Autonomous shipping as a possible solution to impending labour shortages in the shipping sector

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Credit: Delft University of Technology

Autonomous shipping is a hot, yet hugely significant topic. According to researchers at TU Delft, this is the first time that we have really had to completely rethink the design of ships since we made the jump from wooden sailing vessels to steel steamships. From 12 - 14 December, the university will be devoting extra attention to this issue with two PhD ceremonies, a colloquium and an autonomous shipping demonstration.

The captain is on dry land instead of aboard his ship. From his impressive control room, which is comparable to the inside of an air

traffic control tower, he can monitor all ships wanting to call at the port of Rotterdam. He no longer needs to be involved with the logistical side of things because the vessels plan their own schedules with container terminals, locks and bridges. Just as sailors are no longer required on board, a captain is no longer required at the helm of the ship. However, the vessels do contact their on-shore captain if a component is broken, for example.

This is the future of autonomous shipping. It could be an answer to the looming labour shortage in the shipping sector, which is arising partly due to the tremendous increase in the amount of cargo being transported by sea around the world.

Cheaper

'Another big advantage of unmanned shipping is that the transportation of goods becomes considerably cheaper. As a result, cargo will be transported by water more often than over land,' says associate professor Rudy Negenborn. 'The costs are also reduced in another way: since ships, container terminals, bridges, locks and other facilities within the harbours can automatically exchange information with each other, they can efficiently coordinate how quickly and which route the vessels need to sail to reach a specific location in order to collect and deliver their cargo.'

Scientists at TU Delft also think that autonomous shipping is safer. 'At the moment, 75 to 95 percent of all accidents at sea are partly caused by human error,' said Robert Hekkenberg, a researcher in the Marine Technology programme.

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Obstacles

Of course, there's still a long way to go, and there are numerous obstacles to overcome - technical as well as legal. Hekkenberg thinks that the legal framework will be adjusted by 2030. 'On the technical side, there is still a lot to do, but the concept is really gaining momentum. For example, Rolls-Royce, a major player in the shipping industry, has unshakeable confidence in the future of autonomous shipping. We are expecting the first pilot projects to get underway soon.'

'The important thing to remember is that it's not a question of all or nothing,' says Hekkenberg. 'We can automate parts of the process step by step, just like automation in cars progressed. A key intermediate step towards real autonomous shipping is, for example, unmanned shipping; so there is no crew on board, but humans are still in control from dry

land.'

Complete redesign

For Hekkenberg, completely redesigning vessels poses a great challenge because existing ships were designed to work with the help of crew. 'On board, people can walk between the complex machine installations, touch them, listen to what's going on, replace a filter or make a few small adjustments. If there is no longer a crew on board, today's vessels will soon come to a standstill. This is the first time that we have really had to completely rethink the design of ships since we made the jump from wooden sailing vessels to steel steamships. Our current framework for designing ships is irrelevant for autonomous shipping. We are actually in the midst of a major system change.'

Demo in Delft

In the Netherlands, TU Delft is at the forefront of research into autonomous shipping. The university works closely with the international shipping community. From 12 - 14 December, a number of activities devoted to this topic will be held in Delft. Huarong Zheng will be awarded her doctorate on 12 December following her research into the possibilities of a new type of container carrier that can autonomously navigate between the various terminals in a port, and on 13 December Shijie Li will be defending her dissertation on improved and more flexible planning for maritime transportation.

'Besides these two ceremonies, which are primarily theoretical, we also want to try to establish a link with reality,' says Negenborn. 'So on Wednesday, 14 December, we will be holding the colloquium "Towards autonomous ship systems", followed by a quick demonstration of autonomous shipping.'

Provided by Delft University of Technology