



The outside view of the main tug simulator is provided by seven forward facing large flatpanels, plus 3 angled panels emulating the top windows in a real tug.

Pursuing Reality

Simulation and the workboat operator

BY COR DE RIDDER

Stakeholders in the maritime industry who are responsible for training and instruction of seafarers are turning more and more to simulator supported training as part of their induction and training structure. The high level of competence that crews can achieve within a relative limited amount of time in a simulator is remarkable.

At our tug and offshore training facility near Amsterdam, 360-Control, a joint venture training center of DAMEN Shipyards and Iskes Towage and Salvage, we work closely with towage and workboat operators from around the globe. They have their focus on getting the best out of their crews, while getting the best value for money when it comes to training. Throughout the history of shipping, on-the-job training has been the only usable tool available, next to providing theoretical foundation by constitutional schools. To modern eyes, this approach seems a rather time consuming process, that no longer fits in today's digital world.

There are a number of developments taking place, one being a huge technological evolution in simulation technique. The simulator provides much more realistic scenarios. From a financial point of view, this lowers thresholds to access simulator supported training.

Another development is that corporate attention has, over a number of years, shifted from capital expenditure (CAPEX) to operational expenditure (OPEX). With the focus on OPEX, the majority of companies will only engage the bare minimum of personnel required to get the work done. Getting personnel free from the operation for long-term training is therefore often problematic.

As a result, it seems only logical to reduce training time without compromising on the output. This is where simulator supported training comes in. But the use of a simulator not only limits time spent on training; it also results in a higher end result compared to training on-the-job. Masters and mates, particularly in the towage industry, work their tugs primarily on sound and outside visuals and use their bridge instruments as a secondary means of information to operate the tug. Now that simulators can provide much more realistic visuals, the experience is close to real life, and this is a tremendous step upward, providing a much higher end result than on-the-job training.

The power of repetition

A simulator reduces the time needed to train crew because of the power of repetition. A trainee can be

Pursuing Reality *continued*



LEFT: One of Iskes' tugmasters in the simulator, towing a container vessel in Rotterdam Europort. The main simulator features the same tug bridge console as found onboard the DAMEN 2810 tug for a maximum feeling of realism. **RIGHT:** A desktop tug simulator complements the main simulator at 360-Control. It can be used in the same exercise as the main simulator, or in a separate one.



placed in exactly the same situation with a click of the mouse, over and over again. If we compare that with normal on-the-job training it would take at least five to seven times longer to get back in the same position, while circumstances may already have changed. A bit more or less wind or current, and the situation can be quite different. Changing circumstances hamper the learning process. But with a simulator, one can train in the exact same situation over and over again, thereby intensifying the training compared to normal on-the-job training. Another big advantage is that trainees can be exposed repeatedly to jobs or circumstances that may occur only occasionally. Think of emergency situations, particularly difficult jobs and very adverse weather. This is an area left blank in most on-the-job training.

The tug simulator at the training center was designed by VSTEP, a well-known player in the area of maritime simulation, to provide a compact yet natural and realistic look and feel, very close to the real tugs that DAMEN provides. Large vertical LCD flatpanels are used for the outside view, providing the same viewing angles as inside a real tug. VSTEP's NAUTIS maritime simulation software provided the outside view, including a series of ports and vessels and a ship dynamics model suitable for the precise maneuvering characteristics of modern azimuth stern drive (ASD) tugs in close proximity to a cargo vessel. Special effects like the repulsion force of the cargo vessel's bow wave and the suction effect caused by the propeller wash are part of NAUTIS ship dynamics system, needed for realistic tug training.

The instructor has a PC available with multiple displays. One of these shows a bird's eye view of the scenario in 3D, providing him with a good overview of the situation. A second display shows the scenario on a chart, showing the shallows, and a trail of ship icons of previous positions. A third display shows the view of the simulator and two CCTV observation cameras.

The instructor can show all forces acting on the tug and the towed cargo vessel as vectors in both the 3D bird's eye view

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display and the chart. He can make a complete video recording of this, which is useful for debriefing sessions following the simulator exercise.

Corrective actions

Faults and failures can be introduced in the tug's engines during a maneuver, forcing the trainee to reconsider his actions. The beauty of a simulator is that the trainee can experiment with different corrective actions and experience the consequences without putting himself, his crew, or his vessel in danger. The lessons learned from such virtual experiences are much more intense than plain instructions from a teacher or supervisor.

On the output side, we see that trainees who are already expert captains, but who are not yet proficient on complicated propulsion systems like ASD or azimuth tractor drive, can be trained to a (beginner) level of competence on these propulsion systems within one week of simulator-supported training.

What does it take to enable good training results? It is not enough just to provide a simulator and expose trainees to a virtual reality, and more or less hope for the best. One also needs a well-balanced set of carefully administered theoretical knowledge at the level the trainee has reached. For that, we make use of the stacking principle, where theory or assignments given come back as routine action in future modules.

Additionally, it is of great benefit to expose the trainee to an environment that he knows. So re-creating a bridge layout up to the level of his experience saves time in familiarization. Once the trainee is back onboard, he will experience a form of recognition in layout, vessel behaviour, and expectation. All of this contributes greatly to the embedding of the training. It therefore has added value, not only to the trainee but also to the company that employs him. **MT**

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