

ICE NAVIGATION SIMULATION

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CLEAN ENVIRONMENT
A future without emissions or pollution

MARKET SHAPING & INNOVATION
A union of new technology and business models

ENERGY INTELLIGENCE
An optimised way of producing and using energy

WÄRTSILÄ'S PURPOSE
is to enable sustainable societies with smart technology.

MARINE SOLUTIONS



Our offering covers all market segments



OIL & GAS



MERCHANT



CRUISE & FERRY



NAVY



SPECIAL VESSELS

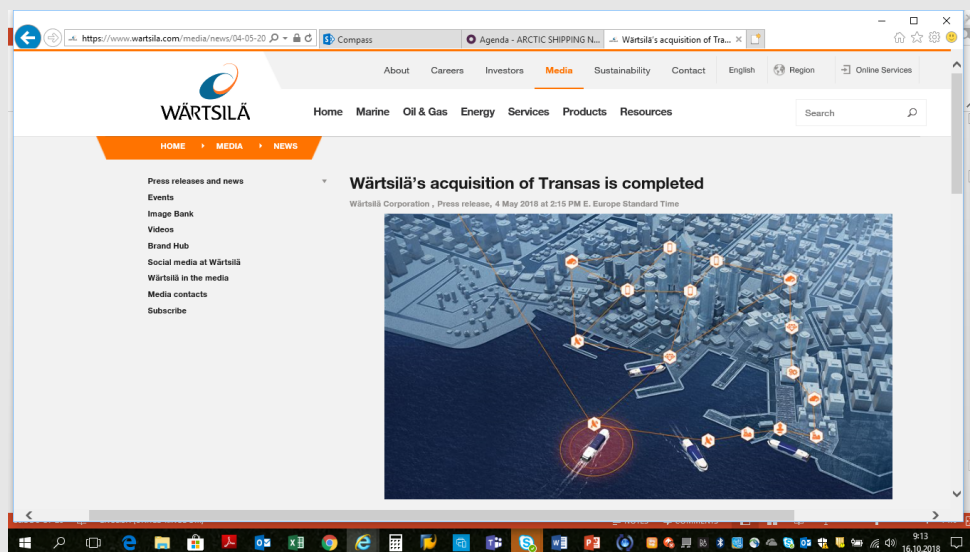
LEADER IN:

EFFICIENCY • GAS AND DUAL-FUEL SOLUTIONS • ENVIRONMENTAL SOLUTIONS

THROUGH OFFERING:

- Lifecycle solutions for ship owners and operators
- Integrated solutions for the shipbuilding industry, owners and operators
- The best customer value and customer experience in the marine industry

TRANAS ACQUISITION



WÄRTSILÄ VOYAGE SOLUTIONS – TECHNOLOGY & SOLUTIONS



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VTMS are installed
in more than

100
ports in

55
countries



More than
3000000
of electronic charts sold
worldwide

Transas collections includes
17000
electronic charts



Marine onboard equipment is
used on more than
13000 commercial
vessels and patrol boats of
naval and Coast Guard fleets
from over 100 nations.

More than **5500**
marine simulation systems in
91 countries

More than

10000

electronic chart systems and
several millions of electronic
charts supplied

45%

world's marine simulation
market

35%

Electronic Chart Systems
world's market share

Offshore simulation

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TRANSAS

Ice training in Transas NPro 5000

TRANSAS

Arctic shuttle tanker *Timofey Guzenko* mooring at the Varandey FOIROT

Working near the oil installations is an art

<https://www.youtube.com/watch?v=VIY0V0nYZBU>

Footer © Wärtsilä PUBLIC

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TRANSAS

Ntpro 5000

WHAT IS NTPRO 5000?

- 5th generation of the Transas Navigational Simulation Platform for conventional Standard for Training and Certification of Watchkeepers (STCW) training, advanced operation specific training and R&D applications.
- Windows based network/client software package using COTS hardware infrastructure.
- Fully scalable solutions from online STCW training from the cloud up to full mission systems interconnected to other types of Transas and/or 3rd party simulators.
- The optimal simulation solution whether it is for generic or type specific ship's bridge operations.



STCW training



Operation specific training



Research & Development

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COMPLIANCE WITH INTERNATIONAL STANDARDS AND REGULATIONS



- International Convention of Training, Certification and Watch keeping for Seafarers (STCW 2010 including the Manila Amendments).
- IMO model courses.
- International SOLAS Conventions.
- Close cooperation with ClassNK on training and simulator development.
- Approved by DNV (with class notation INTEGRATED SIMULATOR SYSTEM, NAUT-AW(SIM), DYNPOS-AUT(SIM), HSC, TUG, ICE, AHTS and DYNAMIC POSITIONING SIMULATOR to the Class A Standard for Certification of Maritime Simulators No. 2.14 January 2011).
- The Nautical Institutes and OSVDPA requirements for Dynamic Positioning Simulators.
- Regulations concerning 'special' training: fishing operations, VTS operator training, etc.



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TRAINING OBJECTIVE DEFINES THE SIMULATOR CONFIGURATION

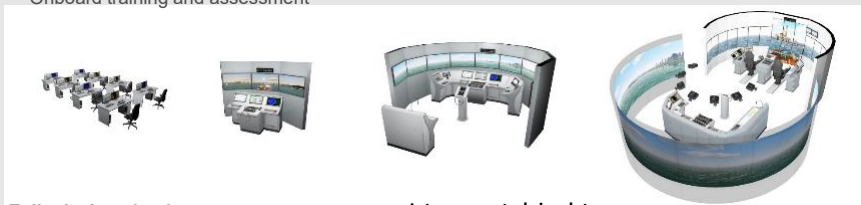


Computer based training

- Individual in-house or distance learning from the cloud
- Equipment familiarisation
- Self-examination and competence assessment
- Onboard training and assessment

Networked classes

- Interactive group exercises under instructor supervision



Full mission simulator

- Final training, assessment and certification
- Bridge Resource Management
- Pilot training
- Task rehearsals

Interconnected simulators

- Crew resource management: 'Whole ship' evolution training; Exercising communications between the bridge and engineering departments
- Operation resource management: interconnecting different types of Transas or 3rd party simulators to simulate a full operation, e.g. Oil Spill Response, Naval warfare, etc.

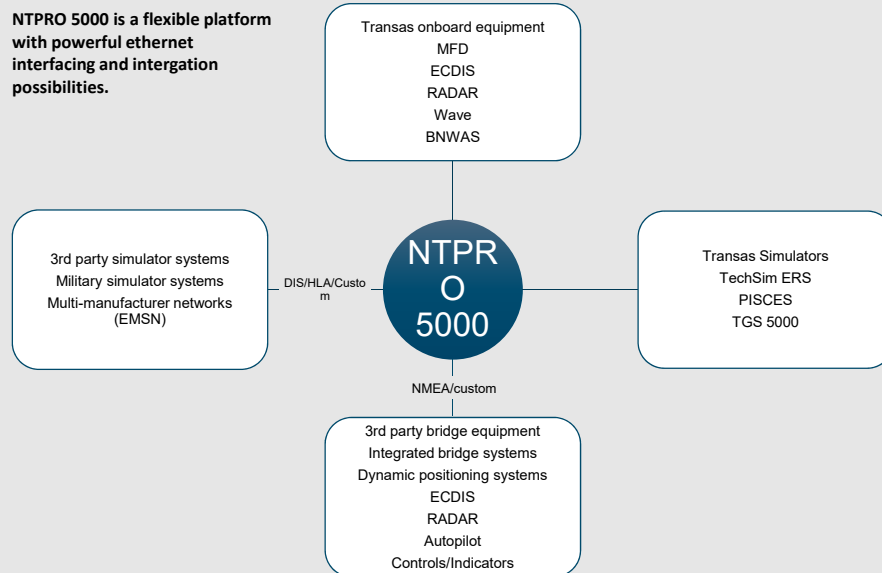
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INTEROPERABILITY

NTPRO 5000 is a flexible platform with powerful ethernet interfacing and intergation possibilities.



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OPERATIONS IN ICE – BACKGROUND/POLAR CODE

- Ice free waters are now expanding in the Arctic
- Mandatory international requirements for ships operating in polar waters (Polar Code), in force 1/2017
- New construction 1/2017, existing ships 1/2018
- Safety (SOLAS – new Chapter XIV)
- Environmental (MARPOL, various Annexes amended)
- Non-SOLAS ships to be considered next
- Ships in compliance will be issued a polar certificate
- Three main areas for compliance:
 - Equipment
 - Design & construction
 - Operations and manning



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OPERATIONS IN ICE – STCW



- STCW Convention and Code must be aligned with Polar Code.
- Draft amendments from HTW 2 (Feb 2015) to STCW Code (A) and Guidance (B), approved by MSC 95, expected to be adopted by MSC 96 (May 2016).
- Expected entry into force 1/2018.
- Important points to consider:
 - HTW 2 agreed that the required service area would apply to experiences in areas considered equivalent to the polar area.
 - Certificate of proficiency will be required.
 - All training requirements will have to be met by 1/2018.
 - Certified training applies to seafarers working on board a ship subject to Polar Code.
- Course development – Full Ice course package with lesson plans, PPTs and simulator exercises is available.



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OPERATIONS IN ICE – POLAR CODE MODEL COURSE DEVELOPMENT



Basic Ice Navigation Course:

- | | |
|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ▪ Awareness of environment: | complexity, remoteness, changing factors. |
| ▪ Risk assessment: | introduction to operational risk management. |
| ▪ Responsibility: | introduction to risk management, ecological stewardship, regulations, construction requirements, communications. |
| ▪ Ice navigation: | recognition of conditions, instrumentation, chart coverage and projections and datum's, survey qualities, compasses, radar for positioning and for ice detection, A-to-B transit, alternate routing, SAR options, passage planning, marine communications, traffic monitoring, ice escort. |



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OPERATIONS IN ICE – POLAR CODE MODEL COURSE DEVELOPMENT



Advanced Ice Navigation Course:

- In-depth examination of Arctic environmental protection issues: MARPOL on HFO vs LNG, emission control areas, Ballast Water management, anti-fouling, Special Areas and PSSA's and ATBA's, routing measures, mandatory ship reporting systems, marine mammal and seabird watch.
- In-depth risk assessment: real-time tracking, rescue resources, emergency readiness, environmental forecasts, communications protocols, VTS, IACS Polar Class rules, routing and planning to match conditions to construction, hydrographic limitations, risk indexing systems.
- Ice navigator proficiencies: ice identifications, ice avoidance, partial ice concentration, position fixing, risk identification, A-to-B transit in various ice concentrations, use of open-water (polynya), finding leads, ice berg drift track, CPA's from bergs, ridges, pressure areas, growlers mixed in the ice edge, support for structures, ice management, etc.



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OPERATIONS IN ICE – COURSE DEVELOPMENT AND APPROVAL SUPPORT



Transas can offer a full course package:

- Ice course design based on objectives and requirements
- Lesson plans with associated presentations and other teaching materials
- Simulator scenarios including objective assessment tool
- Administration and quality support
- Course and simulator approval support (Class society, local programs, etc.)
- Similar packages can be delivered for other types of training



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OPERATIONS IN ICE – PRIMARY SIMULATOR FEATURES

- Automatic ice fields generation considering desired concentration, size, thickness, hardness, etc.
- Each piece of ice is simulated as 6 degrees of freedom floating rigid body connected to others.
- Ice ridges and hummocks are also simulated as semi-rigid bodies.
- Ship and objects interacts with ice considering 3D hull and object shape, ice strength, friction coefficients, etc. Full 6 DOF motion in ice is simulated.
- All types of hulls and engines are simulated including diesel electric azipod model developed in cooperation with ABB;
- Ice interacts with area bottom topography, wind and currents.
- Different types and sizes of icebergs are simulated.
- Interaction between propeller wash and ice.



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OPERATIONS IN ICE – TRAINING OBJECTIVES

- Navigating a vessel in cold weather conditions (below 0°C) and/or in ice-infested areas
- Taking command of the vessel in cold climatic conditions/in ice
- To reduce the potential for sea accidents
- Communication procedures
- Analyzing weather and ice information
- Voyage planning in ice covered areas
- Awareness of ice accretion risk
- Vessel formation during convoys



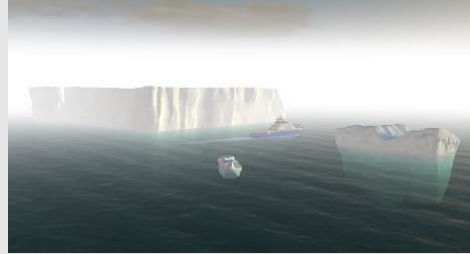
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OPERATIONS IN ICE – TYPICAL SCENARIOS

- Ice management
- Ice type identifications
- Ice avoidance
- Risk identification
- A-to-B transit in various ice concentrations
- Use of open-water (polynya)
- Finding leads
- Ice berg drift track & CPA's from bergs
- Ridges/Hummocks
- Growlers mixed in the ice edge
- Ice breaking support for structures
- SAR in ice

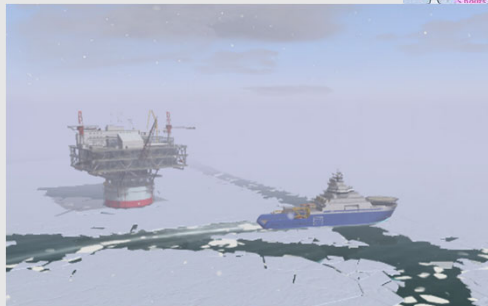
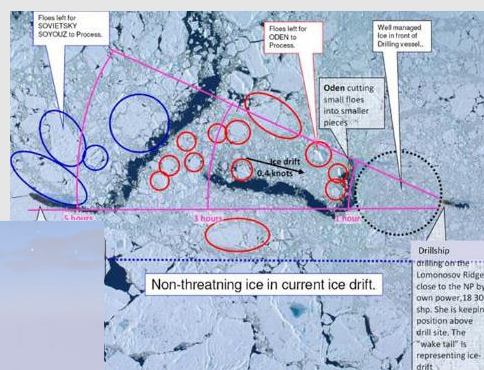


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OPERATIONS IN ICE – ICE MANAGEMENT

Monitoring and breaking drifting ice into smaller floes and steering icebergs away from the protected object, e.g.:

- Oil and gas platforms
- Drill ships
- FPSOs
- SPMs
- other offshore structures

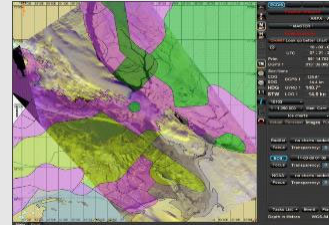


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OPERATIONS IN ICE – USE OF ECDIS



- Presentation of Raster Images from satellites (Modis, NOAA, RadSat)
- Separate presentation of concentration, deformation and pressure layers
- Adjustable transparency for all ice data layers
- One click focus on ice chart
- One click focus on recommended route
- Ice chart auto-loading
- Support of national/international symbols (ice eggs)
- Animation for Forecast Ice data

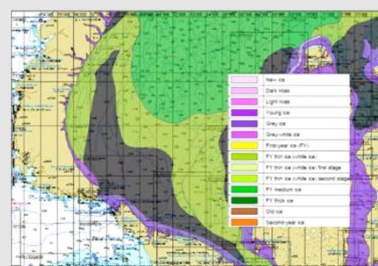
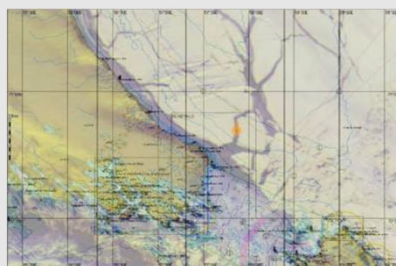


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OPERATIONS IN ICE – USE OF ECDIS



- Analysis of weather and ice condition information
- Voyage planning in ice covered areas



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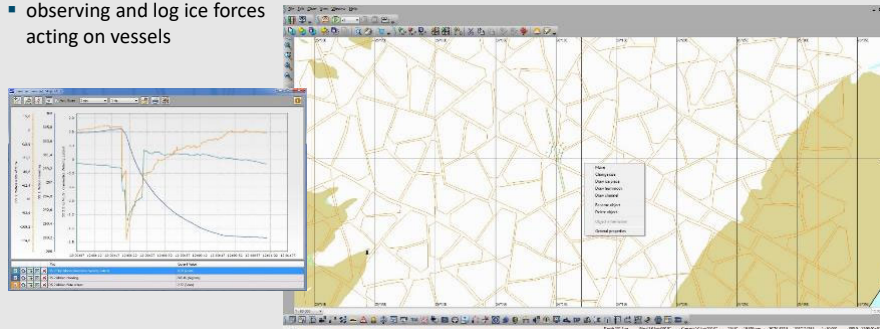
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OPERATIONS IN ICE – INSTRUCTOR TOOLS



- Automatic ice fields generation considering desired concentration, size, thickness, sigma value (hardness), etc.
- setting up ice ridges, channels, polynyas, stamukhas, etc.
- setting required drift speed depending on wind, current and other factors
- modifying ice friction for each vessel individually
- observing and log ice forces acting on vessels



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Wartsila Transas Ice Simulation Reference List (not complete):

- Makarov Academy & Krylov Institute in Russia involved in the Yamal/Sabetta project, with whom we developed Ice Management.
- Maritime Institute of Quebec in Rimouski and St. Romauld, used for Polar Code courses.
- Georgian College Ontario has the ice functionality
- Maine Maritime Academy
- Resolve Maritime Academy (Florida)
- MITAGS/Pacific Maritime Institute
- USCG Academy - installed in September 2019
- Edison Chouest Offshore

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