



AKER ARCTIC TECHNOLOGY

Introduction of model test: Baltic cargo ship in a narrow channel

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Hanyang Gong
Research Engineer

hanyang.gong@akerarctic.fi

Content



Ice basin & testing technology

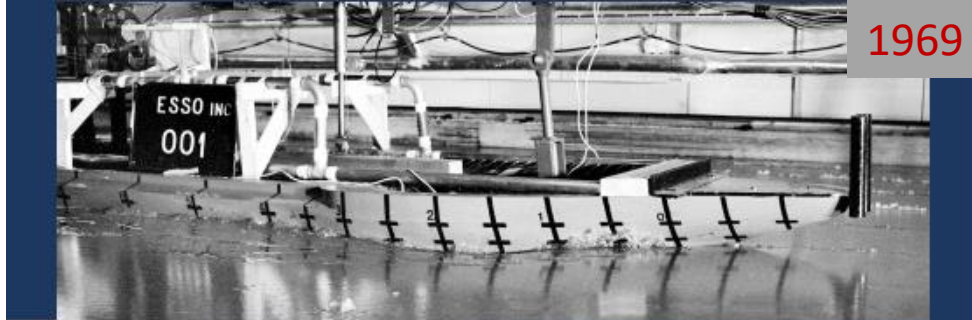


Today's demo



Aker Arctic Ice Model Basin

Aker Arctic Ice Model Basin



1969



1983



2005

The Ice Technology Partner

- Built in 2005, 3rd-generation
- 55-year model testing experience: 500+ model test series
- 75 m × 8 m × 2.1 m
- Unique bottom and side viewing windows
- Unique ice making system and fine-grained ice
- Deep water / shallow water
- 3D motion tracking system
- Test online service



Ice model testing technology

Aker Arctic Model Ice

- Fine-grained ice
- Ice thickness: 15 - 55 mm (max. 150 mm)
- Flexural strength: 15 - 80 kPa
- Strain modulus of elasticity
- Ice density
- Compressive strength and crushing strength

Level ice



Brash ice channel



Brash ice



Floe ice



Ice ridge



Ice rubble



- Compressive ice
- Consolidation

Model tests

- Conduct various arctic engineering and research projects
- *Cooperation with Aalto Ice Tank (40 m × 40 m × 2.8 m)



Aker Arctic



Aker Arctic



Aalto Ice Tank



Aker Arctic

Ship tests

Ice performance prediction

- Ice resistance
- Manoeuvring*
- Mooring

Ice Class test

Propeller-ice interaction analysis

Offshore structure tests

Ice loads

Ice accumulation Ice encroachment



Ice model test demo

Baltic cargo ship in a narrow ice channel

Cargo ship in Baltic



A typical cargo ship can keep speed in a wide enough channel on fairway.

- Channel should be wider than cargo ship's beam
- Increases icebreaker's assistance in ice
- High risk of besetment

Any better ice-going cargo ship solution?

- Very large displacement with a wide beam
- Increases operation efficiency and safety in ice



Aker Arctic new design

Aker Arctic is developing a novel wide ice-going cargo ship solution

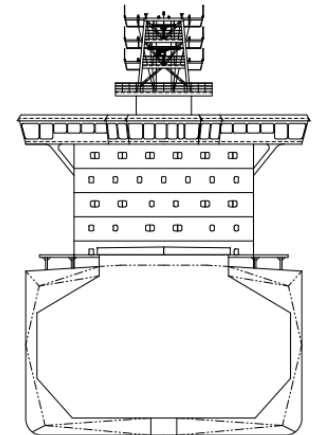
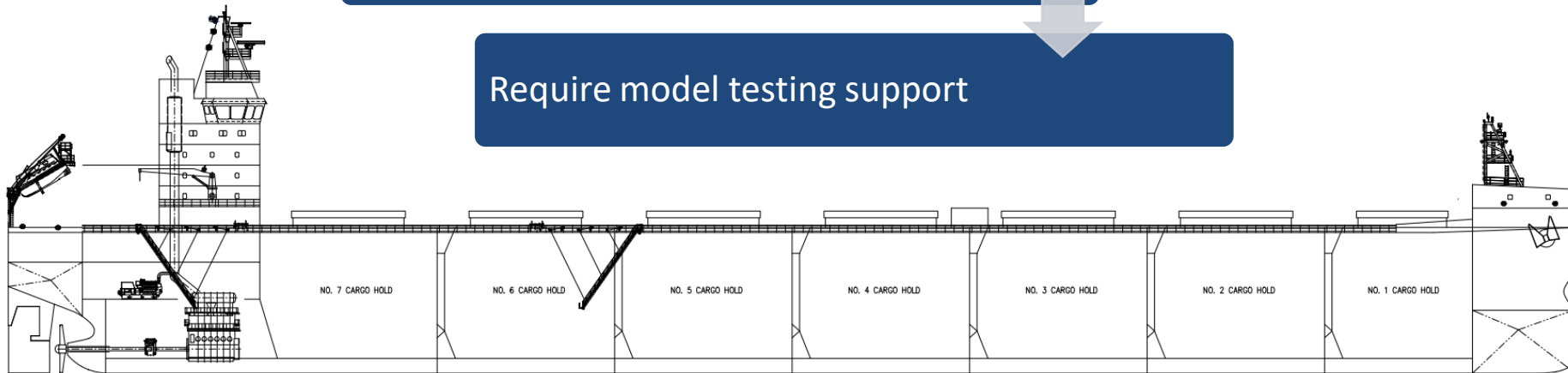
- Good open-water efficiency
 - Beam can be 32 m for Baltic
 - Special icebreaking wide shoulder
- > can operate in a narrow ice channel escorted by a 24-m-wide icebreaker.

An illustration



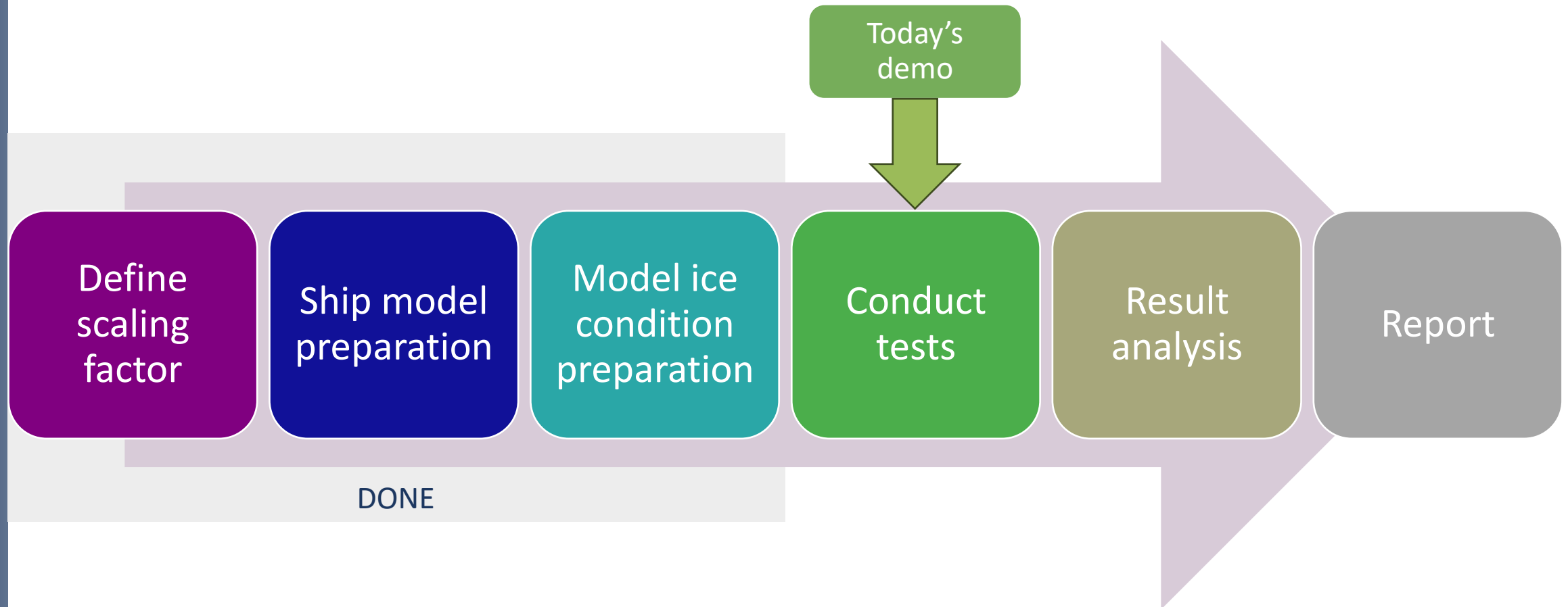
How fast the cargo ship can advance in a narrow ice channel?

Require model testing support



Model testing support

- Evaluate ice performance of new ship design



Ship model

- The scaling factor is 22.7.

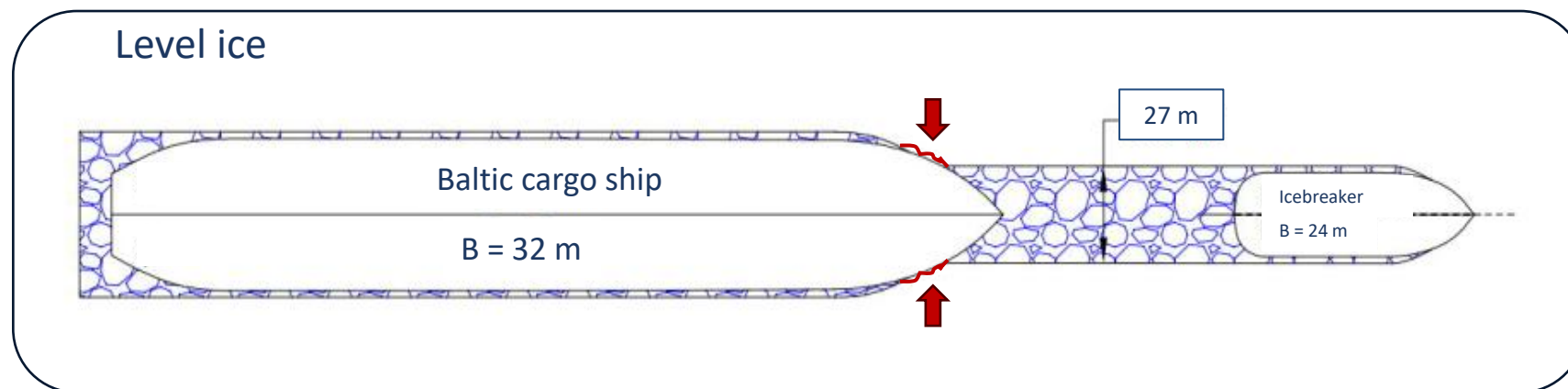
New design	Full scale	Model scale
L_{OA} [m]	~213	9.0
B [m]	~32	1.4
T_{design} [m]	~13	0.6



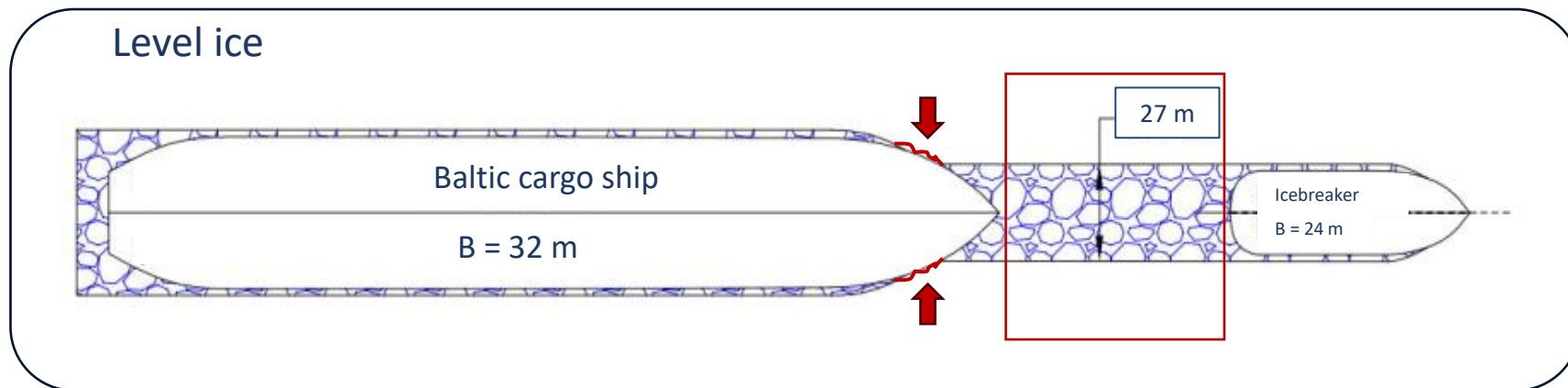
Ice condition: A narrow channel in level ice



An illustration



Ice condition: A narrow channel in level ice



- The scaling factor is 22.7.

Ice condition	Full scale	Model scale
h_i [m]	0.8	0.035
Flexural strength [kPa]	500	22
Channel width [m]	27	1.2

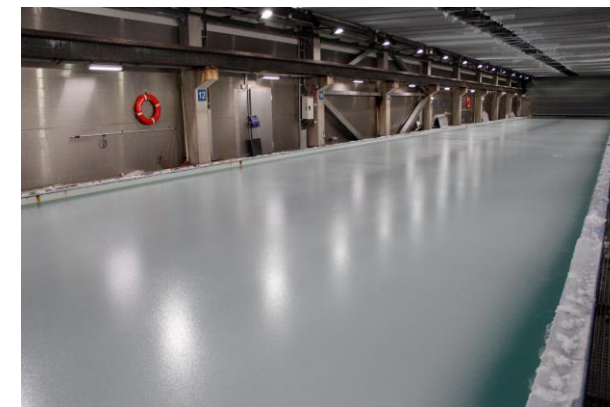




PHOTO IS ALLOWED



Please, mention Aker Arctic

SAFETY INFORMATION



WARNING
Slippery
surface

- Stay with the group
- Watch your step



Thank you!

hanyang.gong@akerarctic.fi
www.akerarctic.fi