



# ***Jäänmurtotekniikan uudet tuulet***

Mikko Niini, Managing Director  
(Reko-Antti Suojanen, R&D Manager)

Aker Arctic Technology Inc.

Kanavan vuokrasopimus jatkuu – Seminaari Lappeenrannssa

25.1.2012 Lappeenranta

- Esittely – Aker Arctic Technology
- Pienet jäissäkulkevat alukset
- DAS jäänmurtotekniikka on jo nykypäivää
- Mihin jäänmurtotekniikka on tullut – vinottain kulkeva jäänmurtaja?
- Saimaan alueen ympärivuotisen liikenteen haasteet
- Yhteenveto

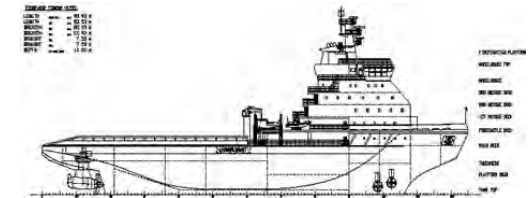
# AARC basic services

# Aker Arctic



## Ship design

- Concept development
- Feasibility studies
- Performance predictions
- Simulations
- Basic design packages



## Field research

- Ice conditions
- Ice properties
- Route selection
- Design basis development

## Testing in model and fullscale

- Ships
- Structures
- Offloading operations
- Rescue and evacuation





# Aker Arctic – THE ice technology partner

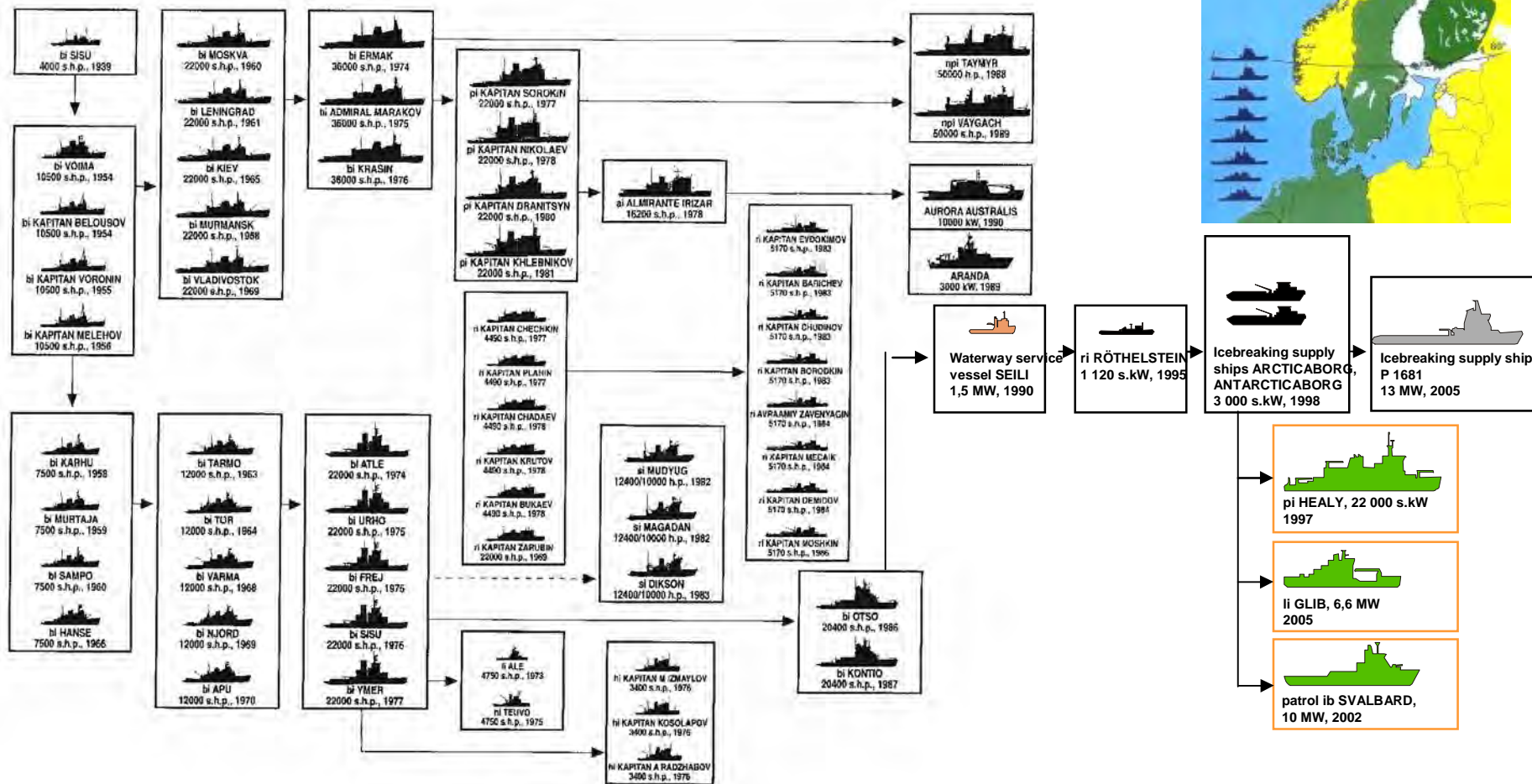
Aker Arctic

- Since establishing of the Company we have grown from 1,5 Mill. EUR to 6 Mill. EUR in turnover.
- Today 35 experienced naval architects and are growing
- We are a solid company with an equity of 8 Mill. EUR
- AARC shareholders:

STX Europe	71,4 %
ABB Marine	14,3 %
Aker Solutions	14,3 %
- Co-operating with Helsinki University of Technology, Rovaniemi Polytechnics (cold laboratory), Finnish Institute of Marine Research, SSPA in Sweden, NTNU and Marintek in Norway, Froce Technologies in Denmark

# Building the domestic icebreaker fleet created a knowledge to achieve a 60% market share in icebreakers globally

Aker Arctic



## Talviliikenteen tavoitteet sisävesillä

- Saimax-laivan ympärivuotinen käyttö
- Kanavan pitäminen auki talvella
- Jäänmurto
- Bioenergiakuljetukset – tulevaisuuden potentiaali
- Erilaisia proomukombinaatioita (mm. tankki/kontti)

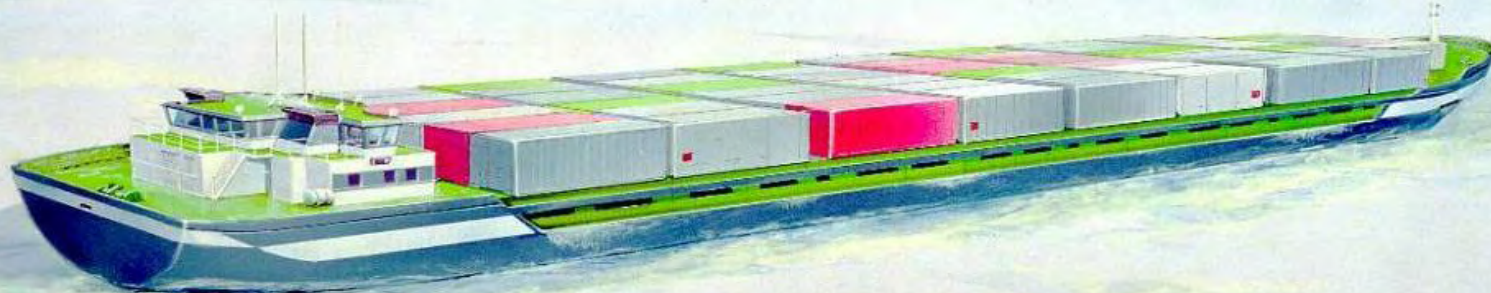
## Aker Arctic



# Esimerkki - ympärivuotinen DAS kanavalaiva

Aker Arctic

Loa 134m  
Bwl 16.0m  
Draught 4.5m  
Power: 2300 kW  
Speed: 12 kn.  
DWT 5100



- Can go stern ahead in ice conditions
- Bulbous bow to improve open water performance
- Limited operating area to Baltic

## Matalakulkuisia jäissäkulkevia aluksia

Aker Arctic

- Röthelstein (1995)
- Syväys 1.5 - 2.0m
- 40m x 10m
- Teho 2 x 560 kW



## Matalakulkuisia jäissäkulkevia aluksia

Aker Arctic

- Arcticaborg (Wagenborg)
- 65m x 16m x 2.9m
- 2 x 1600 kW

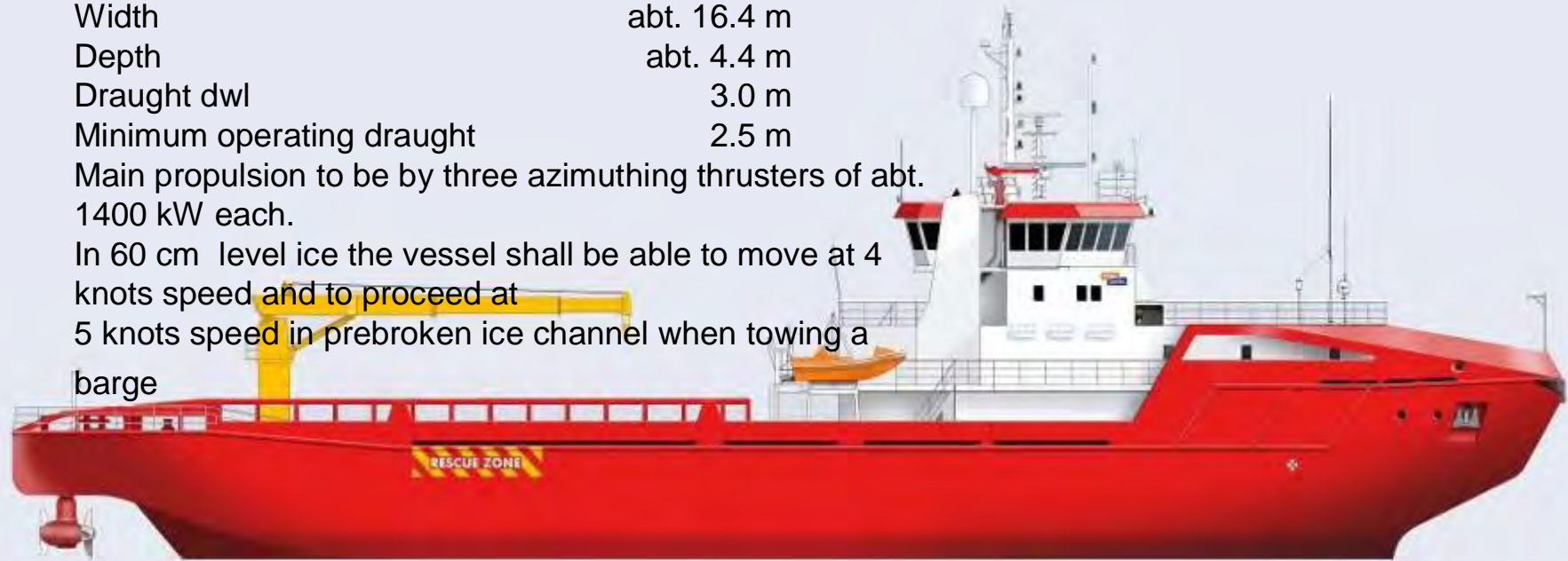


# Shallow Draught Caspian Icebreaker tug Aker Aker Arctic ARC 104 PSV contracted by Caspian Offshore Construction. Built in STX Romania.

Length oa	abt. 65.0 m
Length dwl	abt. 61.7 m
Width	abt. 16.4 m
Depth	abt. 4.4 m
Draught dwl	3.0 m
Minimum operating draught	2.5 m

Main propulsion to be by three azimuthing thrusters of abt. 1400 kW each.

In 60 cm level ice the vessel shall be able to move at 4 knots speed and to proceed at 5 knots speed in prebroken ice channel when towing a barge



Edellämainitut laivat perustuvat DAS-  
jäänmurtotekniikkaan.



DAS-tekniikan avulla voidaan jää murtaa 50% pienemmällä  
teholla.

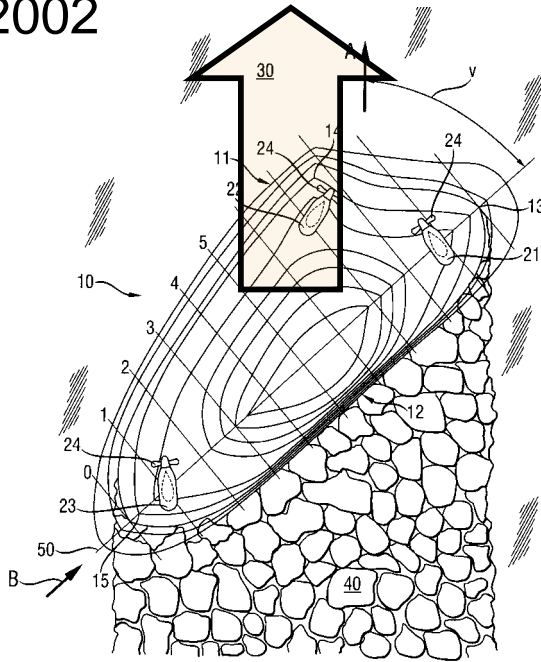
# Oblique Oil Combat Icebreaker

- Concept
  - Development
  - Functions / Modes of Operation
  - Environmental Friendliness

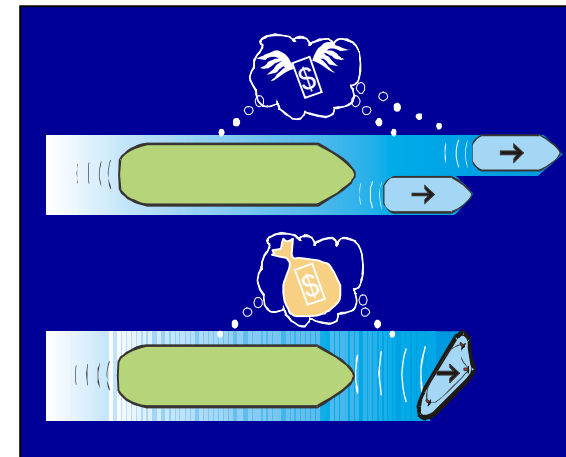


# Original Development

- Project established in 1997 to develop an icebreaker which could provide independent assistance to 40m beam vessels
- Oil recovery function by using vertical side as a sweep arm was founded 2002



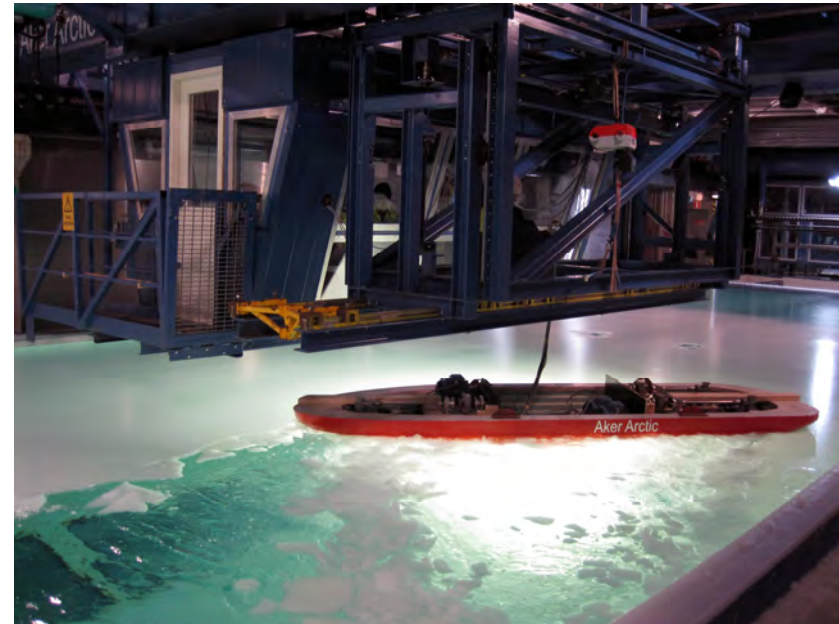
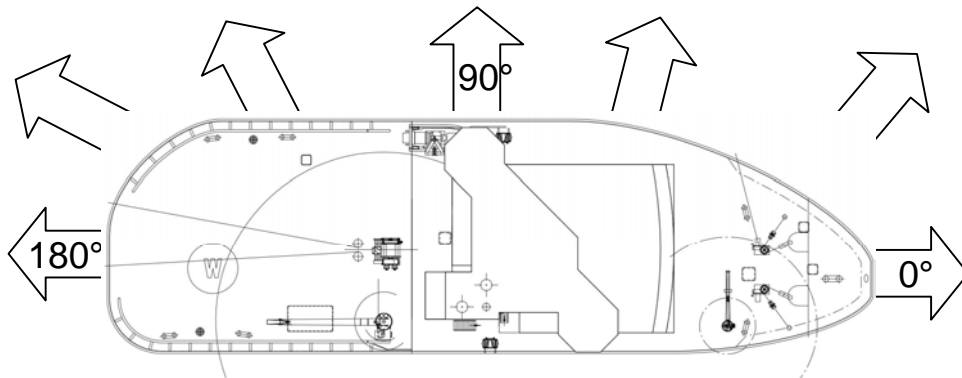
# Aker Arctic



# Icebreaking Modes

Aker Arctic

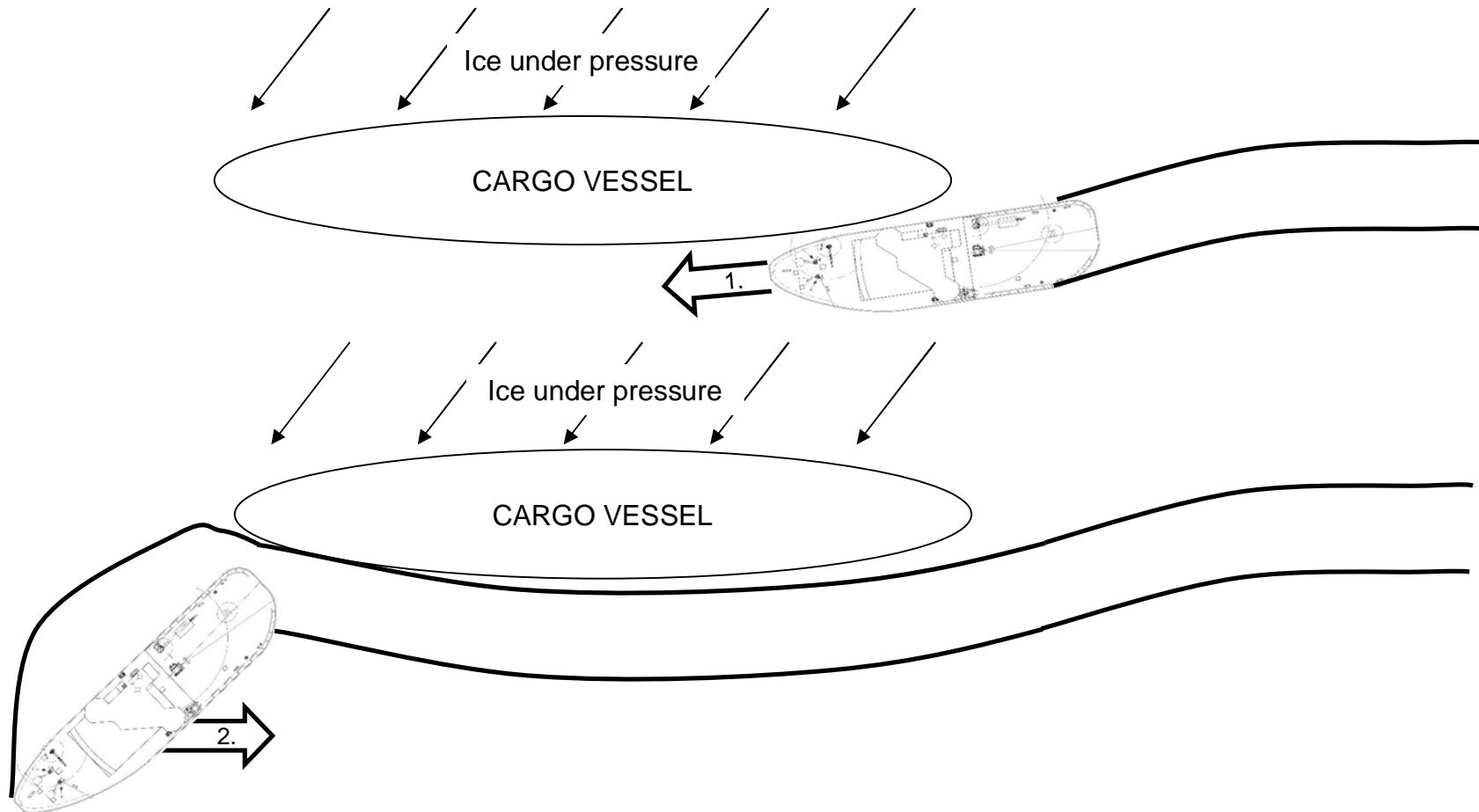
- Ahead and astern
  - Transit in level ice
  - Penetration of ridge fields by milling and flushing
- Oblique mode
  - Possible directions from  $0^{\circ}$ - $180^{\circ}$  without restrictions
  - Channel widening



# Icebreaking Modes

Aker Arctic

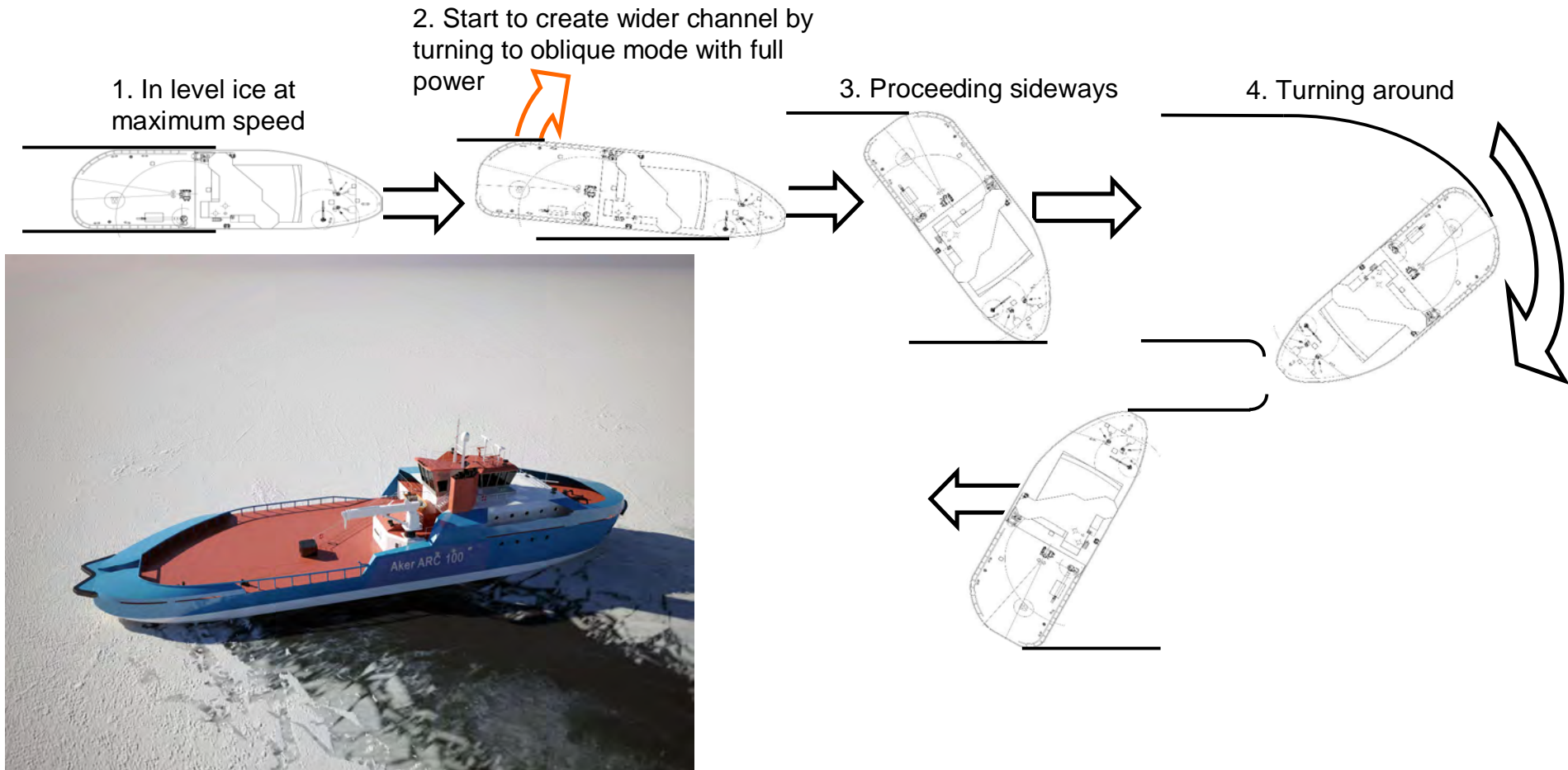
- Icebreaking assistance – releasing stuck vessel



# Icebreaking Modes

Aker Arctic

- Harbour operation assistance
  - Breaking space for maneuvering operation in harbour area

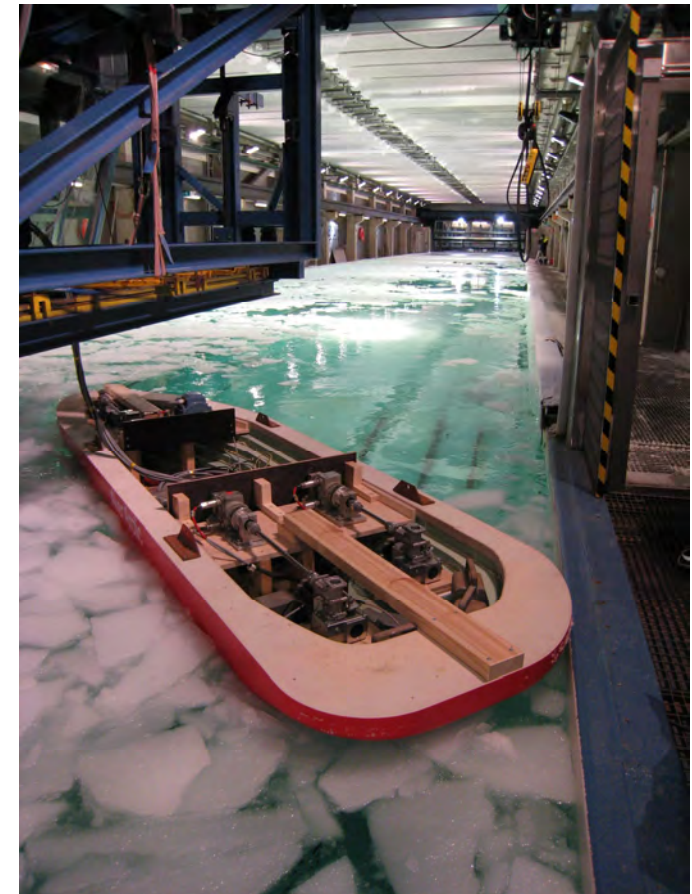
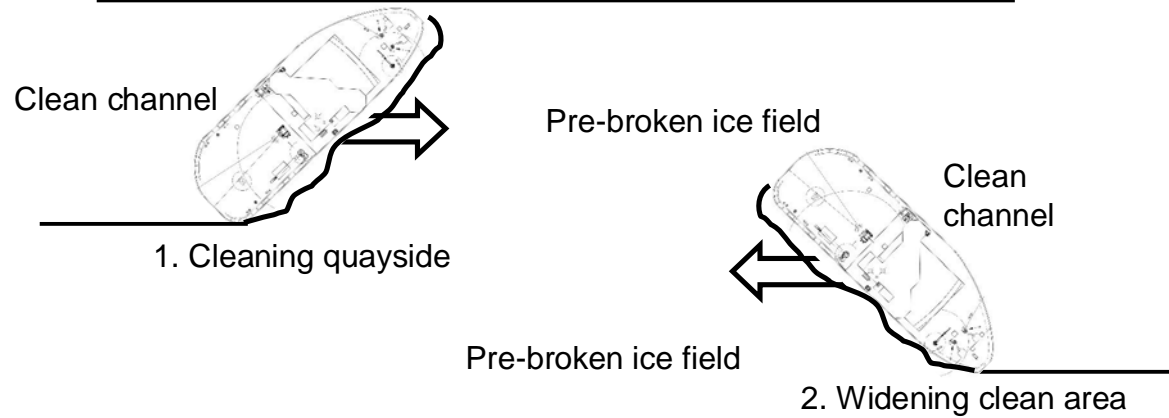


# Icebreaking Modes

Aker Arctic

- Harbour operation assistance - Quayside cleaning

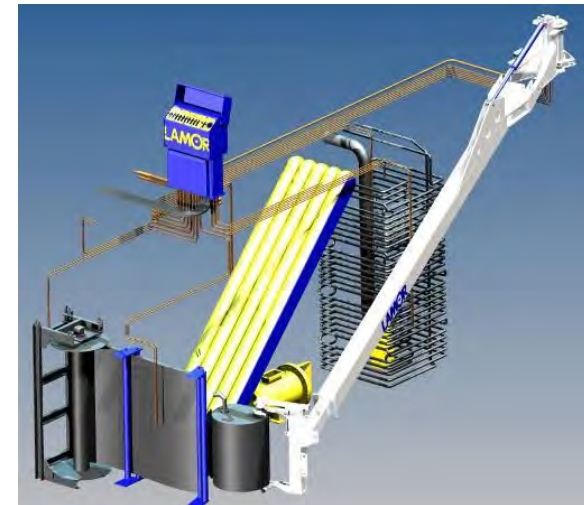
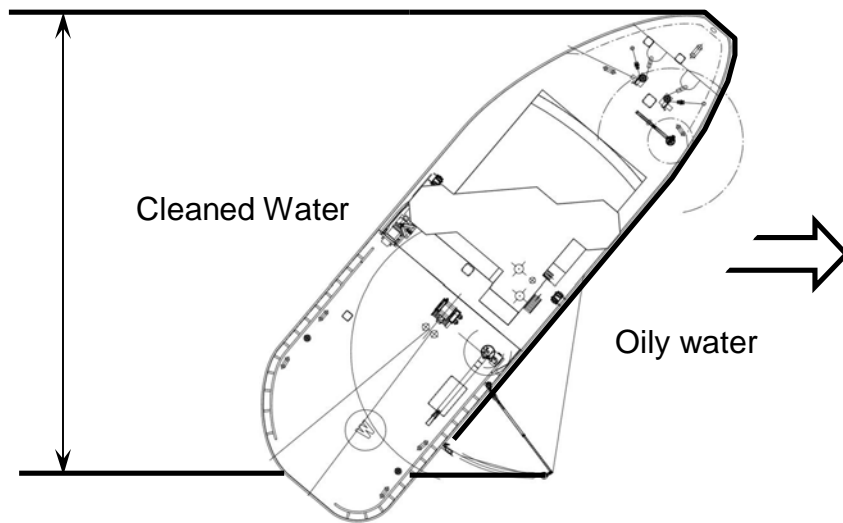
FIXED STRUCTURE



# Oil Recovery Modes

Aker Arctic

- Oil recovery in open water
  - In heavy waves by using hull vertical side as a sweep arm
  - Rubber boom for leading oil to brush collectors
  - Oil separation by built-in brush collectors



# Ice conditions and performance

- **Ice conditions in operation area – Eastern Gulf of Finland**

- **Season (days)**

- Average winter about 120 days
- Severe winter about 150 days
- Mild winter about 60 days

- **Level ice thickness**

- Average 50 cm
- Maximum 70 cm



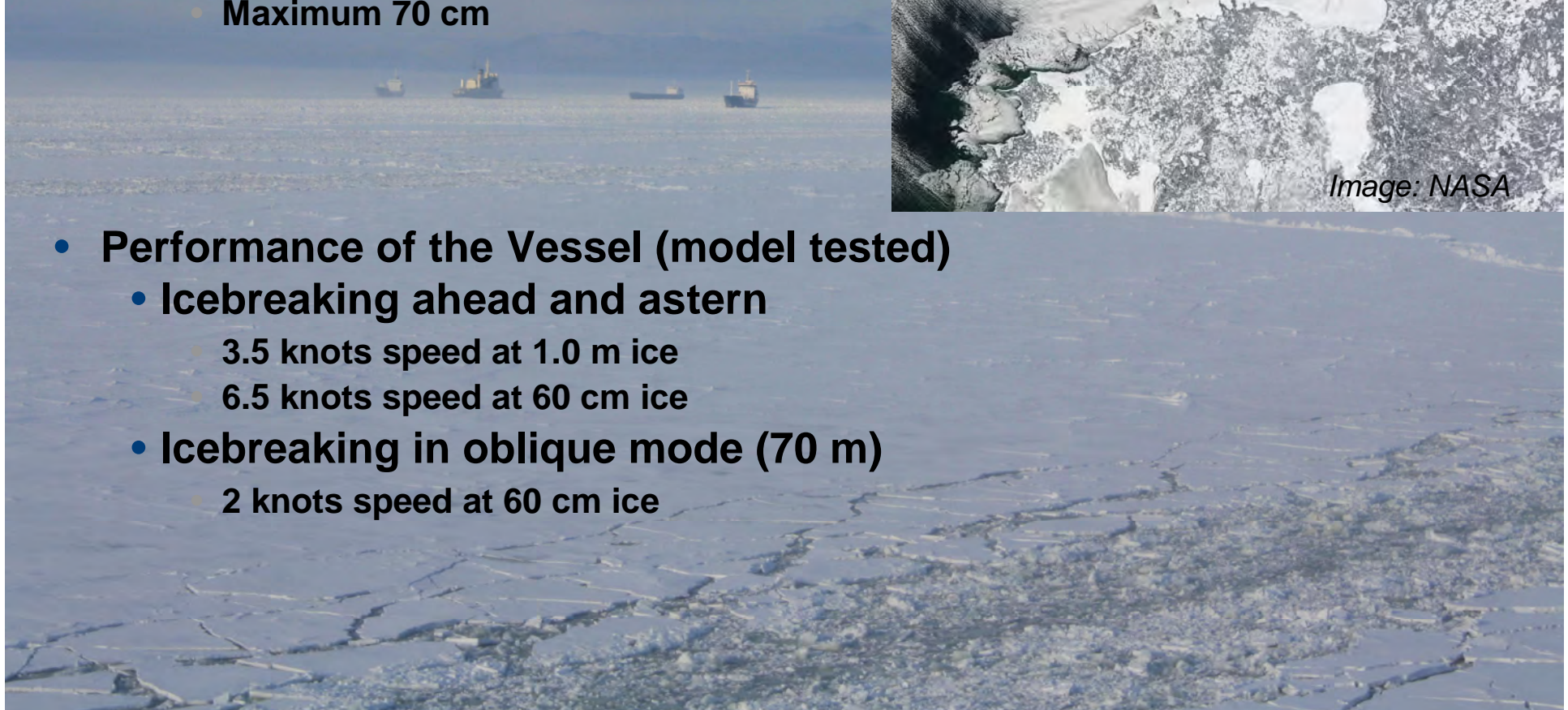
- **Performance of the Vessel (model tested)**

- **Icebreaking ahead and astern**

- 3.5 knots speed at 1.0 m ice
- 6.5 knots speed at 60 cm ice

- **Icebreaking in oblique mode (70 m)**

- 2 knots speed at 60 cm ice



## Video of recent model tests for Oblique Icebreaker

- \* Ice test
- \* Seakeeping test (oil recovery mode)

# Mission

Aker Arctic

- Operating area: Year round service in Eastern Gulf of Finland
- Main functions
  - Oil spill response in open water and winter conditions
  - Icebreaking + terminal ice management
  - ECO environment monitoring
  - Salvage operations and emergency towing
  - Towing and tug operations
  - Fire fighting of external fires
  - Education, training

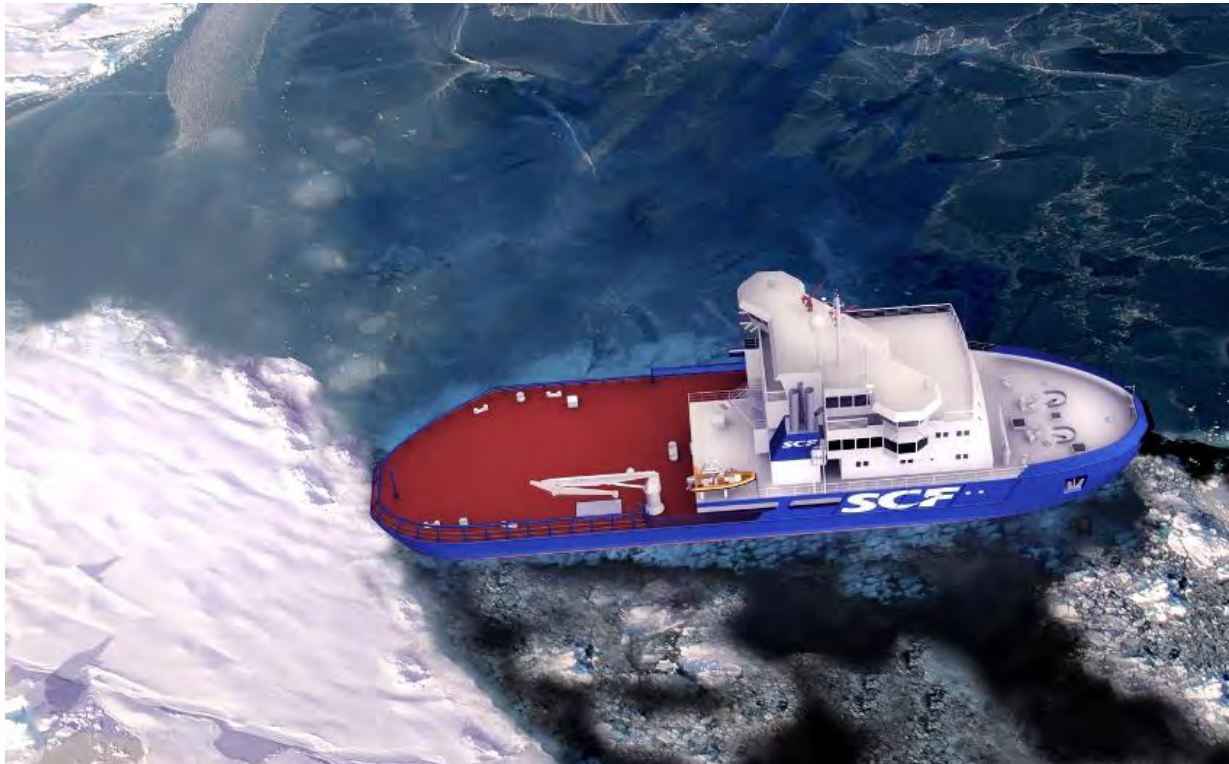


## Main parameters

- Length over all 78.8 m
- Length at dwl 74.5 m
- Breadth over all 20.5 m
- Breadth at dwl 19.2 m
- Draught, minimum operating 6.0 m
- Draught at design waterline 6.3 m

## Aker Arctic

- Draught maximum 7.0 m
- Depth to main deck 9.0 m
- Propulsion Power 3 x 2.5 MW
- Main engine power 10200 kW
- Bollard pull 80 ton
- Accommodation 24 person



# Ympäri vuotisen liikenteen haasteet

- Väistämättä kustannukset suuremmat kuin kesällä
- NykYTEKNIikka mahdollistaa ympärivuotisuuden
- Esimerkit maailmalta osoittavat tämän kun ei muita vaihtoehtoja ole ja rahtitaso on hyvä (oil&gas)
- Kanavien jäänhallinta on ratkaistavissa
- Tuki- ja väylämaksupolitiikkaa tarvitaan investointien aikaansaamiseksi
- Tuoko talviliikenne lisää kuljetuksia?

*Luovuus on liiketoimintamme*

*Kohti uusia haasteita*

*Kiitos mielenkiinnostanne!*

19 5:43 PM

# Copyright

Aker Arctic

Copyright of all published material including photographs, drawings and images in this document remains vested in Aker Arctic and third party contributors as appropriate. Accordingly, neither the whole nor any part of this document shall be reproduced in any form nor used in any manner without express prior permission and applicable acknowledgements. No trademark, copyright or other notice shall be altered or removed from any reproduction.