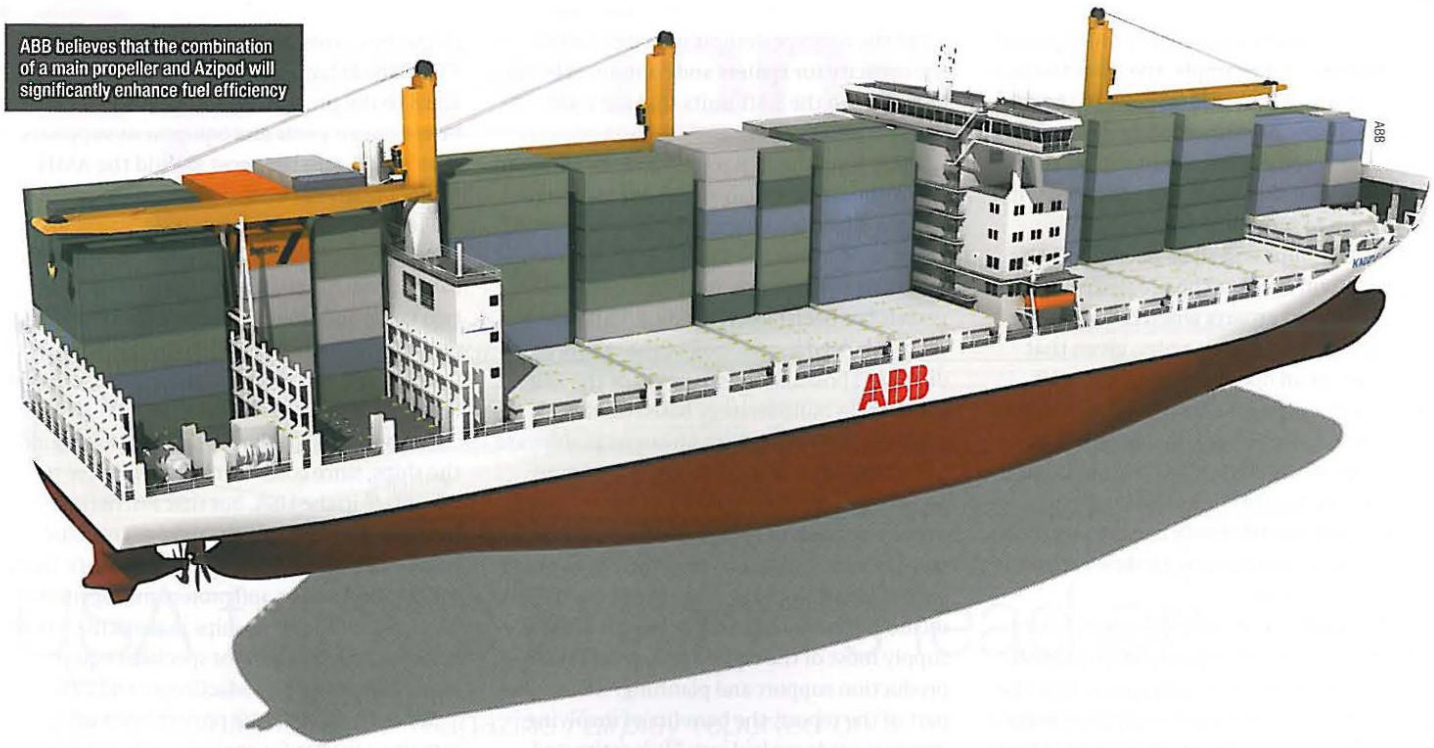


ABB believes that the combination of a main propeller and Azipod will significantly enhance fuel efficiency

Novel feeder vessel could set new standards

Danish naval design and marine consultancy Knud E Hansen and joint-venture partner ABB have developed a fuel-efficient 2,000teu container feeder vessel that they believe could set new standards for the type

The vessel's main dimensions have been optimised for calling into Bangkok, but the companies believe that the design will deliver benefits to operators and the environment on any route. It has been developed with an emphasis on fuel economy and low environmental impact, and is expected to need to use less water ballast than a conventional design. It fits well with the industry's increased interest in so-called slow steaming and the use of variable transit speeds and loading flexibility. It can carry more containers and has a higher reefer capacity than similar-sized vessels of traditional design.

As Eero Lehtovaara, a senior vice-president at ABB, explained, the company had been considering making its entry into the market for container feeder vessels for some time. "We don't have a big profile in that area currently," he informed *Solutions*, "but we have analysed the market and are confident that there will be plenty of demand for vessels in the 1,000–3,000teu range in the near future."

Lehtovaara revealed that ABB opted for the Bangkokmax-size vessel because the type has clear design parameters. "We felt that it would be easy to compare it with similar vessels of this type," he said. "We talked to a lot of owners and operators, and one thing that became clear was that a lot of the vessels that entered service in the last decade – many of which were designed for speeds of 22–25kt – have rarely been required to operate at that speed. More often than not, we found that they operate at slower speeds than they were designed for. What this means is that a lot of the power that was built in to these vessels isn't being used."

This realisation, and the growing interest in slow steaming, is at the heart of the machinery selected for the feeder ship. "We decided to look at a hybrid solution and see what that could do in terms of energy efficiency," Lehtovaara told *Solutions*.

The propulsive efficiency of the new design is boosted by an electrically driven counter-rotating Azipod unit fitted behind the main propeller, which is directly driven by the engine. The power balance between the main propeller and the Azipod is roughly 65%/35%. As the Azipod can be turned through 360°, the vessel will be extremely manoeuvrable and so reduces – or even eliminates – the need for assistance from tugs when in port.

Compared with the diesel-direct propulsion system in a vessel of conventional design, the main engine has been considerably downsized; the propeller diameter is correspondingly smaller and it has a low shaftline. Because of this, ballast water is rarely required to submerge the propellers in lightly loaded conditions.

At 18kt the main engine and a shaft

generator will deliver all of the power required for propulsion, including the electrical power for the Azipod, hotel load and power for the reefer containers. Additional auxiliary power is necessary only if higher speeds (up to 21kt) are required or if an exceptionally large number of reefer containers are carried.

Three auxiliary engines with a total electrical output of about 8,000kW are arranged in an auxiliary engine room, which is completely segregated from the main engine room. With the main engine stopped, the vessel can navigate at more than 13kt on auxiliary power and Azipod alone, hence there is a high degree of redundancy and more than sufficient 'return to port' capability.

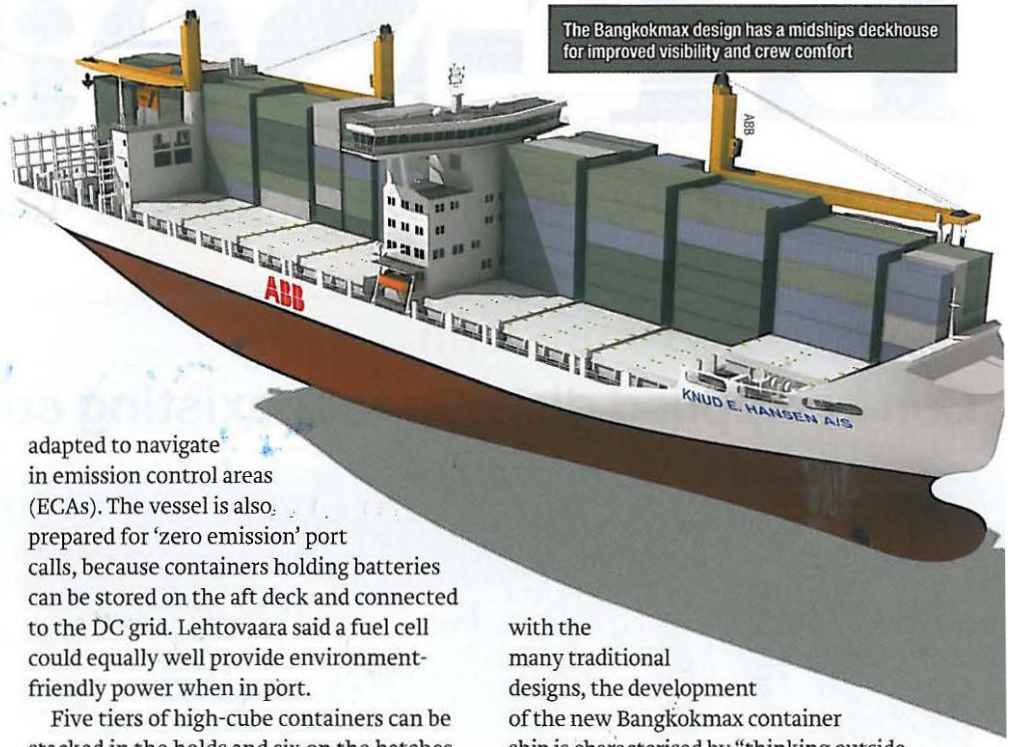
The vessel also has an onboard DC grid system from ABB that ensures the engines will run at their optimal load at any cruising speed from 2kt to 21kt. As well as improving fuel economy it provides considerable flexibility in transit speeds, including slow steaming, in contrast to most of today's feeder vessels.

The vessel has an overall length of 172m and a beam of 30m. Its deadweight at the Bangkokmax draught (8.2m) is about 18,300 tonnes and some 28,400 tonnes at a fully loaded draught of 10.5m.

The midship position of the narrow deckhouse provides a much better view from the bridge and, says Knud E Hansen, allows about 15% more containers to be carried on deck than on a feeder vessel with the deckhouse aft. Placing the deckhouse in this position also ensures that the crew is less affected by bad weather than they would be in a forward deckhouse.

HFO tanks have been arranged in a simple, square block below the deckhouse to minimise the need for trim-compensating ballast water and changes of trim during a voyage. The tanks are segregated from the sides and the bottom in preparation for Clean Design class notation.

Space has also been prepared in the engine casing for scrubbers or a selective catalytic reduction system so that the vessel can be adapted to navigate in emission control areas (ECAs). The vessel is also prepared for 'zero emission' port calls, because containers holding batteries can be stored on the aft deck and connected to the DC grid. Lehtovaara said a fuel cell could equally well provide environment-friendly power when in port.



The Bangkokmax design has a midships deckhouse for improved visibility and crew comfort

Five tiers of high-cube containers can be stacked in the holds and six on the hatches. In the gearless version the vessel will carry up to 1,448teu on deck and 668teu in the holds, corresponding to a total high-cube capacity of 2,116teu.

As designed, the reefer capacity below deck is 438teu (or 258feu), and with three tiers on the hatches and four on the aft deck the capacity on deck is 746teu/370feu), giving the vessel a total potential reefer capacity of 1,184teu/628feu). With 8,000kW of auxiliary power installed, access to the reefer units is the only limiting factor for the number of reefers that can be carried, so the capacity on deck can be further increased by higher lashing bridges aft and/or lashing bridges between the hatches.

Knud E Hansen believes that the high container capacity in combination with fine hull lines and a very efficient propulsion system gives the vessel a fuel economy 15–25% better per teu than typical feeder vessels of similar size.

Maersk Broker is working closely with ABB and Knud E Hansen and noted that, compared with the many traditional designs, the development of the new Bangkokmax container ship is characterised by "thinking outside the box". This, it said, has produced some impressive results in terms of speed/consumption, stowage flexibility and, not least, flexibility of transit speed. "We believe that this is what is needed in a future-proof design, and should be attractive to liner operators and tramp owners, who focus on stowage/speed flexibility and fuel efficiency – and thus on a greener profile," said the broker.

"We believe that this is probably the most flexible vessel in this segment," said Lehtovaara. He acknowledged that a vessel with this kind of machinery will be more expensive to acquire than a conventional design, but Knud E Hansen and ABB expect that its fuel efficiency will pay dividends in the long run. "We are looking at getting a price and a better idea of the savings that will accrue once in service," Lehtovaara concluded, noting that the next stage of the process will see the partners in the project analyse the design further using computational fluid dynamics; model tests are also being planned.