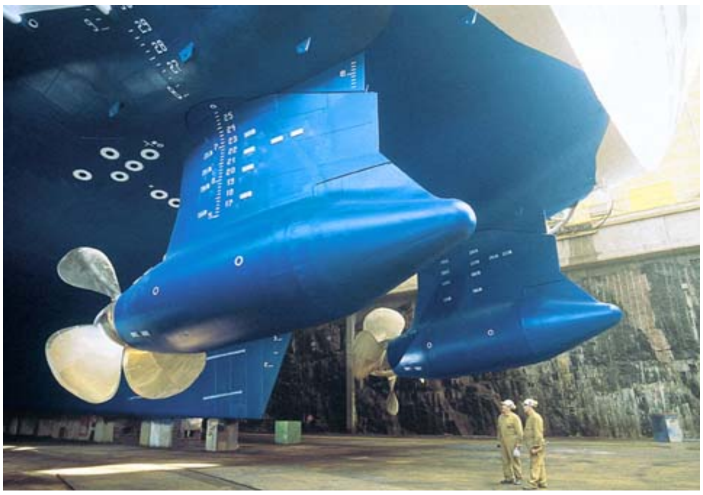
AZIPODS memento for the pilots' use

Rodolphe STRIGA

The following information are partly coming from technical data bases available on builders' websites (mostly ABB and Alsthom) and partly from the very experienced master Pietro Esposito who accepted in June 2002 to spend some moments giving me the practical results of its own experience on the azipod handling on the passenger vessels European Stars and European Vision.
His explanations are coming from his theoretical training during the vessels' delevery and from his personal tests while performing handlings in the very beginning times of this technique.



Captain Esposito’s data

The pods are tractors ; this means that the control levers on the bridge have to be orientated in the direction where the pulling is required and not in the direction to where the ship should go.
These levers are composed of a classical handle to put ahead or astern with a small window in the middle in which it’s possible to read the rpm required by the lever position. This handle can be orientated aver 360°; in contrary with the water jets joysticks, the azipods levers have a sense (ahead or astern) materialized by an arrow showing the preferred position of the pod.

->Many limitations exist:

- In the direction of the arrow, the maximum rpm is 180; 150 in the opposite direction. => this means that in the case of a crash-stop, it is better to rotate the handle 180° and put the maximum order of rpm than to put directly astern (with a maximum 150 rpm).
- When the pod speed is over 50 rpm, an order in the opposite sense is considered by the computer to be a mistake and the power unit does not change the pod speed and direction of pulling. If there is no change in the order in a short delay decided by the designers and adjustable, the rpm will be se to zero without any alarm. This means that when the vessel has to move astern, the handler have to reduce pod’s speed in advance to be under 50 rpm before giving an order astern.
- There is a long delay between the order and the reaction of the electronic and mechanic plant; this means that a succession of short and fast orders will not have any chance to be effective.

->In fairway driving, the two levers are twinned so that the two pods can be controlled in parallel with a single handle. (the name is like for water jets, “common lever”). While the vessel is out of the harbour, the helmsman acts as on a classical vessel fitted with two rudders and the power is given on the lever themselves.

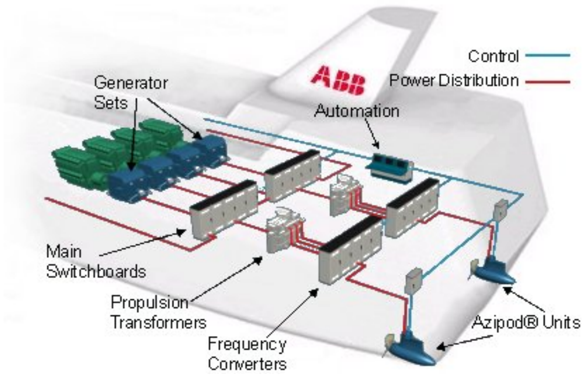
->The shipyards advise while the vessel is in berthing phase, close to the berth, to put the pod on the berth side in a longitudinal position in order to move ahead or astern, and the other one perpendicular to the berth, acting like a stern thruster. In this case the electronic plant gives a preference to the longitudinal one and reduces automatically the power available for the perpendicular one. Indeed, the ship electrical power outlet is not sufficient to supply both the pods and the bow-thrusters operating all together at 100%. So, the handler has to remind that the entire pod’s power should not be available while the thrusters are used at maximum power.

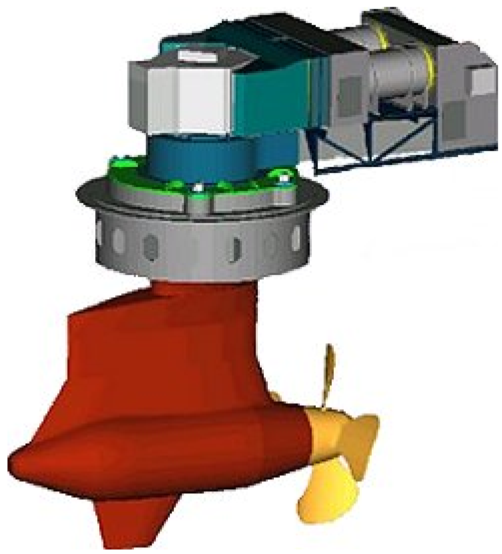
->While the vessel is proceeding, without any order on the rpm control (lever on zero), the screw is kept rotating by the wake ; so when the lever is set on the zero position, it doesn’t reduces the ship’s speed because there is no resistant torque. So, when the handler wants to slow down the vessel, he has to give a small negative rpm order.

->The pods’ efficiency is quite bigger than the bow thrusters’ one ; the handler has to keep in mind the difference of powers to adjust the position of the bow before the position of the stern.

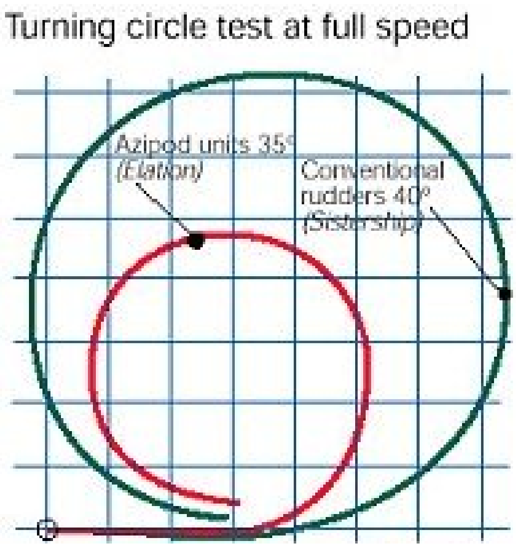
->At the moment, regarding to the reliability of this system, azipods require a lot of maintenance (especially for water tightness, dampers, or cooling systems)

Technical data



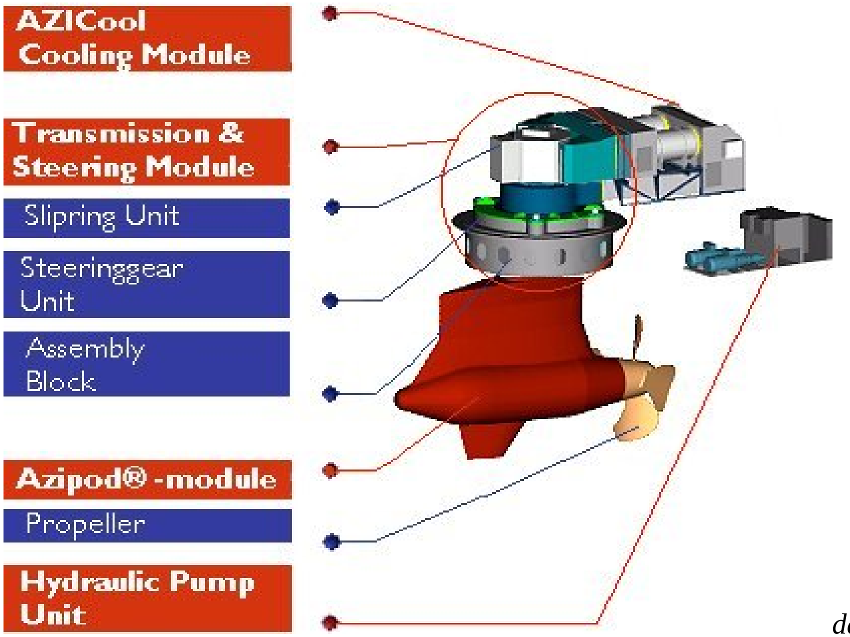


The pod principle is set in an electrical engine fitted in a hub that can be orientated over 360°. This engine is coupled to a shaft as short as possible on which is connected a reversible propeller.
The electrical variation of rotation speed allows a very thin control of the shaft speed, very smooth, with a big torque since the reduced speeds very close to the zero rotation. The azipod maximum power is close to 25 MW.



On a theoretical point of view, the azipod should offer a bigger dynamism in the control of the command and also reduced turning circles. These characteristics drive the builders to point out the reduced times for handling but also the consumption reductions and the high swinging abilities.

Hub details

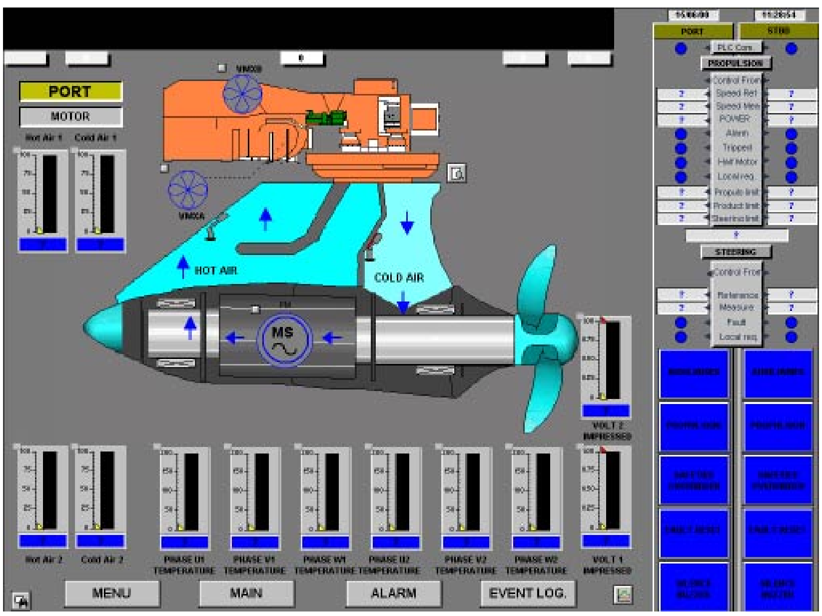


data ABB

Air cooling module
This unit contains intercoolers and fans in order to maintain an acceptable temperature in the hub.

Transmission and Steering Module
Composed of an hydraulic unit , transmission shafts and wheels , and a big bearing (source of main troubles)

Azipod module
It is composed of an electric engine and a shaft on which is mounted a fix propeller ; water tightness is given by a seal fitted by an hydraulic pump unit.




MV Infinity

PODS FOR ROPAX

Siemens-Schottel propulsor systems will be powering two new RoPax vessels ordered by the TT-Line shipping company and to be built by SSW Fähr- und Spezialschiffbau GmbH of Bremerhaven. The ships will be operating in the ferry service between Travemünde and Trelleborg. The Siemens Marine Engineering Subdivision in Hamburg will be supplying and installing all the electrical machinery and systems as a turn-key contract worth around $40 million.

Each of the 190 m ships will be propelled by two Siemens-Schottel SSP 10 Propulsors. The power output of each SSP 10 will be 11 MW. The turn-key project also includes all the automation equipment employing proven “SIMOS IMAC 55” equipment and the communications systems.

The SSP utilizes a compact permanent magnet electric motor that allows the pod to have a lower profile, permitting more efficient water flow into the propellers.

The SSP is particularly suitable for passenger vessels such as TT-Line’s two new RoPax ferries because its twin screws produce much lower noise and vibration levels so passengers can enjoy higher standards of comfort.

Since the Propulsor comes in sizes from 5,000 kW to 30,000 kW it is suitable for the whole range of outputs needed by seagoing vessels.
Further development of electric propulsion systems will undoubtedly be expanding the range of

application of pod-type propulsion systems in the future .In the permanent-magnet electric motor and the twin propeller concept, the Siemens-Schottel Propulsor is employing two basic technologies that, since they are both innovative and trend-setting, provide a solid foundation for successful penetration of the market.

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