



UNIVERSITY OF SPLIT  
FACULTY OF MARITIME STUDIES

**Sveučilište Split**  
**Pomorski fakultet u Splitu (PFST)**

**University of Split**  
**Faculty of Maritime Studies**

**PFST Maritime Education & Training Centre**



## ***Your safety is our mission!***

Due to the rapid growth of the maritime industry the demand for highly trained specialists to operate all kinds of vessels around the world is still going strong. About 70,000 ocean going ships and more than 2,200 new ships built annually need to be manned properly according to the international rules and regulations. To guarantee the necessary skills for officers and crews is one of the biggest challenges of ship operating companies around the world. The PFST Maritime Education & Training centre is providing the required training to meet such educational demands. The heart of the PFST Maritime Education & Training is a simulation center which comprises 2 x FMB BRIDGE SIMULATORS, 2 x MINI TUG BRIDGES, 8 x ECDIS/RADAR w/CONING – SMALL BRIDGES, 2 x ENGINE ROOM SIMULATORS + 1 x LNG DUAL ENGINE SIMULATOR, BRIEFING/DEBRIEFING classroom with Instructor station, 2 x FULL GMDSS SIMILATORS, LCHS SIMULATOR, MACS3 Software Solutions for dry cargo simulator, VTMS, Real AIS, PISCES, MODEL WIZARD, Mobile workstation for pneumatics and electropneumatics, Mobile workstation for hydraulics and electrohydraulics, Digital Planetarium and fully equipped PFST-class and seminar rooms.

### **WHY TRAINING IN SHIP HANDLING?**

The safe handling of ships depends on many factors - on ship's maneuvering characteristics, human factor (operator experience and skill, his behavior in stressed situation, etc.), actual environmental conditions, and degree of water area restriction.

Results of analysis of casualties and accidents show that in one third of all, human error is involved and the same amount of damages are attributed to poor controllability of ships. Training on ship handling is one of the most effective methods for improving the safety at sea. The goal of the above training is to gain theoretical and practical knowledge on ship handling in a variety of different situations met in practice at sea.

Transas – Wärtsilä Vessel Simulator is very efficient in hands-on training due to its modeling, which is as close to the seafarers' real environment and context as possible.



## *PFST Maritime Education & Training Centre*

*Dear customers and friends,*

*All of us at Faculty of Maritime Studies University of Split are proud that our PFST Maritime Education & Training Center is in operation since 1990. We had several hundred candidates who successfully completed a variety of courses. During that period of time we also added new components and trainings to our portfolio. A large number of well known shipping companies (SHELL, NYK Line, MSC, CMA-CGM, DORIAN, GOLAR, THOME, ROYAL CARIBBEAN, ...) count to our customers and together we contribute to an increase of safety on the open sea.*

*Faculty of Maritime Studies Split (PFST) located into new 6,500 sq.m. premises on University Campus. Maritime simulators, completely installed on present faculty premises and entire equipment Class certified and in full operate.*

*Our modern facilities on campus include modern classrooms and Theatres equipped with various state-of-the-art maritime simulators. Our simulator package is flexible in conducting various types of training. The courses conducted at our centre comply with the requirements of STCW 95 as Manila Amendments 2010, ISM Code, ISPS Code, SOLAS, MARPOL 73/78, and have been approved by the Ministry of Sea, Tourism, Transport and Development for the Republic of Croatia, which is on the white list. complies with international standards and regulations (STCW '95/2010, IMO, SOLAS), as well as research and development studies.*

*Please be introduced that Faculty of Maritime Studies Split is certified by:*

- BV ISO 9001 and OH&SS Standards*
- Maritime Crew Resource Management (MCRM) Oxford Aviation Academy*
- The Japan Ministry of Land, Infrastructure, Transport and Tourism (MLIT)*

*Faculty of Maritime Studies Split certified by MLIT for system which call Recognition for Maritime Education and Training (MET) institution which confirm that the contents and standards of PFST education and training are according MLIT requirements. The Recognition of Certificates of Japan is that Minister of Land, Infrastructure, Transport and Tourism (MLIT) allows those persons other than Japanese, who hold certificates issued by a signatory / Parties (in our case any student with Faculty of Maritime Studies, University of Split nautical and ship engineer diploma) of the STCW convention, to board a Japanese flag ship as a (nautical or engineering) officer within a scope specified by MLIT.*

*This system allow the graduates of MET (certified by the MLIT) to be recognized without the individual examination for recognition or other confirmation of abilities after MLIT confirm and authorized that the MET had provided the education for seafarers properly.*

*Professors, lecturers and instructors have experience/qualifications relative to their respective courses and most of them are ex-seafarers with long sea service experience in capacity of Masters, Chief Engineers, Chief Officers on VLCC, LNG, VLCV, Off-Shore, Reefer, Ro-Ro, etc.*



*Our teaching staff and the advanced equipment ensure the training of students in real-life scenarios where we shall provide a first-class education, higher-level training, consultancy and research in line with the requirements of domestic and international shipping industries.*

*A dedicated team of course administrators are on hand to provide friendly and efficient service...whether a student requires information on course application or an informal discussion of his/her training needs. We can guarantee that the quality of education, training and related services will be according to the highest possible standards.*

*Transas and Konsberg also provides the advantage of receiving all their software updates and allows keeping up with new or potential changes in National and International standards.*

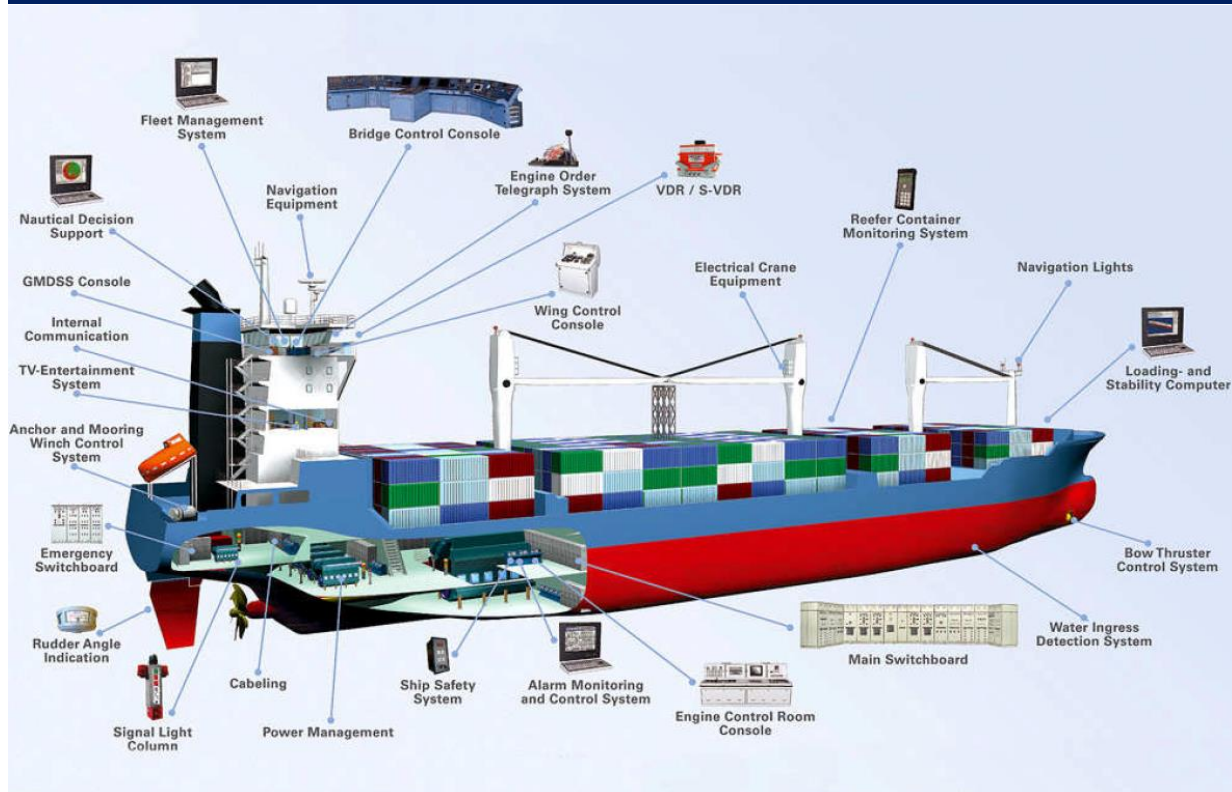
*The new simulator complex make the PFST & University of Split a leading training provider in the area. With this installation, every maritime school and maritime industries in the area will get benefits from PFST innovative solutions.*

*It is our pleasure to welcome you and your team at PFST attending our training.  
We look forward to meet with you in Split, Croatia.*

*Sincerely yours,  
Training Center Manager  
Faculty of Maritime Studies University of Split*

Split, 15. December 2019.

## INTEGRATED SIMULATOR CONCEPT FOR RESEARCH, EDUCATION AND TRAINING



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  - 2. Full Mission Wärtsilä Engine Room Simulator ERS 5000 w/3D virtual reality & 6 different types of Main Engines available (connected with Bridge No.1 Transas Simulator NTPRO 5000)**
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**(Mockup is under construction – works in progress – opening Nov/2019)**



## PFST Simulator Package

Educational products consist of the following *Wärtsilä* and third party simulators / equipment:

1. **MAIN FMB No.1** - Full Mission *Wärtsilä* NTPRO 5000 Bridge simulator **DNV "Class A"** (255° environment realized with a projection display on cylindrical wall + 1 x Extend rear visualization 60° environment realized with a projection display on rear wall) **Total 315°** projected visuals with 3D visualisation, mockup equipped with **DP Class 2** system and:

- 1 x 55" Interactive screen for ECDIS and GMDSS station for VTS,
- 2 x LCD 55" screen 25° for ship side view.

Simulator approved by DNV with class notation INTEGRATED SIMULATOR SYSTEM, NAUT AW (SIM), DYNPOS – AUT (SIM), HSC, TUG, ICE to the **DNV "Class A"** Standard for Certification of Maritime Simulators;

2. **BRIDGE No.2** - *Wärtsilä* NTPRO 5000 Bridge simulator 5 x LED 48" screen (30° each = 150°) + addition rear view w/2 x LCD 42" screen (25° each = 50°), **Total 200°** and will provide joint operation with the new Transas Bridge simulator to enable realistic training involving interaction of two or more vessels' crews.

Simulator approved by DNV with class notation INTEGRATED SIMULATOR SYSTEM, NAUT AW (SIM), DYNPOS – AUT (SIM), HSC, TUG, ICE to the **DNV "Class B"** Standard for Certification of Maritime Simulators.;

3. **2 x *Wärtsilä* TUG Simulators**

Simulators approved by DNV (with class notation INTEGRATED SIMULATOR SYSTEM, NAUT AW (SIM), TUG, ICE to the **DNV** Standard for Certification of Maritime Simulators.;

4. ***Wärtsilä* ECDIS 4000/Radar/ARPA w/Coning display class of 8 x working stations each with own bridge + 1 x Instructor station,**

Navi-Sailor 4000 ECDIS MFD PREMIUM, Navi-Sailor 4100 ECDIS MFD, Navi-Sailor 4000 ECDIS Standard, Navi-Planner 4000 SW Module, AlphaChart-T comply with the requirements in the following Regulations/Standards:

Annex A.1, item No. A.1/4.30 and Annex B, Module Bin the Directive. IMO Resolutions A. 694(17), MSC.191(79) & MSC.232(82), DNV GL AS;

5. **BRIEFING/DEBRIEFING Room with Instructor station** connected with FMB No.1, Bridge No.2 and ECDIS/RADAR Simulators

Comply with all IMO /STWC requirements Regulations/Standards.;

6. ***Wärtsilä* Full GMDSS Sim TGS 5000 module as part of FMB No.1 + Full GMDSS Sim TGS 5000 Classroom with 1 x Instructor and 10 working station**

Comply with standard for Certification of Maritime Simulators applicable standards:

1. STCW 2010 Manila amendments Regulation J/12,
2. STCW 2010 Manila amendments Code A -J/12, B-J/12.

7. **REAL SAILOR GMDSS Simulator Classroom with 6 working stations;**
8. **VTMS Station for NTPRO 5000 - VTMS Operator Workplace SW Module;**
9. **Wärtsilä 1 x Fishing module simulator;**
10. **Transas Liquid Cargo and Ballast Handling Simulator (LCHS), Type designation LCHS 5000**  
TechSim class with 4 x working stations + 1 x instructor station.  
Comply with standard for Certification of Maritime Simulators applicable standards:
  1. STCW 2010 Manila amendments Regulation J/12,
  2. STCW 2010 Manila amendments Code A -J/12, B-J/12.
11. **1 x NEW Wärtsilä ENGINE ROOM SIMULATOR - ERS 5000 TECHSIM SHIP MODEL WITH DIZEL-ELECTRIC PROPULSION DUAL ENGINE (MAN L51/60DF) FOR LNG TANKER**  
Comply with DNV Class A-Standard for Certification of Maritime Simulators and applicable standards:
  1. STCW 2010 Manila amendments Regulation I/12,
  2. STCW 2010 Manila amendments Code A/Table A-III.
12. **1 x Small scale Full Mission Engine Room Simulator** (*Wärtsilä* ERS 5000 w/3D virtual reality & 6 engine modules available) connected (integrated) with Main Bridge 1 (*Wärtsilä* NTPRO 5000).;
13. **1 x Engine Room Classroom** w/1 x Instructor + 10 x working station;
14. **1 x Independent Kongsberg NEPTUNE – Full Mission Engine Room Simulator**  
Ship slow speed 2-stroke diesel engine (MAN B&W L90 MC IV power approx. 18.000 kW for VLCC up to 300.000 GT) and medium speed 4- stroke engine (Pielstik) for RO-RO;  
Comply with DNV Class A-Standard for Certification of Maritime Simulators and applicable standards:
  1. STCW 2010 Manila amendments Regulation I/12,
  2. STCW 2010 Manila amendments Code A/Table A-III.
15. **Marine Hydraulic and Pneumatic Simulator;**
16. **5 x MACS3 Cargo Handling Simulator for Dry Cargo (5 x working stations in net for Containers, Ro-Ro, Passengers, Crane Operation Module, Multi-Voyage Module, StowMAN for Terminals + 6 working stations for:**
  - LoadSafe for Dry Cargo Ship, Liquid Cargo - Tanker VLCC, LPG, Gas, Heavy Lifter;
  - Shipman for LNG (Membrane & Sphere);
  - EASEACON for Containers;
  - Shipcal for VLCC;
  - LNG Simulator (Membrane & Sphere);
17. **Real Automatic Identification System (AIS);**
18. **Planetarium (Digital STARLAB®) under construction- will be in full operation Nov./2019.**
19. **Complex includes a 2 x powerful Research and Development (R&D) stations:**
  - a) **TRANSAS MODELING STATIONS - Model Wizard** station allowing to create own databases and provide an outmost research projects, participate in the international R&D

projects and exchange information with other users. The advanced modeling station for creation of own ships and sailing areas (Port study) thus enabling an unrivalled R&D capabilities for the Split University. Having this package will allow PFST to participate in any international research project which are constantly going or combine the efforts with numerous Transas system users around the globe for joint training or projects.

- b) **RESEARCH WORKS FOR OIL SPILL STATION** - famous DNV approved “**Potential Incident Simulation Control and Evaluation System**” (**PISCES II**) Software for oil spill response management training – the one off system of its kind.

Model Wizard & PISCES stations are separate stations but integrated as part of NTPRO 5000 Bridge simulator. These system allows **Marine Accident & Incident Investigation capabilities:**

- visual representation of the accident scenario using voyage data obtained by SVDR (VDR) or ECDIS,
- the real situation at sea is being reproduced taking into account: real sailing area; navigation intensity in present area; real ship route; vessel's maneuvering characteristics; weather conditions,
- information for developing decision taking recommendations for ship's crew in these conditions.

#### IMPORTANT NOTE:

*All our simulators are regulary hardware and software upgrade accordance with all IMO and STCW amendments and changes that came into force up today during makers regular annual maintenance simulators. All equipment is in full operate.*



## PFST Simulator Package

### COMPLIANCE WITH INTERNATIONAL STANDARDS AND REGULATIONS

- International Convention of Training, Certification and Watch keeping for Seafarers (STCW'95/2010),
- IMO model courses,
- International SOLAS Conventions.

Det Norske Veritas-DNV (Norway) issued statement of compliance for the Transas navigational and DP simulators. As a result, the Transas Navi-Trainer Professional 5000 holds the most advanced certificates set in the maritime simulator industry.

It has been certified as a Bridge Operation Simulator **Class A** with class notation "Integrated simulator system, NAUT AW (SIM), DYNPOS – AUT (SIM), HSC, TUG, ICE, AHTS" and Dynamic Positioning Simulator **Class A** as per the latest edition of Standard for Certification of Maritime Simulators No. 2.14 January 2011. which is based on the requirements of STCW Convention, Regulation I/12 and includes the new 2010 amended convention that came into force from January 1st 2012.

DNV approval of an anchor-handling operations module according to the latest standard. This standard is based on the requirements of the STCW convention which was significantly amended in 2010 (Manila amendments).

Transas NTPRO meets both basic standard requirements for Bridge Operation simulation system (Section 3) and:

- *Additional requirements for simulators intended for training in ice navigation (Ref. STCW Section B-V/g Guidance regarding training of masters and officers for ships operating in polar waters) -Class notation ICE;*
- *Additional requirements for simulators intended for training on Integrated Bridge Systems including Integrated Navigation – Class notation NAUT AW (SIM);*
- *Additional requirements for simulators intended for training in Anchor Handling operations (Ref. STCW Section B-V/e, Offshore supply vessels performing anchor-handling operations) – Class notation AHTS.*

Transas NTPRO supports simulation training and qualification for crews of ordinary vessels, and for High Speed Craft – Class notation **HSC**, and all types of tugs – Class notation **TUG**.

The new Statement of Compliance certificate for DP simulator declares that Transas NTPRO 5000 meets all requirements for Class A Dynamic Positioning simulation system (Section 8) – Class notation **DYNPOS – AUT (SIM)**.

Simulator Package is flexible in conducting various types of training as well as research and development studies. In particular, the Simulator Package can be used for the following:

**Basic training for Deck Officers to the level of Master mariner IMO STCW 78/95/2010 Convention,**

IMO Model Course 7.01 / Master and chief mate

IMO Model Course 7.03 / Officer in Charge of a Navigational Watch

**Basic training for Engine Officers to the level of Ch. Engineer IMO STCW 78/95/2010 Convention,**

IMO model course 7.02 / Chief Engineer Officer and Second Engineer Officer

IMO model course 7.04 &/ Officer in Charge of an Engineering Watch

**Yacht master up to 100 GT HR III/11 & 500 GT HR III/12**

**GMDSS, ROC and GOC courses IMO STCW-F 95/2010,**

IMO Model Course 1.25 / General Operator's Certificate for GMDSS

IMO Model Course 1.26 / Restricted Operator's Certificate for GMDSS

IMO Model Course 1.31 / 2nd Class Radioelectronic Certificate for GMDSS

**ARPA/ECDIS courses IMO STCW 78/95/2010 Convention,**

IMO Model Course 1.07 / Radar Navigation, Radar Plotting and Use of ARPA,

IMO Model Course 1.27 (May 2012 edition) / Operational Use of ECDIS,

**Bridge Resource Management Training IMO STCW 78/95/2010 Convention,**

IMO Model Course 1.08 / Radar, ARPA, Bridge Teamwork and Search & Rescue,

IMO Model Course 1.22 / Ship simulator and bridge teamwork

Bridge Team Management STCW A-II/2-6

Bridge Resource Management STCW B-VII/2-5

Crew (Human) Resource Management STCW A-II/2.5

Maritime Crew Resource Management Course (Ver. Aug.2010.) As Oxford Aviation Academy - UK authorized representative

**Engine Resource Management Training IMO STCW 78/95/2010 Convention,**

IMO model course 2.07 / Engine Room Simulator

Engine Room Team Management STCW A-III/1&2.A & STCW B VIII/2

Engine Room Resource Management STCW A-III/1&2

Marine Hydraulic and Pneumatic courses

High Voltage Course

**Search and Rescue Exercises IMO STCW 78/95/2012 Convention**

IMO Model Course 1.24 / Proficiency in Fast Rescue Boats

IMO Model Course 3.13 / Maritime Search and Rescue administrator

IMO Model Course 3.14 / Maritime SAR Mission Co-ordinator with Compendium

**Crises Management and Maritime Security**

IMO Model Course 1.29 / Proficiency in Crisis Management & Human Behavior

IMO Model Course 3.11 / Marine Accident & Incident Investigation

IMO Model Course 3.19 / ISPS – Ship Security Officer

IMO Model Course 3.09 / Port State Control

**Liquid Cargo and Ballast Handling Simulator on LCHS 5000 TechSim**

IMO model course 1.35 / Liquefied Petroleum Gas (LPG) Tanker Cargo & Ballast Handling Sim.

IMO model course 1.36 / Liquefied Natural Gas (LNG) Tanker Cargo & Ballast Handling Simulator

IMO model course 1.37 / Chemical Tanker Cargo & Ballast Handling Simulator

IMO model course 2.06 / Oil Tanker Cargo and Ballast Handling Simulator

**Other Special training on ERS 5000 TechSim SHIP MODEL WITH DIZEL-ELECTRIC PROPULSION DUAL ENGINE (MAN L51/60DF) FOR LNG TANKER**

**IGF Code:** International Code of Safety for Ships Using Gases or Other Low-Flashpoint Fuels, 2016 Edition (I109E)

- Basic training for ships subject to the IGF Code (STCW V/3)
- Advanced training for ships subject to the IGF Code (STCW V/3)

**Special Liquid Cargo Handling training**

- Tanker **Familiarization** Certificate
- **Advanced** Oil Tanker Operations
- **Advanced** Liquefied Natural Gas (LNG) Tanker Operations
- **Advanced** Chemical Trainer Operations
- **Advanced VLCC** Tanker cargo operation's course

**Dry Cargo Handling Training**

- **Basic Program MACS3 including the Container Program BELCO** - MixCargo, SEALASH Module Grain, Bulklim, LoadMan, DastyMAN, Passenger, Ro-Ro, Crane Operation Module, Multi-Voyage Module, StowMAN for Terminals - Installation of ship data for six(6) different types of vessels.
- Dangerous cargo handling

**Ship handling and other specific trainings**

**Ship simulator and bridge team work & the training course for master and chief officer of large ships and with unusual manouvering characteristics**

IMO Model Course 1.22, 1.32 / Shiphandling Large Container Vessels (VLCV) & PCC

IMO Model Course 1.22, 1.32 / Shiphandling Large Tankers (LNG, VLCC)

IMO Model Course 1.22, 1.32 / Simulator Ship Handling and Manoeuvring in Narrow Channel

IMO Model Course 1.22, 1.32 / Ship to Ship (STS) handling

IMO Model Course 1.22, 1.32 / Simulator Ship Handling when using Marine AZIPODs (Ope.Level)

IMO Model Course 1.22, 1.32 / Simulator Ship Handling w/using Marine AZIPODs (Manag. Level)

IMO Model Course 1.22, 1.32 / Simulator Ship Handling with Harbour Tug Boat Assistance operations Training, STCW A-II/I, 2-9, Ship/Port Interface CHAPTER 8 IMO MSC/Circ.1101 – T, Tug Simulation, IMO resolution A.960(23), 8.Sept.2003.

**Shiphandling for Pilots (Pilot training)** IMO 2003 resolution A.960(23) Recommendation on Training and Certification of Maritime Pilots other than Deep sea Pilots and Recommendation on Operational Procedures for Maritime Pilots other than Deep sea Pilots.

**Type Rating Certificate for Master and Officers on board High Speed Craft (HSC)**

**Type Rating Certificate for Ratings on board High Speed Craft (HSC)**

**Automatic Identification System & Voyage Data Recorder (AIS / VDR)**

IMO Model Course 1.34 / Automatic Identification System (AIS) & VDR - STCW 95 A-III



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### Navigation in Ice - *Training for Navigation in Ice and STCW 2010 Amendments*

- **Basic** Training For Ships Operating In Polar Waters - STCW Table A-II/1, A-II/2, A-II/3
- **Advanced** Training For Ships Operating In Polar Waters - STCW Table A-V/4-2

### Dynamic Position System (DPS)

**Integrated Navigation Systems (INS)** - Integrated Vessel Control System Navis IVCS 2000 – Offshore operations and using DP system

### Research and Development Port and Fairway studies

International Navigation Association (PIANC). Approach Channels. A Guide to Concept Design  
PIANC. Optimal lay-out and dimensions for the adjustment to large ships of maritime fairways in shallow seas, sea straits and maritime waterways

#### Step 1. Basic training:

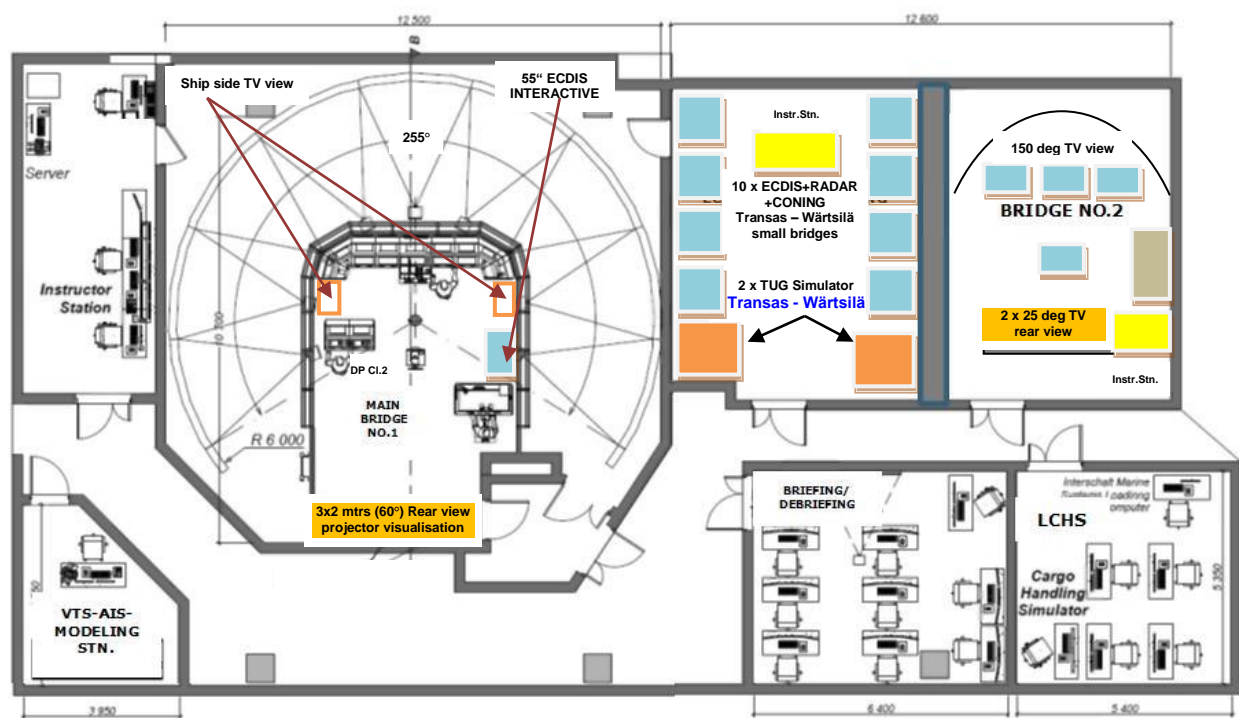
Competencies include Application of nautical knowledge, Operate equipment, Traffic management within the VTS area, Communication co-ordination, Transmitting and receiving information by radio, Demonstrate identified personal attributes, Respond to emergency situations.  
Use of the English language and other languages authorized by the Government.

#### Step 2. Advancement training:

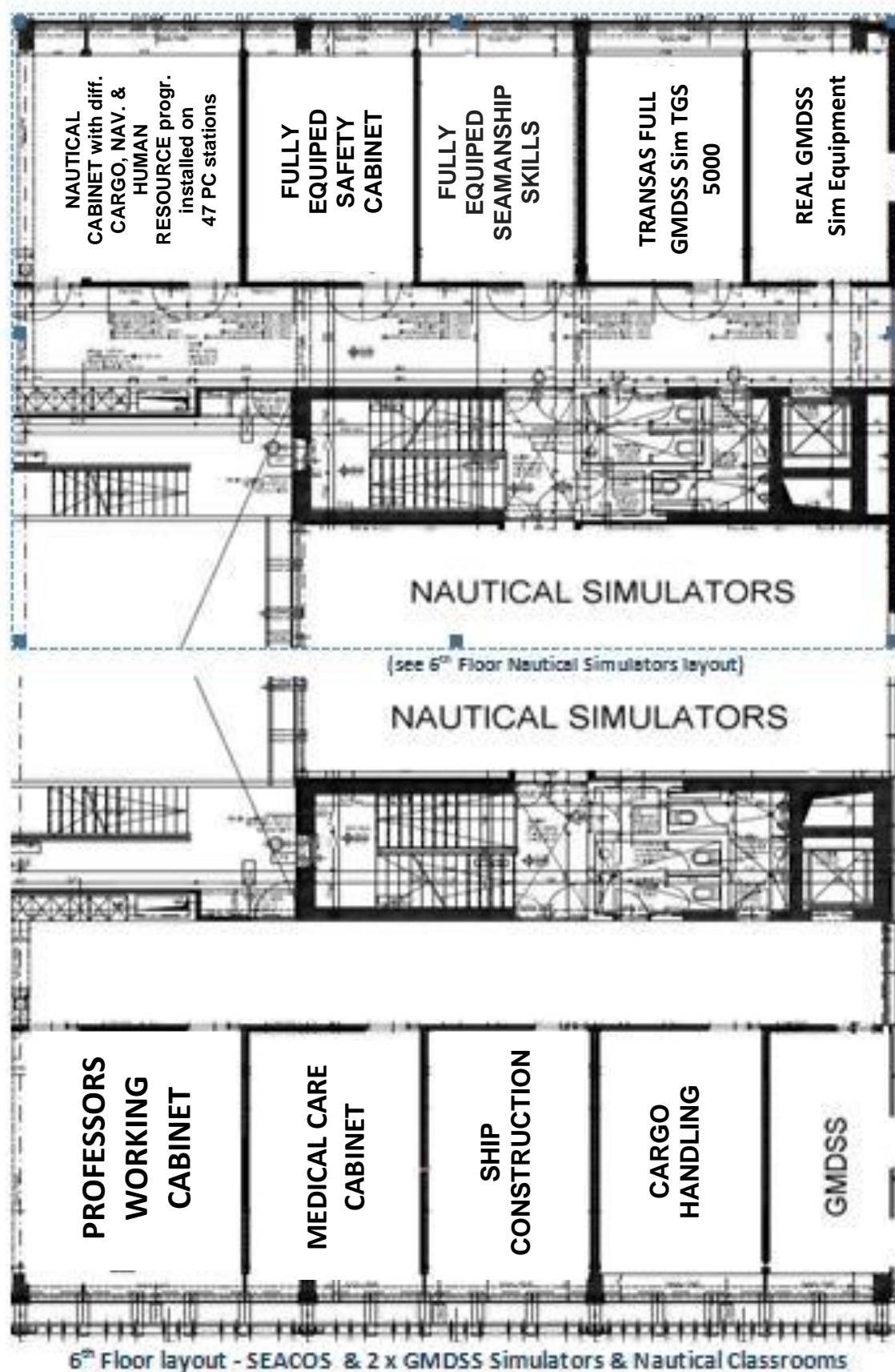
Additional nautical knowledge, Additional knowledge on responding to emergency situations  
Demonstration of additional personal attributes.

These courses are aimed at protection of large scale waterside perimeter infrastructure assets such as transportation centers, power plants, water resources, hazardous waste facilities, above ground storage facilities, territorial borders, defense facilities, and any other potential targets of hostile actions from terrorists or other acts of violence.

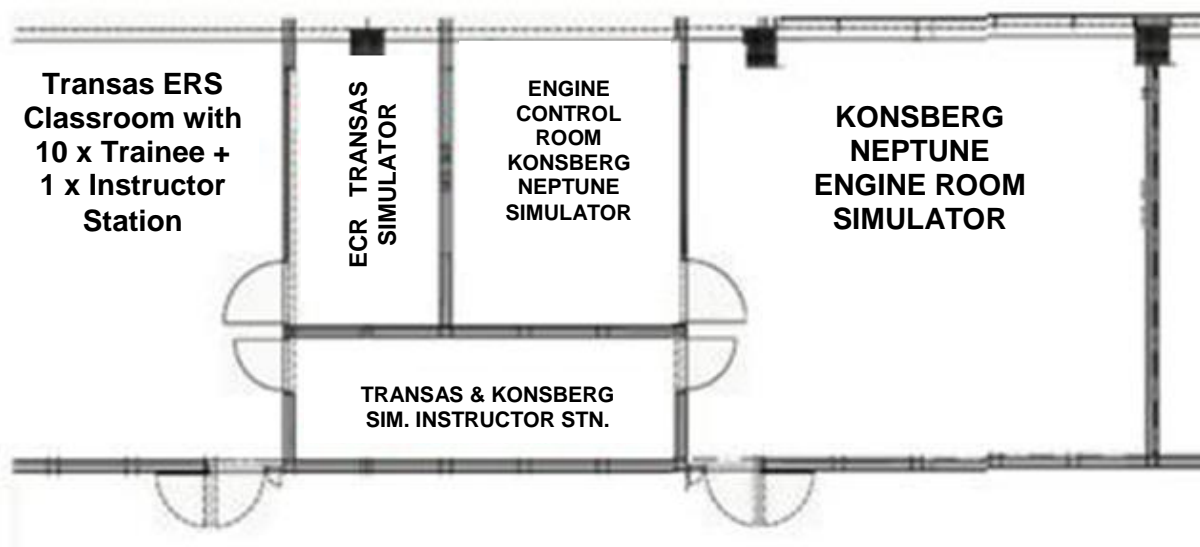
## SIMULATORS LAYOUT



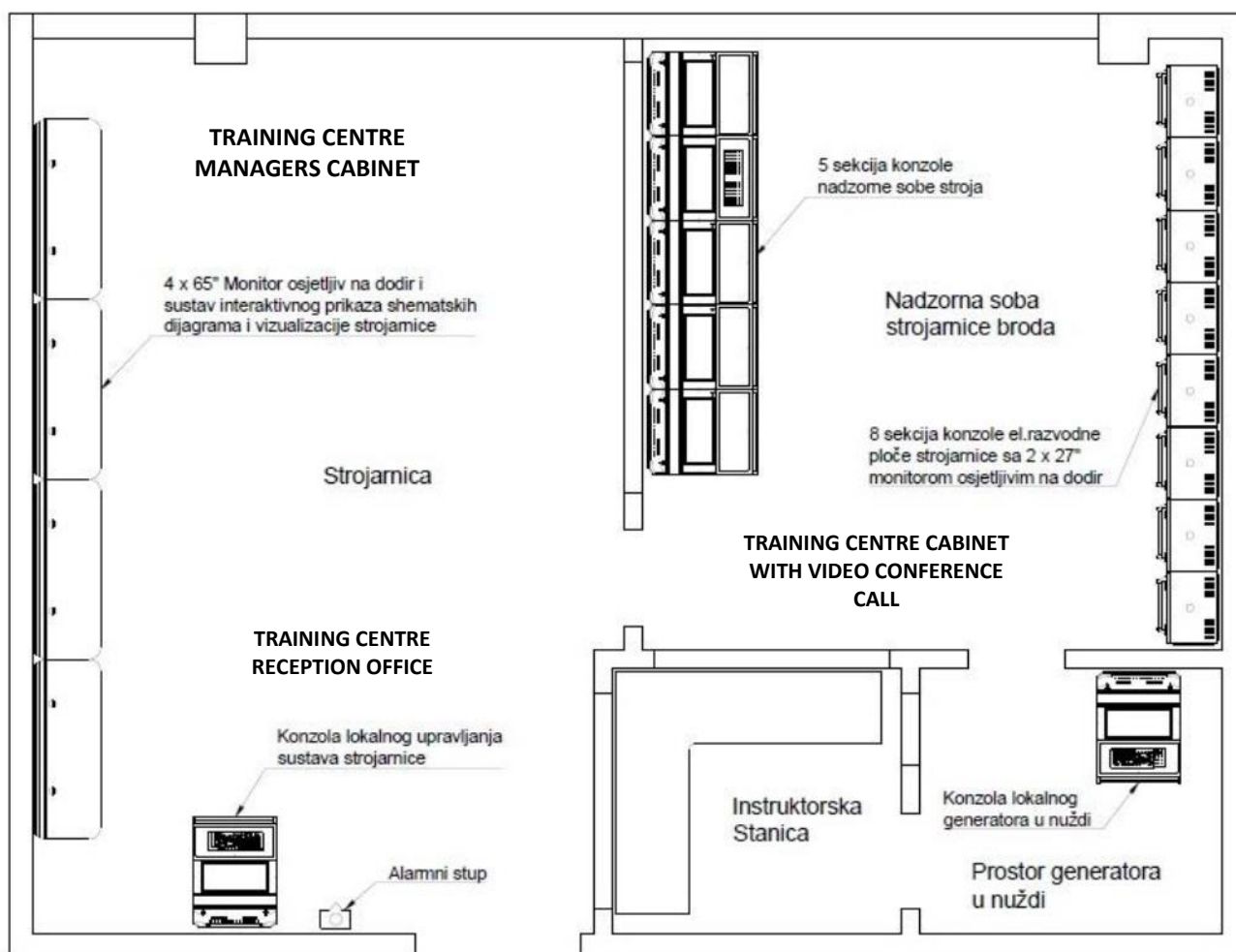
6<sup>th</sup> Floor Main Nautical Simulator Classrooms





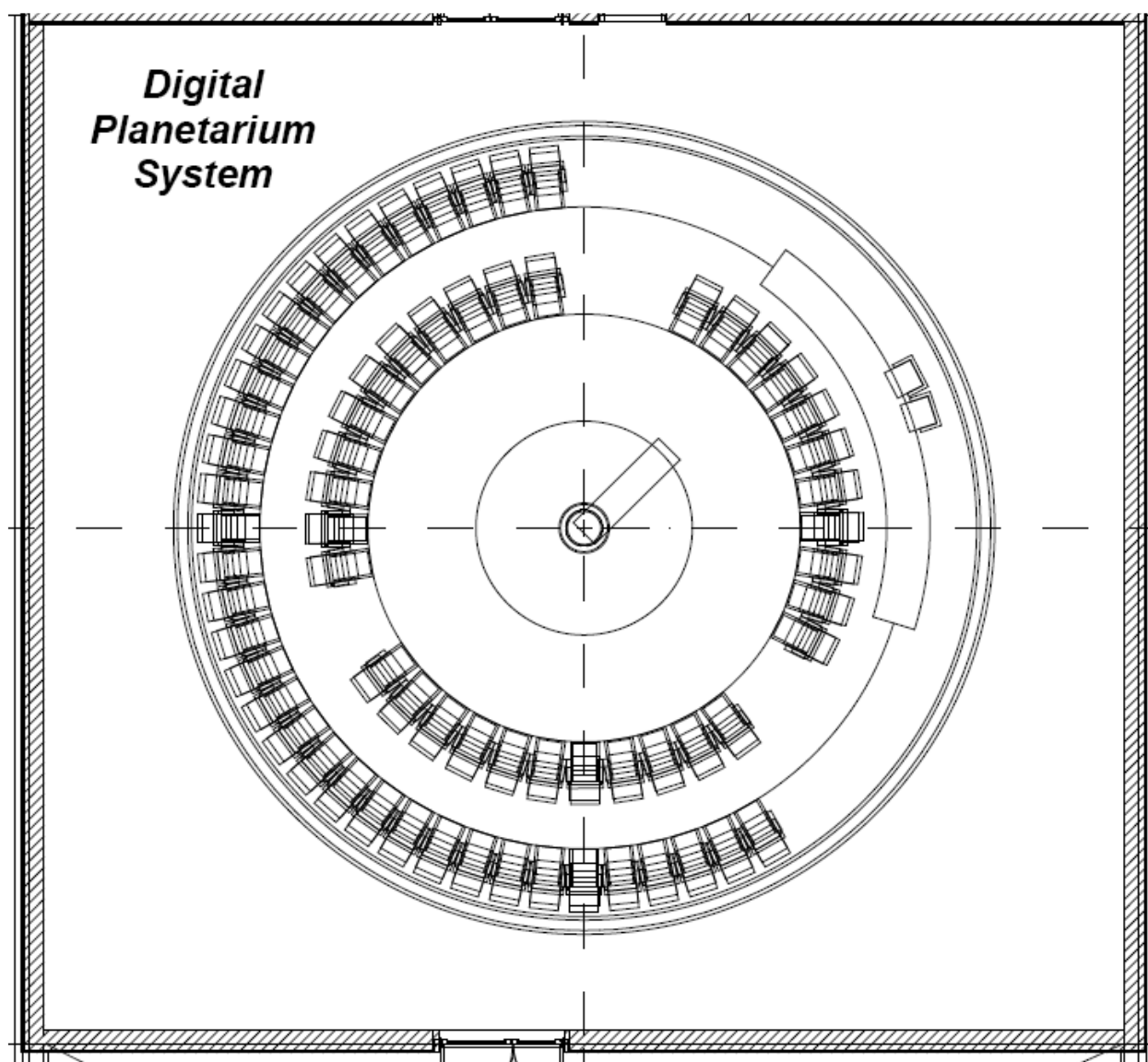


5<sup>th</sup> Floor layout – Engine Room Simulator



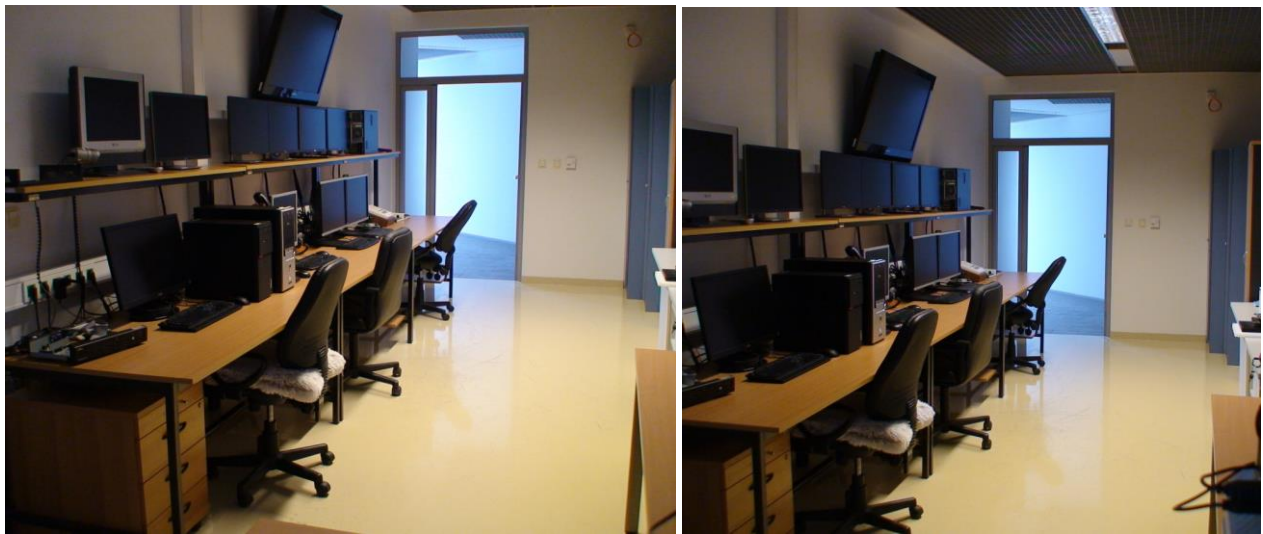
5<sup>th</sup> Floor layout – NEW TRANSAS - Wärtsilä ENGINE ROOM SIMULATOR - ERS 5000 TECHSIM SHIP MODEL WITH DIZEL-ELECTRIC PROPULSION DUAL ENGINE (MAN L51/60DF) FOR LNG TANKER

## Digital Planetarium System



7<sup>th</sup> Floor layout (Top Roof) – Digital Planetarium System With Amphitheater

## 1. Main Instructor Room



General view of the Main Instructor Room

Main Instructor Station connected with FMB No.1, Bridge No.2, Transas ERS, ECDIS/RADAR Classroom, AIS/VTS/PISCES/MODEL WIZARD Cabinet, BRIEFING/DEBRIEFING Classroom.

## 2. BRIEFING/DEBRIEFING Classroom with Instructor Station



General view of the BRIEFING/DEBRIEFING Classroom with Instructor Station

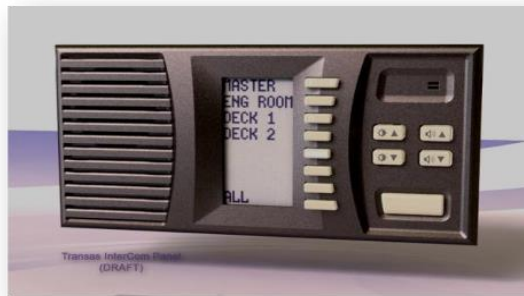
BRIEFING/DEBRIEFING Classroom with Instructor Station connected with Main Instructor Station, FMB No.1, Bridge No.2, Transas ERS, ECDIS/RADAR Classroom, AIS/VTS/PISCES/MODEL WIZARD Cabinet.



### 3. GMDSS Simulators

#### a) Wärtsilä Full GMDSS Sim TGS 5000 module Communication on the FMB BRIDGE No.1

There will be a programmable Transas Simulated Intercom Panels:



- All-to-all Intercom system is offered as both a software and hardware system
- Simulates communication within the own ship
- Unlimited number of programmable recipients
- The Intercom station panel is a stand-alone task within NTPRO and can be run on any simulator computer having a sound card
- Audio logging synchronized with debriefing log is provided for all Intercom exchanges
- Hardware Intercom panel connects via a USB interface
- PA feature is available as part of this solution

The workplace of Transas GMDSS Simulator 5000 will be provided on the bridge. This is also essential for obtaining of DNV Class A certification for the given bridge.

Satellite telephone is included in TGS 5000 simulator as software panel on a screen display placed at the Corner console.

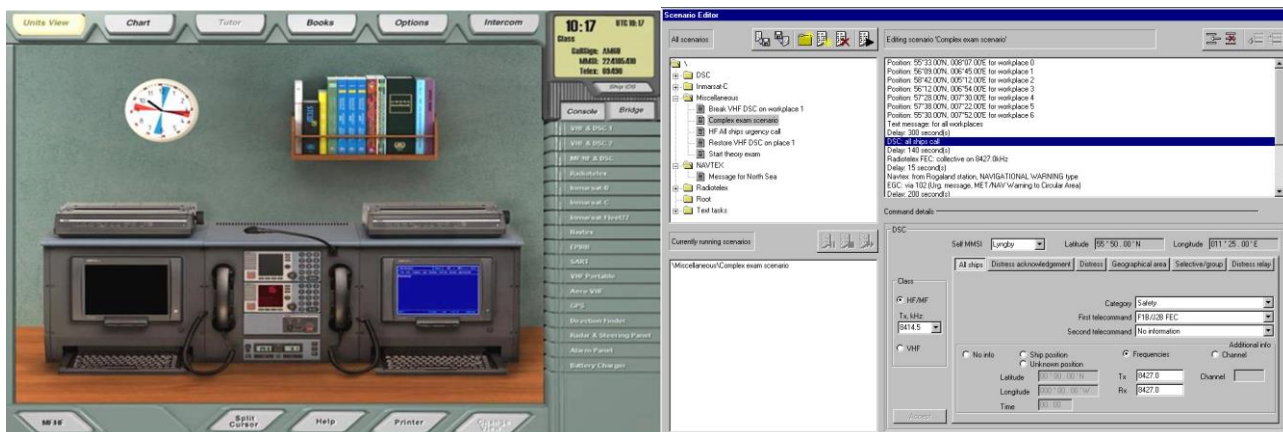
The TGS 5000 simulator will add some additional functions and training possibilities:

- Operation in standalone and network modes;
- Control of all the GMDSS radio station instruments;
- Imitation of radio communication in the telephony, telex and DSC modes taking into account the radio waves propagation;
- Self education program (Tutor);
- Built in HELP system on all the instruments;
- Reference materials on the GMDSS theory and some ITU publications;
- Printing out of received information on both, simulated and connected external printer;
- Availability of an electronic chart with a coast station database and indication of the current ship position;
- On-chart display of GMDSS Sea Areas, Search and Rescue Regions (SRR), and of radio wave propagation range;
- Possibility of using two micro telephone handsets.



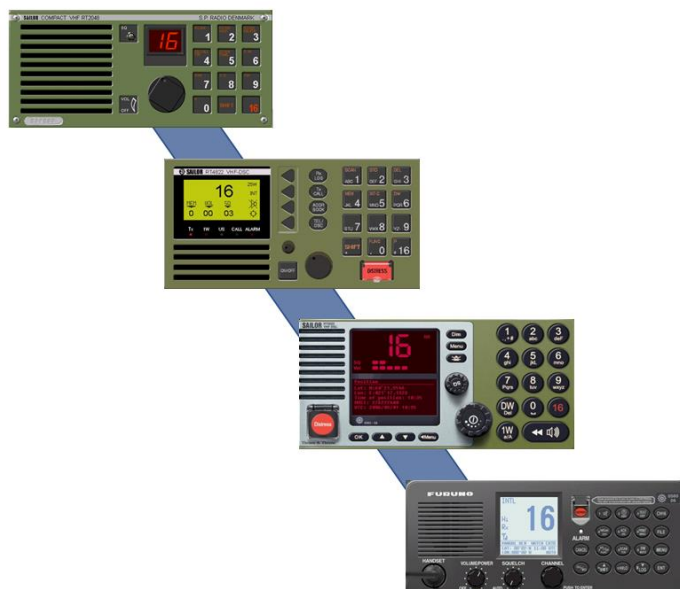
## GMDSS Sim TGS 5000 Instructor Station as part of MAIN Instructor Station

The Instructor Workplace is the core of the simulator. It is from here that the instructor assigns tasks to different bridges, receives information on trainees' actions, monitors mechanical operation and readings of instruments, and can take control over the events occurring on the Trainee workplace. Up to three instructor stations can be implemented in a simulator.



*TGS 5000 Instructor workplace*










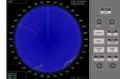












## Trainee Workplace



*Available VHF devices in TGS 5000: Sailor RT2048, Sailor RT4822, Sailor RT5022, Furuno FM-8800S.*

The student workplace can be used both in network mode and standalone mode (where the trainee can make individual use of the self-education program ("Tutor" mode).

With the selection bar on the right side of the screens, the trainees have access to the following functional GMDSS/communication components:

VHF radio		Portable VHF GMDSS radio	
VHF DSC modem with channel 70 receiver		Watch receiver on 2182 kHz	
MF/HF radio station		Airborne VHF radio station	
MF/HF DSC modem with a scanning receiver		GMDSS Distress Alarm Panel	
MF/HF telex modem and terminal		Radar	
INMARSAT-B station		GPS receiver	
INMARSAT-C station		Radio Direction Finder	
INMARSAT Fleet77 station		Power Switchboards	
NAVTEX receiver		Charging unit control panel	
COSPAS/SARSAT emergency position-indicating radio beacon		Ship Security Alert System	
Search and rescue transponder		Steering Panel.	

For a variety of the above listed devices the trainees can select from different manufacturers/models.

The best example for this is the VHF/HF section: TGS 5000 has been developed and improved over years, and has consequently followed the development of new equipment on the market. Therefore, an interesting feature is the capability to select between three generations of VHF/HF equipment of S.P. Radio's Sailor series (Sailor 2000, Sailor 4000 and Sailor 5000) in the software options page. Besides, also a VHF device of Furuno (FM-8800S) is available.

## b) REAL SAILOR GMDSS Simulator - Classroom 6 x working station



SAILOR GMDSS simulator



GMDSS Simulator equipment include:

- VHF DSC radio station;
- MF DSC radio station or MF/HF DSC radio station;
- SES INMARSAT C radio station;
- SES INMARSAT A ili B (simulator)
- NAVTEX receiver
- EGC receiver
- EPIRB unit (training model)
- SART unit (training model)
- VHF station



### c) Wärtsilä GMDSS Sim TGS 5000

#### Classroom with 1 x Instructor + 10 x working station

Wärtsilä Full GMDSS Sim TGS 5000 spread on 10 x working stations + 1 x Instructor station with same full functions as GMDSS Communication installed on the FMB BRIDGE No.1.





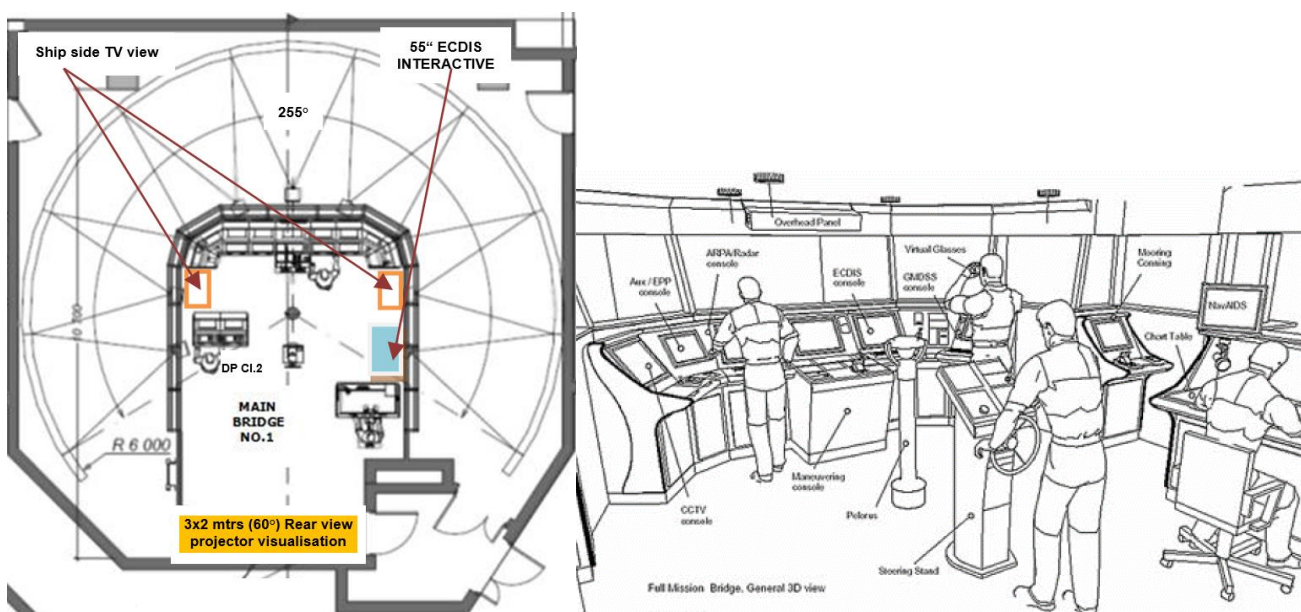
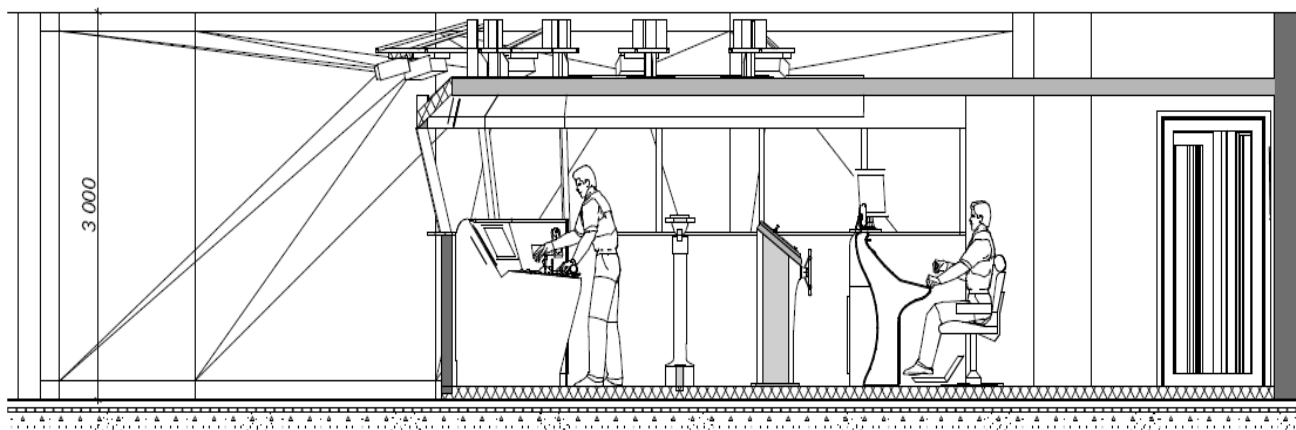
## 4. Main FMB 1 - Full Mission Wärtsilä NTPRO 5000 Bridge simulator DNV "Class A" (NAV)

Simulator compliant and approved with/by DNV Class notation INTEGRATED SIMULATOR SYSTEM, NAUT AW (SIM), DYNPOS – AUT (SIM), HSC, TUG, ICE to the **DNV "Class A"** Standard for Certification of Maritime Simulators requirements for Bridge Operation Simulator, including training for Dynamic Position System (DPS), High Speed Crafts (HSC), Tugs, SAR, Ice Navigation, Anti-Piracy, Integrated Navigation Systems (INS).

- HFOV-projector system = 255° projected visual environment realized with a projection display on cylindrical wall + 1 x Extend rear visualization 60° environment realized with a projection display on rear wall, **Total 315°** projected visuals with 3D visualisation. This means that it has been recognised as being capable of simulating all environments, creating a VIRTUAL SHIP ENVIRONMENT;
- 1 x 55" Interactive screen for ECDIS and GMDSS station for VTS;
- 2 x LCD 55" screen 25° for ship side view;
- Own ship to ship tugging software module,
- Automatic Identification System (AIS),
- GMDSS Sim TGS 5000,
- DPS (Class 2) module,
- Steering stand,
- Real Pelorus – Real Sperry Marine Bearing Repeater stand w/Azimuth Device



**Main FMB 1 with DP Class 2 , Manoeuvring station + Real Pelorus Stand (Class A NAV)**



**6<sup>th</sup> Floor Main FMB No. 1 Sim. layout w/DP System Class 2, 315° projected visuals**



**Main FMB 1 with DP Class 2 , Manoeuvring station + Real Pelorus Stand (Class A NAV)**

The “**Class A**” (NAV) bridge equipped with an internationally recognized type approved “**Class 2**” system from Navis engineering.



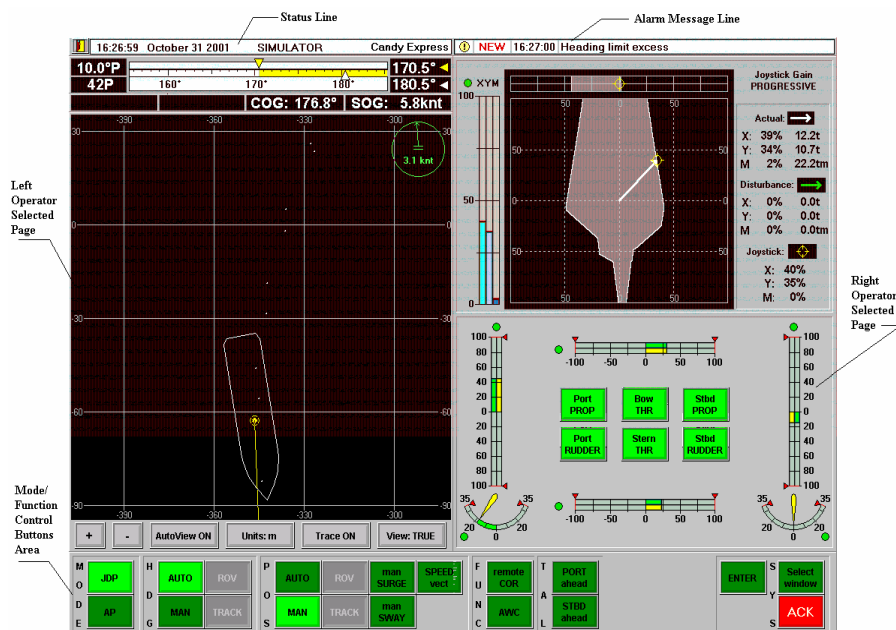
*The location of the DP consoles on the bridge*

The core of the proposed system is DNV Class A approved Transas Navi-Trainer Professional 5000 simulator that simulates data from “external environment”, which is in real practice being collected from the ship sensors, and provides data exchange with the DP System.

According to the *Specification for the equipment requirements for a DP training facility* “For the conduct of Nautical Institute approved training, the DP system must simulate “real” systems from one of the recognized manufacturers of DP equipment. The system should be a modern one, with relevance to current DP operations and vessel types. The system should be of the type fitted in Equipment Class 2 or 3 vessels, i.e. with the level of redundancy expected to be found in vessels of those classes. DP simulator training should not be conducted entirely on systems described as non-redundant or “Simplex”.

In order to provide the standard compliant training NT-Pro 5000 provides integration with the IVCS 2002 DPS system.

**NavisDPS IVCS2002 Series Dynamic Positioning System** is a new generation of DP systems incorporating state-of-the-art capabilities. Aside from using the most modern approach, the system preserves proven and reliable engineering solutions. Highly accurate position control with reasonably priced systems and ease of maintainability is the end result.





**Table 1. DPS system approvals**

Name	IMO	ABS	DNV	Lloyds
DPS-01 (Joystick Control Station)	NA	DPS-0	DNV-T	NA
DPS -11/12	Class 1	NA	DNV-AUTS	DP(AM)
DPS -11/12+Joystick Control Station	NA	DPS-1	DNV-AUT	NA
DPS -21/22/32	Class 2	NA	AUTR	DP(AA)
DPS -21/22/32+Joystick Control Station	NA	DPS-2	NA	NA
DPS -21/22/32+ NavisDPS -11/12	Class 3	DPS-3	AUTRO	DP(AAA)

The IVCS 2002 is a Windows based integrated vessel control system. The integration is designed to provide a DP2 system level simulation.

The following DPS Controls Mode and Functions are available:

- Joystick modes with manual or automatic heading control;
- Dynamic positioning modes with manual heading, automatic heading or split axis manual/automatic control;
- Autopilot mode with FFU steering knob for direct rudder control;
- Track Control modes for low and high speeds with automatic or manual course holding and following the route (track) described by a set of waypoints;
- ROV follow mode with manual or automatic heading control and watch circle; sensor blending of DGPS provides accurate and stable operation;
- Variable center of rotation;
- Automatic wind compensation.

### ***Vessel mathematical model***

Data from the real Navis IVCS 2002 mathematical model is being transmitted to NTPro simulator and back as it is described below:

The mathematical model is a special calculating module (hydro- and aerodynamic ship description). This module continually calculates the ship's response from external disturbances as well as from on board thrusters. The response is indirectly estimated from sensor data.

Wind speed and wind angle, relatively to a ship, are parameters of wind disturbance. Wind forces and moment are calculated based on aerodynamic ship hull characteristics. Data from follow up control system sensors are parameters defining thruster's thrust. Using these parameters, instantaneous forces from propeller, rudder and thruster are calculated.

All ship particulars: mass, draft, dimensions, hull type, propulsion unit type, thrusters types and structure, superstructure location etc. are taken into account in the Mathematical Model, which is modified in accordance with sea trial data and then applicable to the actual ship.

The Mathematical Model adjustment is as accurate as possible and describes all possible modes of ship motion from external disturbances as well as on board thrusters.

### **Compliance with Nautical Institute requirements**

Please find below the compliance matrix between The Nautical Institute training requirements and NT-PRO 5000. A number of supplied DP simulator has already obtained a NI Certification.



## 5. Bridge 2 – Second Bridge simulator B (NAV):

- Own Instructor station
- Wärtsilä NTPRO 5000 Bridge simulator, 5 x LED 2" screen = 150° + addition rear view w/2 x LCD 2" screen (25° each = 50°) total view = 200°;
- 2 x ARPA RADAR, 2 x ECDIS, CONING Display
- Own ship to ship tugging software module,
- SAR software module,
- Ice navigation software module
- Anti-Piracy software module
- Fishing module
- Steering stand




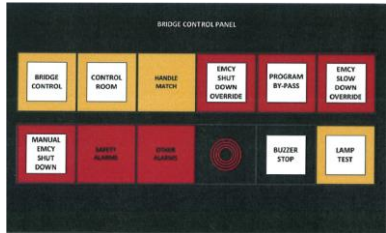

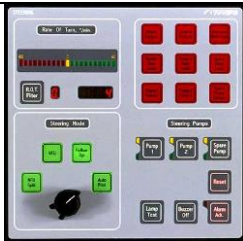

**Bridge 2 Simulator B (NAV) General view of the Main Bridge and Local Instructor Station**





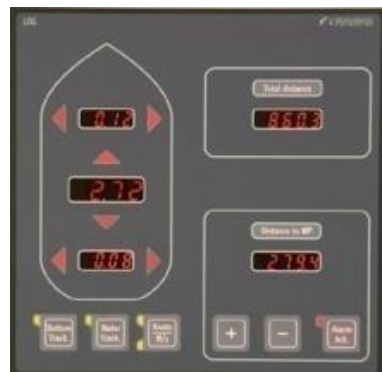
Azimuth control PORT & STBD (1+1 pcs):



## 6. Main Bridge no.1 equipment - Hardware panels and indicators

Main Bridge equipment- Hardware panels and indicators located within the Class A bridge

Panel	Description	Picture
Dual Engine panel	<ul style="list-style-type: none"> <li>* Dual engine alarms</li> <li>* Start air pressure indication bar</li> <li>* Emergency controls</li> <li>* Fine tuning of RPM</li> <li>* BCC control panel for ECR</li> </ul>	 
Thruster Panel	<ul style="list-style-type: none"> <li>* Analogue Dual Thrusters control (Real LF90 Thruster telegraph)</li> </ul>	
Rate of turn indicator	<ul style="list-style-type: none"> <li>*Steering mode selector switch</li> <li>*Rate of turn indicator</li> <li>*Steering gear pumps controls and alarm indicators</li> </ul>	
Autopilot Panel	<ul style="list-style-type: none"> <li>* Track control</li> <li>* Track control from an external device (ECDIS);</li> <li>* Mode of maintaining the constant turn radius;</li> <li>* Mode of maintaining the constant rate of turn;</li> <li>* Mode of the course and turn radius (ROT) programmable input;</li> <li>* Mode of the course and turn radius (ROT) instant</li> </ul>	


	<p>input.</p> <ul style="list-style-type: none"> <li>* Ordered course display</li> <li>* Tiller for course order</li> </ul>	
Search Light Panel	<ul style="list-style-type: none"> <li>* Control of up to 2 search lights</li> <li>* Joystick</li> <li>* Speed of rotation</li> <li>* Focus control</li> </ul>	
Visual panel	<ul style="list-style-type: none"> <li>* Simulator visual control</li> </ul> <p>Allowing the user to tilt and pan the visualization and select various view points.</p>	
Sound Signals panel	<ul style="list-style-type: none"> <li>* Manual ship's whistle controls</li> <li>* Automatic ship sounds</li> </ul>	
General panel	<ul style="list-style-type: none"> <li>* Dimming of panels</li> <li>* Simulation elapsed time</li> <li>* Depth repeater</li> <li>* Gyro and Magnetic Repeater</li> </ul>	
LOG Panel	<ul style="list-style-type: none"> <li>* Dual axis doppler log</li> <li>* Transverse speeds fore and aft</li> <li>* Distance to WP controls and indicators</li> <li>* Bottom track / Water track</li> </ul>	








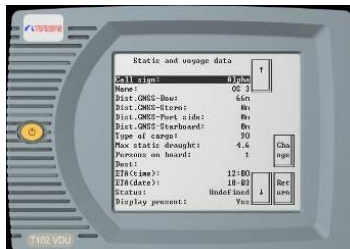
<p>Navigation lights control panel</p>	<p>* Navigation Lights control * Deck lights control</p>	
<p>Alarm panel</p>	<p>* Zone alarm indications * Alarm control and confirmation * Fire doors and ventilation control</p>	
<p>Dual Engine Telegraph</p>	<p>Real Dual Engine Telegraph Lilaas LF120D</p>	
<p>Winch Control panel</p>	<p>Winch control panel has at least following controls:</p> <ul style="list-style-type: none"> <li>• Winch IN/OUT control lever</li> <li>• Automatic Tension control</li> <li>• PINS control buttons</li> <li>• Emergency release buttons</li> </ul>	




Non Follow Up steering tiller(s) for synchronized or independent rudder control	Two steering handles will be provided to allow for independent rudder control. The operator will activate the independent rudder control handles by setting the turn knob on the Steering panel to NFU Split mode, activating the follow up steering control. When in follow up mode, the autopilot will indicate that the steering is in "remote" mode.	
POD/AZIMUTH/Water Jet Propulsion	<ul style="list-style-type: none"> <li>• POD/Water jet control Lillas LF 70 Left</li> <li>• POD/Water jet control Lillas LF 70 Right</li> <li>• Pod Backup panel for emergency steering in HW fault situation</li> </ul>	
Steering Stand	Professional Steering Stand with instrument panels and a steering wheel mounted inside	
Steering Wheel with high precision steering shaft	<ul style="list-style-type: none"> <li>* Rudder order indicator</li> <li>* Interface box</li> <li>* +-70 degrees</li> </ul>	
Rudder angle (Status) indicator	* +- 70 degrees	

Pelorus Stand	Real Sperry Marine Bearing repeater stand	
Bearing sight	Real Sperry Azimuth Device	
Bearing Repeater	Real Sperry Bearing repeater	
Transas VoIP intercom	Multichannel intercom with build in capability of communication recording with overall exercise log.	









Handset	Real Sailor handset for intercom communications	
MFD Station Keyboard	Dedicated real ES6 combined ECDIS/Radar keyboard for MFD station	
Overhead Display #1	<p>Configurable display unit based on TFT display with possibility to indicate any available ship parameters, supporting different propulsion systems including:</p> <ul style="list-style-type: none"> <li>- Port propeller RPM</li> <li>- Port azimuth direction</li> <li>- Starboard azimuth direction</li> <li>- Starboard propeller RPM</li> <li>- Port propeller pitch</li> <li>- Port water jet bucket position</li> <li>- Starboard water jet bucket position</li> <li>- Starboard propeller pitch</li> </ul>	



Overhead Display #2	Configurable display unit based on TFT display with possibility to indicate any available ship parameters, supporting different propulsion systems including: <ul style="list-style-type: none"> <li>- Depth</li> <li>- Heading, time &amp; Speed log</li> <li>- Rate of turn</li> <li>- Anemometer</li> <li>- Port and Starboard rudder</li> <li>- Inclinator</li> </ul>	
Trackball	Professional 3 button trackball	
AIS equipment	<ul style="list-style-type: none"> <li>- Real full AIS set (Jotron)</li> <li>- simulated MCMurdo AIS display on the conning and NavAids stations</li> </ul>	

Standard Hardware components of Class A (NAV) bridge and instructor Station

Equipment	Description	Picture
Server Monitor	17" LCD monitor, keyboard and trackball to control LAN equipment	



Communication Telephony	Digital PBX and 3 Telephone sets	
CCTV video recording	A solution includes necessary hardware and software to record CCTV video by 4 CCTV cameras.	
UPS	UPS with sufficient capacity to ensure safe data back up and system shutdown in case of power loss	
Firewall Hardware	Cisco Firewall router for remote access and maintenance	
Printers	-Local color printer A3 to create paper copies of exercise description and result for briefing/debriefing - Color Printer A4 - B/W Printer A4	
PC (Instructor and Trainee)	COTS PC x 26 - compliant with required specification	
Monitors	20" LCD monitor x 7 for slave playback applications 24" LCD monitor x 8 for Instructor and Bridge applications 19"LCD Monitor x 7 Video Splitters and VGA extension cables	
Stereo Speakers	Low power stereo speakers x 5 to playback simulated sound effects at instructor workplace and MFD Stations	

Bridge Sound System	Professional 5.1 sound system for bridge sound application	
Audio Recording	Solution includes necessary hardware (2 x high quality microphones) and software to record audio signal from microphones in synchronization with overall exercise log file	

### **Integrated Bridge and Navigation System- Multi Functional Displays with real ECDIS and Radar/Arpa (x,s bands applications)**

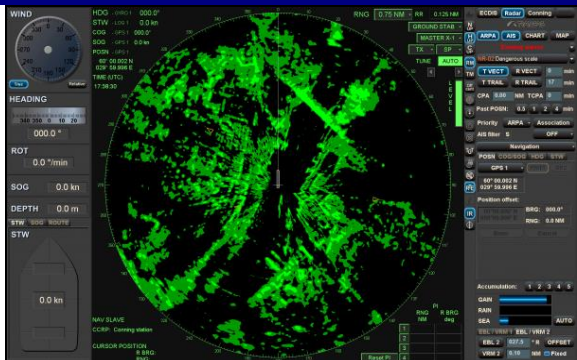
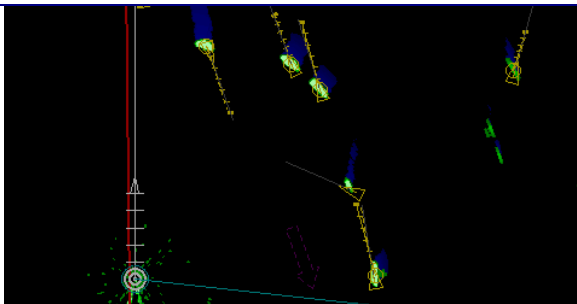
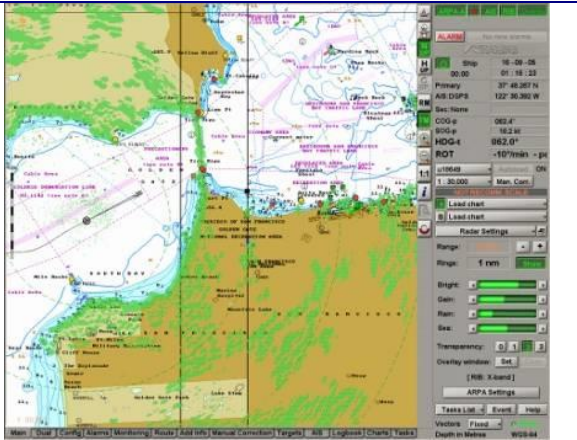
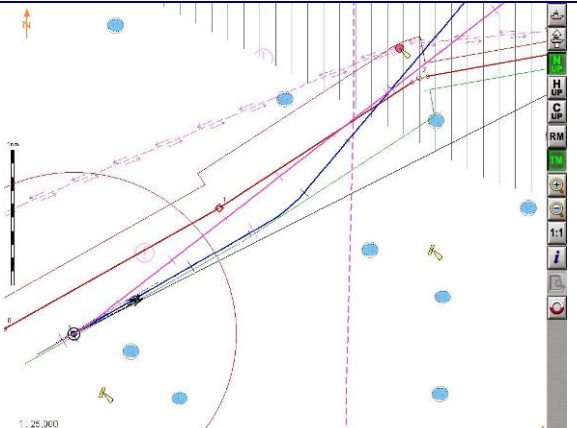
4 x Transas MFD 4000 stations configured for ECDIS and ARPA/Radar will be provided

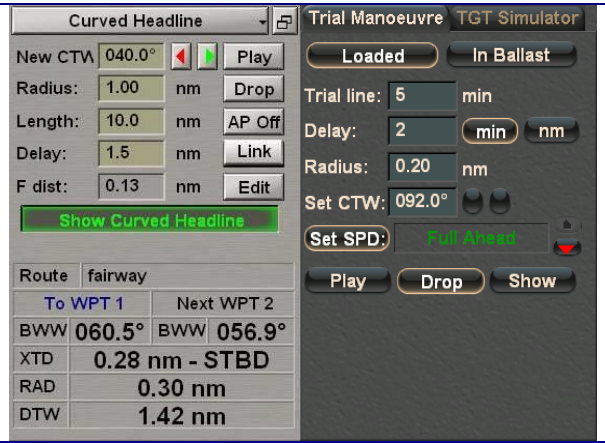
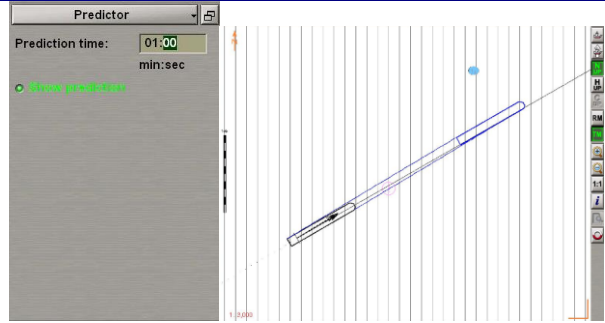
1 Station will be equipped with Transas ES-6 keyboard which is specifically designed for easy control of MFD



The ES6 Keyboard with Trackball consists of the following parts:

- PC compatible keyboard unit with QWERTY and function-keys
- Ergonomic trackball unit with two left buttons (one on each side of the Trackball), one right button for easy left or right hand operation, and an optional scroll wheel.
- USB port on top, connected to Computers USB interface, for connection of external data storage media
- USB or PS2 connection to Computer.
- Power supply 24VDC (-10/ +30% according to IEC 60945);

Requirement	Description	Picture
Capability to switch between X-band and S-band without stopping an ongoing exercise	<i>This is standard MFD feature. Both X- and S- band radar are simulated.</i>	
Capability to show ARPA radar and AIS overlay	<i>This is standard MFD feature.</i>	
Capability to show ECDIS with ARPA radar and AIS overlay	<i>This is standard MFD feature.</i>	
Capability to show 'Curved Headline', 'Ships Path' and 'Predictor'	<i>Curved Headline and Trial Maneuver</i>	

			
		<p><i>Predictor</i></p> <p>Ship path - available</p>	

## Transas Navi-Sailor 4000 ECDIS MFD

NAVI-Sailor 4000 ECDIS is the 5th generation of ECDIS from Transas. It can be installed as standalone system or as Dual ECDIS that can be the start for the vessel to meet the carriage requirements, with official ENC vessel is on its way to navigation without paper charts.

NAVI-Sailor 4000 Multi Functional Display (MFD) allows full integration of Conning and Chart Radar on one and the same workstation. For more information about MFD see the separate MFD section in the document.

## Description

NAVI-Sailor 4000 ECDIS (Electronic Chart Display and Information System) is designed in full compliance with the latest IMO, IHO and IEC standards and resolutions (see section Approvals below for details). NS 4000 ECDIS is a navigation information system that displays full positional information from navigation sensors on the electronic navigational charts. The system is designed to assist the mariner in route planning and monitoring. The combination of all data on a single display allows the quickest possible situation assessment and decision making onboard.



## Features

### GUI and display

- Various resolutions, 5 skins, 4 palettes, common style with other MFD tasks
- "North-Up", "Course-Up", "Head-Up" orientation with True/Relative motion.
- Multi Language support including Localizer tool for in house translation
- Possibility to change Units of measure for main parameters real time.

### Navigation tools

- Route Monitoring and Alarms management
- Generation of SAR operation patterns (reference to std/doc)
- Precise Navigation Tools package: Trial Manoeuvring, Curved Headline, Simplified and Adaptive predictors

### Planning, Logging and Playback

- Automated keeping of the ship electronic logbook (the E-Logbook is TA by DNV but needs approval from respective ships flag state)
- Events logging manually and automatically with fixed time intervals each 1 hour and 1 minute
- Passage planning includes environment data (currents, weather, etc)
- Advanced route planning and validation
- Passage recording playback function in compliance with IEC requirements regarding 12 hour log
- Vessel track recording up to 3 months
- Track high frequency recording up to 1 second and for period of up to 15 days.
- Track to text conversion via built-in Data Tool utility



### Charts and Databases

- Multiple operation modes with charts in 7 different formats. Primarily official ENC/SENC as part of TADS subscription, but also Transas vector TX-97 with worldwide coverage, ARCS, etc) including online updates.
- World Ports, Magnetic variation, Tides and Currents databases implemented.
- Admiralty Information Overlay (AIO) displays the chart data changes published by UKHO on top of the ENC data.

### MFD added value

- CHART RADAR MFD task work and display on the same workstation or Extended Display connected to RS6 main unit (Optional)
- Conning MFD task work and display on the same workstation or Extended Display connected to RS6 main unit (Optional)
- Interface with Transas RADAR system via LAN providing
- Sharing of Sensor data
- Common Alarm handling
- Synchronized Chart updates from one station

### Interface with External Systems/Sensors

- Integrates with AIS equipment in compliance with IEC61993/2 standard
- AIS binary messaging support (Meteo Info for Great Lakes area e.g.)
- AIS Class B Support
- Incorporated Radar Processor board providing the RAW Radar picture overlay from external radar (optional)
- Automatically reads processes and overlays messages from NAVTEX to the electronic navigation chart. More information in separate Software Options section.
- Tender tracking on electronic chart using Seetrac Interface (Optional)
- Connection to Internet via Transas Firewall and Antivirus Protector for downloading of charts and chart updates from the Transas Chart Server (Optional). More info in separate section below.
- Reset of the timer on Watch Bridge Alarm System (BWAS) when system is under control by operator.
- **Input** data from the following systems in accordance with IEC 61162-1 (not all are simulated):
  - Positioning (GGA, GLL, VTG, RMC, DTM, ZDA, GBS, GNS)
  - Gyrocompass x 2 (HDT, ROT)
  - Speed Log (VHW, VBW)
  - Magnetic Compass (HDG, HDM)
  - Echo Sounder (DBT, DPT)
  - Wind Sensor (MWD, MWV, VWR)
  - Water Temperature Indicator (MTW)
  - Digitizer YEOMAN (WPL, GLL)
  - Alarm Station (ALR, ACK, Analog data via WAGO converters)
  - Customized NMEA sentences
  - Target data from 2 ARPA (ARPA's A/B)
  - External ARPA ERBL cursor (RSD)
- **Output** the following NMEA data:
  - Navigational Data (GLL, GGA, VTG, VHW, VDR, WPL, RTE, ZDA, XTE, GBS, DTM, HDT, ROT, VBW, APB, BOD, BWC, OSD)
  - Route Segment Transmission (RTE, WPL sentences)
  - Alarms

### Approvals (IMPORTANT!)

NAVI-Sailor 4000 ECDIS MFD meets the following NEW Resolutions and Standards and has been type approved by DNV:

- **MSC 232 (82)** – Revised performance standard for Electronic Chart displays and Information Systems (ECDIS).
- **MSC 191 (79)** – Performance standard for the presentation of Navigation-related information on ship born navigational displays.
- **61174 edition 3** – ECDIS - Operational and performance requirements, methods of testing and required test results
- **62288 edition 1** – Presentation of navigation-related information on ship-borne navigational displays – General requirements, methods of testing and required test results



## Wärtsilä Navi-Radar 4000 MFD as part of FMB No.1

Navi-Radar 4000 MFD is the 3rd generation of RADAR system from Transas. It is fully compliant with the latest standards for RADAR, CHART RADAR and ARPA.

NAVI-Radar 4000 Multi Functional Display (MFD) allows full integration and multitasking of Chart Radar/ARPA and ECDIS on one and the same workstation. For more information about MFD see the separate MFD section in the document.

### Description

Navi-Radar 4000 MFD is designed in full compliance with the latest IMO, IHO and IEC standards and resolutions. NR 4000 is a PC-based radar system with advanced ARPA, AIS and Chart Radar facilities. Core of the Transas radar system is new 24VDC low power consumption and compact size reliable hardware that perfectly fit for any type of the vessels when supplied with variety of up mast and down mast transceivers and antennas from 4 up to 12 feet.

Beside enhanced video performance and system overall stability to the list of new Navi-Radar features is reckoned improved radar algorithms including D3D video acceleration for trails presentation, which enables to save trails when switching modes. Graphical interface has undergone certain changes: information order on the main screen became more convenient for perception including new skins – “Carbone” & “Blue” and grouped in strict requirements of performance standard at the same time. New rules of symbol presentation according to IEC 62388 are reflected in this product.

### Features

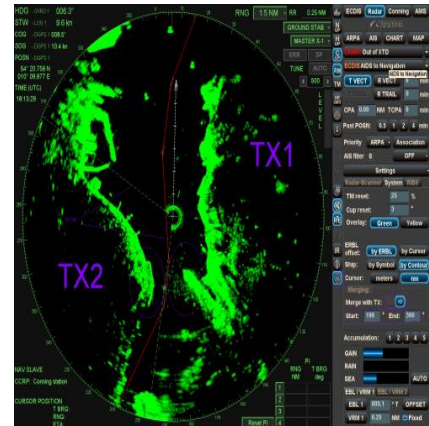
#### GUI and main ARPA tasks

- User friendly, clear and logically structured interface
- Handling of primary radar information
- Set of ranges: 0,25; 0,5; 0,75; 1,5; 3; 6; 12; 24; 48 nautical miles
- North-up/ Course-up/ Head-up orientation display
- Display of radar information in the true and relative motion modes
- True and relative motion target vectors
- Display of radar picture with center shifted to up to 2/3 of the screen radius
- Display of two electronic range and bearing lines with offset possibility in drop and carry mode
- Display of four electronic Index lines
- Curved Electronic bearing line (EBL) with ECDIS synchronization within one workstation



- Trial manoeuvre
- Estimated time of arrival in point under cursor
- Display of all-round radar picture from multiple radar sensors

Combining functionality is implemented in accordance with requirements of IEC62388 14.4.3. Combining radar (MSC.192/5.35.2). The goal of this functionality is to provide navigator with all-round radar picture from multiple radar sensors on a single display, in case of blind or covered sectors on one of radar sensor. NR4000 MFD is able to combine the radar picture from any 2 of maximum 4 transceivers in MFD network in different combination mixing X and S.



### Charts

- Chart Radar with support of different chart formats: SENC/ENC/S-57 and Transas TX-97 charts
- Selection of chart in-fills (colored, monochrome) or contours
- Separate layer of objects (MAP) for storage of notes and service information not connected with official chart correction data
- Simultaneous displaying of MAPs and Charts
- Multi-loading of TX-97 and S57 Charts the same time

### Targets

- Target data from ARPA for collision avoidance
- Targets from AIS for easy identification
- Association of AIS targets with ARPA targets
- Acquires and process ARPA tasks (up to 80 targets)
- Displays up to 256 AIS targets
- Stable tracking of targets with relative speed up to 140 kn (requirements of IEC62388)

### MFD added value

- ECDIS MFD (Optional)
- ECDIS Curved Headline and Predictor (Optional)
- Conning MFD (Optional)
- Interface with Transas ECDIS via LAN providing
  - Sharing of Sensor data
  - Common Alarm handling
  - Radar Overlay in ECDIS
  - Synchronized Chart installation and updates from one workstation for the whole system

### Interface with External Systems

- Display of a route loaded from external systems ECDIS/positioning system
- Reception of position, course, speed and route information from the connected external sensors in accordance with NMEA 0183 standard; (IEC 61162 ed.1/2);



- Reception of water and ground speed information from the connected dual axis log in accordance with NMEA 0183 standard;(IEC 61162 ed.1/2);
- Reception and displaying of routes;
- Output of tracked targets (ARPA and AIS) parameters in TTM telegram as per NMEA 0183 standard; (IEC 61162 ed.1/2);
- Output of own ship parameters in RSD/OSD telegram as per NMEA 0183 standard; (IEC 61162 ed.1/2).

### Approvals (Important!)

Navi-Radar 4000 MFD meets the following NEW Resolutions and Standards:

- **MSC 192 (79)** – Revised performance standard for Radar Equipment.
- **IEC62388 edition 1** – Ship-borne Radar performance standard

### New ship-born Radar standard

NR4000 MFD is certified by QinetiQ in accordance with IEC62388 category 1&2

## 7. 8 x Wärtsilä ECDIS 4000 + RADAR & CONING Bridges connected with Main Bridge no.1 and Bridge no.2, (HFOV = Up to 60) + additional 2 x ECDIS independent working station;

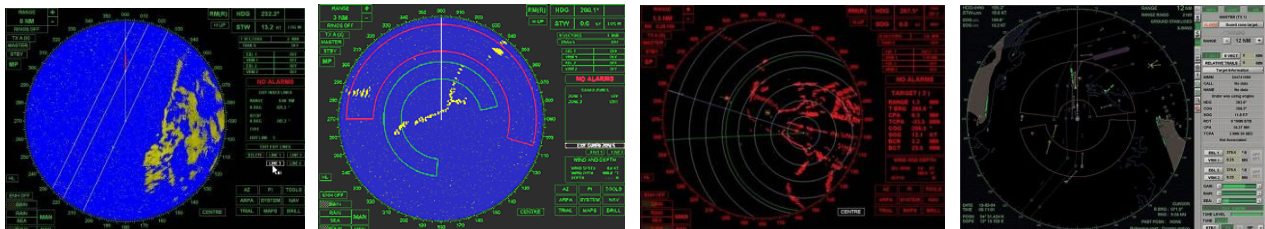
### CLASS TRAINER GENERAL ECDIS/RADAR/ARPA SIMULATION



### ECDIS/RADAR/CONING class simulator (8 bridges / Own ships)

Each **Radar/ARPA** station includes imitation of the following radar types:

- Sperry Bridge Master E
- Furuno 2100
- Kelvin Hughes Nucleus 6000



## ECDIS training

With the experience of more than 150 ECDIS and BRM training courses for over 400 nautical officers, captains and shore based personnel during the last five years, the **Faculty of Maritime Studies – Split (PFST)** offers an unique platform to conduct high qualified trainings in respect of the mandatory ECDIS implementation in 2012. The PFST offers IMO Model ECDIS training courses with state-of-the-art environment w/eight working stations as own bridges each (ECDIS/RADAR/CONING) + one(1) instructor station made according Standard for Certification No. 2.14 Maritime Simulator Systems January 2012.

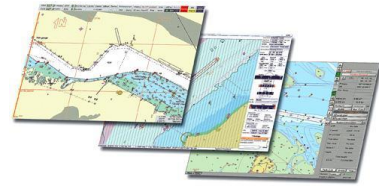
### The ECDIS training qualifies the crew

- Pass Port State Controls
- Assess displayed ECDIS information correctly
- Conduct chart installations and updates properly
- Interpret legal standards
- Recognize and solve malfunctions
- Avoid misinterpretation



### Be prepared for ECDIS

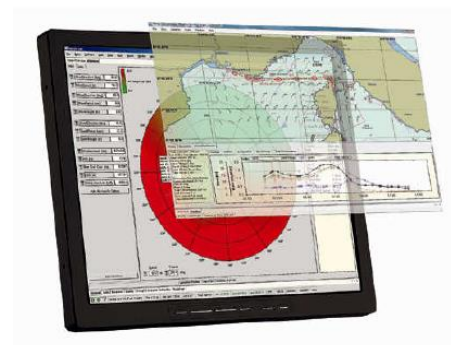
- Navigate paperless and safely
- Be trained on type ECDIS software and simulation environment
- Benefit by high qualified and experienced trainers



### Significant Features:

#### **Bluewave**

- \_ Optimal routing Weather routing- and decision support system
- \_ Early danger detection
- \_ Avoidance of damages
- \_ Online processing of weather data
- \_ Dynamic real time representation
- \_ Indication of optimal course and speed
- \_ Integrated electronic sea chart system
- \_ Interface to sensors (GPS, weather etc.)
- \_ Precise prediction of vessel motions



### Additional notices:

- Database for 50 different Own vessel models, including VLCC tankers up to 320,000 DWT, VLCV container carriers up to 18000 TEUS, Large LNG, PCC - all Ice class LU1 or higher & Dynamic naming, Double acting LNG YAMAL with three Azipod + 250 x Hydrodynamic Target models.
- Database for 30 different "gaming areas" including Rotterdam, Singapore, Hong Kong, Bosfor, Dardanelles, San Francisco and Los Angeles, Koper, Bari, Split, Venice, Nord Cape..... Worldwide folio of electronic charts.
- "Double bank" moorings (Lightering operations).
- Bridge Simulator includes modern Own Ship models for Search and Rescue (SAR) at sea, helicopters, combined with communications modeling. These allow training in using these facilities and in the coordination of the search and rescue operations in the most adverse weather conditions.  
The full scope training in search and rescue operations as per the IAMSAR manual (edited jointly by the International Civil Aviation Organisation and International Maritime Organisation).
- Bridge Simulator also includes Own Ships Models for Dynamic Positioning System with different Oil Rig Models, Own Ships Models for TUG HANDLING.
- In order to provide the standard compliant training NT-Pro 5000 provides integration with the IVCS 2002 DPS system.



## 8. Navi-Planner 4000 SW

Wärtsilä “Navi-Planner 4000” allows to perform training on route planning, charts and chart updates orders, working with weather forecasts.

Integrated in NTPro5000 Instructor station and Trainee Bridge, Instructor can see full view of “ECDIS TRAINING” panel, that includes:

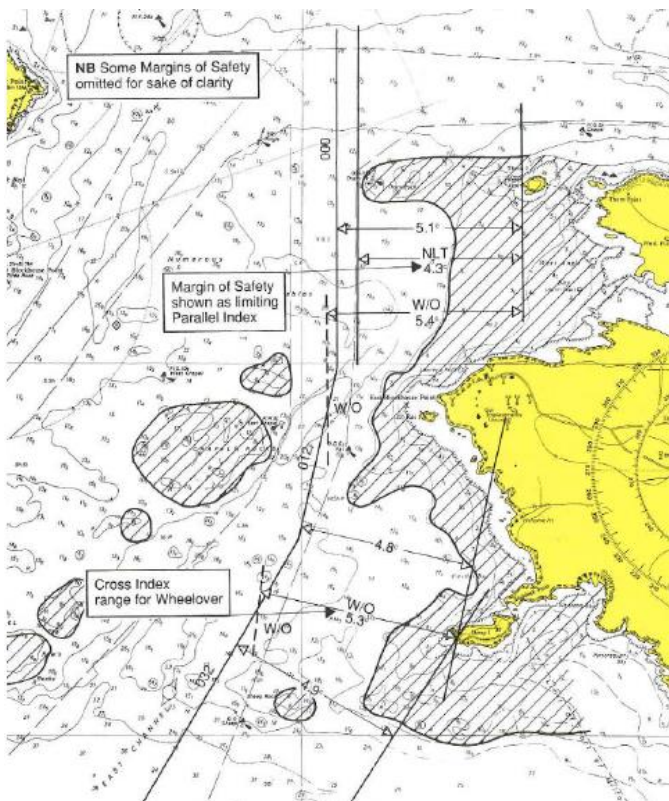
- Panel Orders, showing all the requests, received from the trainees, including order type – catalogue, chart update, weather;;
- Panel Order information, showing details of each order;
- Possibility to choose weather forecast to send;
- Possibility to reset and revert all the actions.

Also Instructor gets additional area - Fictitious area, that serves for the ECDIS training in respect of correct understanding of electronic charts visual elements. This area allows to plan port to port passage.

Trainee Bridge workstation can work with the following features:

- Navi-Planner 4000 software;
- Emulator of email software, that allows to simulate work on the host with no internet support.

Fictious Area Training Chart Folio is included with module. These charts may serve as a ready solution for ECDIS-training.



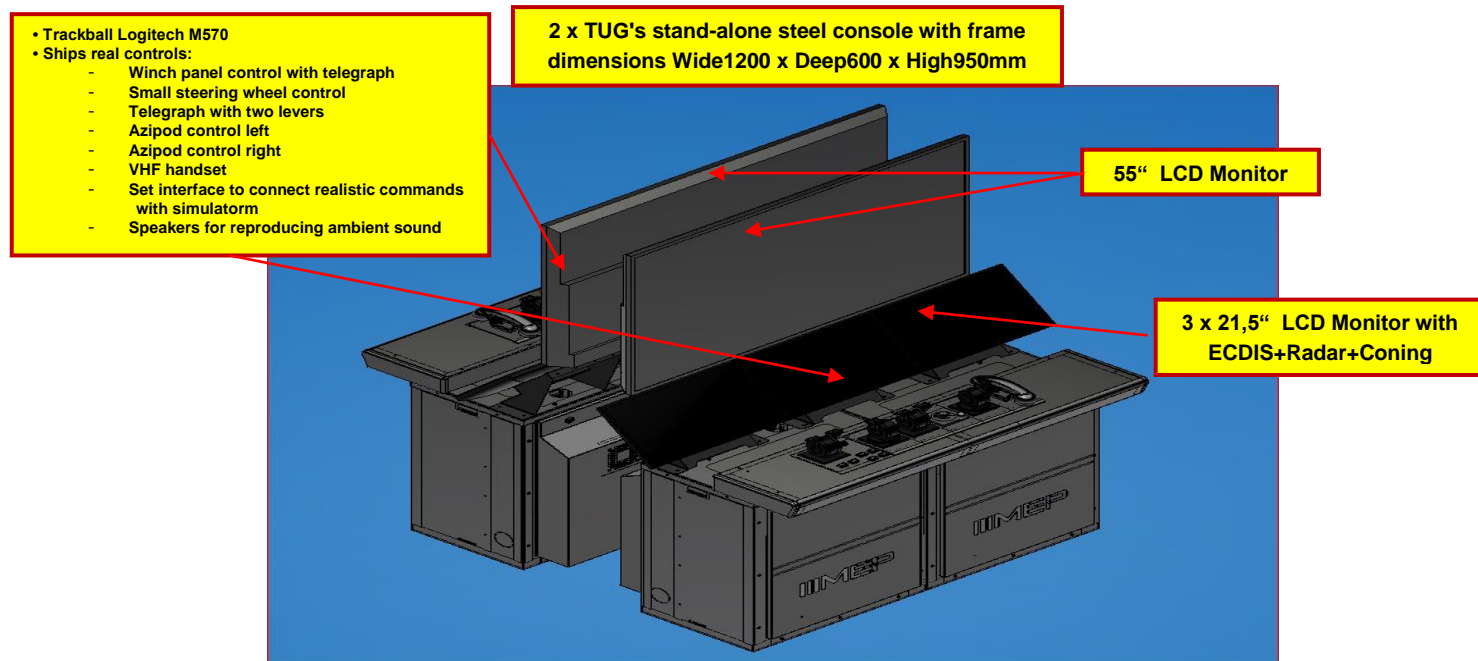
### Simulation, Navigation & Shiphandling:

- \_ Proper Passage Planning
- \_ ECDIS training
- \_ Voyage Monitoring
- \_ Track control operation theory and practise
- \_ Routing systems



## 9. Wärtsilä TUG Simulators





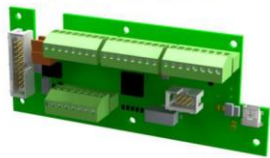
TUGs Simulators integrated with FMB No.1 BRIDGE SIMULATOR & BRIDGE SIMULATOR No.2



2 x TUG Wärtsilä Simulators layout 6<sup>th</sup> floor



PORT & STBD CONSOLE for TUG Wärtsilä Simulators layout 6<sup>th</sup> floor  
(positioned opposite each other)

R.br.	Ime	Količina	Opis
1.	Panel kontrole vitla sa telegrafom	1 kom	Panel sa kontrolama i ručicama za hidrauličko vitlo
2.	Mala kontrola kormila	1 kom	Kataloški broj 20001111 Dimenzije: 111 x 192 mm USB sučelje, napajanje 24 V DC 
3.	Telegraf s dvije ručice	1 kom	Kataloški broj 20001150 Dimenzije: 111 x 192 mm USB sučelje, napajanje 24 V DC 
4.	Azipod kontrola lijeva	1 kom	Kataloški broj 20001146 Dimenzije: 111 x 192 mm USB sučelje, napajanje 24 V DC 
5.	Azipod kontrola desna	1 kom	Kataloški broj 20001147 Dimenzije: 111 x 192 mm USB sučelje, napajanje 24 V DC 
7.	Sučelje za povezivanje sa simulatorom NTPro 5000	1 set	RCIB pločica sučelja USB sučelje za PC 4 digitalna ulaza, 4 naponska izlaza, 2 alalogna ulaza, 2 enkoderska ulaza 

## 10. VTMS Station for NTPro 5000 as part of Main Instructor Room VTMS Operator Workplace SW Module Includes:

- SW interface to NTPro Simulator to exchange ship data, enviromental data and raw radar information between simulator and real VTMS software
- Transas Navi Harbour VTMS software with Radar/Conning/ECDIS/DP

Hardware and software simulators mimic all the main functions of the VTS, which instructor creature areas with different navigational situations, the controlled boats and creating different scenarios and tasks of training.

VTS simulator can operate in a shared environment with navigation and GMDSS simulator.

### Functionality

- full functionality of real VTS operator in the workplace
- Information on the current situation simulated navigation based on the data radar charts, AIS, RDF, and other data,
- detection of local violations of traffic rules
- Recording / Playback: objects, motion, audio, data, data from various sensors, etc.,
- Simulated CCTV provides accurate insight into the monitored area,
- 3D imitation view from the control tower,
- Imitation Radio goniometer (Eng. Radio Direction Finder) and
- Interconnection with navigation simulator.

## 11. CARGO HANDLING SIMULATORS

### a) Transas Liquid Cargo Handling Simulators intended for training and assessment of personnel responsible for the handling of liquid cargoes aboard ships

#### ➤ TRANSAS Liquified Cargo handling simulator (LICOS):

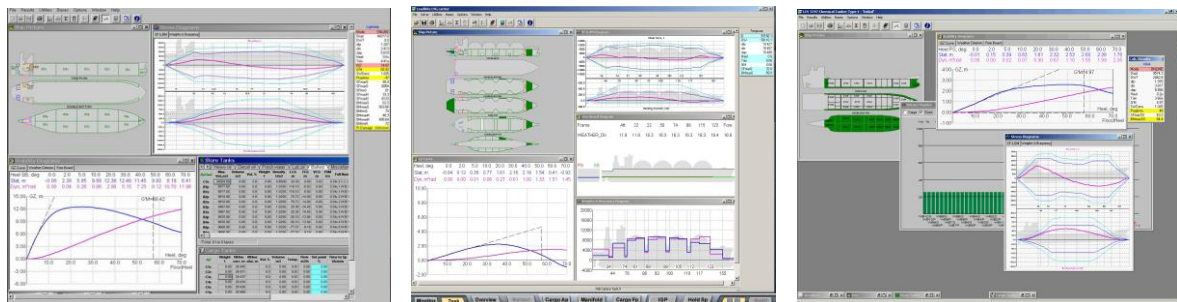
Liquified Cargo handling simulator w/4 x working/training stations ate equipped with 2 x 19" TFT display each + 1 x Instructor station capable to simulate crude oil, gas and chemical tankers + Terminal connection

LCHS software allows standard training for ship officers of all vessel types within the competency framework of STCW'95/2010 convention requirements:

- Control of vessel ballast system,
- Trim, stability and stress,
- Prevention of oil pollution from the ship,
- General arrangement of the tanker and its systems, and maintenance of the tanker systems on management level
- Proficiency in tanker technological operations

### Models developed for the following types of vessels:

- Oil Tanker (LCC and VLCC)
- Liquefied Petroleum Gas (LPG) Carrier
- Liquefied Natural Gas Carrier (LNG) – spherical and membrane
- Chemical Tanker
- Oil Terminal



LCHS Load Control Systems (LCS) for VLCC tanker, LNG carrier and Chemical Carrier.

### TRANSAS Liquid Cargo Handling Simulator LCHS TechSim 5000

Transas Liquid Cargo Handling Simulators are currently available for a large variety of ship types and an oil terminal application. The simulators are split into two major product lines: **LCHS Oil and Product Line** (including LCC, VLCC, Chemical Carrier, Product Carrier, and **LCHS Gas Line** (including LNG (M types) and LEG/LPG ship model.

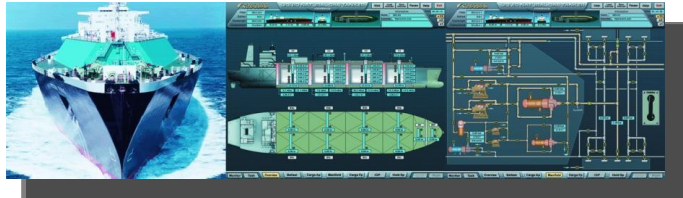


### LCHS Trainee Workplaces

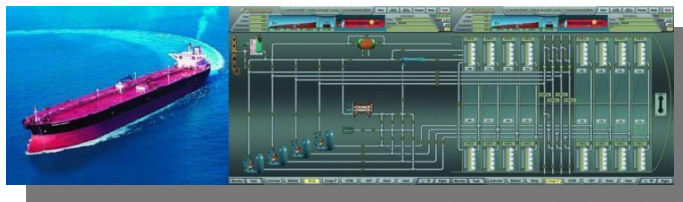
Four trainee stations are configured as “Standard” stations with two (2) 19” TFT monitors.

LCHS Oil and Product Line currently available functional modules:

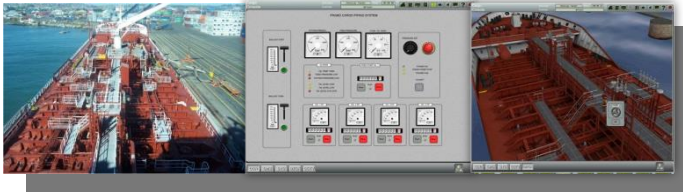
#### Liquefied Natural Gas Carrier (LNG membrane)



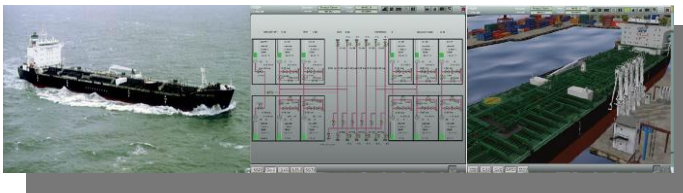
#### Large Crude Oil Carrier (LCC)



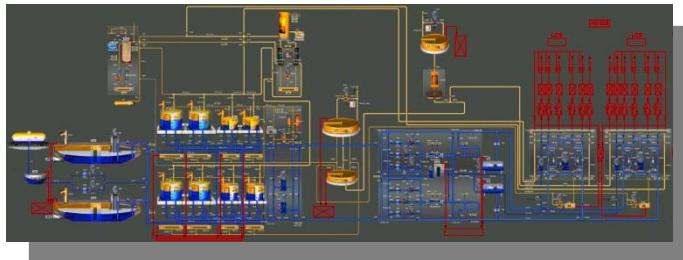
#### Chemical Carrier (new LCCH TechSim 5000 generation)



#### Product Carrier (new LCCH TechSim 5000 generation)



#### Crude Oil Terminal



LCCH Oil and Product Line functional modules

### LCCH SIMULATOR CONFIGURATIONS LAYOUT AND SOFTWARE OVERVIEW

The LCCH software simulates all important parts and systems that are necessary for treatment, preparation and conduction of liquid cargo transfer ship-ship / ship-shore onboard of tankers. The relevant systems (Cargo, Ballast, Inert Gas Plant and Distribution etc.) can be accessed and switched easily via onscreen buttons and are displayed on separate animated screens.

Two 19” LCD monitors for instructor station are included in to the quotation, for better overview and more efficient training (at the instructor station the 2<sup>nd</sup> monitor is used as “slave monitor”, viewing current activities at the trainee stations’ systems).

At the trainee stations the second monitor is used to enable simultaneous display of connected sub systems (e.g. Cargo after peak part and Cargo Forepeak part, see picture below), or to show and work with two systems simultaneously.

Four (4) of the trainee stations are equipped with two 19" TFT displays each. In this configuration two of the displays usually show the main LCHS working screens or virtual 3D CCTV cameras (LCC/VLCC/Chemical/Product carriers) to monitor the cargo handling operations on ship, jetty and terminal. However the LCHS simulator is very flexible in configurations and it is possible to arrange another layout of the screens and running tasks. Such configurations support all offered models.

### Transas LCHS software

- ☉ Allows standard training for ship officers of all vessel types within the competency framework of STCW'95 convention requirements:
  - f. Control of vessel ballast system,
  - g. Trim, stability and stress,
  - h. Prevention of oil pollution from the ship,
  - i. General arrangement of the tanker and its systems, and maintenance of the tanker systems on management level
  - j. Proficiency in tanker technological operations
- ☉ Is compliant with the OCIMF marine terminal training and competence assessment guidelines for oil terminal and product terminals
- ☉ Allows training in accordance with the requirements of MARPOL 73/78
- ☉ Meets the SIGTTO requirements
- ☉ Is in line with the latest DNV standards.



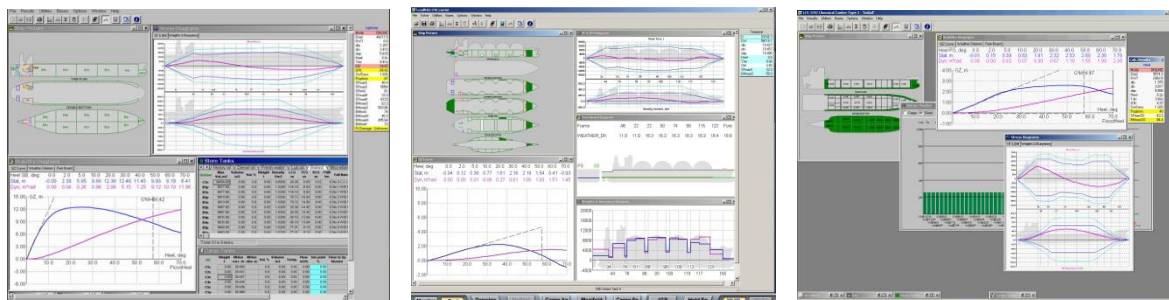
Transas LCHS 4000 simulator screenshots are used as standard in the following publications:

- ☉ IMO Model Course 1.36 "Liquefied Natural Gas (LNG) Tanker Cargo and Ballast Handling Simulator"
- ☉ SIGTTO publication "Crew Safety Standards and Training for Large LNG Carriers: Essential best practices for the industry".



## Load Control System (LCS)

All Transas LCHS models are provided with an online/offline Load Control System that can be used during the training sessions either for cargo loading/unloading planning process (offline mode) or to calculate and display current load and load changes, and the resulting forces and bending moments while LCHS cargo and ballast operations are being conducted (online mode).




*LCHS Load Control Systems (LCS) for VLCC tanker, LNG carrier and Chemical Carrier.*

For some ship models in our software (e.g. LNG), Transas' Liquid Cargo Handling simulator comprises a unique user interface which combines capacity to train both cadets and experienced users by either selecting mimic diagrams common for real on-board systems or an animated console which clearly explains the processes running behind the control screens for the trainee stations.


## LCHS Classroom Simulation Software

### LCHS Simulator Gas Instructor Station Software Module

No.	Qty	Name	Short Description / Specification	Illustration
1.	1	<b>LCHS Gas Line Instructor Software Module</b>	<p>The central control and monitoring application for the LCHS Gas line software (LNG, LEG/LPG) is the LCHS Gas Line Instructor software module. The software automatically detects a second monitor attached to the Instructor PC, and extends the instructor workspace with an additional console on this second device.</p> <p>The Instructor Software Module is the core application combining trainee on-line Monitoring, Exercise Editing, Intervention and Slave Monitor operations with below main features:</p>	
		<b>On-Line Monitoring</b>	<p>On-line monitoring is accessed via "Monitor" control button. In the current LCHS Gas version, the computer is in full control of the terminal operation, and the exercise fulfillment process is monitored by switching between active trainee workstations, this enabling:</p> <ul style="list-style-type: none"> <li>- Exercise loading/start/modification/stop for an individual trainee;</li> <li>- Control of the simulator running time and pause due to completion of the exercise by the trainee;</li> <li>- Loading/playback of a previously recorded log with events;</li> <li>- Logging and display of Trainee performance in Event Log window;</li> <li>- Logging and display of active alarm list in the Alarm List window.</li> </ul>	
		<b>Debriefing Capabilities</b>	<p>Loading and playback of a recorded session is done on the Instructor Slave monitor;</p> <ul style="list-style-type: none"> <li>- Choosing a certain position in the record;</li> <li>- Playback from an arbitrary place in the recorded time frame;</li> <li>- Debriefing at the Instructor Workstation.</li> </ul>	
		<b>Exercise Editor</b>	<p>The capabilities are implemented on „Task“ screen of the Console and allow:</p> <ul style="list-style-type: none"> <li>- Setting initial tank level condition;</li> <li>- Preparing checklists or Instructor information on the exercise;</li> <li>- Saving the state to a file;</li> <li>- Using the edited state for the continuation of a scenario.</li> </ul>	
		<b>Intervention Slave Monitor</b>	<p>Intervention Slave Monitor is implemented in the Instructor console (similar to the Trainee console) and allows the following functions to be performed:</p> <ul style="list-style-type: none"> <li>- Monitoring of current operation parameters on the Slave Monitor for the active Trainee;</li> <li>- On-line input of faults and failures in the valves/pumps/blowers remote control system;</li> </ul>	
		<b>Load Calculator System</b>	<p>Load calculator system is an individual actual onboard application with its own interface, which allows</p> <p>off-line mode calculations and check of:</p> <ul style="list-style-type: none"> <li>- Draft, trim, heel, free board diagram and check stability curve of the tanker in on-line mode;</li> <li>- Shearing force, weight, buoyancy and bending moments within seagoing and port condition limits;</li> <li>- Accident calculations for LNG-m tankers</li> </ul>	


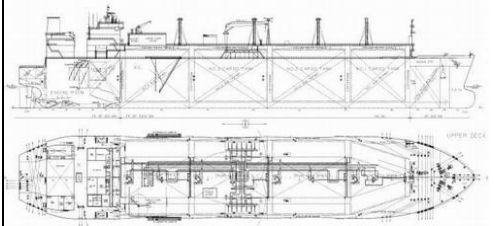


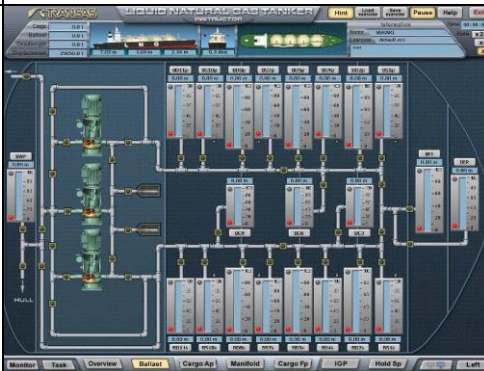

## LCHS Simulator Oil Instructor Station Software Module

No.	Qty	Name	Short Description / Specification	Illustration
2.	1	<b>LCHS Oil Line Instructor Software Module</b>	<p>The central control and monitoring application for the LCCH Oil line software (LCC, VLCC, FPSO, Oil Terminal) is the LCCH Oil Line Instructor software module. Similar to 3.1.1 above the software also detects a second monitor attached to the Instructor PC, and extends the instructor workspace with an additional console on this second device.</p> <p>The Instructor Software Module is the core application combining trainee on-line Monitoring, Exercise Editing, Intervention and Slave Monitor operations with below main features:</p>	
		<b>On-Line Monitoring</b>	<p>On-line monitoring is accessed via "Class" control console. In the current terminal version, the computer is in full control of the tanker operation, and the exercise fulfillment process is monitored by switching between active trainee workstations, this enabling:</p> <ul style="list-style-type: none"> <li>- Exercise loading/start/modification/stop for an individual trainee;</li> <li>- Control of the simulator running time and pause due to completion of the exercise by the trainee;</li> <li>- Loading/playback of a previously recorded log with events;</li> <li>- Logging and display of Trainee performance in Event Log window;</li> <li>- Logging and display of active alarm list in the Alarm List window.</li> </ul>	
		<b>Debriefing Capabilities</b>	<p>Loading and playback of a recorded session is done on the Instructor Slave monitor;</p> <ul style="list-style-type: none"> <li>- Choosing a certain position in the record;</li> <li>- Playback from an arbitrary place in the recorded time frame;</li> <li>- Debriefing at the Instructor Workstation.</li> </ul>	
		<b>Exercise Editor</b>	<p>The capabilities are implemented on „Task“ screen of the Console and allow:</p> <ul style="list-style-type: none"> <li>- Setting initial tank level condition;</li> <li>- Preparing checklists or Instructor information on the exercise;</li> <li>- Saving the state to a file;</li> <li>- Using the edited state for the continuation of a scenario.</li> </ul>	
		<b>Intervention Slave Monitor</b>	<p>Intervention Slave Monitor is implemented in the Instructor console (similar to the Trainee console) and allows the following functions to be performed:</p> <ul style="list-style-type: none"> <li>- Monitoring of current operation parameters on the Slave Monitor for the active Trainee;</li> <li>- On-line input of faults and failures in the valves/pumps/blowers remote control system;</li> </ul>	

## LCHS Gas Trainee Workplaces



### LCHS Spherical and Membrane LNG Tanker

No.	Qty	Name	Short Description / Specification	Illustration
.	4	<b>LCHS LNG Trainee Workplaces</b>  Software Module  Software includes ship models:  <u><b>LNG-m (membrane)</b></u>	<p>The Trainees' main software console module includes a computer simulated LNG Gas ship model (<b>LNG-s</b> membrane tanks).</p> <p>The included Load Calculator system can receive data in on-line mode for simulation or in off-line mode for cargo planning.</p> <p>The main (start-) screens shows the current conditions (in sea or terminal connected) and general tanker information (tanker type and status, cargo/ballast information, trim and heel).</p> <p>All trainee actions can be executed in separate functional screens (e.g. „Ballast“, „Cargo“, „IGS“ etc.) that can be easily accessed via soft buttons on the screens bottom line. Use of two monitors allows operating two sub systems simultaneously or showing larger systems (that are spread on two screens) as a whole.</p> <p>Following main information can be accessed:</p> <ul style="list-style-type: none"> <li>- General tank information (ballast/cargo tanks),</li> <li>- Flow in pipelines; level/capacity/current cargo volume in tanks,</li> <li>- Average temperature/pressure in the tank;</li> <li>- Cargo flow rate/density/type.</li> </ul> <p>Animation of:</p> <ul style="list-style-type: none"> <li>- Flow in pipelines;</li> <li>- Operation of pumps, blowers;</li> <li>- Changes of level in main and auxiliary tanks;</li> <li>- Operation of P/V valves;</li> <li>- Burning process.</li> </ul> <ul style="list-style-type: none"> <li>- Inlet/outlet pressure of pumps is shown. Operation of centrifugal pumps is described in the form of head /capacity characteristics. Parallel/serial operation of pumps;</li> <li>- Hydraulic-driven valves maneuvering dynamics are reproduced; etc.</li> <li>- Input faults: break/repair of pumps, blowers and valves.</li> </ul>	 


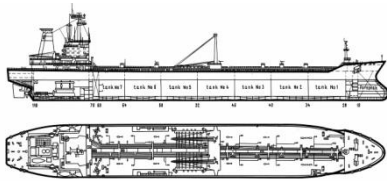

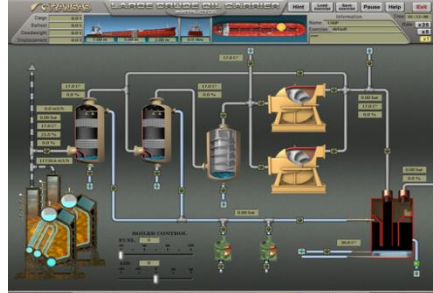
No.	Qty	Name	Short Description / Specification	Illustration
3.		Continued:  Trainee Workplaces  Software Module	<p>Following sub pages / screens are available at each trainee workplace:</p> <p><b>Task Screen</b></p> <p>The screen shows initial conditions of the task, and a checklist or Instructor recommendations for the exercise.</p> <p><b>Ballast System</b></p> <p>The system is used for ballasting operations on the ship. The main purpose of the system is to ensure the ship trim and stability in order to maintain its seaworthiness and admissible stresses on the hull.</p> <p><b>Three Cargo System</b></p> <p>The cargo handling system line is designed for the loading and discharging of cargo into/from the four tanks from/to the terminal and auxiliary operations.</p>	<p>w/o</p> 
No.	Qty	Name	Short Description / Specification	Illustration
3.		Continued:  Trainee Workplaces  Software Module	<p><b>Inert Gas System</b></p> <p>The Inert Gas system is designed for maintaining safe oxygen level in the tank atmosphere before gassing up and replacing warm vapor to keep it beyond the ignition limits, and for the aeration. Nitrogen is used for keeping cargo tanks surface in good maintenance conditions and purging-of-cargo- lines procedures.</p> <p><b>Hold Space or Membrane Service System</b></p> <p>The system is intended for maintaining positive pressure in cargo tank annular spaces for LNG-s and in primary/secondary barrier for LNG-m, monitoring of gas medium in the cargo tank space and ventilation of the cargo tank insulation. These prevent formation of explosive gas concentrations and frosting of the tank surface.</p>	



### LCHS LEG/LPG Tanker

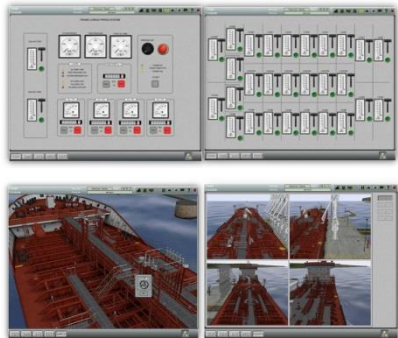
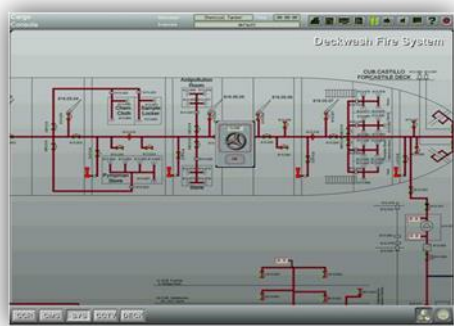
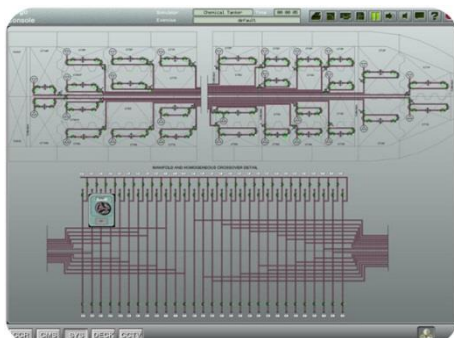
No.	Qty	Name	Short Description / Specification	Illustration
4.	4	<b>LCHS LEG/LPG Trainee Workplaces</b>  Software Module	<p>Operation and usage is similar to the above described LNG vessels.</p> <p>The LEG/LPG vessel is based on the vessel "Clipper Harald" with following particulars:</p> <p>Type: Semi ref. LPG/Ethylene  Cargo Capacity: 12676  Tdw: 13779  Grt: 10692  Nrt: 3208  Min. Temp. C: - 104  Summer draft: 9,70  Engine: MANB&amp;W 6L50MCE  Speed: 17,5  BHP: 10850  LOA/BEAM: 146,40 x 20,50</p>	 

### LCHS LCC Oil Tanker


No.	Qty	Name	Short Description / Specification	Illustration
5.	4	<b>LCHS LCC Trainee Workplaces</b>  Software Module	<p>The LCCH LCC model is based on a Panamax prototype with LOA of 242,6m and a cargo capacity of 70.140 m<sup>3</sup> including slops. The cargo is operated by four steam turbine driven pumps.</p>  	 

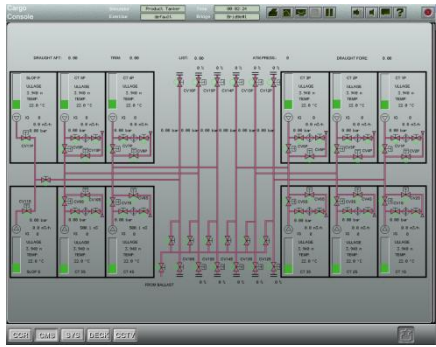
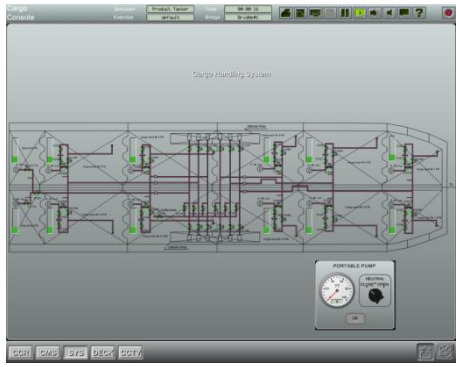


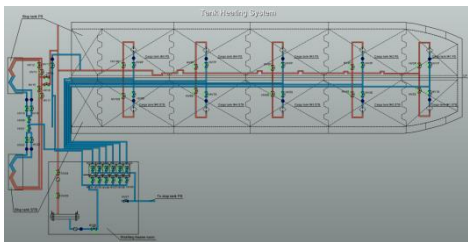
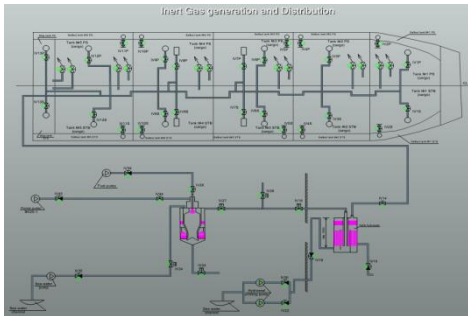
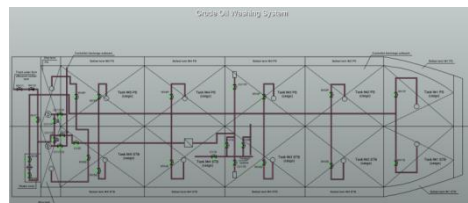
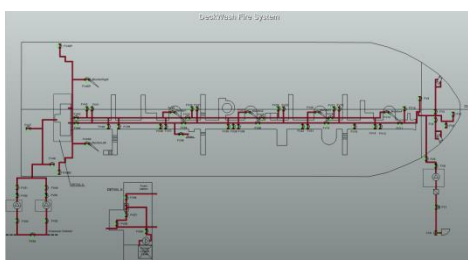
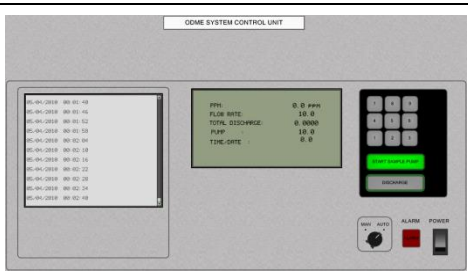
### LCHS Chemical Carrier

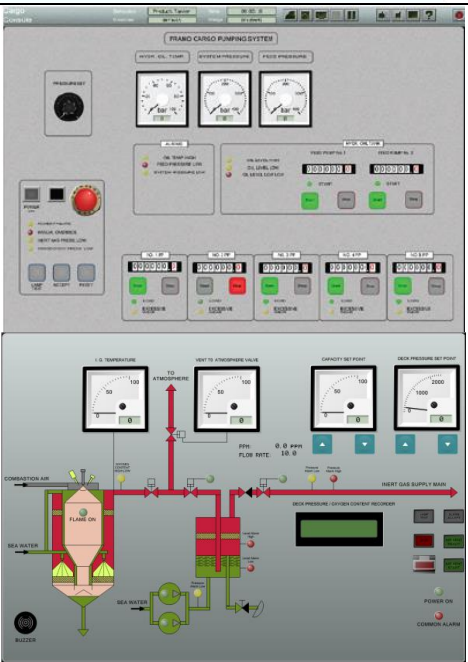
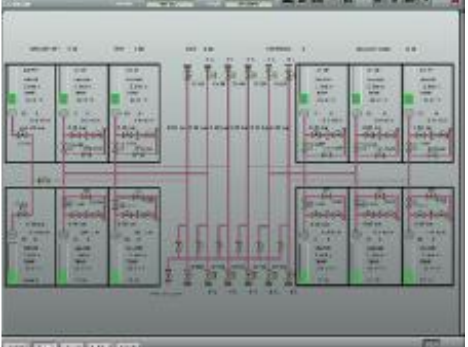
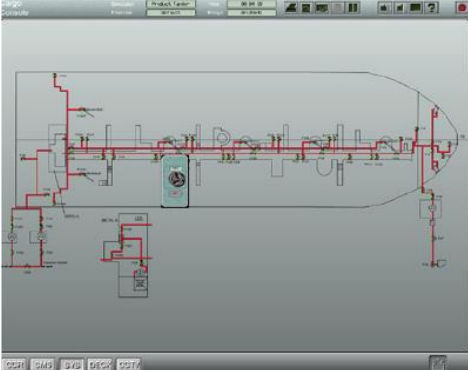
No.	Qty	Name	Short Description / Specification	Illustration
6.	4	<b>LCHS Chemical Carrier Trainee Workplaces</b>  Software Module	<p>The Chemical Carrier is the first Transas LCHS 5000 ship model (created with Transas new modeling technology). The model prototype is based on the first class (Type 1) chemical tanker "Vicuna" with a cargo capacity of 23.700 tons in 28 tanks and capability to ship 28 different cargo types. The software offers interactive 3D visual deck representation and zoom function in system mimics screens.</p> <p>Simulator includes advanced e-Tutor evaluation and assessment system.</p> 	 

### LCHS Product Carrier

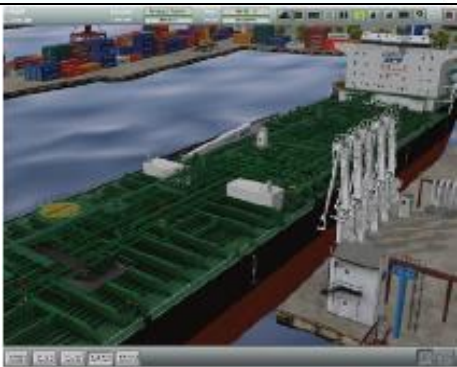

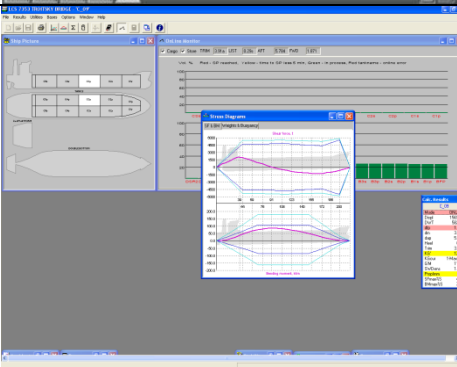
No.	Qty	Name	Short Description / Specification	Illustration
7.	4	<b>LCHS Product Carrier Trainee Workplaces</b>  Software Module	<ul style="list-style-type: none"> <li>Length overall: 182,5 m</li> <li>Breadth: 32,2 m</li> <li>Capacity: 54298 cbm (including slop tanks)</li> <li>Deadweight: 47400 t</li> <li>Draught: 12.2 m</li> </ul> <p>The Product Carrier is the second Transas LCHS 5000 ship model (created with Transas new modeling technology). The model prototype is based on the Type 3 product tanker "Troytsky Bridge" with 12 tanks (2 slop) and capability to carry five types of different cargoes simultaneously, including crude oil and oil products in 10 different cargo tanks.</p> <p>The Product Carrier Simulator is specifically designed to train Junior Officers in basic cargo handling operations and emergency situations, and to train Senior Personnel in optimal operations during cargo handling. These</p>	
		Continued		
		<b>LCHS Product</b>		

		<b>Carrier Trainee Workplaces</b>  Software Module	<p>objectives are achieved by controlled training leading to a better understanding of the cargo operations. The simulator is based on real Product Tanker systems and controls, such as the Inert Gas System, Hydraulics, Ballast, Deck Wash, Fire, and Cargo Heating Systems. The complexity and simulated fidelity of the systems provides a challenging training environment that meets all society and state requirements. The LCHS 5000 simulator has two modules: 'Cargo' and 'Terminal'. These modules can be run individually or in joint mode for team training. The Cargo console is designed to train the tanker personnel for operation of the vessel cargo system and auxiliaries. The Terminal console is designed to train the shore terminal personnel.</p> <p>The software offers interactive 3D visual deck representation and zoom function in system mimics screens.</p> <p>Simulator includes advanced e-Tutor evaluation and assessment system.</p>	
		1.	<b>Ballast system</b>	
		2.	<b>Cargo system</b>	


		3.	Cargo tank heating system	
		4.	Inert gas system	
		5.	Cargo tank crude oil washing	
		6.	Deck fire system	
		7.	Automatic measurement system, discharge registration and control (ODME)	
			The cargo control console and terminal control console comprise of:	



		8.	Panels, imitating the real equipment of Cargo Control Room of the ship	
		9.	Panels, imitating the screens of <b>Cargo Monitoring System</b> software, installed on the ship	
		10.	<p><b>Interactive scalable drawings</b> of the systems and subsystems used in ballast handling operations</p> <p>The diagrams represent detailed circuits of the systems built on the basis of real ship systems. There is a possibility to zoom-up parts of interest and move the diagram visible area around the screen.</p> <p>The diagrams show animated flows through the pipelines at a speed changing in direct proportionate with the flow rate, color changes in accordance with the substance in the pipes.</p>	



		11.	<p><b>Interactive 3D visualization</b> of the ship with a possibility to control deck equipment and the view from cargo control room window</p> <p>To provide situational awareness training systems can be controlled from the 3D visualization. Clicking and object on deck will active a 2D control for the item of equipment selected. When an object is selected on the 2D diagram, the respective one in the 3D diagram is highlighted in color, the camera automatically focusing on it.</p>	
		12.	<p><b>3D visualization</b> of the pictures presented by the ship/pier CCTV System cameras</p> <p>The CCTV system provides a 3D visualization of the ship representing its draught, trim and heel in real time dependant on load and distribution. The system includes a function which allows the possibility of arbitrarily shifting the viewpoint.</p>	
		13.	<p><b>Loading Control System</b></p> <p>The system allow off-line and on-line calculation and monitoring of the following parameters:</p> <ul style="list-style-type: none"> <li>• Draught, trim, free board diagram and tanker stability curve;</li> <li>• Transverse force, weight, buoyancy and bending moment, when sailing, and berth limitations;</li> <li>• emergency calculations for the tanker</li> </ul>	

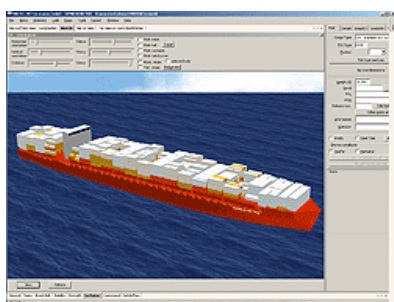
### LCBS Instructor and Trainee Station

Panel	Description	Picture
PC (Instructor and Trainee)	COTS PC x 5 - compliant with required specification	 <p>Maße (HxBxT): 436x181x430 mm</p>

Monitors	19"LCD Monitor x 10 for Instructor and Trainee applications	
Printer	HP Laser Printer	

### b) MACS3 Loading Computer System Loading Computer from SEACOS / INTERSCHALT maritime systems AG five (5) users/working stations in a network

MACS3 for Containers, Bulk, dry & various general cargo (MixCargo), Ro-Ro and crane simulator: 5 x working stations in net.



More than 5,200 vessels world-wide equipped with MACS3 loading computer system and installed a corresponding number of office systems at the shipping companies.

Type loading computer (*Software*) installed and has been type-approved and certified for on-board use by GL, LR and DNV as well as ship specific certificates of all important classification societies. This software product offers solutions for all types of vessels. Please find the following software specification with licenses for 5 Users in a Network:

#### Selected Modules

- Basic Program MACS3.net incl. Tankplan
- Cargo Program for container program BELCO Container Management
- Program for Dangerous Goods (DAGO):
  - **DAGO I** checks the stowage and segregation requirements
  - **DAGO II** adds fire-fighting and safety plans
  - **DAGO III** contains the complete Medical First Aid Guide (MFAG)
- Lashing Program SEALASH incl. Lashoptimization
- SEALASH and Additional Module for Tankplan & Grain
- LOADMAN for Bulk Carriers
- MIXCARGO for General Cargo Ships
- ULLAGE REPORT for Tankers
- DASTYMAN Damage Stability Calculation
- RoRo

- Passenger Vessels
- BALLASTMAN Ballast Water Exchange Management
- Crane Operation
- Multi-Voyage Module
- StowMAN for Terminals

Loading computer system MACS3 also added with modules for grounding, squat, mooring and residual strength:

- RESIDUAL STRENGTH for calculation of residual strength of the damaged ship
- MOORING to plan mooring
- GROUNDING for calculation of the effect of grounding

Installation of ship data for six different vessels + stowage planning version with the following constellation:

#### Container Vessel / RoRo

MACS3.net incl. Tankplan  
Belco  
DAGO I + II + III  
RoRo

#### MPC/Heavy Lift Vessel

MACS3.net incl.  
Tankplan  
MixCargo  
Grain  
Crane  
LoadMAN  
Multi-Voyage Mod.

#### Bulk Carrier

MACS3.net incl.  
Tankplan  
MixCargo  
DAGO I + II+ III  
Sealash + Addition  
BULKLM  
LoadMAN  
Grain

#### LPG / Chemical-Product Oil Tanker

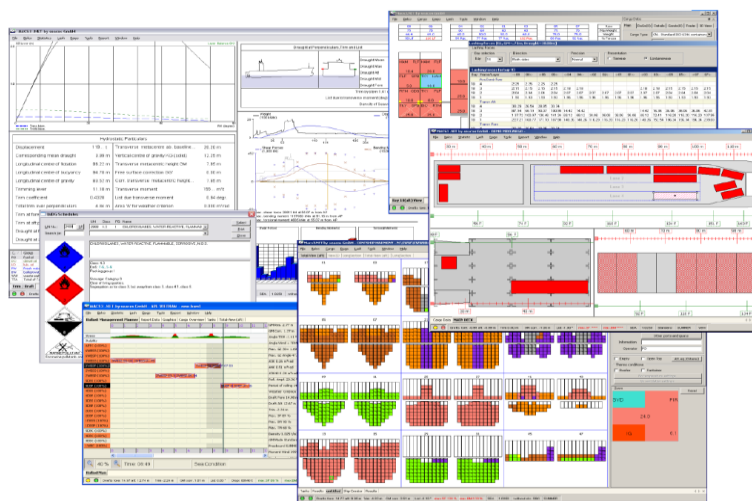
MACS3.net  
Ullage  
DastyMAN

#### Stowage Planning Version

Belco  
Dago I  
StowMAN for Terminals

#### General Passenger Vessel

MACS3.net





### Third party Stability and Cargo Handling Simulator Complex and equipment

- Shipman for LNG (Membrane & Sphere);
- EASEACON for Containers;
- Shipcal for VLCC;
- LNG Simulator (Membrane & Sphere);
- LoadSafe 4.0 for Liquid Cargo User's
- LoadSafe 4.0 for Gas Tanker User's
- LoadSafe 4.0 for Heavy Lift User's
- LoadSafe 4.0 for Dry Bulk Cargo User's





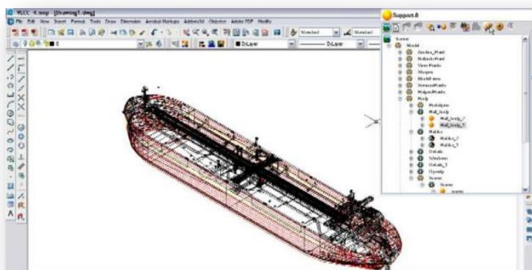
## 12. MODEL WIZARD SOFTWARE

### SHIP MODELLING, HARBOUR AND FAIRWAYS DESIGN

#### 1. Ship Models and Modeling capabilities software for creation of ownships

- Simulator Training, Research and Consultancy;
- Ship motion predictor for IBS;
- Ship motion predictor for DP system

Hydrodynamic modeling tool known as the Ship Database Manager (SDBM). The modeling tool offers the possibility to create own ship mathematical models based on the vessel characteristics - both for data available or estimated values. Highly advanced methods for ship model preparation and analysis are used and the user is capable of visualizing in the tool the effects of wave and wave heights, change of load, vessel draught etc. before transferring the model to the bridge simulator.



#### 2. Visual Area development software creates any particular port or sailing area

A simplified user interface hides the complexity of processing algorithms. Four mouse clicks are required to build your first Exercise Area. The system uses a standard collection of parametrical spatial prototypes and textures. MW supports automatic import of most of TX97 chart features into spatial database. Spatial data structure supports automatic analysis of navigational features, correction and mistakes search. Possible operator errors do not cause fatal results in the databases that will be built in the future.

#### 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, Visual Area development software, Own Ship Models, Virtual Shipyard (VSY), Motion Model Editor, Ship Hull Models, Water Depth, Current Model, Wave Effect, Wind Effects, Steering Devices, Main Engine, Propulsion Units, Thruster effects, Ship – Ship Interaction, Bank Effects, Fender Effects, Mooring Effects, Anchor Effects, Own Ships As Tugs, Traffic Ship Models.



### Functionality

- Automated generation of basic 3D terrain and subsea model, based on information from Electronic Navigational Charts;
- Navigational aids are automatically generated from data embedded in the same electronic navigational charts;
- Simulation areas can be created for any area in the world;
- No 3D modeling skills are required for a developer when constructing basic level navigational areas.

### MODEL WIZARD COMPONENTS

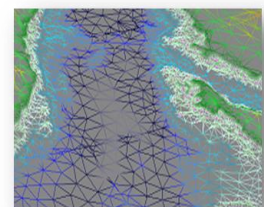
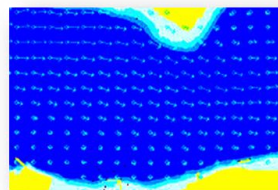
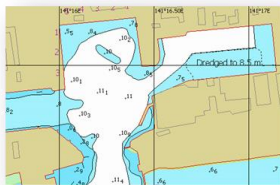
- AUTOMATIC CONSTRUCTION OF 3D MODEL
- AUTOMATED CREATION OF NAVIGATION AREAS
- VISUAL MODEL EDITOR
- VIRTUAL SHIP YARD

### Editing and creation of sailing areas

- Basic scenes can be easily generated from a user selected charts set;
- Coastline configuration, such as mooring walls and embankments, can be created easily and realistically;
- The terrain model is generated automatically based on elevation data included in the electronic navigational chart or DEM data loaded by the user;
- The radar scene is created automatically based on the 3D terrain model and chart data;
- The generated scene can be supplemented with 3D models (prototypes) from the object library and any objects created using Model Wizard.

### Editing a model

- The user can create geometry and textures, can assign visual behaviour logic and properties for a ship model or an exercise area 3D object;
- The Virtual Shipyard (VSY) is used for development and editing of ships motion, engine and propulsion models, as well as controlling and documenting the results.



## VIRTUAL SHIP YARD

Virtual Ship Yard software is a ship motion model development tool for creation, modification and tuning of ship models.

Virtual Ship Yard can be applied as an instrument for the simulated ship's development and also as an educational tool in ship theory and hydrodynamics.

- Model Unit Editor
- Graphical Curve Editor
- Automatic Test System
- Automatic Documentation System
- Console Editor

### 3. Marine Accident & Incident Investigation

Visual representation of the accident scenario using voyage data obtained by SVDR (VDR) or ECDIS. The real situation at sea is being reproduced taking into account: real sailing area; navigation intensity in present area; real ship route; vessel's maneuvering characteristics; weather conditions, information for developing decision taking recommendations for ship's crew in these conditions.



**Note:** The neighbouring Slovenian Maritime Faculty (Portoroz) has the same type of the system which allows PFST to carry out joint international training drills and research projects.

## 13. RESEARCH WORKS FOR OIL SPILL

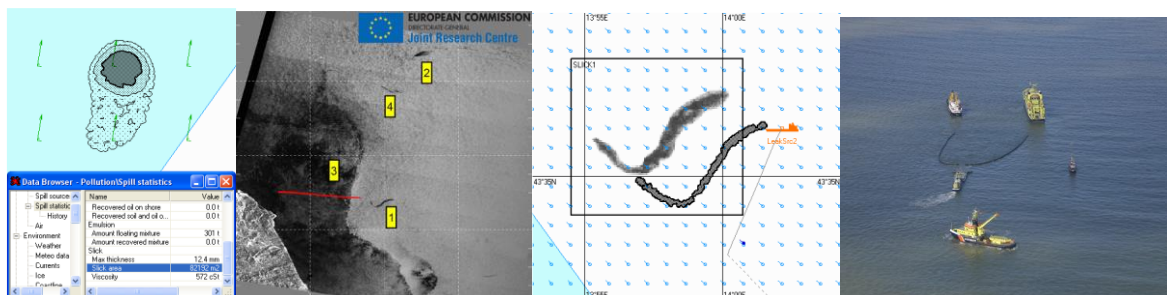
### Potential Pollution Incidents Simulation and Evaluation System Software (PISCES II)

PISCES II is an incident response simulator designed for preparing and conducting command centre exercises and area drills. The application is developed to support exercises focusing on oil spill response.

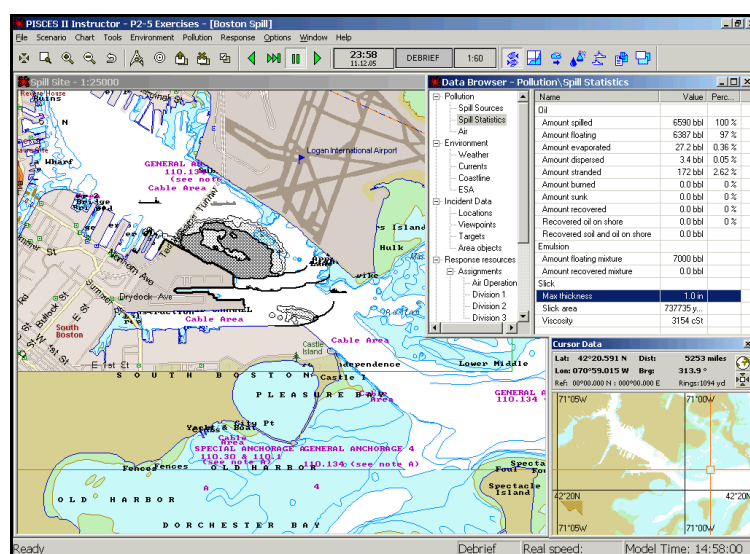
The PISCES II provides the exercise participants with interactive information environment based on the mathematical modeling of an oil spill interacting with surroundings and combat facilities.

The PISCES II spill model simulates processes in an oil spill on the water surface: transport by currents and wind, spreading, evaporation, dispersion, emulsification, viscosity variation, burning, and interaction with booms, skimmers, and the coastline.

- Interface with NOAA (USA) ALOHA sw module
- Calculation of downwind airborne dispersion from a chemical release source
- Calculation of predicted footprint for oil mass
- Calculation Cost of each “mobilized” resource is determined for the statuses “Ordered”, “Available”, “Assigned”, and “Out of service”
- Level of visibility set up
- Red edge mark of the spilled area



Modeling of an oil spill incident



PISCES Workstation Desktop



## 14. Vessel Traffic Management System (VTMS) Automatic Identification System (AIS)

### Navi-Harbour

#### VTMS Operator Workplace SW Module

Transas' primary vessel traffic management solution - Navi-Harbour, is a state-of-the-art system designed to ensure maritime safety and navigation efficiency, as well as to protect the marine environment and adjacent shore areas from the possible adverse effects of marine traffic. Navi-Harbour is the solution of choice for large-scale and high-density ports, and when it is necessary to integrate several existing Navi-MonitorVTMS sites. One of the Navi-Harbour's advanced features is 3D VTS, a full-scale 3-dimensional view of the navigational situation in the VTS area. Based on real-time VTMS data, this invaluable tool enables the VTS operator to observe the navigation situation from a variety of different perspectives.

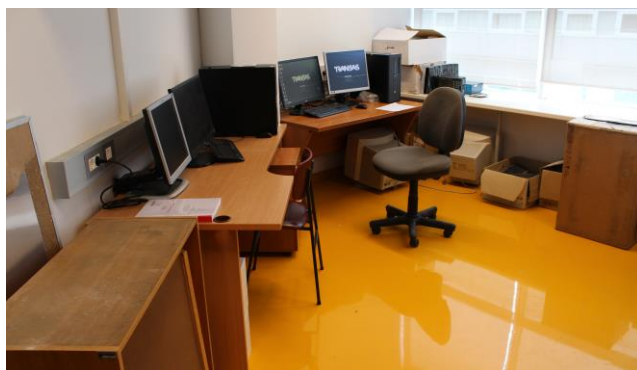
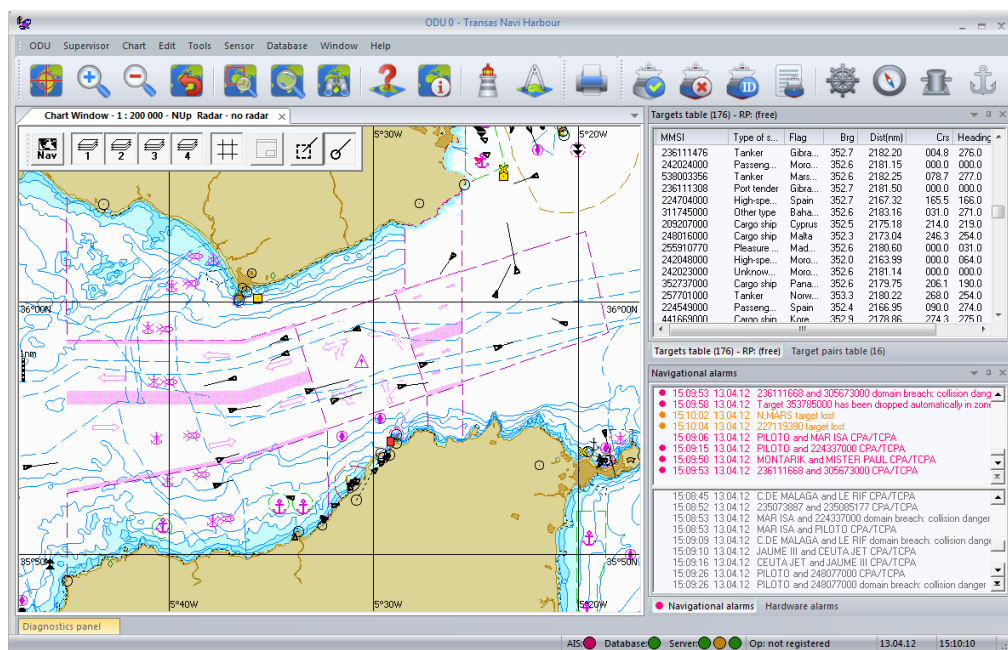
#### Functionality

- Radar, AIS, CCTV, RDF, Meteo-Hydro sensors support and control;
- Multi-radar tracking integration;
- Multi-sensor (Radar and AIS) tracking integration;
- Multi-AIS data filtering and integration;
- Manual or automatic target acquisition and drop;
- Manual or automatic target identification;
- Radar video presentation;
- AIS dynamic and static data presentation;
- Transmission and reception of AIS text telegrams;
- Target simulation (creation, modification, tracking);
- Route management;
- Target pairs mutual calculations/operations (target pairs table, target pairs operations);
- Target maneuver prediction (radar tracking in "shadow areas");
- Sophisticated zone configuration – e.g. traffic, guard, auto-acquisition, jurisdiction, etc.;
- Comprehensive configurable Alarm Management, including Navigation and Sensor Alarms;
- Recording and Playback;
- Extensive chart functionality, including chart editing and S-57 support.

#### Advantages

- Vessel traffic management and safety provision in large-scale and high-density ports;
- Improved quality of port services and resources utilization (compliant with ISPS Code);
- Large scale planning and traffic coordination in regional or national areas;
- Detection of illegal activity;
- Greater safety of life and property;
- Reduced risk associated with marine operations;
- Provides primary support for collision avoidance and mitigates consequences of incidents;
- Environmental protection;
- Distributes VTS-related information to interested parties;
- Stores VTS data for administrative purposes and incident analysis;

- Provides assistance in search and rescue operations and to the coastguard.



## 15. ENGINE ROOM SIMULATORS

1. NEW TRANSAS - Wärtsilä ENGINE ROOM SIMULATOR - ERS 5000 TECHSIM SHIP MODEL WITH DIZEL-ELECTRIC PROPULSION DUAL ENGINE (MAN L51/60DF) FOR LNG TANKER
2. Full Mission Transas Engine Room Simulator ERS 5000
3. Independent Kongsberg NEPTUNE – Full Mission Engine Room Simulator
4. Marine Hydraulic and Pneumatic Simulator

### 1. NEW TRANSAS - Wärtsilä ENGINE ROOM SIMULATOR - ERS 5000 TECHSIM SHIP MODEL WITH DIZEL-ELECTRIC PROPULSION DUAL ENGINE (MAN L51/60DF) FOR LNG TANKER

#### ENGINE ROOM MATHEMATICAL MODEL

Model of ER diesel-powered LNG simulator using two types of dual fuel

Basic characteristics of a modeled ship



#### LNG Tanker

LOA	299,9 m
BEAM	45,8 m
DRAFT	11,5 m
SPEED	19,5 kn

#### PROPULZION:

- 2 x ABB AMZ1120MR08 LSF Main electric engine propulzion 11700 kW /3000 V
- 2 x Renk RSH-1950 reduction cogs, reduction relation 8.048:1
- 2 x fix propeller 81 rev/min

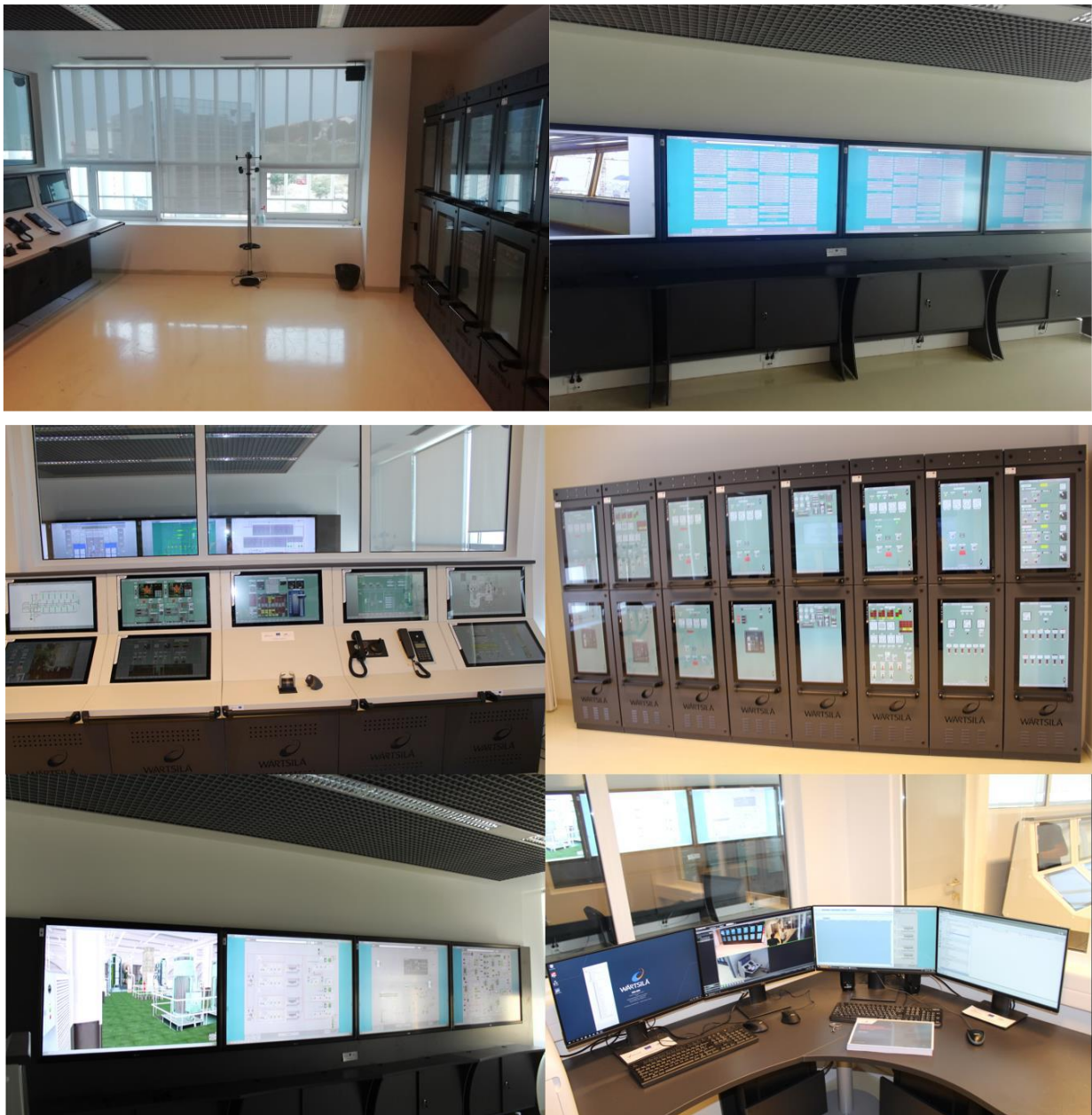
The model's propulsion is based on two synchronous drive motors with a total power of 23.4 MW. The drive power is transmitted to the drive system by two screws connected via reduction gears. Bow propulsion with bow thruster of electric motor minimum 2MW, type KTE TCT-240A.

#### ELECTRIC SYSTEM:

- 2 x diesel generator STX MAN 8L51/60DF, 7,700 kW, 6600 V AC, /60 Hz, 3 ph;
- 2 x diesel generator STX MAN 9L51/60DF, 8,700 kW, 6600 V AC, /60 Hz, 3 ph;
- 1 x generator driven by steam turbine Shinko RG66, 2250 kVA, 6600 V AC, /60 Hz, 3 ph;
- emergency diesel generator STX KTA 38DMGE, 850 kW, 450 V AC, /60 Hz.



The power plant consists of four mid-range diesel electric generators and a steam turbine driven generator. Electricity distribution is performed at a high voltage of 6.6 kV. The total power of the power plant satisfies the full power of the propulsion engines and the consumption of other marine systems and amounts to a total of 32.8 mW. Emergency power supply provide a low voltage (440V) diesel generator connected to the main switchboard via transformers and disconnectors and protective switches. The emergency power switch board contains a land terminal with protective circuit breakers. The main switchboard is divided into two sections connected by safety switches to prevent a short circuit in one section from causing the complete main switchboard to malfunction. The Main Engine generators are 4-stroke, non-reversible, with turbocharger and intercooler, for two fuel types (diesel: LFO / FHO and LNG gas) and an electronic speed/revolution controller.



**TRANSAS - Wärtsilä ENGINE ROOM SIMULATOR - ERS 5000 TECHSIM SHIP MODEL WITH DIESEL-ELECTRIC PROPULSION DUAL ENGINE FOR LNG TANKER**



**2. Full Mission Transas Engine Room Simulator ERS 5000 w/3D virtual reality & 6 different types of Main Engines available (connected with Bridge No.1 Transas Simulator NTPRO 5000)**





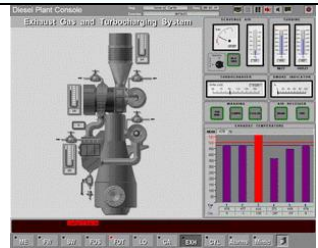
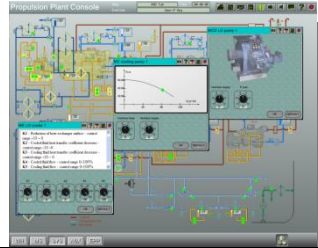

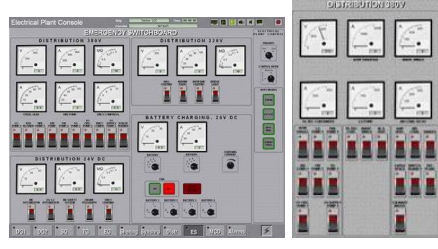
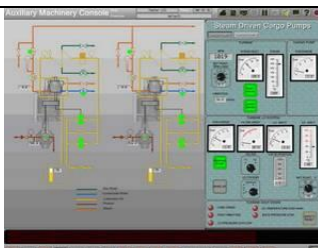
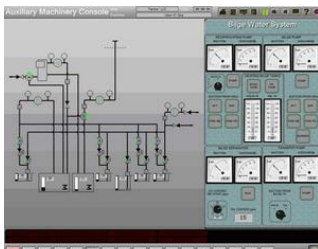
**Full Mission Engine Room Simulator (Transas ERS 5000) connected (integrated) with Main bridge (Transas NTPRO 5000)**

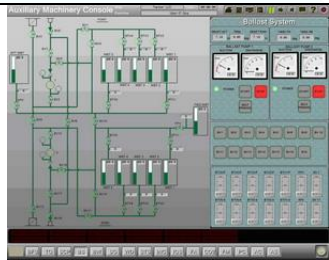
**Trainee Software – replica of structure and hierarchy of ship's real control system:**



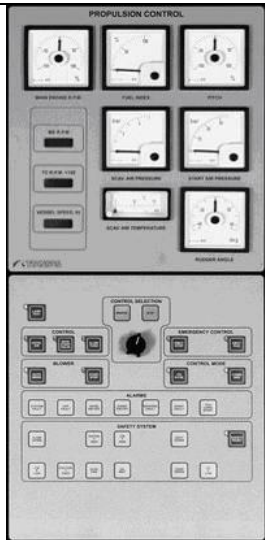
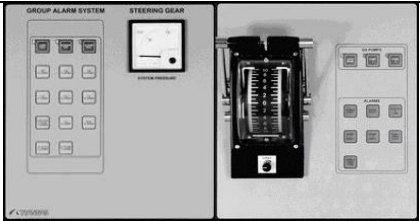

- Monitoring and operation of Propulsion Plant from Navigation Bridge
- Automatic and remote operation and monitoring from Machinery Control Room
- Local operation and monitoring from auxiliary stations


Full Mission Engine Room Simulator of the latest generation – fully certified by DNV according to the latest edition of Standard 2.14 from January 2012 as a Class A product

INSTRUCTOR AND TRAINEE STATIONS		
Equipment	Description	
ERS Instructor Control and Monitoring Module sw	Instructor software for exercise preparation, on-line control and monitoring and briefing/debriefing	
Interface functionality module	Provides interface for joint operations with existing navigational simulator	
Tanker Propulsion Plant	<p>Slow Speed Engine: MAN B&amp;W 6S60MC +FPP (12,240 kW, 105 RPM)</p> <ul style="list-style-type: none"> <li>- ME Remote control</li> <li>- Fresh Water cooling</li> <li>- Sea Water cooling</li> <li>- Fuel Oil Supply</li> <li>- Fuel Oil Transfer</li> <li>- Oil &amp; Fuel Separators</li> </ul>	

	<ul style="list-style-type: none"> <li>- Lubricating Oil</li> <li>- Compressed Air</li> <li>- Exhaust system &amp; Turbocharger</li> <li>- ME Cylinder processes</li> <li>- Engine Local control</li> <li>- Alarm Station</li> <li>- Unified System Diagram</li> <li>- Dead Man system</li> <li>- Parameterization feature</li> </ul>	 
Tanker Electric Plant	<ul style="list-style-type: none"> <li>- 2xDiesel Generator</li> <li>- 1xShaft Generator</li> <li>- 1xTurbo Generator</li> <li>- 1xEMCY Generator</li> <li>- Main Switchboard</li> <li>- EMCY Switchboard</li> <li>- Transformers</li> <li>- Breakers</li> <li>- Feeders</li> <li>- Safety systems</li> <li>- Automation system</li> <li>- Alarm Station</li> </ul>	 
Tanker Auxiliary Systems	<ul style="list-style-type: none"> <li>- Steam plant</li> <li>- Boiler Fuel system</li> <li>- Turbo Generator Steam Turbine</li> <li>- Steam Driven Cargo Pumps</li> <li>- Ballast system</li> <li>- Bilge Water system</li> <li>- Steering Gear</li> <li>- Water Desalination</li> <li>- Sewage Treatment system</li> <li>- Incinerator</li> <li>- Inert Gas system</li> <li>- Fire Alarm system</li> <li>- CO2 Fire system</li> <li>- Fire Main system</li> <li>- Provision cooling</li> <li>- Air Conditioning</li> </ul>	 

	- Alarm Station	
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DEDICATED HARDWARE PANELS		
Equipment	Description	
Interface Set	Main USB interface unit, Power connection boxes	
PSU	Power Supply Unit, 24V, 240W	
Propulsion Control Section	<ul style="list-style-type: none"> <li>- Set of analogue gauges for monitoring of parameters (ME speed, Propeller Pitch, Fuel Index, Pressures, Temperature, etc.)</li> <li>- Set of digital gauges for monitoring of parameters (Turbocharger speed, Vessel speed, etc.)</li> <li>- Set of Controls for normal operations</li> <li>- Set of Controls for emergency operations</li> <li>- Set of Alarm Indicators</li> <li>- Main Engine Safety system</li> </ul>	
Machine Telegraph, Steering Gear Control, Group Alarm Section	<ul style="list-style-type: none"> <li>- Group Alarm System indicators</li> <li>- Machine Telegraph unit</li> <li>- Steering Gear system pressure analogue gauge</li> <li>- Steering Gear system controls</li> <li>- Steering Gear system Alarm Indicators</li> </ul>	
	Industrial, ergonomic trackball	

5	Professional marine steel consoles of the same type as being supplied to real ships.	
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List of installed ERS 5000 ship models which are corresponding with NTPro5000 bridge simulator models (Full Mission Bridge/Engine Room Simulator):

ERS Model	NTPro Model
MAN BW 50MC-C	Chemical Tanker 7 Ref. No TR-S-NT-DB-OM404
MAN BW 6S60MC-C Tanker L	Crude Oil Tanker 4 Ref. No TR-S-NT-DB-OM435
Steam Turbine LNG	LNG 16 Ref. No TR-S-NT-DB-OM470

### Tanker LNG with steam turbine

LNG tanker of 76,000 DWT, with a steam turbine as the main engine, driving a fixed pitch propeller via a turning gearbox.

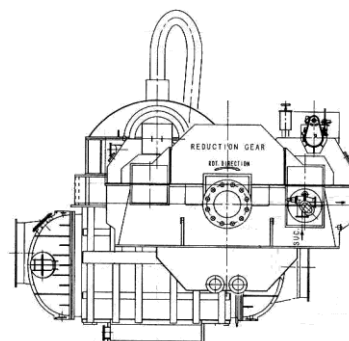
#### Vessel

Length o.a., m	276.00
Breadth mld, m	43.40
Draught at design WL, m	11.01
Deadweight, t	76,134
Cargo tanks, m <sup>3</sup>	137,585
Speed (service), kn	19.5



#### Main Engine

Type	Cross-compound, double reduction geared steam turbine Kawasaki UA-400
Output MCR, kW	29,450
H.P. turbine	5,075
R.P.M. L.P. turbine	3,350
Propeller	90,0
Output NCR, kW	25,040 / 85,3 R.P.M.
Steam conditions at inlet	57,4 bar, 515 °C
Full astern conditions	70% of ahead M.C.R. r.p.m. for period of at least two hours
Condenser vacuum at top (pump cooling)	722 mmHg Vac. at M.C.R.
Main boiler	2x Two-drum, water tube marine boiler with dual-fuel burners Mitsubishi MB-4E with Economizer
Superheated steam	61,5 bar / 515 °C / 63,500kg/h at M.C.R. condition
Propeller	FPP


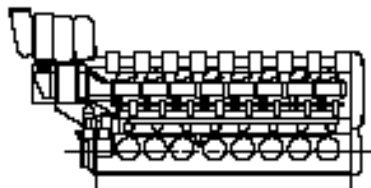




List of installed other ERS 5000 ship models which are not part of FMB/ER Simulator:

ERS Model	NTPro Model
2xMAN Diesel L32-40	Ro-Ro Passenger Ferry 13 Ref. No TR-S-NT-DB-OM427
ANZAC MAN B&W 10K98MC	Frigate 7 Ref. No TR-S-NT-DB-OM281
AZIPOD Diesel-Electric	Cruise Ship ABB Azipod Ref. No TR-S-NT-DB-OM349
OPV 2 × MAN RK280	OPV_1 Ref. No TR-S-NT-DB-OM252

### Ro- Ro Vessel

<b>Ro-Ro vessel of 5,000 DWT, with a four-stroke medium speed non-reversible turbo charged diesel engine and controllable pitch propeller.</b>																				
<table><tr><td colspan="2"><b>Vessel</b></td></tr><tr><td>Length o.a., m</td><td>124.09</td></tr><tr><td>Breadth mld, m</td><td>19.20</td></tr><tr><td>Draught at design WL, m</td><td>6.30</td></tr><tr><td>Deadweight at SLM, t</td><td>5.000</td></tr><tr><td>Speed in full load, kn</td><td>16.6</td></tr></table>			<b>Vessel</b>		Length o.a., m	124.09	Breadth mld, m	19.20	Draught at design WL, m	6.30	Deadweight at SLM, t	5.000	Speed in full load, kn	16.6						
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<table><tr><td colspan="2"><b>Main Engine</b></td></tr><tr><td><b>Type</b></td><td><b>S.E.M.T. Pielstick 16 PC2.2 V-400</b></td></tr><tr><td>Cylinder bore, mm</td><td>400</td></tr><tr><td>Piston stroke, mm</td><td>460</td></tr><tr><td>No. of cylinders</td><td>16</td></tr><tr><td>MCR, kW</td><td>5,966</td></tr><tr><td>Electric Power Plant, KW</td><td>1760</td></tr><tr><td>Corresp. Engine speed, rpm</td><td>520</td></tr><tr><td>Propeller</td><td>CPP/4 blades</td></tr></table>		<b>Main Engine</b>		<b>Type</b>	<b>S.E.M.T. Pielstick 16 PC2.2 V-400</b>	Cylinder bore, mm	400	Piston stroke, mm	460	No. of cylinders	16	MCR, kW	5,966	Electric Power Plant, KW	1760	Corresp. Engine speed, rpm	520	Propeller	CPP/4 blades	
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Propeller	CPP/4 blades																			

## Frigate

This excellent and one off in its class model has an ultimate level of complexity in mathematical modelling and over 180 different screens each with different subsystem modelled. The models includes full replica of the Simens automation system and interactive 3D modeling of all ship engine room spaces.

**Frigate of "ANZAC" class (MEKO class), being developed for Royal New Zealand Navy according to highly precise data of the prototype. Vessel has 1 x Gas turbine and 2 x medium speed four stroke diesel engines driving 2 shafts with CPP in CODOG configuration.**

### Vessel

Length o.a., m	118
Breadth mld, m	14,8
Draught at design WL, m	4
Displacement, t	3,600
Speed, operational, kn	27



### Main Engine

#### Type

**1 x General Electric LM2500 Gas Turbine**  
**2 x MTU 12V1163 TB83 diesel engines**

Cylinder bore, mm

Piston stroke, mm

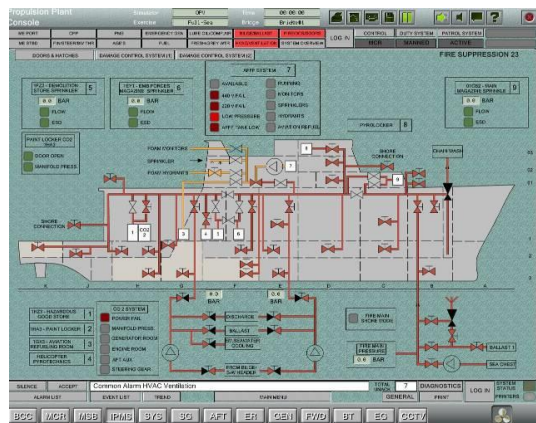
No. of cylinders

MCR, kW

Electric Power Plant, kW

Corresp. Engine speed, rpm

Propeller 2 x CPP



## Offshore Patrol Vessel (OPV)

This excellent and one off in its class model has an ultimate level of complexity in mathematical modelling and over 150 different screens each with different subsystem modelled. The models includes full replica of the modern generation of Servowatch automation system and interactive 3D modeling of all ship engine room spaces.

**Offshore Patrol Vessel (OPV) of "Protector" class, being developed for Royal New Zealand Navy according to highly precise data of the prototype. Vessel has 2 medium speed four stroke diesel engines, 2 shafts and CPP.**

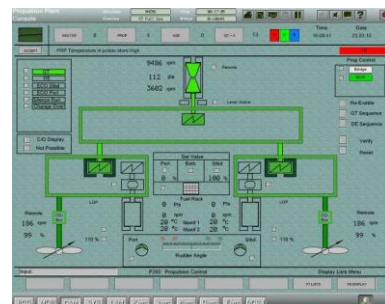
### Vessel

Length o.a., m	81,5
Breadth mld, m	12,05
Draught at design WL, m	3,4
Deadweight at SLM, t	250
Speed, operational, kn	24

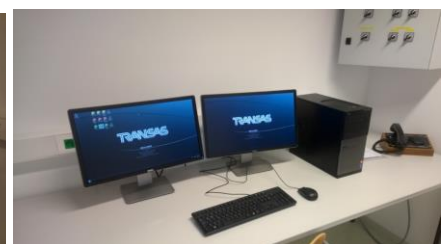


### Main Engine

<b>Type</b>	<b>2 x MAN RK280</b>
Cylinder bore, mm	
Piston stroke, mm	
No. of cylinders	
MCR, kW	
Electric Power Plant, KW	
Corresp. Engine speed, rpm	
Propeller	2 x CPP



## Transas ERS 5000 Classroom with 1 x Instructor Station + 10 x working stations



### TRANSAS Engine Room classroom with instructor station



### 3. Independent Kongsberg NEPTUNE – Full Mission Engine Room Simulator

- Ship slow speed 2-stroke diesel engine (MAN B&W L90 MC IV power approx. 18.000 kW for VLCC up to 300.000 GT) and medium speed 4- stroke engine (Pielstik) for RO-RO,
- Ship diesel – electric propulsion engine for huge Cruiser Ships and Mega Yachts with newest high voltage technology (6,6 kV).

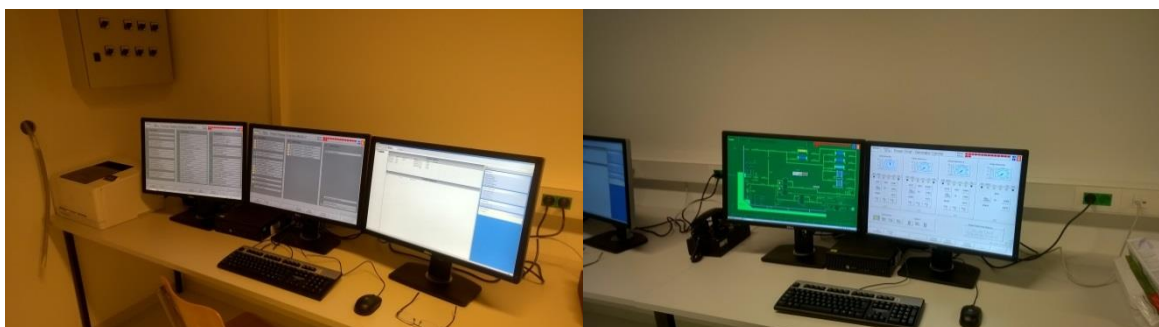
The simulator enables real life simulation of the running of all other ship engine systems (fuel, oil, air, water, steam...). It supports an unlimited number of scenarios of the main propulsion and auxiliary engine failures.



**Kongsberg Engine Control Room (ECR)**



**Kongsberg NEPTUNE «Full Mission Engine Room Simulator»**



**Kongsberg NEPTUNE «Full Mission Engine Room Simulator» Instructor station**



#### 4. Marine Hydraulic and Pneumatic Simulator Courses

Due to their technical characteristics, hydraulics and pneumatics are often used for power transmission and control systems on board all types of vessels. In view of this fact, it is imperative that marine engineers possess sufficient practical and theoretical knowledge in these areas to enable them to maintain and troubleshoot on hydraulic and pneumatic equipment and systems.

For this purpose the Faculty of Maritime Studies in Split acquired a modern didactic equipment for hydraulics and pneumatics from Festo Didactic GmbH&Co.

The equipment consists of two mobile workstations and related hydraulic and pneumatic components, electrical components for the realization of the electrohydraulic and electropneumatic control and measuring accessories. All components are standard construction which is applied in modern facilities. The equipment also includes computer programs *FluidSIM-Pneumatic 4.2* and *FluidSIM-Hydraulic 4.2* and measuring equipment. These computer programs allow drawing of hydraulic, pneumatic and electric schemes and their simulation in real time. This concept allows the visualization operations of pneumatic and hydraulic systems. The components used for measurement include flow meter, pressure and temperature sensors, analog terminal unit and interface. Collecting and documenting of the obtained measured values are realized by computer programs *Fluid Lab-Pneumatic*, version 2.0 and *Fluid Lab-Hydraulic*, version 1.0.

The concept of this equipment provides a very convenient and effective way to study and perform theoretical and practical training of marine engineers and scientific-research work.

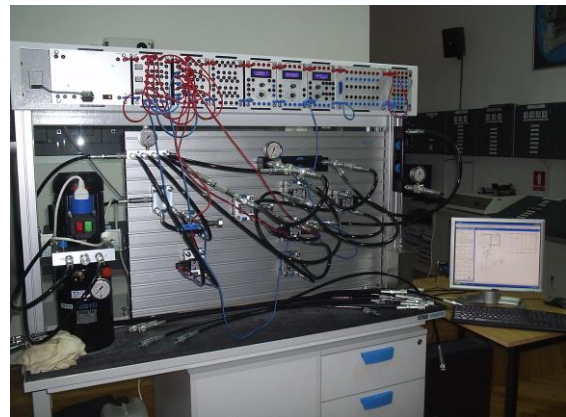
The procured equipment allows us to perform theoretical and practical training in the field of hydraulics and pneumatics through following courses:

- Pneumatics, basic level,
- Electropneumatics, basic and advanced level,
- Hydraulics, basic level,
- Electrohydraulics, basic and advanced level,
- Measurement in pneumatics and hydraulics.

These courses are open to all operational and management level engineer officers and electricians intending to serve on board ship as part of its regular complement.

The aim of these courses is to provide participants with the necessary skills in order to understand these technologies both in theory and practice, to support their duties as watchkeeping engineers in accordance with the requirements of the 1995 STCW Convention Regulation III / 2, section 2.2.

The practical exercises performed on the hydraulic or pneumatic mobile workstation further strengthen participants' ability to understand hydraulic and pneumatic principles, functioning of various components, control and also to troubleshoot faults logically. Problems and sample solutions are taken from actual on board applications.



Mobile workstation for pneumatics and electropneumatics

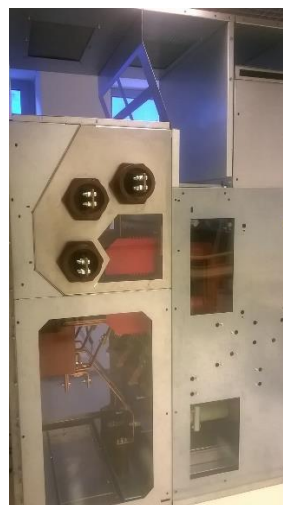
Mobile workstation for hydraulics and electrohydraulics

## 16. HIGH VOLTAGE AND ELECTRO CABINETS

The high voltage simulator of Končar - Electrical Devices d.d., Dicmo type of switching block BVK - M - 7.2 (*Outgounig Feeder*) is 1000 x 2491 x 1548 mm (*length x height x width*).

The high voltage simulator is equipped with the following equipment:

- Vacuum Puller with pull-out trolley, ABB manufacturer, type VD4 / P 12.25.31,  $I = 2500 \text{ A}$ ,  $U = 12 \text{ kV}$ ,  $I_{sc} = 31.5 \text{ kA/3sec}$ .
- Current measuring transformer, manufacturer of ABB, type TPU 40.13
- Voltage measuring transformers with retractable trolley, manufacturers Končar - Measuring transformers, types 4VPA1-24
- High voltage fuse, manufacturer Bussmann, type CAV41/09
- Connector, manufacturer of ABB, type ST-E,  $U = 17.5 \text{ kV}$ ,  $I_{sc} = 25 \text{ kA/3sec}$
- Protective Numeric Relay, manufacturer of ABB, type REF615
- Siemens test plug, type 7XV7507-OCA00.



## 17. Planetarium equipment (Digital STARLAB®)

(Mockup is under construction – works in progress – opening Nov/2019)

### Planetarium System includes:

- High definition digital projector F22 series, wide lens angle (180°),
- Laptop computer interface,
- STARLAB® Starry Night Small Dome™ software,
- Curriculum, elementary, middle school, high school, and additional curriculum modules, based on international standards,
- Custom travel case and stand,
- Training video: set up, use, take down.



7<sup>th</sup> Floor (Top Roof) - Digital Planetarium System



The Starlab is a portable planetarium system. It is comprised of a lightproof dome, a projector, and teaching content.

- The Starlab is similar to full scale planetariums at museums, except it can be transported from one school to another.
- The Starlab can accommodate 30 students with a standard dome, and 55 students with a giant dome.
- The whole system fits in two cases and a duffel bag, and sets up in about 20 minutes.

The Digital Starlab uses a professional quality DLP digital projector.

- This projector has a resolution of 1200 pixels, which exceeds high definition.
- The images are routed through a special fish eye lens that stretches the image across the entire dome.
- This lens is developed for and exclusive to the Digital Starlab

The Digital Starlab is powered by Starry Night, a world class planetarium software.

- The software will display and track any object within 500 million light years of the sun. This gives almost limitless options.
- Common projections are: the planets, solar system, celestial navigation, constellations, star motion, seasons, moon phases, and many many more.
- With all these options and 15 built in lessons, there is no excuse not to use your Digital Starlab.





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**Features, as labeled above:**

1. Frame base (bolt to support)
2. Frame
3. Digitarium® CU-1 control computer
4. DLP projector
5. Fisheye lens
6. Lens focus lock ring and adjustable iris on some versions (see right photo for lens close-up)
7. DVI cable
8. Infrared receiver
9. Lens cap
10. Adjustable iris (not on all versions)
11. Lens focus lock ring

**Additional list of equipment in use for students training and education:**

- Magnetic Compass
- Gyro Compass
- GPS
- Speed Log
- Echosounder
- BA World Chart Folio
- ECDIS World Chart Folio
- Complete update IMO, SOLAS, MARPOL, ITU, BA publications
- Complete licensed SEAGULL training modules
- Complete licensed VIDEOTEL training modules
- Complete Medical Chest as per IHO
- Reanimation equipment W/Life-size mannequin to practice resuscitation procedure
- Stretcher

## Students practical training onboard vessel:

### M/B "Naše more"



LOA: 31,50 m

B: 7,60 m

Draft: 3,50 m

GT: 234

NT: 74

Engine Power: 660 kW

Max speed: 11,50 knts

Capacity: 26 persons



### M/B "Kraljica mora"



LOA: 35,00 m

B: 8,55 m

Draft: 3,18 m

GT: 296

NT: 88

Engine Power: 2 x 373 kW

Max. Speed: 11,00 knts

Capacity: 28 persons

### Research vessel Palagruža



LOA: 45,50m  
B: 10,20m  
Draft: 3,10m  
GT: 699  
Engine Power: 1139 kW

### Jadrolinija Rijeka Passenger HSC & Ferrys

HSC catamaran: **m/b Adriana**



LOA: 40,00 m  
B: 10,10 m  
Draft: 1,50 m  
GT: 478  
NT: 168,00  
Engine Power: 2.920 kW  
Max. speed: 32,0 knts  
Passengers capacity: 325 persons

Passenger Ferry: **m/b Dubrovnik**



LOA: 122,00 m  
B: 18,50 m  
Draft: 5,00 m  
GT: 9.795  
NT: 3.818  
Engine Power: 13.248 kW  
Max. speed: 18,0 čvorova  
H ramp: 4,40 m  
B ramp: 4,50 m  
Passengers capacity: 1300 persons



**Passenger Ferry:**

**m/b Petar Hektorović**



LOA: 91,80 m  
B: 18,00 m  
Draft: 3,80 m  
GT: 6.721  
NT: 2.016  
Engine Power: 3.600 kW  
Max. speed: 15,50 čvorova  
H ramp: 4,50 m  
B ramp: 4,20 m  
Passengers capacity: 1080 persons  
Cars capacity: 120

**Other FACILITIES / WORKSHOPS:**



Machine tools cabinet





Hand tools and welding cabinet, sanding and heat treatment equipment



ENGINE ROOM CABINET (Lora)



FIRE POLIGON (Antipiros)

## Maritime Medicine



Saturation diving and divers simulators

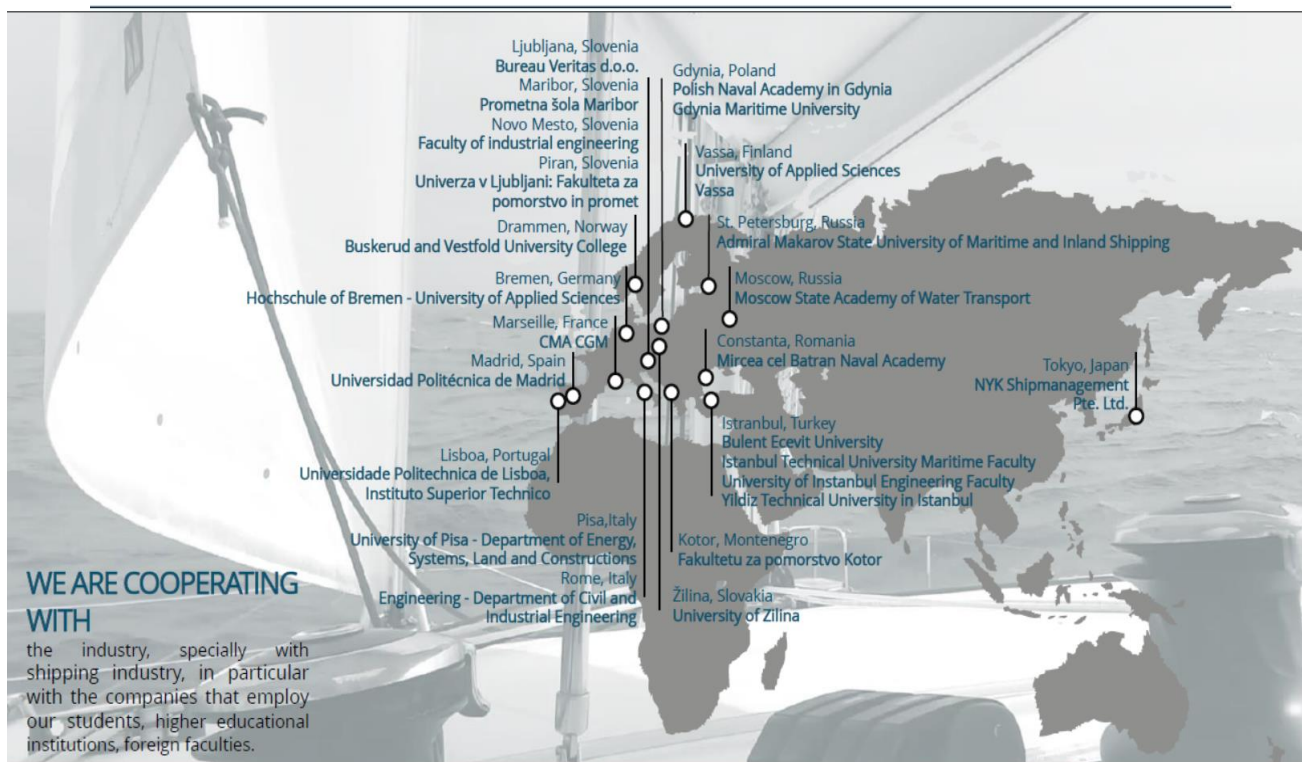


## Long-term collaboration with the Marine Shipping Companies that have been employing our students:

- SHELL International Trading and Shipping Company Ltd., London, UK
- Nippon Yusen Kaisha - *NYK Line*, Tokio, Japan
- *ROYAL CARIBBEAN*
- *GOLAR*
- *THOME*
- *TORM*
- DORIAN LPG Ltd.
- CMA-CGM, Marseille, France (the world's third largest container shipping group)
- PASAT d.o.o. Split
- Jadrolinija – Rijeka, Croatia
- Brodospas - Split, Croatia
- GLOBTIK EXPRESS AGENCY d.o.o., Split, Croatia

## References / Cooperation:

- Pennsylvania State University - USA
- Maritime faculties (Rijeka, Zadar, Dubrovnik, Montenegro, Slovenia, Poland)
- Faculty of Traffic and Transport (University of Zagreb, University of Pavia, Faculty of Engineering and Naval Architecture...)
- Fakultet elektrotehnike, strojarstva i brodogradnje (*Faculty of Electrical Engineering, Mechanical Engineering and Shipbuilding*) – Split, Croatia
- Institutes: Koncar (Zagreb), Croatian Hydrographic Institute (Split), Oceanographic Institute (Split), Shipping Institute (Zagreb), etc.
- Industry: Koncar, Brodosplit Shipyard, NYK, Bourbon, Transas, Plovput, Jadroplov, Kongsberg, Japanese Maritime Center, etc.
- Organisations: European Science Editors, International Maritime Organisation (representative), Association of Shippers Japan, Association of Captains and Engineers, International Association of Maritime Universities
- Harbour Master Office - Split, Croatia
- Department for Maritime Medicine of Split (Saturation diving and divers simulators)
- Other scientific and higher education institutions, military education institutions participating in NATO programs (Croatian Military Academy "Petar Zrinski" and the Ministry of Defence of the Republic of Croatia)
- Maritime Cluster (member of supervision committee)
- Local Government and Port Authorities





The Faculty is presently engaged in 6 projects, of which 4 international.

- „Possibilities of reduction of emission of contamination from ships in Montenegro's and Croatia's part of Adriatic sea through the implementation of Marpol Convention Annex VI”
- Development of qualifications and innovative methods for acquiring competences in logistics and maritime traffic – in cooperation with the Faculty of Maritime Studies in Rijeka and the EU.
- Maritime management for the 21st Century – sustainable development of the coastal area through development of standards for professions and qualifications in the field of maritime management, and enhancement of the university study programme entitled Maritime management for the 21st Century having the same title. The inauguration agreement was signed by the performer (Faculty of Maritime Studies in Split) and the partner (EU).
- TEMPUS “Modernizing and harmonizing maritime education in Montenegro and Albania” MAR-ED

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