

Enhancing Maritime Training Through Virtual Scenario Development with Wärtsilä NTPRO and TechSim

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Abstract. Wärtsilä, a global leader in smart technologies and complete lifecycle solutions for the marine and energy markets, has been at the forefront of innovation in the maritime industry. This case study explores the collaborative implementation of Wärtsilä NTPRO and Wärtsilä TechSim to elevate the training experience for maritime professionals. NVNA Varna, Bulgaria uses Wärtsilä simulators. Wartsila joint operation ntpro and techsim is a simulator that combines navigation and engine room simulators for authentic and complete training of ship operations. With this simulator, trainees can learn how to operate and supervise the propulsion plant, electric power plant, auxiliary systems and machinery, alarm and safety systems, and navigation equipment from different places on board, such as the bridge, the engine control room, the main switchboard, and the engine rooms. The simulator also allows the simulation of various scenarios, such as normal operations, emergency situations, malfunctions, and failures, and how to handle them effectively and safely.

Keywords: bridge room, engine room, bridge, simulator, case study, simulator familiarisation, Joint simulator configuration.

1. Introduction

Nikola Vaptsarov Naval Academy, as a leading maritime training institution sought to modernize its training programs to meet the evolving needs of the industry. The academy aimed to integrate cutting-edge technology to enhance the realism and effectiveness of training scenarios for both navigation and engine room operations. Wärtsilä NTPRO Bridge simulator is a simulator that allows the integration of navigation and engine room simulators for realistic and comprehensive training of ship operations. With this simulator, trainees can learn how to control and monitor the propulsion plant, electric power plant, auxiliary systems and machinery, alarm and safety systems, and navigation equipment from different locations on board, such as the bridge, the engine control room, the main switchboard, and the engine rooms. The simulator also enables the simulation of various scenarios, such as normal operations, emergency situations, malfunctions, and failures, and how to deal with them effectively and safely. The simulator supports the training and certification of watch officers, chief officers, captains, pilots,

engineers, and technicians on all types of vessels, such as cruise ships, tankers, tugboats, and icebreakers.

The Techsim simulator by Wärtsilä is a simulator that mimics the functioning of different technological systems and equipment on vessels, such as the propulsion plant, electric power plant, auxiliary systems and machinery, alarm and safety systems, and liquid cargoes. The simulator is intended for education and evaluation of the skill of the engine room personnel and the liquid cargo handlers. The simulator offers realistic and thorough simulation of vessel operations, by enabling the making and performing of various scenarios, such as normal operations, emergency situations, faults, and breakdowns.[1][2][3]

2. Challenges

- **Realism in Training.** Traditional training often lacks the realism required for mariners to effectively respond to diverse and challenging scenarios. NTPRO addresses this challenge by providing advanced navigation simulations, incorporating factors such as weather conditions, vessel traffic, and emergency situations.
- **Integration of Navigation and Engine Room Simulations.** The academy aimed for a seamless integration of navigation and engine room simulations to create a more comprehensive and realistic training environment. Wärtsilä's solution seamlessly connects NTPRO with TechSim, allowing trainees to transition effortlessly between navigation challenges and engine room operations.
- **User-Friendly Interface.** Recognizing the diverse skill levels of trainees, the academy team emphasized the importance of an intuitive and user-friendly interface. NTPRO's interface was designed to be user-friendly, ensuring that both novice and experienced mariners could easily navigate through the simulations.

Wärtsilä provides a comprehensive solution that addresses the specific needs of the training academy.

3. Implementation: The integration of NTPRO and TechSim involved a collaborative effort between Nikola Vaptsarov Naval academy and Wärtsilä's simulation experts. Wärtsilä works closely with the academy to develop customized scenarios that seamlessly transitioned between navigation challenges on the bridge to engine room operations. The scenarios were designed to create an interconnected simulation environment, allowing trainees to experience the flow of tasks and communication between the navigation bridge and the engine room.

The Results are Enhanced Realism in Training, Improved Coordination Skills and Comprehensive Skill Development. Trainees reported a heightened sense of realism in their training experiences, as scenarios authentically replicated the challenges encountered in actual maritime operations. The integrated training approach encourages improved coordination skills among the students, as they navigated through scenarios requiring seamless communication between the navigation bridge and the engine room. Trainees developed a comprehensive skill set, covering both navigation and engine room operations, resulting in a more versatile and competent maritime workforce.

4. Simulator setup

Using the installer, NTPRO and TECHSIM software could be installed as shown on Figure 1 and Figure 2.

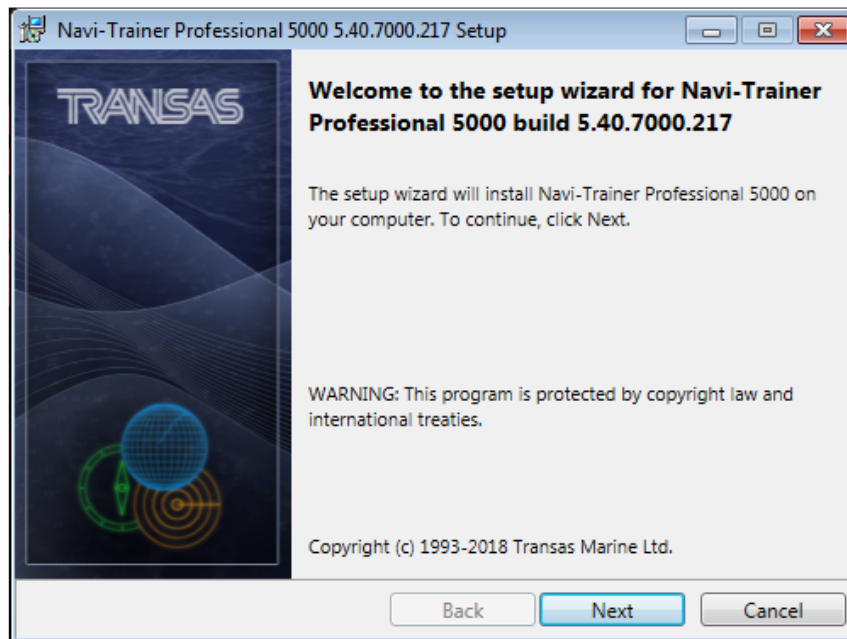


Figure 1. Simulator NTPRO Installation

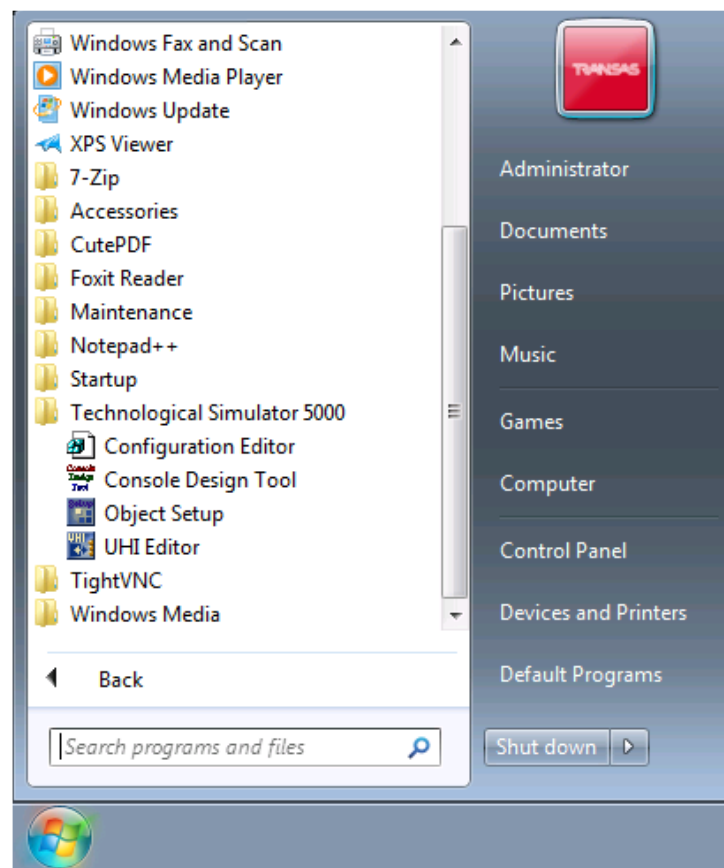


Figure 2. Simulator TECHSIM configuration after install

The possible tasks performed by NTPRO are divided into many subtasks, shown in Figure 3.

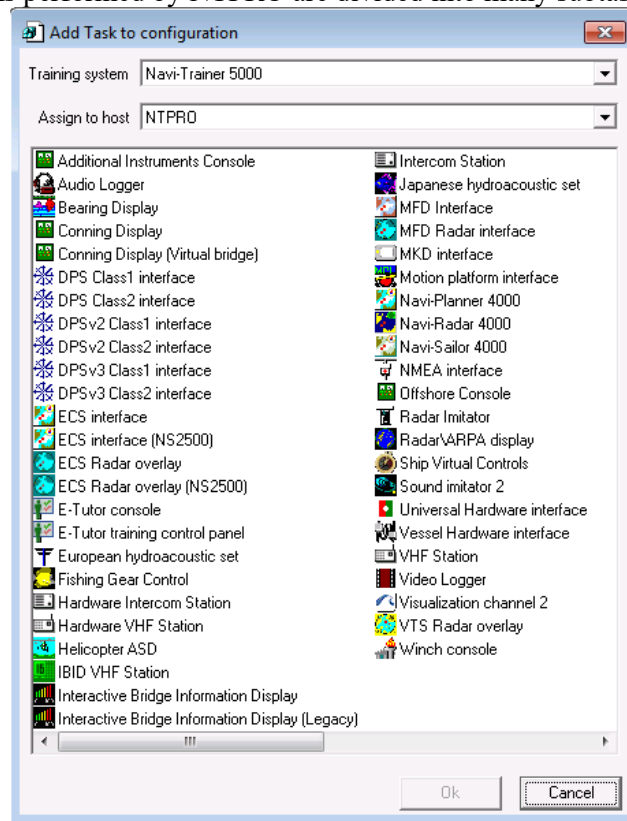


Figure 3. - NTPRO software capabilities

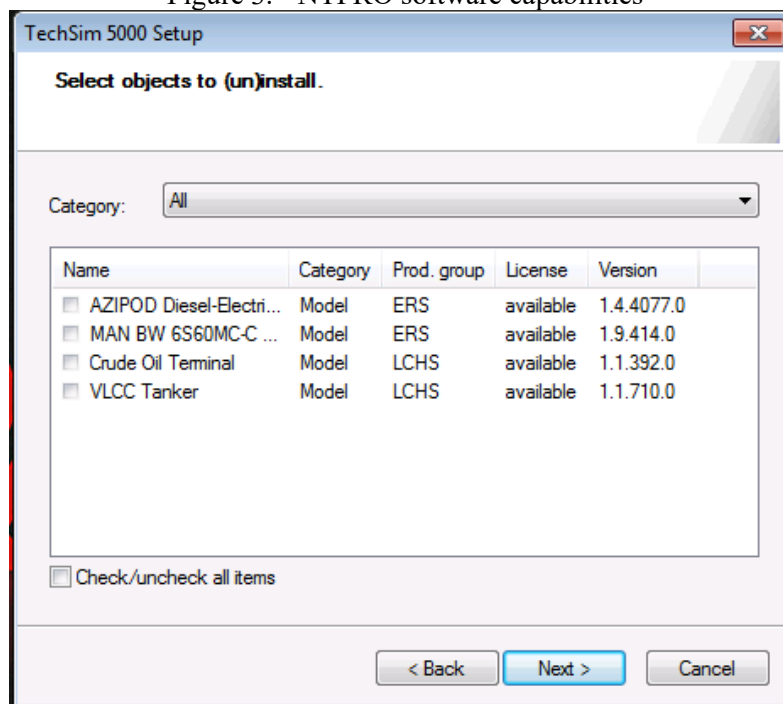


Figure 4. - Types of engines to install on Techsim.

On the Techsim side it is necessary to install the available ship models, as not all types support a connection between the navigation simulator and the engine room simulator. One of the supported ships is the Ro-ro ship.

The engine types shown in Figure 4 are installed on the Techsim side.[2][3]

In order to use connect the two simulators to work together there are a few steps that need to be completed:

1. Provide a computer to serve as a bridge between the two simulators.
2. Configure a port for the connection between the simulators.
3. Select the IP address for the connection to Techsim.
4. Turn on both simulators.
5. Creating an exercise from NTPRO and connecting to the Techsim simulator.
6. Run the exercise using an additional computer.

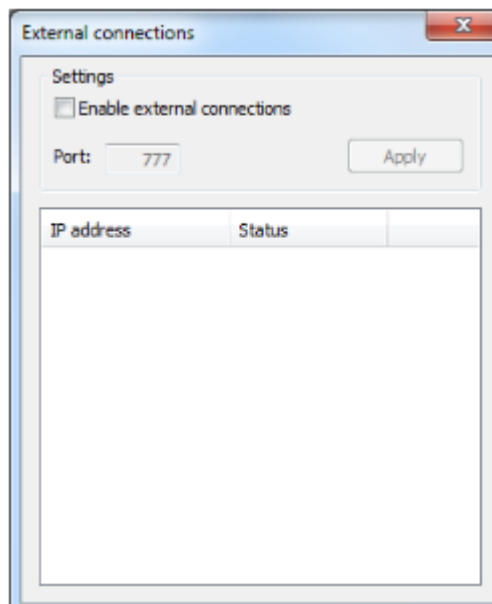


Figure 5 - Enabling connectivity between simulators

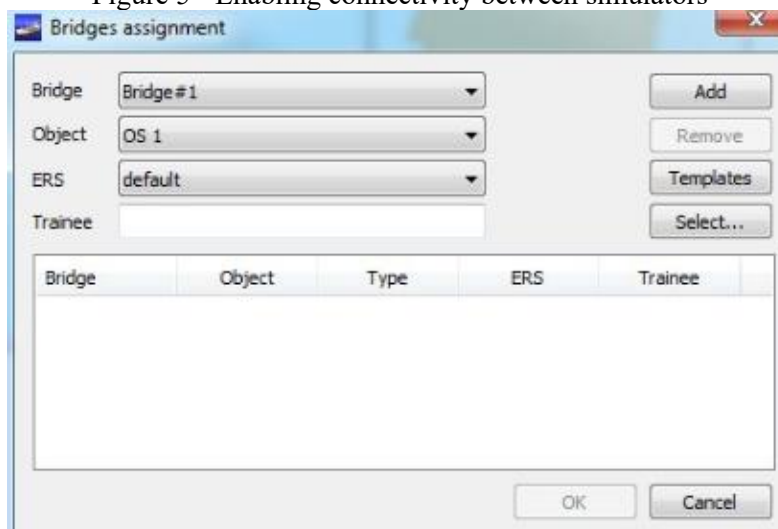


Figure 6 - Running the simulator connecting NTPRO (Bridge) and Techsim (ERS)

5. Features and Advantages of Wärtsilä simulators

NTPRO offers realistic navigation simulations and intuitive interface. NTPRO provided immersive navigation simulations, allowing trainees to experience real-world challenges in a controlled virtual environment. Scenarios include adverse weather conditions, complex traffic situations, and emergency procedures. The user-friendly interface facilitates easy interaction, enabling trainees to focus on developing their skills without being hindered by complex controls.

Wärtsilä TechSim offers also realistic engine room simulations, allowing trainees to practice tasks such as system monitoring, troubleshooting, and emergency response procedures. The integration of NTPRO and TechSim provides a holistic training experience, ensuring that trainees could seamlessly transition between navigation and engine room scenarios.

As per the implementation, the team collaborated closely with Wärtsilä experts during the trial implementation phase. Wärtsilä customized virtual scenarios based on specific vessel types, routes, and operational conditions relevant to the training needs of the institute. The collaboration involved the development of a structured training program that incorporated a variety of scenarios to cover different aspects of maritime operations.

As a result, the trainees reported a significant improvement in their confidence and competence in handling real-world scenarios after completing the virtual training program. Virtual scenarios reduced the need for physical equipment and on-site training, leading to substantial cost savings for the training institute. The immersive nature of the simulations contributed to better information retention among trainees, ensuring that the knowledge gained during training was effectively retained.

6. Conclusions

Wärtsilä's integrated solution, featuring NTPRO and TechSim, emerged as a transformative force in maritime training. By combining realistic navigation and engine room simulations, the training institute successfully modernized its programs, preparing maritime professionals for the challenges of the industry's dynamic landscape.

The ability to connect the two simulators enables teamwork between different specialists or learners. This makes the tasks more challenging and more realistic approaching a real-life setting. Wärtsilä simulator NTPRO TechSim is a joint operation that integrates navigational and technological simulators to offer realistic and effective maritime training. By using this simulator, trainees can learn how to operate different types of vessels, such as cruise ships, tankers, and tugboats, in various scenarios and environments. The simulator also allows trainees to practice how to use Wärtsilä's technologies, such as engines, propellers, and automation systems, to optimize the performance and safety of the vessels. Wärtsilä simulator NTPRO TechSim is important because it helps trainees to develop the skills and knowledge needed for the maritime industry.[4]

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