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PANEL - NEW TECHNOLOGIES
FOR EXISTING VESSELS

Advancements in Simulation Technologies for the Ferry Industry

Canadian Ferry Association, Saint John, NB
September 17, 2019

Clayton Burry, President
Kongsberg Digital Simulation Ltd.

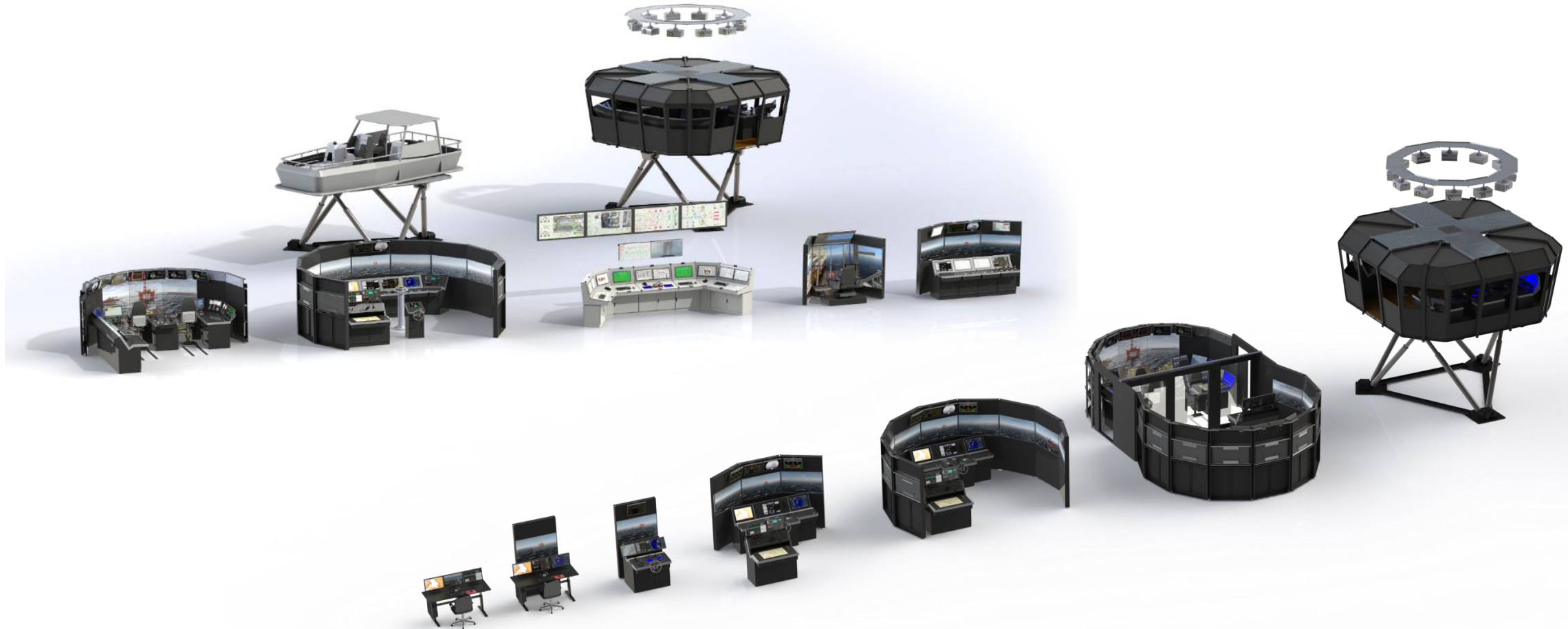




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Customized to fit every requirement and budget

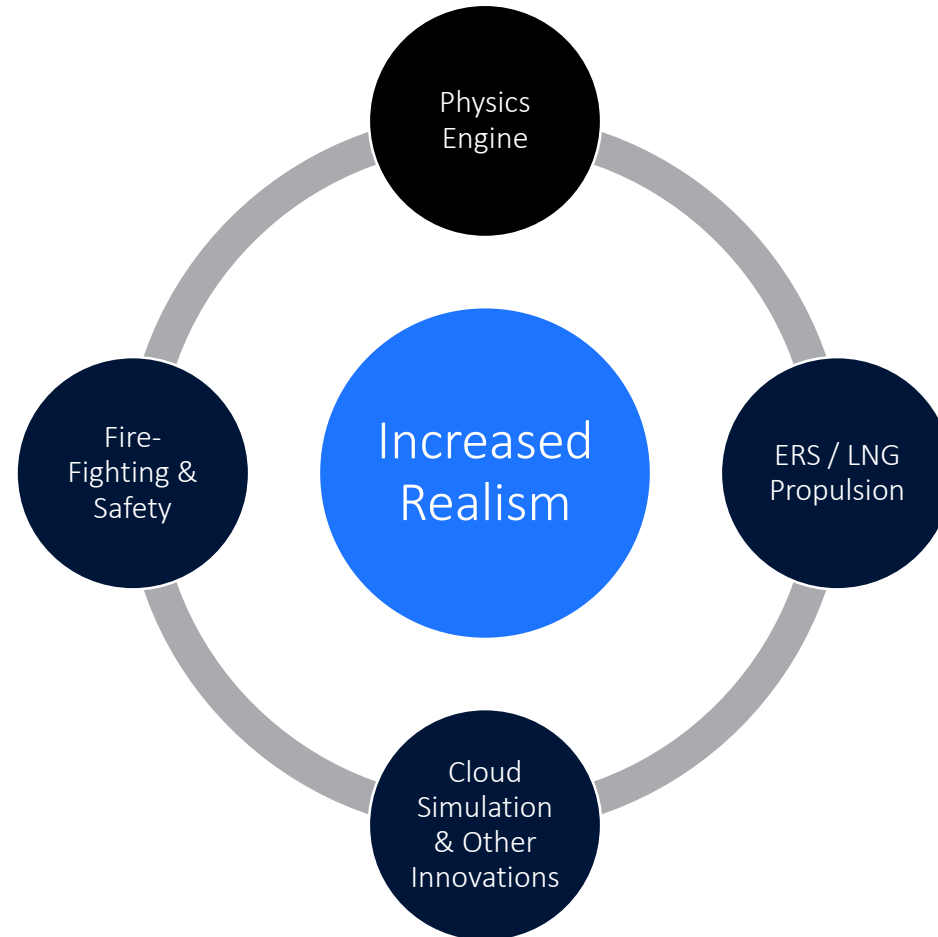
Scalable solutions allow for expansion at anytime





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Recent Advancements for Ferry Industry

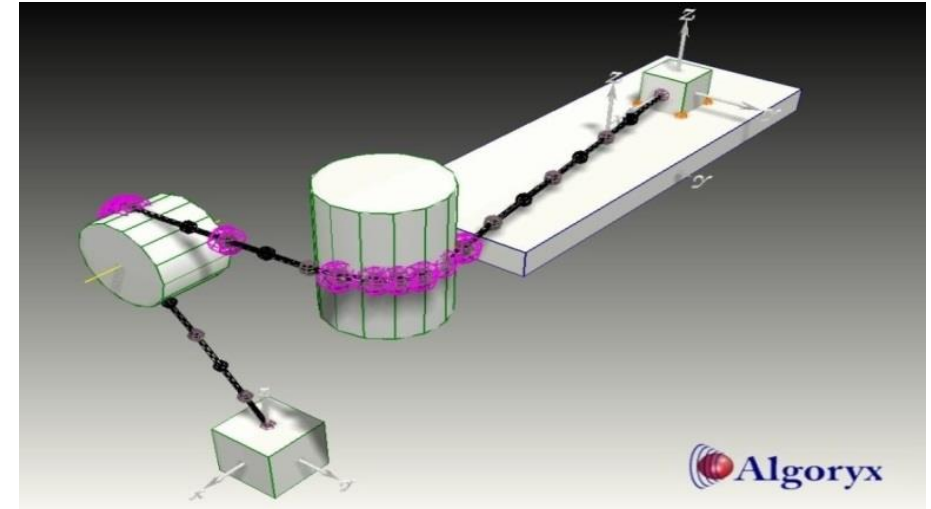




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Integrated AGX Physics Engine

- Realistic line, wire and chain characteristics and interaction
- Modeling of deck equipment and other mechanical objects
- 3D collision interface with vessels, equipment, objects, structures and land masses
- Detailed calculations of winch loads and line forces during tug, mooring operations
- Ballast/cargo loading/discharging and crane operations
- Friction, mass and other physical attributes to be imposed on simulator content
- Soft grounding calculations
- Hydrodynamic effects: Waveload, Wind spectrum, Wave Models, ETDs





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Physics Engine – Line Dynamics

3D View Above and Below the Water Line

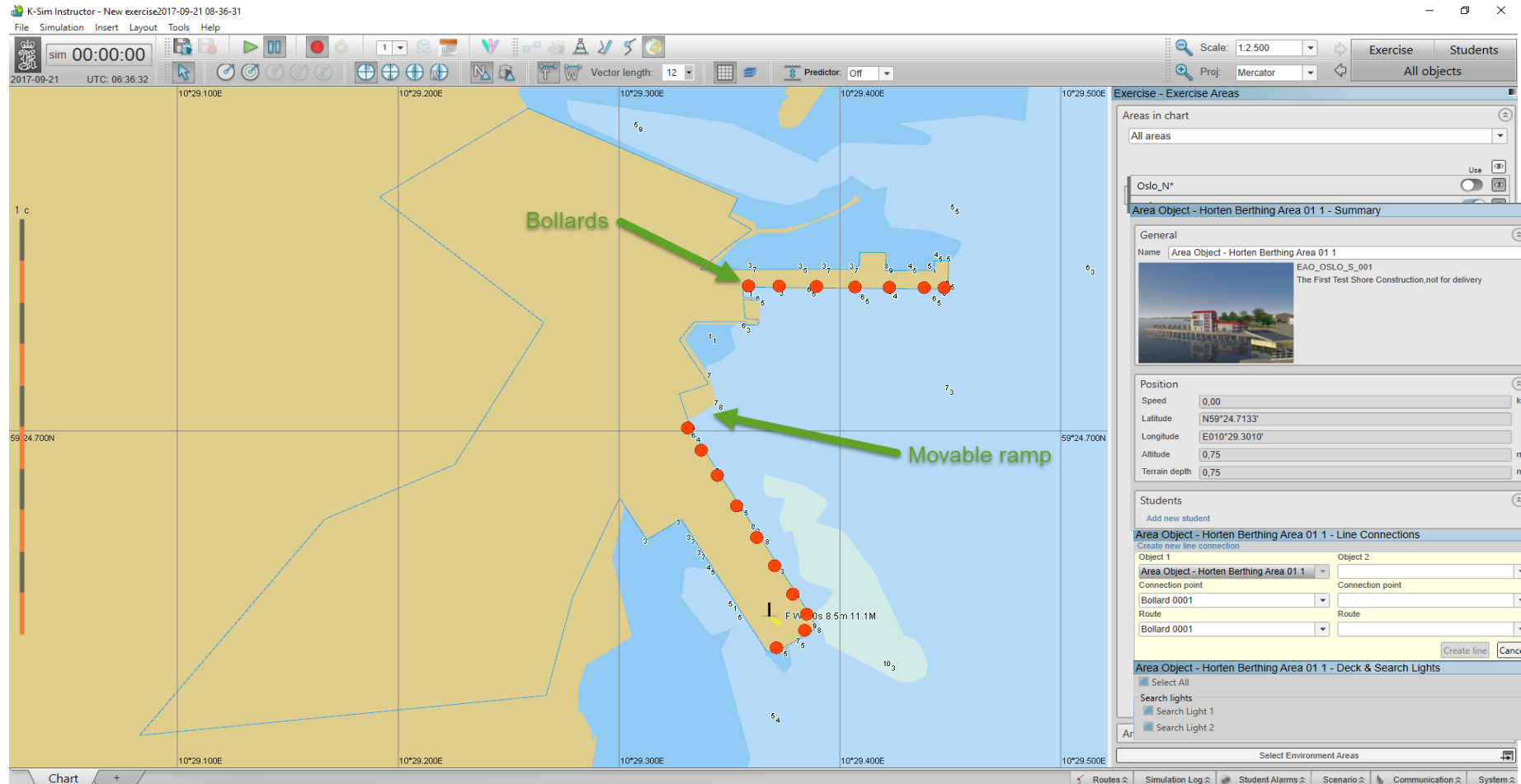




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Movable Ramps

Objects may now be embedded into navigational areas with for example bollards and movable ramps



Ramp Operation – Physics Engine Realism



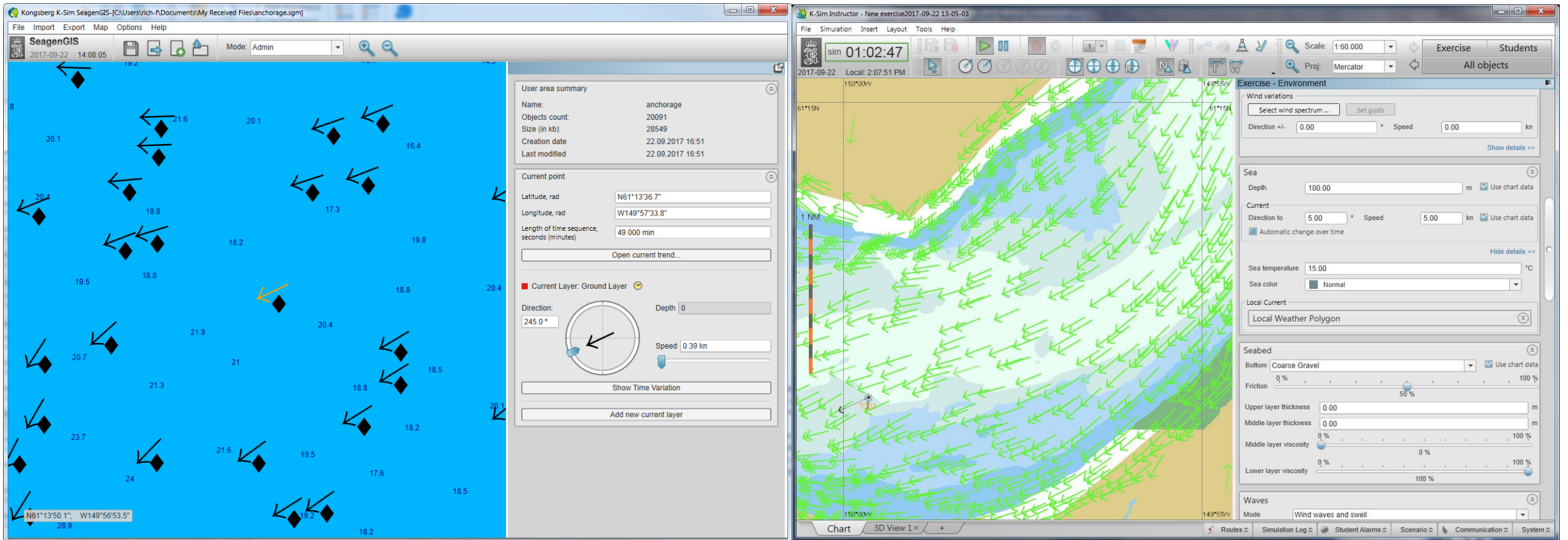
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The screenshot displays a simulation environment for a ship named "SEASPEED". The main 3D view shows the ship docked at a pier with a building in the background. The simulation is running in a window titled "K-Sim Instructor - New exercise2017-09-21 08:36-31". The top toolbar contains various icons for simulation control, including a play button, a stop button, and a refresh button. The status bar at the top shows the simulation time as "sim 00:11:24" and the UTC time as "2017-09-21 UTC: 06:47:56". The view position is displayed as X: 16,17 m, Y: 98,38 m, Z: 23,55 m, with a heading of 226,57 degrees, roll of 0,00 degrees, and pitch of 15,37 degrees. The right-hand control panel, titled "S001 - Kongsberg SeaSpeed 1 - Manoeuvre", shows the ship's speed at 0,61 kn and heading at 321,6 degrees. It also features a "Rate-of-turn" gauge set to "p18" and several sliders for controlling the ship's movement. The bottom status bar includes a "Port Waterjet's failures" indicator and a menu with options like "Routes", "Simulation Log", "Student Alarms", "Scenario", "Communication", and "System".



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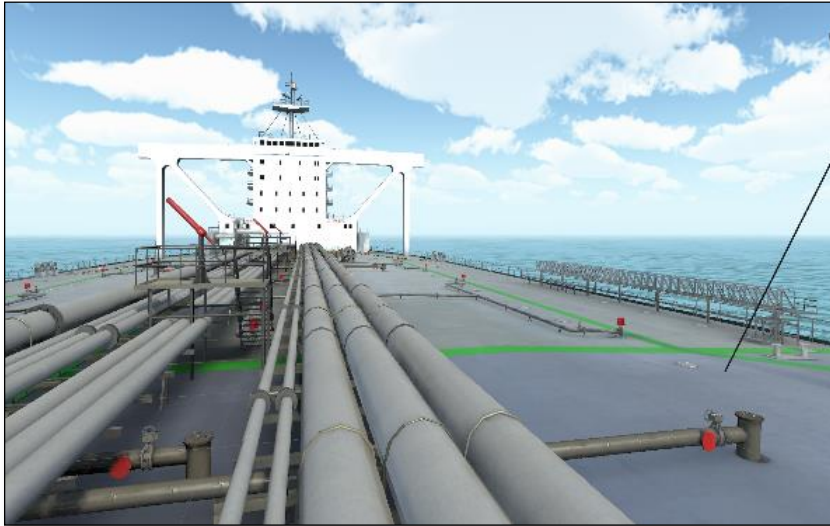
Extended Tidal Diamonds





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Engine Room & Cargo Handling Simulation





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Cruise Ship Order book. Confirmed using LNG

Confirmed on order, using LNG September 2018

1.	2018	AIDA Cruises	Aida Nova
2.	2019	Costa Cruises	Costa Smeralda
3.	2020	P&O Cruises	Iona
4.	2020	Carnival Cruises	Unnamed
5.	2020	Havila	Unnamed
6.	2020	Havlia	Unnamed
7.	2020	Havila	Unnamed
8.	2020	Havila	Unnamed
9.	2021	AIDA Cruises	Unnamed
10.	2021	Ponant Cruises	Unnamed
11.	2021	Viking Ocean	Unnamed
12.	2021	Costa Cruises	Unnamed
13.	2021	Disney Cruises	Unnamed
14.	2022	Royal Caribbean	Unnamed
15.	2022	Viking Ocean	Unnamed
16.	2022	MSC Cruises	Unnamed
17.	2022	Carnival Cruises	Unnamed
18.	2022	Disney Cruises	Unnamed
19.	2022	P&O Cruises	Unnamed
20.	2023	AIDA Cruises	Unnamed
21.	2023	Princess Cruises	Unnamed
22.	2023	Disney Cruises	Unnamed
23.	2023	MSC Cruises	Unnamed
24.	2024	Royal Caribbean	Unnamed
25.	2024	MSC Cruises	Unnamed
26.	2024	TUI Cruises	Unnamed
27.	2025	Princess Cruises	Unnamed
28.	2025	MSC Cruises	Unnamed

Number of firm LNG cruise newbuilds climbs to 19



AIDA Nova was floated out at Meyer Werft in May and is due to become the first cruise ship using LNG for propulsion upon its delivery in November.

With today's order of two LNG-powered ships by TUI Cruises, the number of firmly contracted cruise newbuilds that will use liquefied natural gas for propulsion climbs to 19.

Nine in Carnival Corp. & plc group

Besides the TUI pair, they include nine newbuilds for Carnival Corp. & plc group (three for AIDA Cruises, Costa Cruises, P&O Cruises and Carnival Cruise Line).

Plus MSC, Disney, Royal Caribbean

MSC Cruises' fifth Meraviglia-class ship will use LNG. Disney Cruise Line's trio of new ships and Royal Caribbean's newbuilds are also scheduled for delivery in November.

Disney Cruise Line has options for two additional World Class ships for delivery in 2022.

LNG?

Distribution in whole or in part is expressly prohibited.

Seatrade Cruise News

Princess Cruises

AIDA Cruises

Cruise ships add new dimension to LNG passenger tier

11 May 2018 by Mike Corhill

Print story Email us



AIDA Cruises is preparing to put the world's first LNG-powered cruise ship into service later this year.

The latest LNG World Shipping review of LNG-fuelled ships worldwide, which breaks the fleet into four segments, shows that as of 1 May 2018 there were 41 such passenger ships in service, compared to 40 a year ago, and 42 on order (up from 32).

In terms of vessel numbers, the passenger ship total of in-service and on-order vessels is 24% greater than the rest of the world's fleet, with 10% of the world's largest segment, tankers and bulk carriers.

It is the case for the other fleet segments, passenger ships ordered over the last 12 months have tended to be larger vessels. The number of cruise liners under construction has increased by 38% over the past 12 months.



Selecting the Right Ship
By Wilhelmshaven Ship Manage

Cruise industry passes LNG 'tipping point'

Fri 23 Mar 2018 by Rebecca Moore

Print story Email us



Tom Strang (Carnival Corp): Training in LNG is a huge challenge and huge opportunity

2018 is a landmark year for the use of LNG by the cruise industry, although there are still challenges to overcome

The cruise ship industry has now passed the tipping point for LNG, speakers at Seatrade Cruise Global's Alternative Fuels panel agreed.

The session revealed that there are 18 LNG-powered cruise ships currently under construction, out of 94 ships on the global cruise ship orderbook. This represents a quarter of newbuild cruise ship capacity so will have a significant impact. Carnival Corp is taking the lead with the use of LNG as fuel – it will launch seven fully LNG-powered ships by 2022 – a move that will cause ripple effects throughout the industry. And 2018 is a key year – it will see Carnival's first LNG-fuelled vessel delivered.

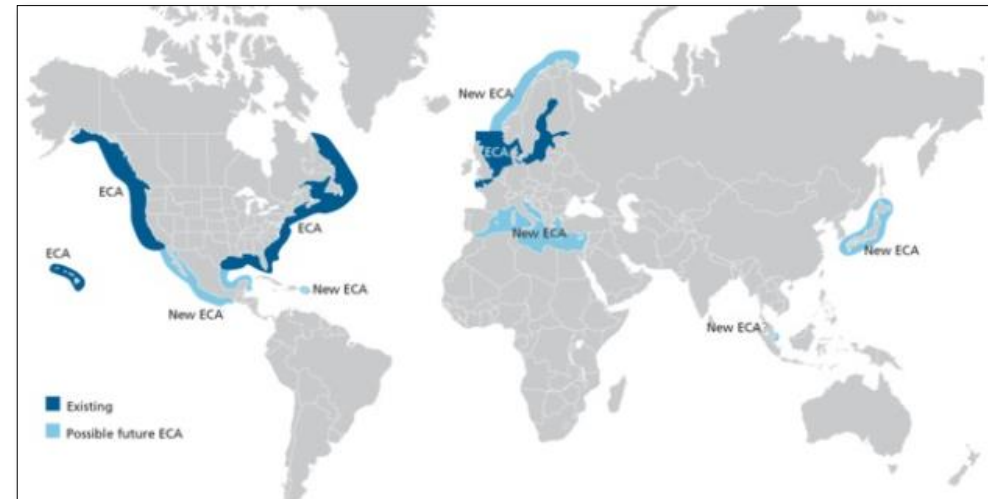


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New DEDF LNG Model Cruise/Ferry



- Ship operating with Gas Engines.
- Focus on bunkering LNG
- High Voltage
- Gas Management
- Eco Drive/Safety





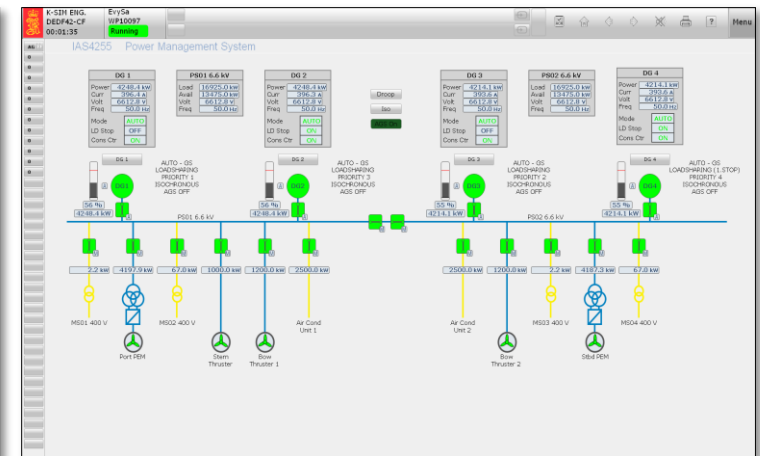
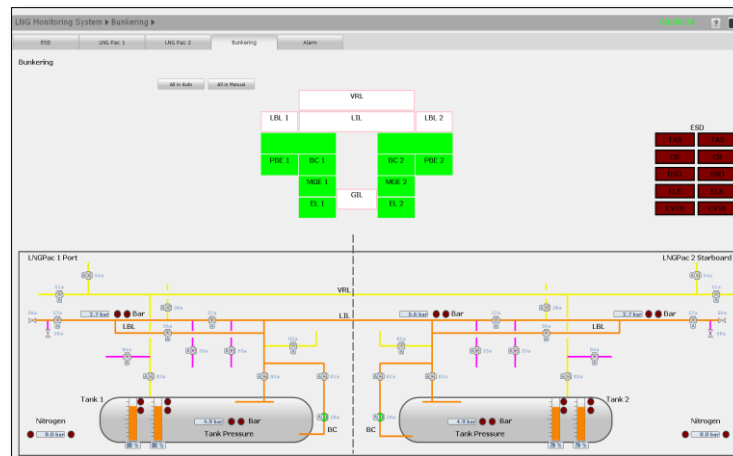
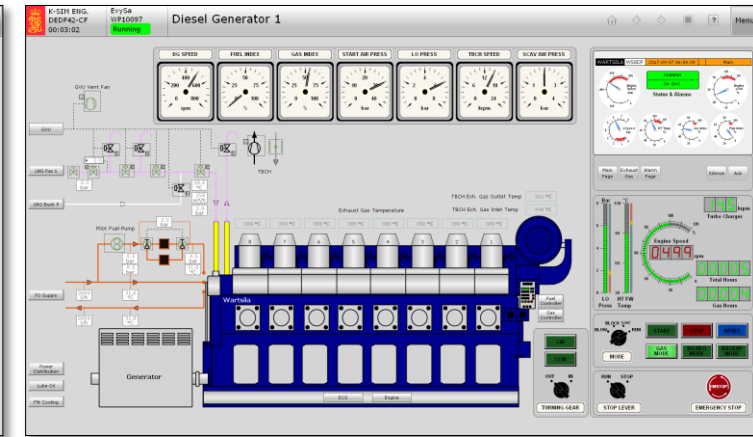
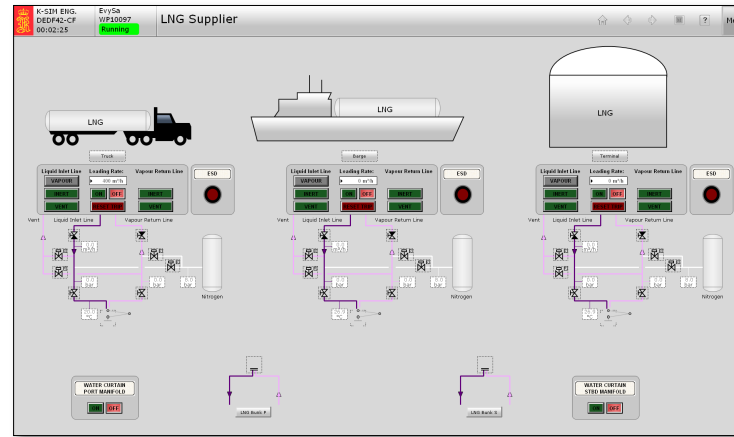
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New K-Sim Engine DEDF Cruise Ferry

- Power Distribution – High Voltage
- 4 Dual Fuel Engines with Aux Systems

- LNG Supplier Mimic (Truck-Barge-Terminal)
- Bunkering
- Gas Heating (LNG Pac 1-2)
- Heating System
- Safety and Protection Systems

- LNG System Monitor
- Integrated Automation System
- Power Management
- Alarm Handling






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LNG Supplier

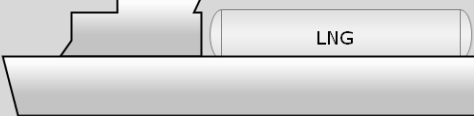
K-SIM ENG.
DEF42-CF
00:02:25

EvySa
WP10097
Running

LNG Supplier



Truck



Barge


Liquid Inlet Line Loading Rate: **Vapour Return Line**

VAPOUR ON OFF INERT

INERT RESET TRIP VENT

VENT

ESD

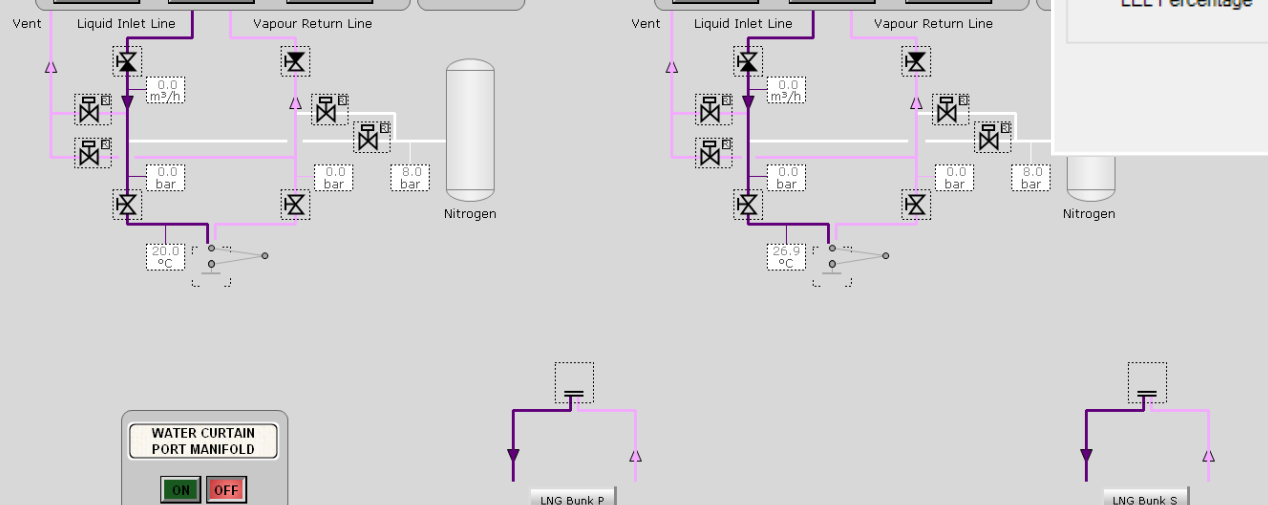


Liquid Inlet Line Loading Rate: **Vapour Return Line**

VAPOUR ON OFF INERT

INERT RESET TRIP VENT

VENT



WATER CURTAIN PORT MANIFOLD

ON OFF

LNG Bunk P LNG Bunk S

Bunker Station

Menu

Data Settings TagID

ID

440BQ513 - LNG Supply - Terminal LNG Properties

Data

Density	<input type="text" value="548.9"/>	kg/m³
Viscosity	<input type="text" value="0.03"/>	cP
Molecular Weight	<input type="text" value="17.0"/>	kg/kmol
Specific Heat Cap		
Saturated Vapour		
Boiling Temperature		
LEL Percentage		

Bunker Station

Close

Data Settings TagID

ID

440BQ513 - LNG Supply - Terminal LNG Properties

Settings

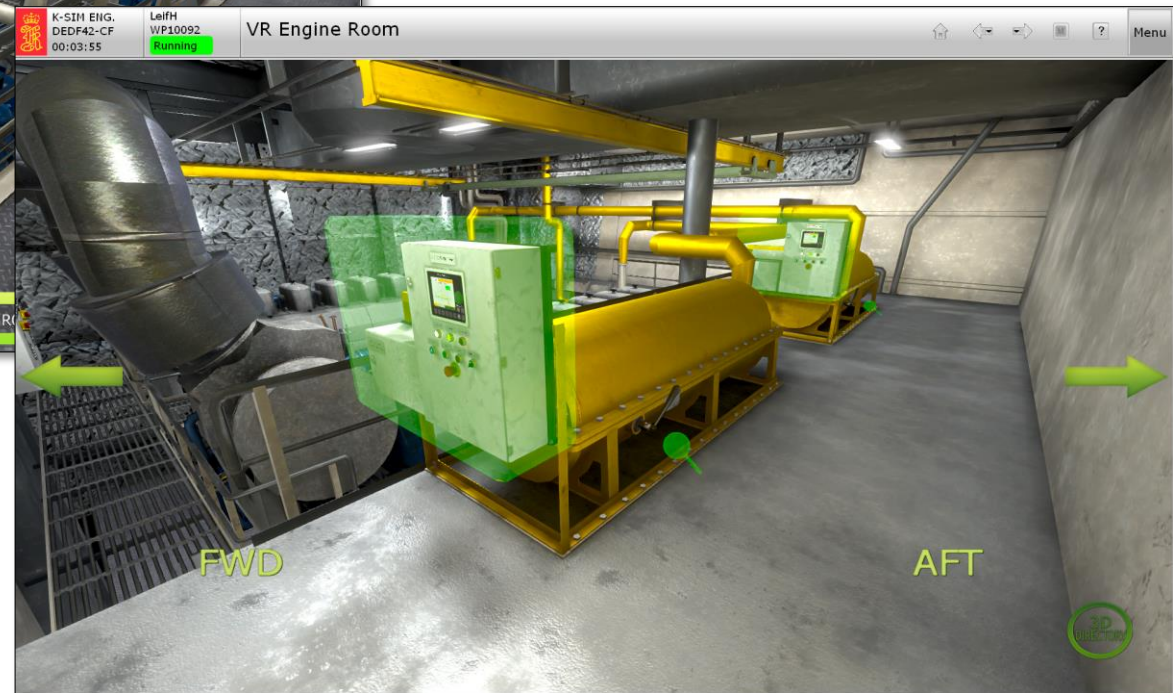
Pressure	<input type="text" value="7.0"/>	bar
Temperature	<input type="text" value="-140.0"/>	°C
Ethane	<input type="text" value="6.5"/>	%
Nitrogen	<input type="text" value="0.5"/>	%
Methane Number	<input type="text" value="81.0"/>	-
Lower Calorific Heat	<input type="text" value="49999.0"/>	kJ/kg

Window



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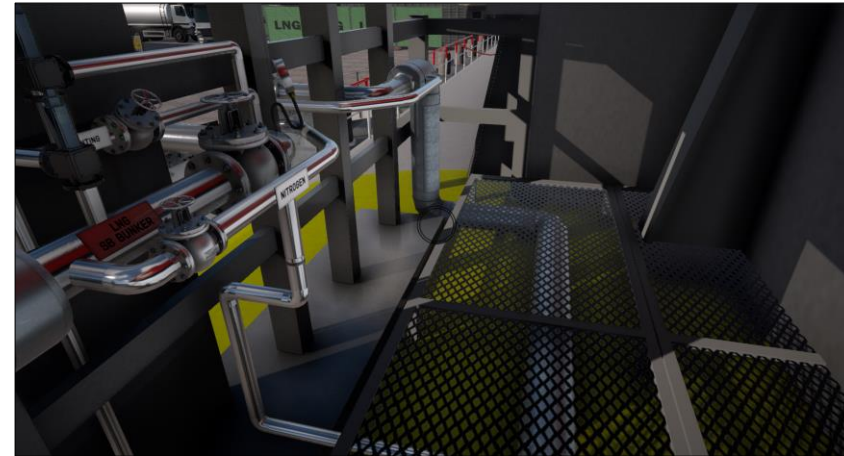
Virtual Engine Room





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Virtual Bunker Station





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Full Mission DEDF Cruise Ferry (Version II)

DNV GL Class A simulator

All auxiliary systems to comply with the DNV GL requirements:

- Cooling Systems
- Fuel Oil System
- Lube Oil System
- Compressed Air System
- Electrical Network, Incl High Voltage
- Steam System
- Ballast System
- Freshwater Production
- Steam system
- Fire Detection and Fire Fighting

BigView, Main Switchboard, Touch Panels, Sound System and K-Sim
Navigation Interface





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DNV-GL Standard for Maritime Simulator Systems

DNV-GL
Statement No: 002/171214
DNV GL Id. No: 10564901

STATEMENT OF COMPLIANCE

Particulars of Product

Name of Product: **Machinery Operation Simulator**

Type designation: **K-Sim® Engine DEDF42 Cruise Ferry**

Particulars of Manufacturer

Manufacturer: **Kongsberg Digital AS, Maritime Simulation**

Manufacturer address: **Horten, Norway**

This is to confirm:
That the above product is found to comply with Class S- Standard for Certification of Maritime Simulators No. DNVGL-ST-0033 March 2017.

Application
The above Standard is based on requirements in the STCW Convention, Regulation I/12.

This Statement is valid until **2022-12-14**, provided the requirements for the retention of the Statement will be complied with.

Issued at **Sandefjord** on **2017-12-14**

for DNV GL

Nils Gunnar Bøe
 Head of DNV GL SeaSkill

DNV-GL
 10 04

Capt. Aksel David Nordholm
 Auditor

This Statement is subject to terms and conditions overleaf. Any significant change in simulation performance may render this Statement invalid.
Form code: MSS 301 Revision: 2017-10 www.dnvgl.com Page 1 of 2
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Job Id:
Statement No: **002/171214**
DNV GL Id. No: **10564901**

Application/Limitation

Training Elements
The engine room simulator comprising the following training elements:

- Training tool in order to deliver training that complies with the IGF (STCW) code
- LNG Bunkering Operation
- LNG Behaviour (Quality)
- Operational Principles Dual Fuel Generator Installations
- Fundamentals of Automation, Instrumentation and Control Systems

System familiarisation, operations and procedures:

- Propulsion Plant Integrated Automation System (Kongsberg standard IAS)
 - o Alarm and Safety Warning System
 - o Power Management System
 - o Propulsion Control System
- Dual Fuel Diesel Generator Sets and Support Systems
- Electric Power Supply including Switchboards and Distribution Centre
- Ventilation Control System in Machinery Space
- Onboard LNG storage and Bunkering System
- Shore side mimic: Selection of Barge, Tank and Truck (Including: Fuel quality, methane number, Wobbe index, density)
- LNG Monitor system for bunker operation
- LNG ESD (Gas Trip), for example switch-over at low methane number
- Gas Heating
- Fuel Oil and Gas supply system for Diesel Generators
- Propulsion Control Panel

Ref:
1.) DNVGL-ST-0026:2014-04 Competence related to the on board use of LNG as fuel
2) INTERNATIONAL CODE OF SAFETY FOR SHIPS USING GASES OR OTHER LOW-FLASHPOINT FUELS (IGF CODE)

This Statement of Compliance is for the manufacturer offering the simulator for examination or mandatory simulator training and complies with the requirements of DNVGL-ST-0033 Maritime Simulator Systems.

Based on this statement of compliance, maritime training providers in possession of simulators that comply with the requirements of the standard can apply for a product certificate for "Maritime simulator". The simulator's function area and the simulator class according to the standard will be stated on the certificate.

Form code: MSS 301 Revision: 2017-10 www.dnvgl.com Page 2 of 2



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K-Sim Safety FFSR (Fire Fighting, Search & Rescue Simulator)

The simulator is intended to be used as a tool in order to train seafarers in firefighting management. (Advanced Fire Fighting).

STCW Regulation VI/3, Section A-VI/3 table A-VI/3-1.

Potential training:

- Communication
- Familiarization with emergency exits.
- Location of firefighting equipment.
- Management training.
- Compare GA Drawings with real life.
- Finding missing persons.
- Black out training.
- Flooding
- Evacuation

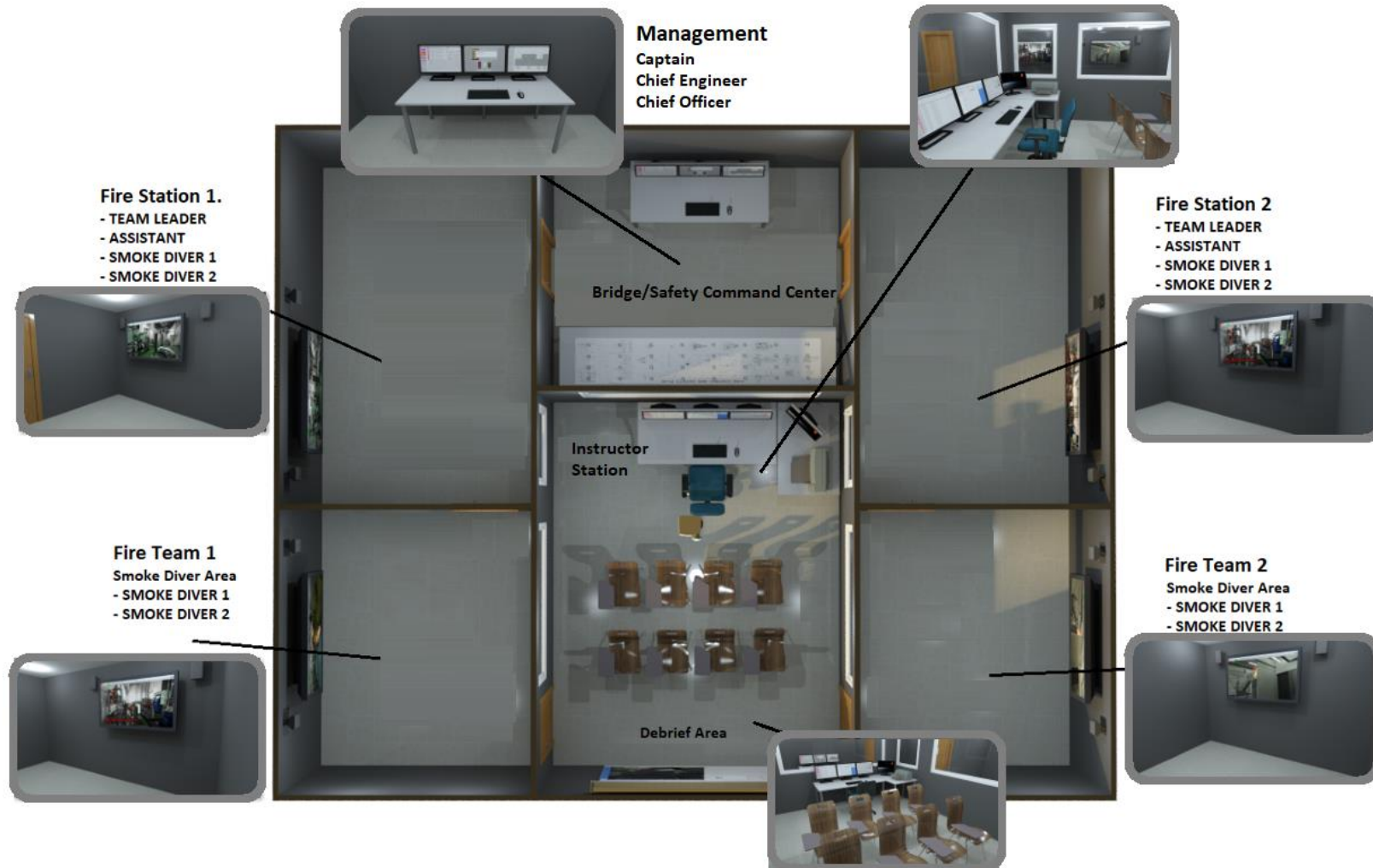
- Assessment.





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K-Sim Safety. FFSR. Full Mission Simulator, Layout





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Victim and Fire in Cabin





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VR Head-set

A Dedicated Area/ Section in the Virtual SW where the Smoke Diver can enter has the possibility to select the use of VR Headset (Goggles) instead of screen and controller.





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Kongsberg's New K18 Console Design Fast Ferry Configuration

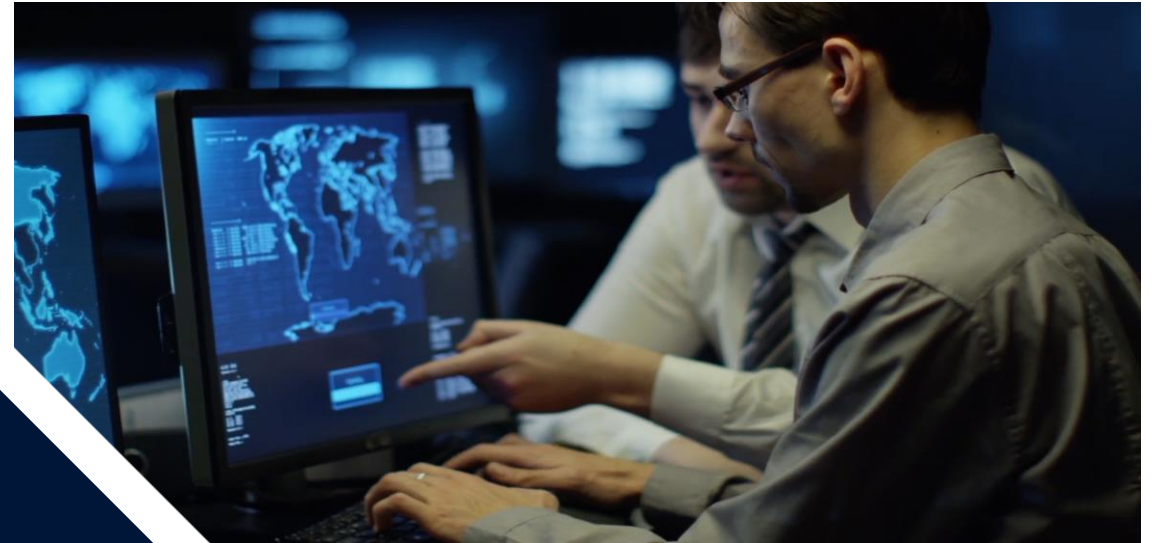




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Simulation as a Service

- Training Anytime & anywhere
- Subscription of simulation models and exercises
- Eco-system for maritime training
- Simulation solutions & services for vessel design, operational verification, optimization and prediction (e.g. autonomous vessels)



K-Sim Anywhere - Anytime



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- The instructor has simulators that can run in Cloud.
- First offerings are the Suez-Max Crude Carrier (SCC-II) and Thermal Power Plant (TPP)
- Every simulator has detailed descriptions and download sections.

SUPPORT NEW MESSAGES: 5 OLA NORDMANN UNIVERSITY OF MAXIMEGALON INSTRUCTOR

K-SIM CONNECT

SIMULATORS EXERCISES ASSIGNMENTS STUDENTS Search ..

MY SIMULATORS
INSTALLED ON MY COMPUTER
ALL SIMULATORS
CLOUD SIMULATORS
ON-SIDE SIMULATORS
CONNECTED SITES

BROWSE BY CLIENT
ANYTIME & ANYWHERE
CLASSROOM
PART TASK TRAINER
FULL MISSION BRIDGE

BROWSE BY CATEGORY
K-SIM CARGO
K-SIM CRANE
K-SIM ENGINE
— SLOW SPEED DIESEL ENGINE PLANTS
— MEDIUM DIESEL ENGINE PLANTS
— HIGH SPEED ENGINE PLANTS
— DIESEL ELECTRIC PROPULSION PLANTS
— STEAM TURBINE PROPULSION PLANTS
— GAS TURBINES
K-SIM GMDSS
K-SIM NAVIGATION
K-SIM OFFSHORE

MY SIMULATORS

MAN B&W 5L90MC VLCCII-V
K-SIM Engine
Jan 03, 2017

12RTA84 Container II-III
K-SIM Engine
Mar 14, 2017

AVAILABLE SIMULATORS FROM KONGSBERG

DE Dual Fuel LNG Carrier - DEDF21
K-SIM Engine
Aug 27, 2017

UPDATING ASSET 2 OF 5 79% (4310 KB/S) VIEW FRIENDS LIST 6 FRIENDS | 1 INSTRUCTOR

SUPPORT NEW MESSAGES: 5 OLA NORDMANN UNIVERSITY OF MAXIMEGALON INSTRUCTOR

K-SIM CONNECT

SIMULATORS EXERCISES ASSIGNMENTS STUDENTS Search ..

MY SIMULATORS
INSTALLED ON MY COMPUTER
ALL SIMULATORS
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BROWSE BY CATEGORY
K-SIM CARGO
K-SIM CRANE
K-SIM ENGINE
— SLOW SPEED DIESEL ENGINE PLANTS
— MEDIUM DIESEL ENGINE PLANTS
— HIGH SPEED ENGINE PLANTS
— DIESEL ELECTRIC PROPULSION PLANTS
— STEAM TURBINE PROPULSION PLANTS
— GAS TURBINES
K-SIM GMDSS
K-SIM NAVIGATION
K-SIM OFFSHORE

SIMULATORS > K-SIM MAN B&W 5L90MC VLCCII-V < BACK

K-SIM MAN B&W 5L90MC VLCCII-V

The K-SIM Engine MAN B&W 5L90MC VLCC II-V simulates a very large crude carrier with a MAN B&W slow speed turbo charged diesel engine as propulsion unit modelled with fixed and controllable propeller. The main engine models respond dynamically to variations in operation and condition of the ship model, and the ship models have mutual responses to the main engine models.

UPDATING ASSET 2 OF 5 79% (4310 KB/S) VIEW FRIENDS LIST 6 FRIENDS | 1 INSTRUCTOR



KONGSBERG

Many thanks...

Clayton Burry
Kongsberg Digital Simulation Ltd.
clayton.burry@kdi.kongsberg.com

