The Superyacht Report

181
09/2017

BUYER

Chris Cecil-Wright

"The big brokerages are desperate for deals, so they're offering lower commissions. But deals don't happen like that and it's the owners who are losing out."

DESIGN

TSR visits the Cerri Cantieri Navali shipyard near Carrara, Italy, with the first K-Series explorer yacht nearing completion.

OWNER

Jimmy Liautaud, owner of *Rock.It*

"I will go through the journey of the bid process with my next boat – with my spec, my engineering, everything my way, and then let the three shipyards bid it."

TECHNOLOGY

Military-grade thermal imaging and the latest innovations in pod-drive propulsion.

OPERATIONS

The ideal hierarchical communication structure for the optimal operation of a superyacht.

BUSINESS

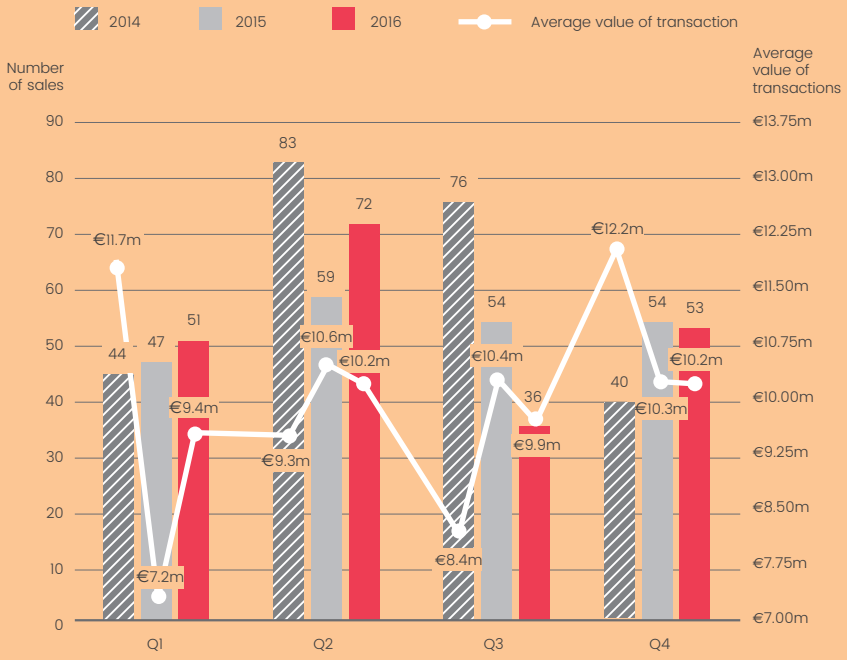
Regional Report: The Netherlands

How is the most complete superyacht market in the world leading the fight against plateauing new build numbers?

FLEET

The Superyacht Brokerage Report

Number of sales per quarter and average value of transactions



Driving in a different direction

BY BRYONY MCCABE

Azipod DO is ABB's compact size pod series covering power range from 1.5 MW to 7.5 MW.

The benefits of the latest pod-drive technology for superyachts are extensive. However, compared to the cruise-ship industry, superyachts have been slow to adopt it. The Superyacht Report *looks at some of the latest technology on the market and asks how it is being utilised by superyachts.*

Pod-drive propulsion has been replacing traditional shaft-drive systems on cruise ships over the past 20 years, as the benefits of the technology in terms of comfort, maneuverability, operational efficiency and design flexibility have become known and proven. Pod drives have also become commonplace in the small-leisure-boat sector because of their ease of operation. However, the superyacht industry has been comparatively slow to follow suit.

Pods are essentially underwater propulsion-drive systems located beneath a vessel's hull. The units are steerable, providing thrust in practically all directions, and therefore allow for enhanced control and mobility. The drives are linked to a vessel's engines, either through a mechanical link or in a diesel-electric arrangement. The term 'pod propulsion' is widely associated with propulsors with an electrical motor encapsulated inside, whereas 'azimuth propulsion' is a more common definition for a configuration of marine propellers placed in steerable pods, including those systems with a mechanical link between the actuator and the propeller.

Pod-drive arrangements can present certain challenges for designers and builders as the heavier weight of the system means that a boat's hull and weight distribution have to be designed specifically with the technology in mind. While the reduced number of component parts allows for more flexibility in arranging system machinery, for superyachts the system takes up vital additional space in the aft of the vessel that is already in high demand for garages and beach clubs. As a result, the technology is often only utilised by yachts of a certain size that have the interior space to spare.

Pod technology is not yet a mainstream solution for the superyacht sector but it is being considered increasingly for innovative new-build projects. The trend has been set by the large cruise-ship industry, with operators such as Carnival and Royal Caribbean building their vessels with ABB's Azipod technology. Azipod propulsion is now considered a viable concept as an alternative to shaft-drive propulsion in large diesel-electric superyachts, and there are more players entering the market to cater for the smaller end of the sector.

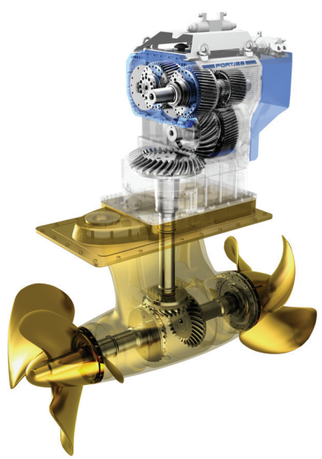
Latest technology and applications

Azipod

Compared with a conventional drive system with two propeller shafts driven by diesel engines, ABB's Azipod propulsion is a gearless steerable system that requires a diesel-electric power plant that feeds into an electric drive motor in a submerged pod beneath a vessel's hull. The pod then turns on a vertical axis to direct thrust in any direction, hence eliminating the need for stern thrusters.

Azipods were first seen on board superyachts in 2005 and 2006 when the 90m Lürssen motoryacht *Ice* (ex-*Air*) and the 65m Benetti *Ambrosia III* respectively became the first yachts to be fitted with the systems. Since then, there have been a number of high-profile large yachts built with the technology, including 73m *Grace E*, 71.1m *Kogo*, 122m *Maryah* and 162.5m *Eclipse*.

The Azipod systems installed on superyachts are different to those on cruise ships. ABB supplies a smaller compact range, which it introduced as the Azipod C range in 2000, and more recently has introduced the D range. The Azipod D range caters for up to 7.5 megawatts in one unit, which is enough to drive the largest yachts currently on the water, depending on configuration. ABB advises that the technology can be applied to any yacht above 60m as anything below this would be challenging in terms of design considerations. "The power plant takes up space, and a yacht below 60m would find it hard to accommodate," explains Thomas Hackman, global segment manager at ABB.



Reintjes' pod system Fortjes.

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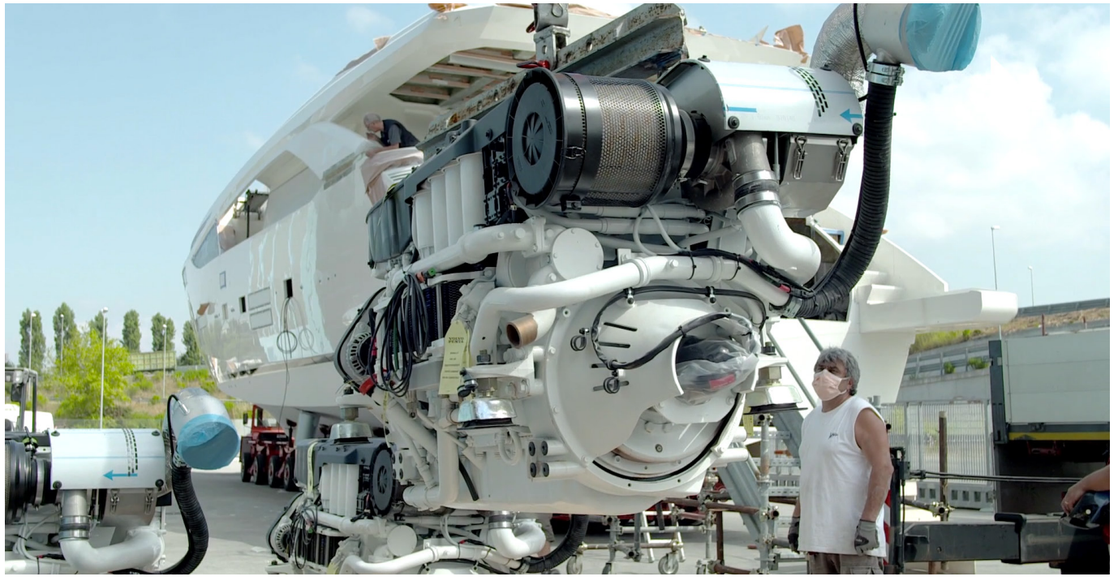
Volvo Penta IPS System being installed on a motoryacht.

The majority of superyachts will have a double Azipod configuration, and in some cases a triple configuration. Often this has to do with the arrangement in the stern and the need to reduce the overall draught. It is also possible for a yacht to have a combination of a traditional shaft-line system and Azipods.

Volvo Penta IPS

Volvo Penta launched its pod technology, Volvo Penta IPS (Inboard Performance System), to the marine market in 2005. Since its launch, it has been popular in the small-boat sector, and in the past few years it has been increasingly installed on larger yachts. While the current available technology is able to power vessels up to 120ft (36.6m), Volvo hopes to expand its offering to large yachts in the future.

"The Volvo Penta IPS is a fully integrated propulsion system from the propeller to the helm station," explains Johan Wästeräng, head of marine product management. "The main features include extreme maneuverability through our joystick technology. It can also be combined in twin, triple or quadruple installations." The system is connected electronically through the Volvo Penta Electronic Vessel Control (EVC), which provides full monitoring, protection and diagnostics for both engine and transmission.



Fortjes

For Reintjes, the first interest from the supFor Reintjes, the first interest from the superyacht sector came following the launch of the company's pod system Fortjes when the technology was installed on 39m Dynamiq Jetsetter in 2016. Multiple configurations with installations of four or more Fortjes pods mean that the system can be installed on yachts up to approximately 40m, but this depends on the size of the engine room.

The conventional Fortjes pod system is available as a fully diesel version, and a hybrid version has also been developed. Unlike other pod-drive technology, conventional rudders are necessary as well as a fixed mounting.

Weighing up the benefits

The initial drawbacks of pod technology include higher installation costs, but not necessarily higher maintenance costs. Pods are fairly complex systems and the perception is that there are fewer refit yards that specialise in pod maintenance and repair. However, this is changing. Volvo Penta offers specialised round-the-clock support to IPS owners, and ABB has remote diagnostics that allow a support team to give suggestions or warnings to yachts with Azipod propulsion systems and power plants if something looks problematic.

"Since the pod propellers are forward-facing, an Azipod actually pulls the vessel through the water, meaning that the water flow is undisturbed, and this creates better efficiency."

Double Azipod configuration on board Fesco Sakhalin.

Another factor to consider with a pod drive, as opposed to a shaft drive, is the impact on the design arrangement. Reintjes claims that the Fortjes pods actually give designers and builders more flexibility. “Yacht designers get many more opportunities for the interior design because of the compact Z-drive arrangement, which saves a lot of space in the engine room,” says Vanessa Plenker, head of public relations at Reintjes. Although the power plant requires more technical space for Azipod systems than a traditional shaft-propeller arrangement, the systems offer the freedom to locate each component differently.

Pod technology has been labelled as an ideal solution for vessels in terms of the efficiency gains it brings. In a RINA Megayacht paper on Azipod D technology, it was found that, typically, pulling-pod propulsion decreases the power requirement by five to 10 per cent, compared to shaft-line rudder propulsion in the case of a twin-propeller vessel with a limited draft, such as a ferry, yacht or cruise ship. This reduction is gained from better propulsion efficiency and smaller resistance if the hull lines are optimised for Azipod propulsion.

“Since the pod propellers are forward-facing, an Azipod actually pulls the vessel through the water, meaning that the water flow is undisturbed, and this creates better efficiency,” adds Hackman. “Additionally, pod technology negates the need for appendages such as rudders and steering gear, which lowers the overall resistance of the hull. We can also assist the designer or builder with designing the stern of the vessel in order to accommodate the pods in the best way, which includes the optimal angle of the pod’s inclination to suit the hull shape.”

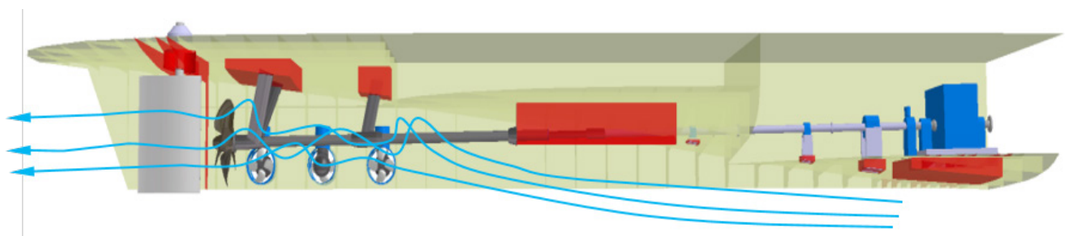
Vibration is also reduced with pod drives as there are no noise-generating gears, and the pod motor and its shaft are located completely outside of the yacht’s hull. Furthermore, the pulling propellers receive a steady and undisturbed wakefield with considerably lower pressure pulses into the aft hull, which gives propeller designers greater scope to optimise propellers for silent operation compared with a conventional propeller with a rudder. Vibrations caused by maneuvering in ports with high rudder angles are also avoided because the pod-drive housing rotates in a single unit, meaning there is never a high angle of attack between them.

Despite Fortjes’ non-steerable arrangement and the necessary rudders, the contra-rotating propellers, in conjunction with the hydrodynamic optimised, twisted strut, increase efficiency at high speeds, reduce propeller cavitation and, therefore, minimise noise and vibration. “In comparison to a conventional propulsion system, an efficiency increase of approximately five to 12 per cent has been realised, depending on many different factors,” says Plenker.

The capability to control the direction of a pod’s thrust, however, gives a new dimension of control over a vessel. A superyacht with pod technology can spin on its axis and move side to side at any angle, making the systems excellent for maneuverability. With Azipod propulsion, for example, the full propeller thrust can be directed freely in any direction, whereas in fixed shaft-line rudder arrangements, thrust decreases rapidly as helm angle increases. According to the aforementioned paper, generally, a conventional rudder can produce only about 40 per cent side thrust compared to maximum ahead bollard pull thrust. With a 360-degree freely turning Azipod, however, full thrust can be precisely applied in any direction. Azipod propulsion also allows navigation astern and sideways simultaneously, which is difficult to achieve with a rudder since negative propeller speeds reduce the effectiveness of a rudder considerably.

One particular attraction for the cruise-ship industry is the enhanced capability of pod-drive technology to enable dynamic positioning. This is equally valuable for superyachts when waiting for bridges to open, loading and unloading tenders or in non-anchorage zones. A key design consideration of *Grace E*, for example, was for her to be independent in remote locations around the world, including visits to marine parks with strict no-anchor policies. The Azipods are connected to a dynamic positioning system that allows the yacht to maintain her direction and position in a current and wind with much more effectiveness than it would be with shaft lines, without deploying her anchors.

Opposite and below: the hydrodynamic benefits of pod propulsion.



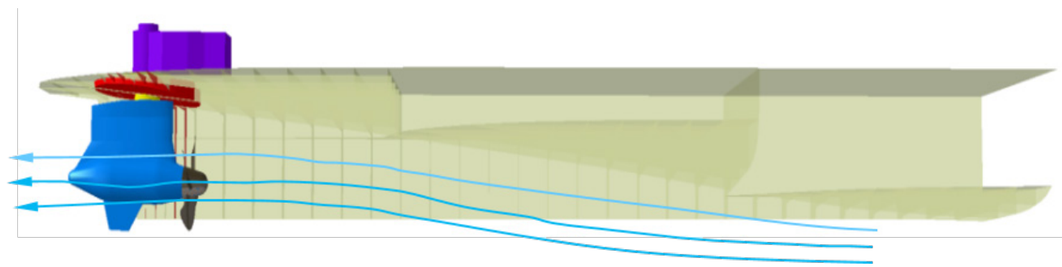


Image courtesy of ABB

A superyacht with pod technology can spin on its axis and move side to side at any angle, making the systems excellent for manoeuvrability.

The future

Considering all the aforementioned advantages of pod-drive technology, it is a wonder that the superyacht industry has yet to adopt it across the sector. One stumbling block is the lack of an apt solution for superyachts in the 40m to 60m size bracket, which represented 29.6 per cent of the delivered fleet at the time of writing. However, both Volvo Penta and Reintjes have their sights on larger installations, so this could possibly be only a short-term hindrance.

Another reason could be attributed to apprehension. "The yacht industry tends to be conservative, selecting more traditional technology as a standard," reflects Wästeräng. "There is still a journey in the industry to see it adopted as a mainstream solution for the superyacht segment, but the interest is continuing to grow and it is our ambition to continue to invest Volvo Penta IPS for the future."

Hackman agrees, to some extent, but adds that ABB is seeing a definite change in attitude. When the Azipod concept was introduced 26 years ago, as with all new and evolving technology, there were a few teething problems, such as failures to bearings, that may have discouraged the superyacht sector. "Now that we have done a lot of product development, built up a global service network and it is well received in the cruise-ship industry, superyachts are starting to take note," observes Hackman. "Yards and designers are looking for new solutions, not only on the upper decks but also in machinery."

While refitting yachts with the technology may be too much of a challenge, Hackman predicts that the pod-drive trend will continue to gain momentum as new builds get bigger, more hybrid projects come through and owners plan on exploration. ABB is currently working on several large-yacht projects whose clients are testing Azipods with the design – many of which are over 120m. "I can see a very bright future for Azipod systems on board luxury yachts and exploration vessels," he concludes.

Every characteristic of pod-drive technology lends itself well to the superyacht industry and its future designs. As owners seek bigger yachts, enhanced comfort, a reduced environmental footprint and adventurous exploration, pod-drive technology in its various forms will be a key design consideration of the future. BM