ESI GROUP
MALAYSIA



SARAWAK MARITIME ADVANCED RESEARCH & TRAINING CENTRE (SMART-C)



Centre of Technical Excellence Sarawak (CENTEXS)
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Introduction

At ESI, we provide customized research and expert training solutions to facilitate deep understanding across multifaceted interactions which guide the design, operations, and maintenance of ports, waterways and maritime facilities.

We provide the most up to date bridge and ship handling simulation for various complexities/scenarios pertaining to port, maritime and shipping operations. This simulation provides highly immersive and realistic scenarios for training and research with real sea visualization. It can also be easily upgraded for future ready learning e.g. Wartsila NTPRO 7 – Virtual reality, Augmented reality, Virtual Watchkeeper and Virtual Binoculars. Likewise, it can easily be integrated/interfaced with advanced training tools e.g. VR. AR, MR and Digital Twin.



Datuk Dr. Francis C.W. Wong
Managing Director
Port, Marine &
Transdiciplinary Specialist



Dato' Mohamad Safri Bin Datuk Haji Abdillah
Business Development



Hj Omar Hj Suib
Port Waste Management

Our Wärtsilä Navi-Trainer Professional 5000 (NTPro 5000) real-time ship handling simulator at the Centre of Technical Excellence (Centex) in Santubong, Sarawak represents one of the most modern and comprehensive modelling and design tool in the market allowing conduct of training and research activities for a wide selection of navigational activities and operating environments.

All mathematical models are calibrated against actual vessel manoeuvring data and validated based on the results of research carried out by global leading research centres. The accuracy of our simulators, makes them also ideal for pre-mission planning, feasibility studies and research projects like, autonomous vessel operations, port development, fuel economy, accident investigation and human factor studies.

All our NTPro 5000 simulators are approved for maritime training under IMO STCW Convention Regulation I/12 and certified by Det Norske Veritas (DNV).

The system is also certified according to the DNV Class D standard for cloud-based simulators — making it the first internationally certified cloud solution that offers both interactive instructor-led and remote student-led training

.

We are currently registered with the following government agencies:

- Ministry of Finance (MOF)
- Unit Pendaftaran Kontraktor & Juruperunding (UPKJ)
- Department of Environment (DOE)
- Natural Resources and Environment Board (NREB)
- Environmental Protection Department (Sabah)
- Sarawak Rivers Board (SRB)

Simulation Facility



Lim Poh Keong
Port & Marine
IMO, STCW, IALA &
VTS Training



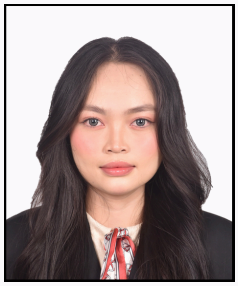
Capt. Jason Thong Seng Yoong
Maritime Operations
& Ship Management



Adrian Tee
Smart Port



Richard Chin
Ship Simulation Instructor &
Modeller



Dextyana Albert Panie
Navigation & Risk Assessment

ESI currently operates the single most advanced ship simulator facility in Malaysia offering a controlled virtual environment for training, evaluation, and risk assessment for numerous marine operations and projects.

The facility is equipped with a scaled-down bridge replica with 130 degree visual projected scenery. The bridge is equipped with realistic consoles and instrumentation, including bridge wing consoles. The sophisticated new visual system brings vessels and objects, including geographical training areas and all possible weather conditions, to life.

The system is powered by Wärtsilä Navi-Trainer Professional 5000 (NTPro 5000) advanced physical engine and state-of-the-art hydrodynamic modelling offering controlled environment with latest in advanced and integrated simulation for realistic research and engineering projects.

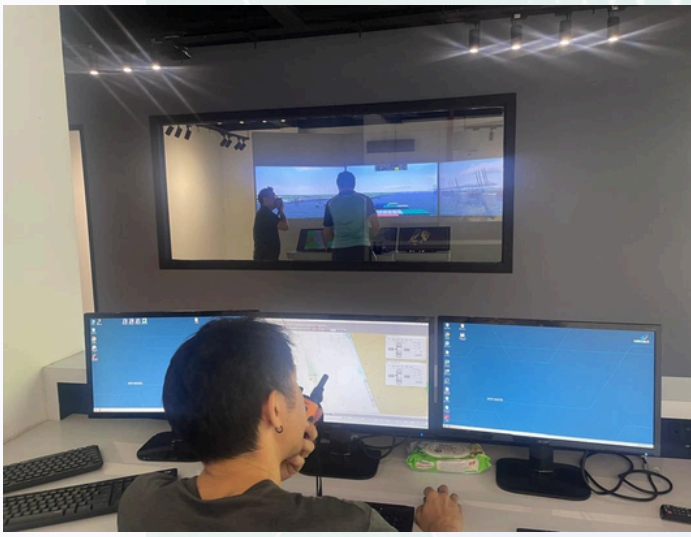
Specifically developed for the maritime education and training industry, the Wärtsilä NTPro 5000 is certified by DNV GL and exceeds the existing STCW requirements.





Wärtsilä Navi-Trainer Professional 5000

Wärtsilä Navi-Trainer Professional 5000The Wärtsilä Navi-Trainer Professional 5000 (NTPro 5000) represents a new generation ship's bridge simulator specially designed for optimum user experience and the future of advanced and integrated simulation training. The design, advanced hydrodynamic vessel modeling and integration of a sophisticated physics engine, ensure maximum realism in exercises, which is important for making competence training adaptable to real-life scenarios.



It is a single platform enabling blended navigational learning through different mediums — classroom training, cloud simulation, part-task bridge, and full mission bridge.

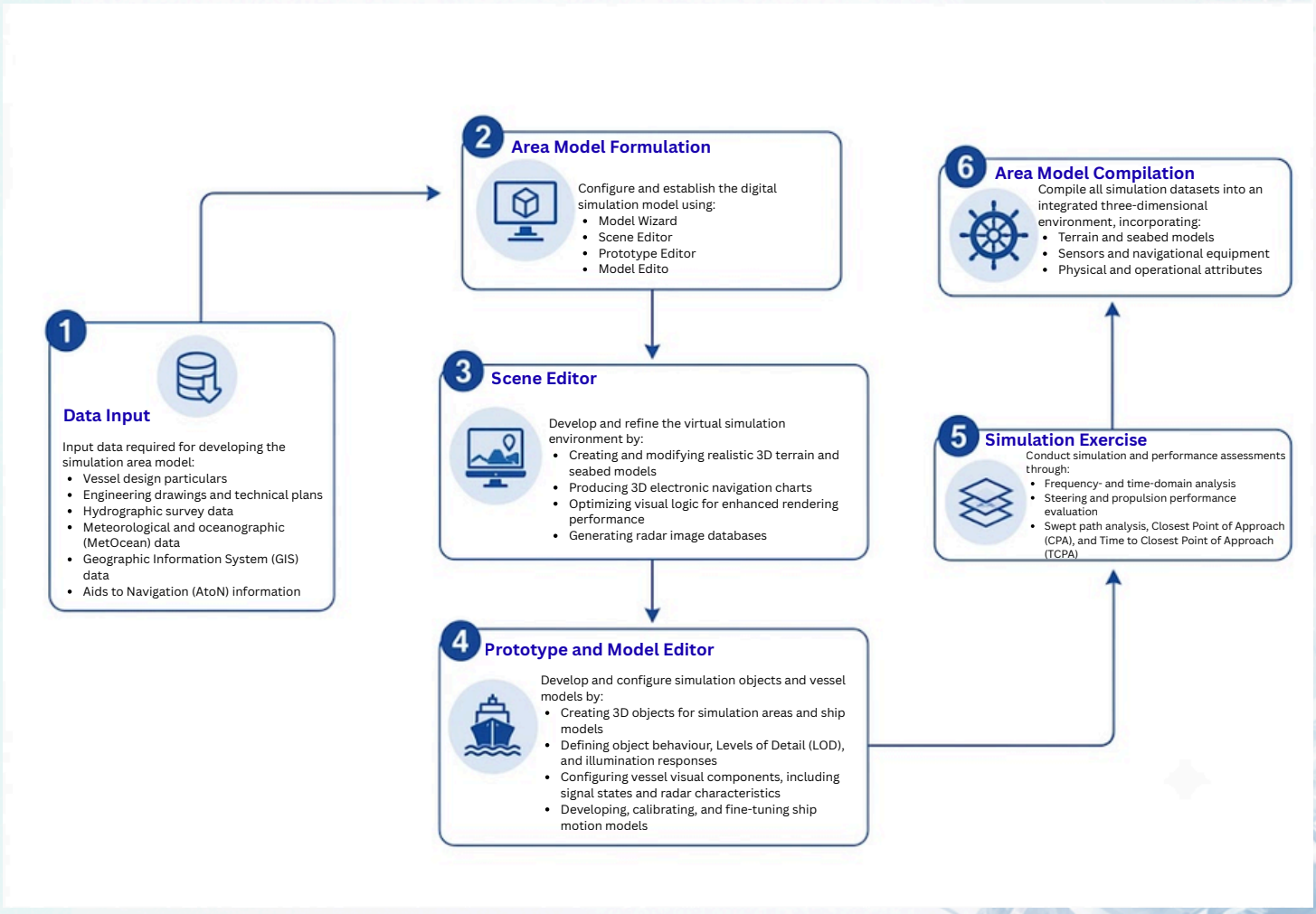
Wärtsilä NTPro 500 provides:



- efficient tool for education of vital skills, enhancing knowledge, safety and cost-efficiency at sea
- real-time simulation supporting everything from mandatory STCW training to advanced integrated crew training for maritime, fisheries, naval and offshore industries
- a user-friendly instructor tool supporting excellent training on all levels and for a multitude of exercises and courses
- a robust and reliable training solution with the flexibility to expand, adapting to changing training needs
- advanced simulation of complex maritime operations supporting pre-mission planning, feasibility studies and research projects for decision support

WÄRTSILÄ

Simulation Process Flow





Visualisation

Leading the way in visualisation, the NTPro 5000 system offer a brand-new highly realistic visualisation system.
Visual presentation of a new wave includes three-dimensional bow waves and associated floating object interference, reflection of the entire scene, water translucency and light refraction, white caps, foam and splashes.

NTPRO 5000 is the world first simulator presenting dynamic shading calculations of all exercise and scene objects.

The visualisation tuning and adjustment module is integrated into the simulator to provide geometry correction, soft edge blending, uniformity adjustment and colour matching.



Instructor Workplace

The role of instructors in simulator training cannot be overestimated. The instructor station incorporated in our simulators provides the instructor with all the necessary tools for the efficient generation, editing, managing and assessment of training exercises

Features

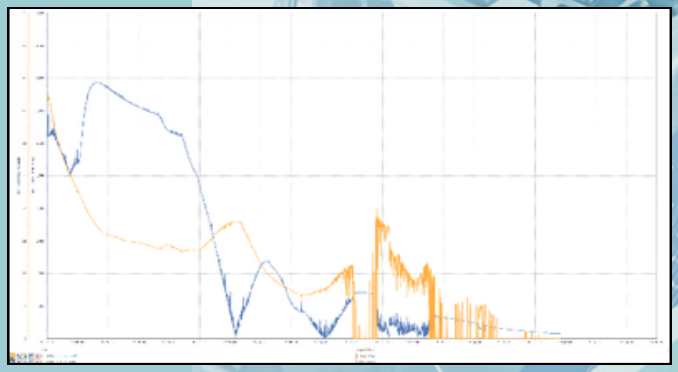
- High accuracy data presentation on the basis of vector charts (able to automatically load all the charts referring to the selected gaming area).
- Multi-lingual user interface
- Creation of exercises and automatic competency assessment scenarios.
- Control of simulator session(s).
- Continuous automatic recording of data in the course of the exercise (main, audio and video log files).
- Real, slow and fast time modes.
- Able to display a track in the form of a succession of contours (Track mode) and to set the track prediction mode (Trend mode) for all the exercise objects (Global settings) and for one object (Local settings).
- Weather conditions manager.

Evaluation and Assessment System

Our Evaluation and Assessment System allows objective assessment of a trainee's exercise. The system enables automated online assessment with the ability to correct any assessment rule at any moment in time. Trainees are promptly given error correction advice in a form pre-programmed by the instructor.



2D Time-domain track plots



Graphic presentation of ship motion parameters

Wärtsilä Model Wizard

ESI in-house experts are fully qualified to digitally produce and custom build high-resolution synthetic area models for port, marine and riverine infrastructure for use in both marine simulators, and other applications which use the Seagull visualization system.

Using Wärtsilä's Model Wizard multi-functional development toolkit and suite of custom design and software programs, ESI is capable of building mathematically accurate and realistic navigational scenarios.

The mathematical core has been validated in numerous cases against model tests and full-scale measurements which are continuously calibrated using data acquired from analysis of local meteorological and hydrographic measurement records and up-to-date physical surveys.

Wärtsilä Model wizard develops the following data sets:

- The set of vector electronic charts
- Terrain and depths database
- Radar database
- Visual database
- Models of water flows distribution



Simulation Area Model Layers

Wärtsilä Ship Model Library

Our continuously growing catalogue currently contains more than 300 highly realistic and mathematically accurate virtual models of a wide selection of ships which are validated against model tests and full-scale measurements.

Wärtsilä's models are based on extensive research into the field of ship hydrodynamics ensuring an excellent level of vessel motion accuracy. The ownship models have six-degrees-of-freedom (6 DOF) taking into account the influence of all external effects, e.g. wind, waves, tidal currents, bank suction, ship-ship interaction, etc.

The use of a sophisticated physics engine supports full interaction including 3D hull collision detection with shore- and maritime-based objects and vessels. The physics engine provides a high degree of realism in the behavior of lines, wires, and chains, and calculates the winch load and line forces in detail, for instance, in tug and mooring exercises.

We also support a virtual ship yard software used for ship model development based on available model tests or manoeuvring tests.





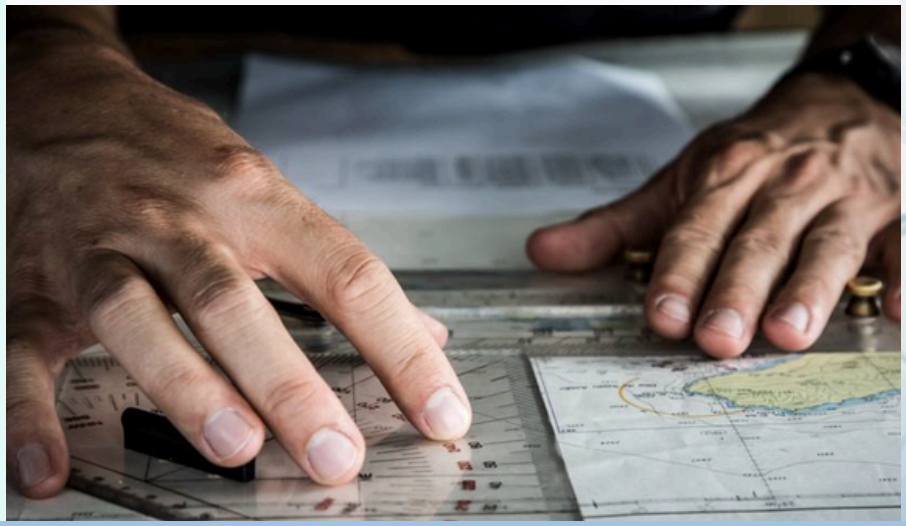
Simulation-Aided Research & Training

Our modular system design and high flexibility allows us to support customised simulation-aided research and expert training services across the following areas:

- Port layout and dimensioning of nautical infrastructure
- Breakwater layout and alignment
- Inland waterway design and navigational operability
- Bridge and transit channel design
- Marine spatial planning
- Low-carbon passage planning and ship manoeuvring
- Assessment on ship motions in both frequency and time domains
- Assessment on ship motions of moored vessels along open or closed structure
- Assessment on controllability of vessels at limited water depth
- Siting of Aids to Navigation (AtoN)
- Incident investigation and marine event forensics

The simulator system is supported by precision six degree-of-freedom hydrodynamic models which accurately compute ship response to waves, wind and currents, allowing for both lift and drag effects and close quarter effects such as shallow water, bank effects, bow and stern thrusters, ship interaction and collisions offering a virtual replica of real-world operational scenarios for ship handling, tug support, and ship-to-ship interactions.

Another key advantage of the simulators is the capability to be operated independently by human operators which are sensitive to pilots' reactions on user-defined operational demands providing the ability to examine nautical feasibility across varying levels of proficiency.



Port & Waterway Design Studies

This programme provides assessment on port and channel design which define the form and dimensional boundaries required to meet functional objectives consistent with fundamental civil engineering practices and construction options.

ESI provides advanced expertise and independent integrated nautical services for port and waterways studies covering each life cycle stage i.e., concept, design, and operational phase for either a green field or a brown field port. We provide advanced expertise and independent research.

Our research simulators have been widely used to support port and terminal operators and maritime civil engineering contractors to optimise port and waterway designs – We assist to quantify factors that are used to determine the form and dimensions for planning and operation of new marine and riverine infrastructure and modification to existing facilities providing confirmation on:

- Siting
- Orientation and alignment
- Depth
- Width
- Radius of curvature of bends
- Tangent distance between bends
- Tug requirements
- Aids to navigation
- Weather operating thresholds





Simulator-Based Training for Pilots

ESI's Wärtsilä Navi-Trainer Professional 5000 is approved and certified according to the DNV Class A (Navigation) standards for simulator training and certification of pilots on all types of vessels. The design, advanced hydrodynamic vessel modeling and integration of a sophisticated physics engine, ensure maximum realism in exercises, which is important for making competence training adaptable to real-life scenarios.

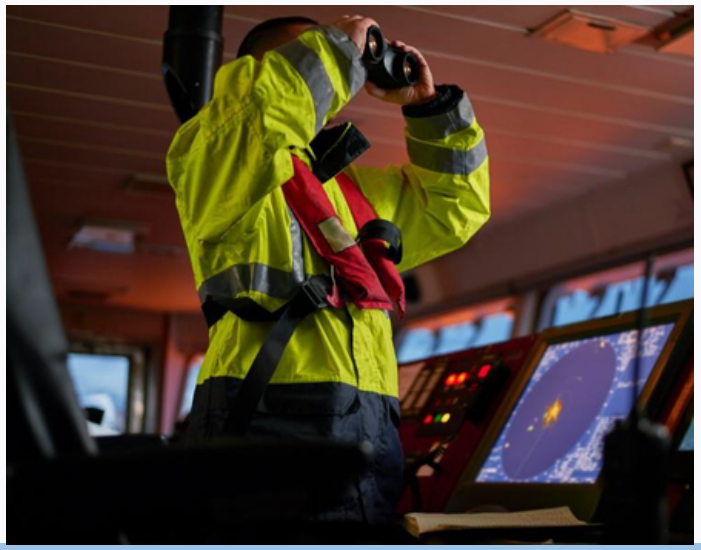
We offer industry standard initial training for new entry pilots, continued professional development for experienced pilots and bespoke ship handling manoeuvring for special case scenarios.

Our state-of-the-art simulator centre can help marine pilots meet training requirements of International Maritime Organisation (IMO) Resolution A.960(23)* and maintain high standards of professional competency.

The simulator also provides facilities for combined training with tugboat masters and VTS operators for a range of specialist pilotage training tasks including:

- Ship to Ship Operation
- Tandem/SPM mooring
- Inland Waterway/Riverine Pilotage
- Bridge Transit
- Towing Operations
- Docking / Undocking with or without mooring lines and tugs, anchoring

**IMO Resolution A.960(23) – Recommendations on Training and Certification and on Operational Procedures for Maritime Pilots other than Deep-Sea Pilots - (Adopted on 5 December 2003)*





Inland Waterway and Riverine Navigation

Training for ship handling in rivers and channels demands high simulation performance due to the demand for accuracy in drift, current, bank effects, ship-to-ship interaction etc.

ESI's offers advanced 3D-hull hydrodynamic vessel models, ensuring that the simulated vessels behave as realistic as possible in the various simulated environmental conditions. This makes the simulator ideal for reconstruction of incidents like collisions, in addition to typical training scenarios such as:

- navigation and ship handling
- vessel to vessel interaction
- vessel to bank interaction
- squat and shallow water effects
- communication procedures





Ship-to-Ship (STS) Training



This programme has a focus on assessment methods to quantify and evaluate nautical safety and ship manoeuvring performance during open-sea Ship-to-Ship (STS) operations which consider safe manoeuvring of individual vessels, and the safety of traffic in proximity is considered.

ESI has designed and carried out a range of simulator-based courses focusing on STS training for Marine Pilots, Mooring Masters, Tanker Captains and Tug Masters involved in these operations. The full-scale simulation exercise involves modelling of realistic environmental forces and effects on the implicated vessels, including forces on mooring gear and fenders.

The exercise can be integrated with interactive tugs controlled by the Instructor Station assisting the vessels during the manoeuvers.



Services

Simulation studies for maritime operations are instrumental in reaching and making the right decisions and in testing the complexity of a maritime project. The facilities at ESI are designed specifically to provide industry standard training in best practices and to test and build the level of competence required to carry out even the most critical operations.

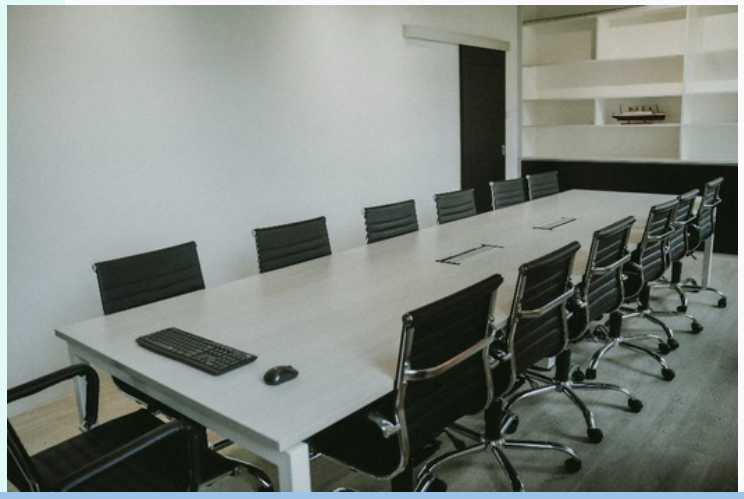
We are able to tailor our standard courses to match the exact requirements and needs of the individual client. This ensures that the participants learn and become confident with the relevant topics that relate to their specific situation.

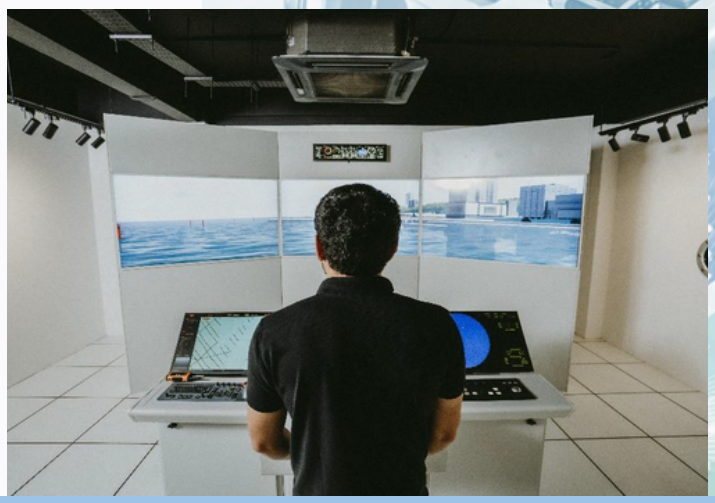
List of our current offered service portfolio:
Custom Training Programs

- Navigation/Pilotage for ports and inland waterways
- Ship-to-Ship (STS)
- Tandem/Single Point Mooring (SPM)
- Bridge and Barrage/Lock transits
- Towing
- Docking/Undocking

Research and Development
In addition to standard and special task training, ESI also provides bespoke applied research across the following:

- Port and waterway design studies
- Engineering studies
- Concept testing and verification
- Spatial planning
- Low carbon shipping optimization
- Autonomous shipping model development
- Vessel behaviour studies
- Siting of Aids to Navigation (AtoN)
- ncident investigation and marine event forensics
- Procedure development and testing





Certification

Compliance with International Standards and Regulations:

- International Convention of Training, Certification and Watch keeping for Seafarers (STCW'2010).
- IMO model courses.
- International SOLAS Conventions.
- Approved with class notations: INTEGRATED SIMULATOR SYSTEM, NAUT AW (SIM), DYNPOS - AUT (SIM), HSC, TUG, ICE, AHTS to the Class A Standard for Certification of Maritime Simulators No. DNVGL-ST-0033 April 2018.
- Regulations concerning 'special' training: fishing operations, VTS operator training etc.



DNV·GL

STATEMENT OF COMPLIANCE

Statement No: **002/180504**
DNV GL Id No: **1214371**

Particulars of Product

Function Area:	**Bridge Operation Simulator**
Class Notation	**INTEGRATED SIMULATOR SYSTEM, NAUT AW (SIM), DYNPOS - AUT (SIM), HSC, TUG, ICE, AHTS**
Name and type designation:	**NAVI-TRAINER PROFESSIONAL 5000 NAVIGATIONAL BRIDGE**

Particulars of Manufacturer

Manufacturer:	**Transas Marine Limited**
Manufacturer address:	**Little Island, Cork, Ireland**

This is to confirm:

That the above product is found to comply with Class A- Standard for Certification of Maritime Simulators No. DNVGL-ST-0033 April 2018.

Application

The above Standard is based on requirements in the STCW Convention, Regulation I/12 and corresponding industry standard and guidelines.

This Statement is valid until **2023-05-04**, provided the requirements for the retention of the Statement will be complied with.

Issued at **Sandefjord** on **2018-05-04**

for **DNV GL**

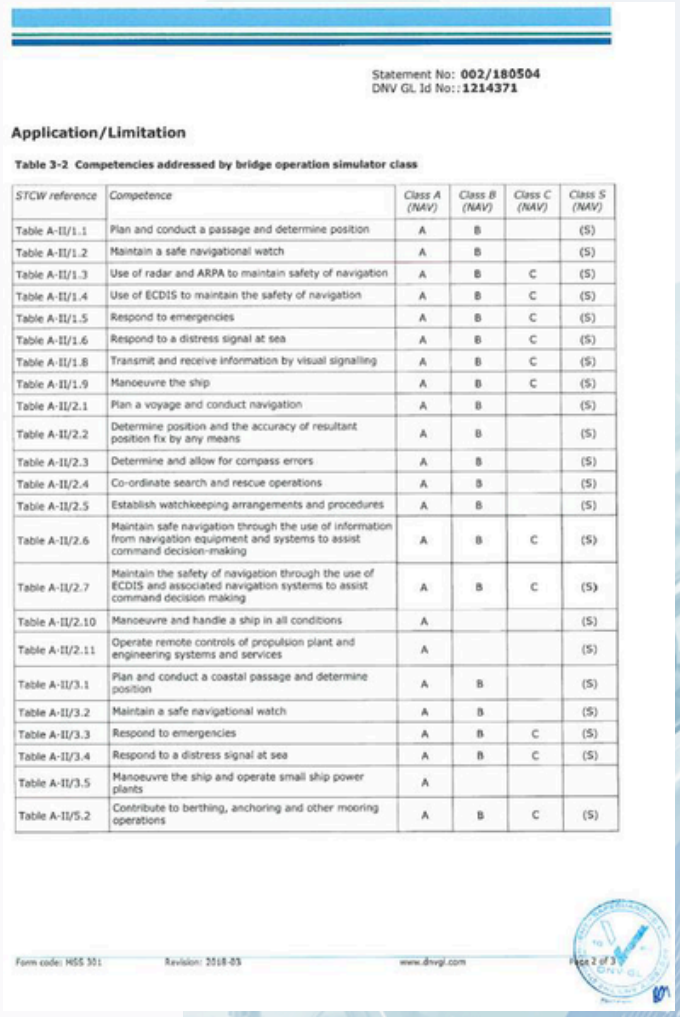
Nils Gunnar Bøe
Head of Section

Capt. Aksel David Nordholm
Auditor

This Statement is subject to terms and conditions overleaf. Any significant change in simulation performance may render this Statement invalid.

Form code: MSS 301 Revision: 2018-03 www.dnvgl.com Page 1 of 3

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Statement No: **002/180504**
DNV GL Id No:: **1214371**

Application/Limitation

Table 3-2 Competencies addressed by bridge operation simulator class

STCW reference	*Competence*	*Class A (NAV)*	*Class B (NAV)*	*Class C (NAV)*	*Class S (NAV)*
Table A-II/1.1	Plan and conduct a passage and determine position	A	B		(S)
Table A-II/1.2	Maintain a safe navigational watch	A	B		(S)
Table A-II/1.3	Use of radar and ARPA to maintain safety of navigation	A	B	C	(S)
Table A-II/1.4	Use of ECDIS to maintain the safety of navigation	A	B	C	(S)
Table A-II/1.5	Respond to emergencies	A	B	C	(S)
Table A-II/1.6	Respond to a distress signal at sea	A	B	C	(S)
Table A-II/1.8	Transmit and receive information by visual signalling	A	B	C	(S)
Table A-II/1.9	Manoeuvre the ship	A	B	C	(S)
Table A-II/2.1	Plan a voyage and conduct navigation	A	B		(S)
Table A-II/2.2	Determine position and the accuracy of resultant position fix by any means	A	B		(S)
Table A-II/2.3	Determine and allow for compass errors	A	B		(S)
Table A-II/2.4	Co-ordinate search and rescue operations	A	B		(S)
Table A-II/2.5	Establish watchkeeping arrangements and procedures	A	B		(S)
Table A-II/2.6	Maintain safe navigation through the use of information from navigation equipment and systems to assist command decision-making	A	B	C	(S)
Table A-II/2.7	Maintain the safety of navigation through the use of ECDIS and associated navigation systems to assist command decision making	A	B	C	(S)
Table A-II/2.10	Manoeuvre and handle a ship in all conditions	A			(S)
Table A-II/2.11	Operate remote controls of propulsion plant and engineering systems and services	A			(S)
Table A-II/3.1	Plan and conduct a coastal passage and determine position	A	B		(S)
Table A-II/3.2	Maintain a safe navigational watch	A	B		(S)
Table A-II/3.3	Respond to emergencies	A	B	C	(S)
Table A-II/3.4	Respond to a distress signal at sea	A	B	C	(S)
Table A-II/3.5	Manoeuvre the ship and operate small ship power plants	A			
Table A-II/5.2	Contribute to berthing, anchoring and other mooring operations	A	B	C	(S)

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