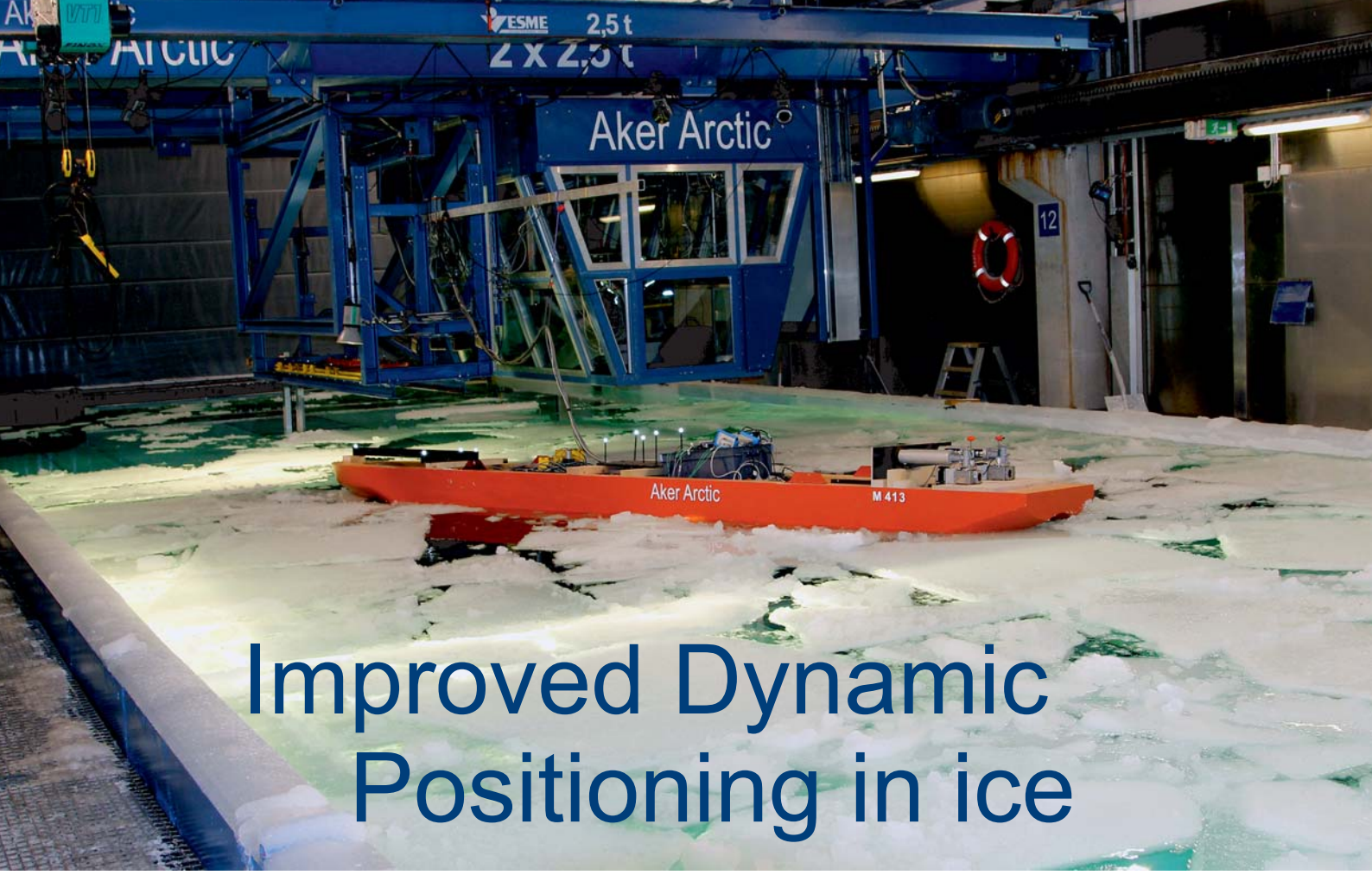

Improved Dynamic Positioning in ice

With the help of the Dynamic Positioning system, a vessel can automatically keep its position by using its own propellers and thrusters. The system works well in open water but in ice conditions the performance varies. We are now developing a better version for ice use, which is ready for pilot studies at our model testing basin.

Dynamic Positioning or DP system is an automatic control system used to keep a ship in position and on heading or moving it with a specific heading into a certain direction. The DP system resists the environmental forces such as wind, current and waves. It works well in open water, but in ice conditions it does not always function as desired. Therefore we are now developing a version that will work better in ice. The development work is being made in cooperation with Navis Engineering Oy, a company specialising in DP equipment.

DP for model testing ready

"We have been working on the new version for a year now. Our target was to develop better algorithms for the system and to improve the performance in ice. Another goal was to build needed equipment for a functional DP system for our ice-testing basin. We wanted to improve our model testing possibilities and also to further develop the DP system by studying how the improved system works in ice," Project Manager Riku Kiili says.

The equipment for the model testing basin is now ready for use. The models will be equipped with better thrusters, tailored systems for positioning, various sensors and a connection link to the computerised DP system.

"We already have a Qualisys camera system that gives detailed information about the model position and its movements. The DP computer is now connected to this camera system. We can also make more accurate measurements of reaction speed, movements, turns, speed, torque and thrust," says Veikko Immonen, responsible for technical development.

Challenges with ice

"Most specialised vessels have DP systems, but they don't work well in ice as the system easily gets confused. In open water, the wind, wave and current forces are relatively constant and do not change quickly. Ice forces on the other hand are high, change fast and circumstances can vary from open water to big ice ridges. Ice is simply so powerful that a DP system and a ship's propulsion cannot react fast enough," Mr Kiili explains.

Model DP in action. Qualisys cameras are used for position referencing.

"An additional challenge is the cold temperature, which means that the equipment has to be winterised so that it does not freeze. Positioning can become a further difficulty, as GPS signals are not always exact in the far North and other position referencing systems can be affected by fog and snowfall. Part of the challenge is to avoid the ice reaching the propellers."

"In more severe ice conditions the DP system needs information about the surrounding ice field and a method to forecast incoming forces. If the ice loads could be forecasted in advance, the ship's machinery and propulsion would have enough time to react. There is still a lot of development to be done. Now that we have the DP system in place for model testing, we can use it for customer projects to help find the solutions for challenging operations," Mr Kiili highlights. ■