- **Continuing development should reduce early problems**
- **Expensive to repair – specialist repairs by manufacturers**
- **Any failures very expensive in cancelled cruises**
- **Units currently relatively new. Query increasing problems with time**
- **Question - Have Hull & Machinery underwriters been subsidising the continuing development of azipods over the last 10 years?**

Azipod Propulsion

Thank you for listening

Any Questions?