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Special Report

International Cruise Ship Industry

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Reflecting on 25 years of development for Azipod propulsion, ABB Marine and Ports new Managing Director, Juha Koskela, claimed that the time is ripe for shipping as a whole to reap clear cut benefits.

An LNG carrier and a superyacht are just two recent, but very different, illustrations on the use of an Azipod, which this year celebrates 25 years of operation as ABB's flagship propulsion technology.

It has become the driving force behind an industry-wide growth in electric propulsion covering many of the most sophisticated vessels in the world.

"We point to Clarkson Research findings that the fleet of vessels using electrical propulsion has grown at three times the rate of the fleet overall during the last decade. Azipod propulsion has a growing constituency," said Juha Koskela, the new Managing Director of ABB's marine and ports business.

The growing popularity of the Azipod propulsion has been a constant during Koskela's own rise through the ranks of ABB. Before taking up his new role at the turn of the year, he was business unit manager of ABB Marine Finland and senior vice president of ABB's passenger vessel and propulsion products businesses.

"We have 400 Azipod units at sea and can document 12 mill hours in service with a remarkable availability of 99.8%," claimed Koskela. He believed that there were clear signs that shipping is changing in a way that favours its wider adoption. "ABB is ready," he said.

Koskela recently oversaw an upgrade to the Helsinki production facility for larger Azipod propulsors (6 MW and above), where a second production unit was installed to ease production bottlenecks. ABB constructs compact Azipod thruster units at a purpose-built facility located outside Shanghai.

Mega crane vessels and the biggest cruise ships currently in operation are a long way from the first, more humble vessel, which was fitted with Azipod propulsion a quarter of a century ago.

Owned by the Finnish Board of Navigation, 'Seili' became the first vessel fitted with an Azipod unit. It heralded a new era of azimuthing propulsion.

Within five years of 'Seili's' 1.5 MW Azipod propulsion unit installation, far larger units were being installed; the technology's ice-breaking performance also opened the minds of shipowners operating in particularly harsh conditions. The Finnish oil tankers 'Uikki' and 'Lunni' became the initial standard bearers for Azipod propulsion in 1993-1994, featuring 11.4 MW units.

The development of 'pull' Azipod thrusters, with the propeller mounted in front of the 'pod' instead of 'pushing' from the rear, brought further efficiency gains and the breakthrough as a mainstream solution for cruise ship operators.

Koskela's direct involvement dates to his earliest days at ABB and the first cruise project involving Azipod propulsion. Working for ABB Drives as a commissioning engineer, he was responsible for programming software and the control part of frequency convertor work on board 'Carnival Elation', delivered in 1998.

"It was a very exciting time," he now says. "After the sea trials on 'Elation', we realised that Azipod propulsion was achieving fuel savings of 8-10% against her sister vessel. We already knew that Azipod propulsion offered better manoeuvrability, more space on board for passengers, lower noise and vibration, and easier maintenance. But, once the fuel results were in, it was only a couple of days before we were getting calls from all over the market."

The subsequent rise of the Azipod propulsion as the leading cruise ship propulsion solution is also a matter for the history books. References include the majority of the main cruise ships built since 2000, with the giant cruise ships of today featuring Azipod propulsion units of more than 20 MW.

In the time since these initial installations, continuous improvements have been made to the Azipod propulsion solution. Today, Koskela is focusing on cultivating the widest possible uptake.

"Combining propulsion and steering using an externally mounted pod was radical," he explained. "However, the results were there for all to see, which is why we have always kept an open mind on enhancing the technology to facilitate wider consideration."

In the early 2000s, ABB reaped the hydrodynamic benefits of installing a fin under the unit, refined strut designs, then introduced the contra-rotating Azipod propulsion system. Then came the Compact Azipod thruster, which introduced permanent magnet synchronous motors and further efficiency gains of 2- 10 %. Azipod propulsion units subsequently made inroads in the offshore market.

A three-year redesign programme followed between 2005-2008, resulting in the arrival of a new generation of Azipod propulsion units, including the Azipod XO in 2008. The propeller hub and motor module diameters were reduced and the unit's hull optimised with the help of CFD and model testing. Overall, the Azipod XO improved by 9% when compared to the 'Elation' results.

"A lot of work was done to make Azipod propulsion more hydrodynamically efficient," said Koskela. "However, at the time, the primary target was to enhance reliability and to focus on ways to reduce the lifecycle costs by avoiding drydocking." First orders came in 2010, with the cruise sector again proving fertile ground.

Then, last year, along came the smaller Azipod D, adopting the best technical features from existing Azipod thrusters but including a new air and water cooling system to reduce weight and direct more power toward propulsion. The solution offers higher propulsion efficiency, both at higher speeds and during dynamic positioning, where varying power is especially prized.

"Once more, we also made gains in reducing lifecycle and maintenance costs," said Koskela. "In addition, we focused on lowering upfront investment costs."

Even when oil prices are so low, Azipod D's 25% less installed power requirement than propulsors of equivalent performance made the unit very competitive in power ranges between 1.6-7 MW per unit. Koskela said that Azipod D "...took 20-30% out of the cost."

"Our engineers continue to innovate, like they did 25 years ago, to ensure Azipod propulsion meets the demands from a diverse range of ship owners," he said.

In the 25th year since first installation, there is clear evidence that continuous innovation continues to pay off. For example, Azipod propulsion units are being installed on the world's most advanced port icebreaker, to be built by Vyborg shipyard, and will feature on the Carnival project to build the world's first LNG-powered cruise ships.

Latest orders for Azipod propulsion units include the world's largest capacity cruise ships (6,600

pax), one of the largest mega crane vessels in Asia, and a 105 m luxury superyacht.

Perhaps more significantly, in January 2016, the first ice-class LNG carrier for Yamal LNG was launched by Daewoo Shipbuilding and Marine Engineering (DSME).

The vessel will feature three ice-class Azipod propulsion units and is the first of 15 specially-designed 170,000 cu m vessels that will be the most powerful icebreaking LNG carriers in the world. The Yamal project is also the largest single contract ever placed by value for Azipod propulsion technology.

"With Yamal, we will be establishing Azipod propulsion in the LNG carrier market, which is significant in itself, and we are delighted that the technology will be proving itself once more in harsh, icy waters," said Koskela. "We are also encouraged by the discussions this has opened with the main South Korean shipbuilders on the application of Azipod propulsion for open water LNG carriers."

Again, building momentum for cruise ships to be constructed in China would be of major significance to ABB, he noted.

Koskela added that the way shipping contracts are set up is changing in a way that makes the fuel saving Azipod propulsion confers more compelling. "In general the charterer pays the fuel bill rather than the operator, so part of the market has not seen the efficiency imperative. However, this has come under more scrutiny, with charters including clauses on fuel consumption. The fall in oil prices may mean that the significance of these arrangements is not so obvious, but the point is that the precedent has been set."

Koskela said that he has been consistently reminded over the past 25 years that continuous development has made Azipod propulsion a technology which, in terms of efficiency gains, keeps on giving.

"We are always studying new improvements and before the year is out, we hope to have another surprise for the market that will bring a 5-7% performance improvement in Azipod propulsion," he reported. "Recent experience has shown that the merchant market is ready to accept the propulsion principle that makes these efficiency gains possible as never before."