Ice management prediction tool updated

Over the last few years, AKAC has been developing an ice management prediction tool to a commercial level, called AKAC Ice Management Suite (AIMS). The latest version of AIMS has been enhanced to include a wide range of ice conditions from low concentration to heavy ice pack, and is applicable for a variety of vessel types including ice classed supply vessels and icebreakers.

The first version of AIMS was developed for a commercial client in 2013. The initial version was considered suitable for ice management predictions of ice-breakers for operations in heavy pack ice.

However, it appears that the industry's initial steps into the arctic offshore will focus on dealing with season extension operations in sub-arctic regions, where open water is common and pack ice may only occur occasionally, and typically in lower concentrations. For such conditions, vessels with an ice class but otherwise an open water hull shape are preferred over icebreakers as they are less expensive, are in greater supply, and have better seakeeping characteristics.

An example of such a region is the Grand Banks, located southeast of Newfoundland in Canada, where sea ice is not experienced on an annual basis, and when it does, the ice is not winter ice strength but rather deteriorated. Therefore, typical standby and supply vessels used on the Grand Banks have a relatively low ice class but otherwise an open water hull shape optimised for efficient operations in heavy seas.

Low concentration ice conditions

Recent interests motivated AKAC to update AIMS to allow for ice management predictions in lower concentration conditions, and to consider ice management performance with low ice class vessels. Thanks to a recent Joint Industry Project (JIP) completed earlier this year, the most recent version of AIMS incorporates the physical management of low concentration ice conditions using low ice class supply vessels.

In the JIP, a key focus area where AIMS was updated was the ice management logic used for managing severe ice features in relatively low ice concentrations. For example, the use of pre-ice management, which is an effective tactic used in practice to physically manage potentially hazardous ice features such as large floes prior to the arrival to the operational site, was incorporated to the logic.

Ice class is not enough

A common misunderstanding is that selecting a vessel of a particular ice class guarantees a vessels performance. However, ice class rules provide little assurance regarding the ability for a vessel to perform ice management. In fact, the structural limitations of a vessel operating in ice is the only distinction between the ability of different ice class vessels to perform ice management. Therefore, selecting a vessel for ice management duties based on ice class alone does not automatically yield an optimum ice management vessel.

As part of the updated AIMS work, AKAC implemented a vessel performance algorithm based on both the attainable performance and the safe operating speed in a given environment. This includes incorporating models to predict the performance of ice class vessels with different hull forms, including bulbous bows and vertical stems, and a safe speed model to limit the speed of the ice management vessels. This upgrade to AIMS will improve its applicability for ice management fleet selection studies, to ensure that the vessels selected have sufficient capability from both a performance and structural safety perspective.

AIMS is both commercially available for license as well can be applied on a project-by-project basis to assist clients in selecting the right assets for their projects.

Text by Mike Neville, head of St. John's office in Canada.

AIMS is a software package for calculating the station keeping performance of floating ship shaped platforms with the influence of ice management. It has now been enhanced to include a wide range of ice conditions from low concentration to heavy ice pack, and is applicable for a variety of vessel types including ice classed supply vessels and icebreakers.
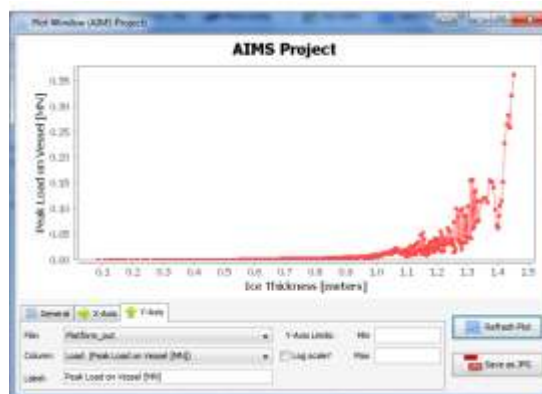
AIMS has a graphical interface designed to be operated on a Windows PC. The interface is easy to use by someone with an understanding of ice management concepts.

AKAC (Aker Arctic Canada) is the Canadian arm of Aker Arctic's activities. AKAC specialises in tailored solutions for offshore operations in ice conditions and complements Aker Arctic's icebreaker and offshore design expertise. Aker Arctic Canada has operations in Victoria and St. John's.