



## CSMART

CENTER FOR SIMULATION  
AND MARINE TRAINING



### Customer

CSMART

### Country

Almere, The Netherlands

### Web-site

[www.csmartalmere.com](http://www.csmartalmere.com)

## SUMMARY

Transas delivered the most innovative integrated full-mission engine and bridge multi-simulator environment to the newest and the world's largest Carnival's training center CSMART.

## BUSINESS NEED

Transas were challenged by Carnival to equip its world's most advanced CSMART training facility with an ultimate maritime simulation solution.

The solution regulated an interface with the real systems installed on board the Carnival's cruise ships to ensure the necessary level of realism. The aim was to completely replicate Carnival's ships on shore.

The annual throughput of 6500 Carnival Corporation deck and engineering officers undergoing extensive training required zero downtime and full redundancy.

## SOLUTION

As a result of intensive R&D, Transas engineered a next-generation training environment concept representing the leading edge Transas Integrated Full Mission Simulation Academy solution, which enabled to overcome previous technical limitations in simulator technology.

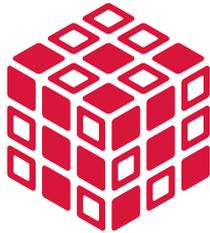
Our simulator specification required the development of many new features, which we now use with great results. One of the most important developments have been the greatly improved de-briefing functionality with HD quality of the video replay.

Capt. Hans Hederström  
Managing Director  
of the CSMART

## CHALLENGES/APPROACH

By applying technological advancements never before utilised within the maritime industry, Transas have created a multi-simulator integrated training that delivers an immersive real world situational environment in which multiple crew members can operate and interact simultaneously as if on a real vessel.

Below are the key challenges Transas team faced during the project:



### CHALLENGE

The power requirements based on traditional simulator technology would have required new power cables to be laid from the nearest power station.

An extreme requirement of 0% downtime due to high volume throughput of seafarers with defined limited training windows.

Any push of a button inside the Simulator needs to be recorded and be available for debriefing, allowing for advanced competency development training.

To ensure the next-generation realism of team situational training for engine room and machinery functions.



### APPROACH

Transas reduced the number of physical machines by 77% from 650 to 150 and cut energy consumption by 30 percent compared to a traditional deployment by the virtualisation of simulation tasks into nVidia Grid System.

Transas Full interswitching capabilities to get any task on any screen within the Simulator (Blackbox IP-matrix). The interswitching with 'spare' virtual machines available allows for continuous operation and delivers maximum configuration flexibility ensuring high volume throughput of seafarers with defined limited training windows.

CCTV camera technology delivered to the CSMART observes and records everything on the bridges and in the engine room to allow full picture team training. Access is available to any task on any screen within the simulator while the CCTV provides professional broadcast, AV control, recording and archiving system with full synchronisation of all workstations, 90 FullHD PTZ cameras and audio.

Transas has implemented the unique high tech 'gamification' technology with 3D Engine compartments walk-through including usage of avatars controlled via large touchscreens or gaming controller. The trainees move avatar through the machinery compartments and can act as a team in case of emergency procedures.

# Project overview

The history of the project traces back to 2013, when Carnival Corporation & plc, the largest leisure travel company in the world, with a portfolio of 10 cruise brands located around the globe and operating 101 ship decided to invest 75 million euro in expanding and upgrading its world-class Center for Simulator and Maritime Training located in Almere, the Netherlands.

Carnival Corporation recognized that a step-change was required in the way seafarers are trained to improve safety at sea. The interaction of human factors on board cruise vessels are some of the most complex in the maritime industry.

Alexander Ponomarev, Deputy Director, Sales, Northern Europe, recalls: 'Initial meetings started in 2013, a year before the tender was released. During one of the first meetings with the potential designer and builder company it became clear that this training center will be the largest one and the most innovative in the world. CSMART wanted to have a throughput of 6,500 deck and engineering officers per year, they wanted to have full redundancy.'

After a series of meetings and presentations the earthquake deal was signed in May, 2015.

Together, the two companies worked out a next-generation solution that required virtualized architecture, intensive graphic and video capabilities, and the comprehensive matrix switching design.

Ralf Lehnert, VP, Transas Academy, said during the contract signing ceremony, 'We at Transas are honored to be selected for such an outstanding project as CSMART. Our team provided an amazing job to put together smart and innovative solutions to answer the challenging demands of Carnival cruises and to convince them to award us what I called an "earthquake deal" in our industry, since this is the largest available project in maritime simulation as of today. Two world-class companies are coming together, and our partnership will set the new standard in the training for the cruise industry and beyond.'

The new facility was supposed to feature four full-mission bridge simulators, four full-mission engine room simulators, set to provide a wide range of simulated exercises, recreating an extensive range of maritime scenarios.

## PRODUCTS AND SERVICES

- 4 full mission bridges (FMB) 240° HFoV with bridge wings visualised by dome projections
- 6 part-task bridges (PTB) 120° HFoV
- 2 PTB 180° HFoV
- 6 Instructor Control Stations
- 8 Debriefing stations & rooms
- 1 Modelling Station (Model Wizard and Virtual Shipyard)
- 4 full mission Engine Room Simulators (ERS) each with 3 sets of Virtual Machinery Space stations (Local Post)
- 2 High Voltage Training Systems
- 2 ERS classrooms, 12 stations each
- 4 ERS Debriefing Stations & rooms
- 12 cruise ship models and 60 sailing areas around the world specific for Carnival vessels' operations.





In November, 2015, installation of the first preliminary projection dome took place. Ralf Lehnert recalls: 'The preliminary installed projection dome for one of the CSMART wings has six F50 and Domeprojection auto calibration tool (it takes four hours for initial configuration only!). It is very impressive if you stand in front of this dome with a diameter of nine meters. Later, each of the four full mission bridges wheelhouses had a width of 23 meters and two bridges got these spherical domes. These massive domes had to come in long before the building was completed, as otherwise they wouldn't fit into the normal doors and staircases. The visual impression standing in the center of the dome is fantastic and the calibration took much less time than planned. A great solution for realistic mooring operation training.'

The very first Factory Acceptance Test (FAT) of the CSMART project was accomplished in December, 2015 at the assembly facility at Interschalt, 15 min from the Transas Hamburg office, where Transas hired some empty industrial space to be able to prepare the gigantic simulator for the CSMART. This was just the first of a series of FATs which run to guarantee the operational functions of the system, until everything was packed and shipped to the final site in Almere, where it was unpacked, physically located and then finally commissioned in July 2016.

Tobias Lehnert, Transas Project Manager, CSMART Deployment, says: 'To get an impression of the giant scope, only for the cable labeling cartridges we have spent \$6,000, in excess of 2 km of glass fiber network cables were laid, we shipped two 12 ft container of only patch cables. 16 trucks of 40t capacity of Transas supplied equipment were sent to the site, which undermines again the remarkable size of the project.'

CSMART houses bridge and engine room simulators in various configurations from classroom stations up to part-task and full mission solutions, interlinked to provide training and assessment for all bridge and engine officers. The simulators provide a wide array of programming and simulated exercises that can recreate an extensive range of maritime scenarios. Within this project, Transas developed 12 cruise ship models and delivered 60 sailing areas – the ports around the world, including Los Angeles, New York, Miami, Copenhagen, Stockholm, Singapore and Glacier Bay, Alaska, specific for Carnival vessels' operations.

The nautical part of the simulation complex comprises four full mission bridges with 220 degrees horizontal field of view with two additional sets of bridge wings with dome projections each with a 180 degree field of view. They are designed for comprehensive training and assessment for the entire bridge crew of a cruise ship including complex mooring operations in various conditions. As in the real world each full mission bridge has its own safety center for training of abnormal and emergency situations. Six part-task bridges with 120 degrees horizontal field of view and two part-task bridges of 180 degrees horizontal field of view provide for specific operations training and assessment.

Each bridge is interfaced with onboard bridge system used on Carnival cruise ships. Seven instructor control stations are used for monitoring and control of the above mentioned bridges. There are four de-briefing rooms one for each full mission simulator. CSMART also got a modelling station with the Transas Model Wizard and Virtual Shipyard software, which allows the center to edit and create their own sailing areas and ship models and use full value of Transas simulation R&D capabilities. In addition, fast time simulation capability allows for fast forward run and repetition of port entry or disembarking which is ideal for port development and maneuvering studies.

The technological simulators part (TechSim) consist of four full mission engine room simulators, 12 sets of virtual machinery space stations, two high voltage training systems, two engine room simulator classrooms (12 stations each), and four debriefing stations and rooms.

Transas developed three new cruise ship engine models with different propulsion systems, including virtual replica of ship automation systems.

In July, 2016 the Grand Opening ceremony took place when the simulation complex was delivered to the customer. The senior management of the Carnival Corporation stated that the Transas Academy solution was by far the most innovative, and the design exceeded all technical requirements.

The CSMART project highly impressed the global shipping community and brought Transas the Lloyd's List Award in Maritime Digital Innovation. The distinguished judges viewed the Transas' creation of the 3D simulator as one of the most unique innovations of the year which has the potential to significantly improve safety across the industry.

## BENEFITS

- The unique solutions deployed turn CSMART into the world's leading training center
- Non-stop annual training with zero downtime and high throughput
- Cut of electricity cost by 30% thanks to energy-saving solution
- Freeing up useful training space due to 77% reduction in physical equipment quantity
- Improved safety at sea due to the advanced detailed competency development training
- A new learning efficiency dimension due to realism for engine room team situational training

The CSMART project is an important milestone in the Transas history. We are proud of what has been achieved in such a short time through our close work with the Carnival Corporation, the CSMART team and our project partners. By applying technological advancements never before utilized within the maritime industry, Transas have created a multi-simulator integrated training that delivers an immersive real world situational environment in which multiple crew members can operate and interact simultaneously, as if on a real vessel. This is the standard by which all training should be measured. I would like to thank the whole Transas and a fantastic CSMART project team with this success.

Frank Coles  
Transas, CEO

## Quick facts

**2** km of fiber glass network cables laid



**30%**

OF ELECTRICITY SAVINGS COMPARED TO A STANDARD DEPLOYMENT 



OF THE PHYSICAL EQUIPMENT REDUCED



COMPARED TO A STANDARD DEPLOYMENT



**9** meters



IS THE DIAMETER OF EVERY OF THE 4 FULL MISSION BRIDGE PROJECTION DOMES



**16**

FORTY-TON TRUCKS WITH TRANSAS EQUIPMENT WERE SENT TO THE SITE

