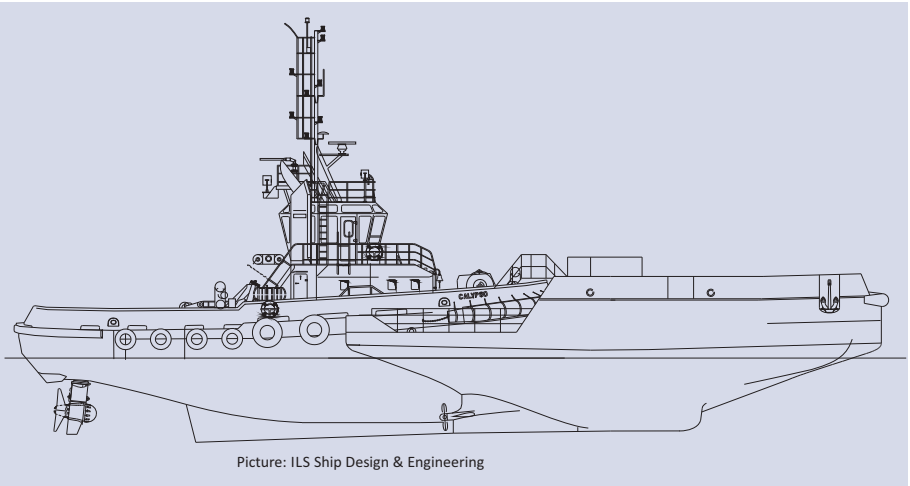
Self-propelled detachable icebreaking bow for Lake Saimaa

The innovative detachable icebreaking bow will be fitted on the tugboat Calypso.

The Finnish Transport Agency has together with ILS Oy developed a new and innovative self-propelled detachable icebreaking bow to improve and ensure icebreaking capacity in freshwater Lake Saimaa and the Saimaa Canal. This bow will be pushed by the tugboat *Calypso*, which usually assists vessels in sea-ports in Southern Finland.

Lake Saimaa is the biggest lake in Finland and the fourth largest freshwater lake in Europe. The Saimaa Canal, which opened in 1856, is a transportation canal that connects Lake Saimaa to the Gulf of Finland near Vyborg in Russia. The canal has been of great importance for industry in Eastern Finland, and is still today the most economical route for timber and other export goods.

During the winter the lake and canal freeze, therefore icebreakers are necessary to keep the waterways open and extend the season in support of the export industry. Products for domestic use can be transported by road or by rail, but it is more beneficial and ecological to transport export cargo along waterways.



The new detachable ice bow will be 25.3 metres long and have a beam of 12.6 metres. A special feature is that the bow will have its own propulsion system, which will improve its efficiency and manoeuvrability.

Fitted on existing tug

In order to improve and secure icebreaking capacity in Lake Saimaa and the Saimaa Canal, the Finnish Transport Agency and Finnish company ILS Oy have under the WINMOS II project together developed an innovative self-propelled detachable icebreaking bow. Based on a procured ten years contract, the bow will be pushed by the tugboat *Calypso*, which is owned and operated by Finnish shipowner Alfons Håkans Ltd. Calypso usually assists vessels in sea-ports in Southern Finland and is suitable for winter use with Finnish-Swedish ice class 1A.

Previous winters, the icebreaking vessel *Protector* with a non-motorized loose bow and a few other tugs have kept water ways in the lake and the canal open, but these vessels are getting old and inadequate and capacity needs to be renewed. Before *Protector*, icebreaker

Arppe performed the main task, but was later sold to become an icebreaker on the Caspian Sea.

Acquiring a completely new icebreaker is a huge investment. Traffic on the lake and the canal are still limited and seasonal, so currently it does not make sense to buy a new icebreaker.

The Finnish Transport Agency is responsible for winter navigation in Finland and is trying this innovative option as part of the EU-funded WINMOS II-project: "Winter Navigation Motorways of the Sea II". The WINMOS II is a continuation to the WINMOS I-project, in which Aker Arctic also participated. The aim of the WINMOS II-project is to improve winter navigation for the future by developing existing vessels and finding new options. The Finnish Transport Agency acts as a coordinator in the project.

Own propulsion system

The new detachable icebreaking bow will be 25.3 metres long and have a beam of 12.6 metres. One special feature is that the bow will have its own propulsion system, which will improve its efficiency and manoeuvrability. Two shaft-lines will be installed on both sides of the bow, each having 600 kW power.

The tugboat *Calypso* when outfitted with the new icebreaking bow will break a wider channel than before, which will enhance the transportation of cargo along the Saimaa waterway.

While ILS has developed the icebreaking bow, Aker Arctic has performed the model tests for the design.

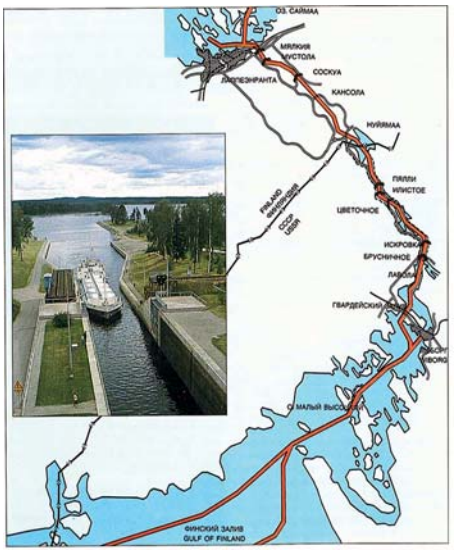
Turku Repair Yard in Naantali has been selected to construct the bow and additionally make alterations to *Calypso* in order to connect two units seamlessly. The bow is to be delivered to the owners by the end of 2018. Full- scale ice trials are planned for next winter.

The aim of all involved participants is to gather as much information and experience as possible to establish whether this removable ice-bow concept will be possible to enlarge and use on other, bigger vessels and in other sea areas. In some areas it could be very useful to have this kind of multipurpose vessel, which could break ice in winter and perform other duties in summer.

New propellers for winter

An additional feature will be to equip *Calypso* with new propellers for the icebreaking season. The existing nozzles are susceptible to clogging during icebreaking operations, but this is avoided with the new nozzle-free propellers. For summer, the original propellers will be re-installed.
This is something quite new, as the vessel has to be dry-docked in order to change the propellers.

During winter the lake and canal freeze and an icebreaker is necessary to keep the waterways open and extend the season in support of the export industry.



The Finnish Transport Agency is investigating the possibility to enlarge the locks on Saimaa Canal, as this would allow larger vessels on the canal. Larger locks would also benefit existing vessel sizes during winter faring.