Harmonising model tests for power requirements

Aker Arctic and Aalto University have started a joint project with the aim to develop the model test methods for defining vessels' power requirements according to the Finnish-Swedish Ice Class Rules.

Today there are no guidelines in the Finnish-Swedish Ice Class Rules on how to define brash ice channel properties in the ice model tests to define a vessel's power requirements.

The power requirements of the Finnish-Swedish Ice Class Rules (FSICR) can be defined by model tests. The tests are conducted in an ice channel where the thickness and width is defined by the guidelines. However, practice has shown that the model brash ice properties strongly affect the ice resistance of vessels, and these properties are not well defined.

"There are currently no guidelines for instance regarding the size of the ice blocks, level ice strength, cohesion nor porosity," head of the ice model testing laboratory Topi Leiviskä says.

Varied results

At the moment, ice model basins conduct tests for ice class certification with different methods. Some facilities conduct propulsion tests with a free running model, and others use towed propulsion tests; this variety of systems may lead to variation in results. The results may also differ depending on the ice and channel properties. It is therefore essential to harmonise the methods as much as possible.

Aker Arctic and Aalto University have started a joint project with the target of defining the needed channel properties and production methods. These will also be verified in two model test facilities at Aalto University and Aker Arctic. Both institutes have a long experience in ice model tests and good knowledge in testing and model ice preparation procedures. As part of the project, all main facilities, which are members of ITTC ice committee, have been asked to comment on their procedures and channel properties.

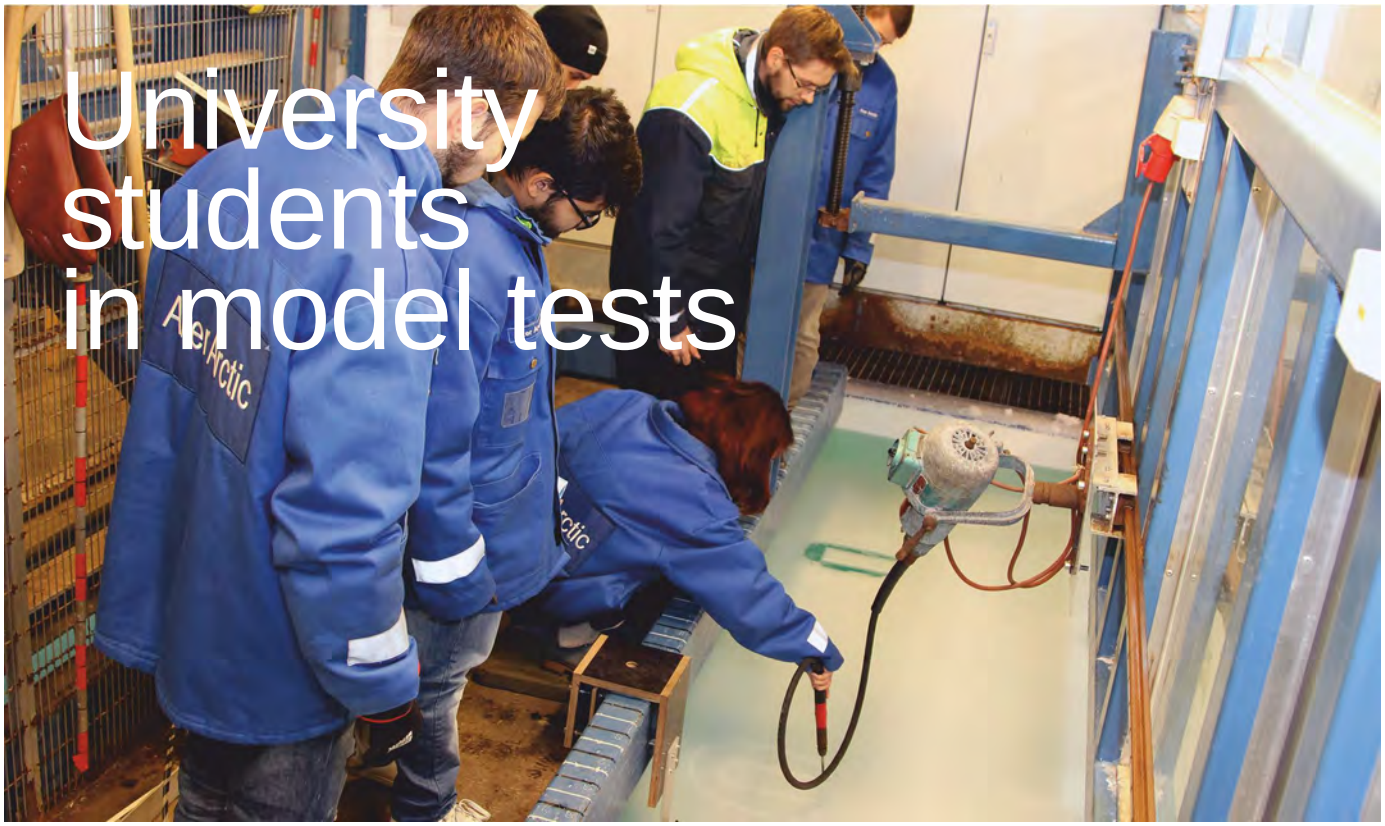
"We have gathered information from the main facilities worldwide, developed a standardised method for making an ice channel as well as defined the parameters for the two different ice channels we intend to use in the research," Leiviskä explains.

"The next step is to test the two channels with a model of an existing ship in two ice model basins. Tests will be conducted in two defined ice sheets and they will be repeated in each channel once. The channels will then be reconstructed and the tests repeated in all channels at least three times, both in our model basin and in Aalto's basin."

The project will be ready by the end of 2017.

"We hope to then have good recommendations for procedures on how to prepare the brash ice channels used for the definition of the power requirement with ice model tests according to the FSIC Rules," Leviskä says.

University students in model tests



Naval Architect students learning to prepare ice at the ice laboratory.

Aker Arctic regularly employs students who are studying to become Naval Architects to help out part-time at the ice laboratory. They help in e.g. preparing the ice, forming the ice to channels or ridges, measuring the ice, and in filming the actual tests.

"In this way the students get acquainted with working life, they earn a bit of money, and they also learn about icebreaking and other technical topics," Topi Leiviskä says.

Many of these students eventually do their master's thesis for Aker Arctic, and start working full-time after graduation.

One of our newest employees, Jesse Lehtonen, began his career at Aker Arctic as a part-time employee during his studies.

"I visited Aker Arctic for the first time four years ago, with Aalto University's Shipbuilder's club," Jesse Lehtonen says.
"Topi Leiviskä asked me to come for an interview the next day, and I began working one or two days a week at the ice laboratory, helping out with preparing the ice, equipping the vessel models and assisting during tests."

Lehtonen also worked during his summer holidays at Aker Arctic, and when his studies advanced he began helping out in more demanding tasks in ship design. In his master's thesis he studied simulation of propulsion system dynamics under propeller-ice interaction. From January 2017, Lehtonen is a full-time employee working with machinery system design.

"It is an excellent idea to have a student pool. I don't know of any other engineering office offering a similar system for younger students," Lehtonen says. "It has provided me and many others with working experience and interesting job opportunities."

Jesse Lehtonen started his career at Aker Arctic as a part-time employee during his studies and is now working full-time with machinery system design.