

Tractor Tug Training

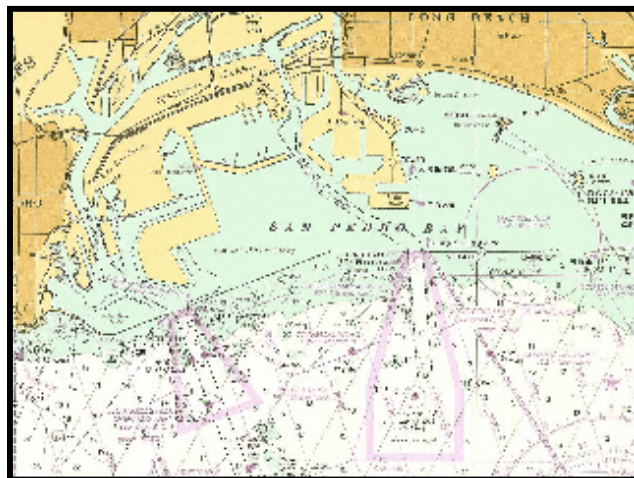
Captain Greg Brooks, Towing Solutions

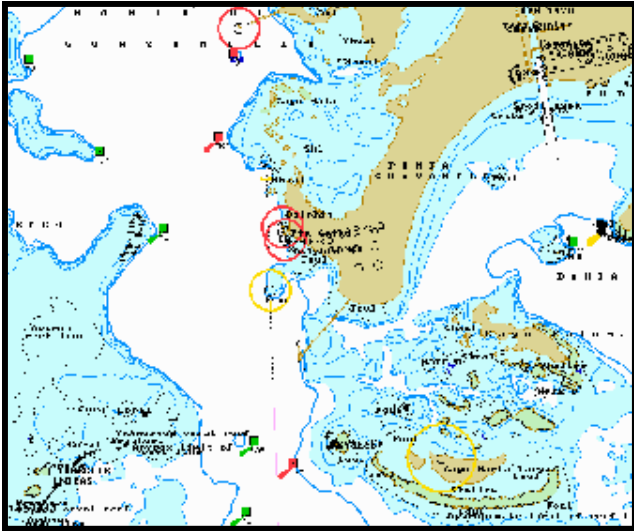
Captain William Mackay, MarineSafety International



MarineSafety International, located in San Diego, Norfolk, and Newport has the goal of being the premier simulator facilities for training pilots in the skills of using tractor tugs for normal harbor operations and for escorting. Further, our facilities can also simulate Voith Schneider and Z-Drive tractor tugs to allow the tug operators to learn the maneuvers that they will have to perform to get the most out of their new equipment. How did our facility, that is known primarily for US Navy training, become the leader of tractor tug training?

The genesis of this training effort began when we worked on two port development projects that pushed us into tractor tug simulations. The first project was the LA 2020 port expansion project for the port of Los Angeles, where we worked with Foss Maritime producing simulated tractor tugs to test the plans for building new pier facilities; a project that is nearly complete today. Our initial tractor tug simulation efforts were pretty crude and not terribly realistic. Essentially they were force vectors applied on the simulated ship by a systems operator. However, MSI staff learned a lot from the Foss folks, and while the simulation effort served its intended purpose, we recognized that we had a number of challenges to work on. Progress at this point was slow and intermittent.





The second project that we were involved with was the Ecoelectrica LNG Terminal at Guayanilla, on the south coast of Puerto Rico. Ecoelectrica had built a new regasification facility and was about to take deliveries of LNG from Trinidad. Delivery ships of up to 125,000m³ such as *MATTHEW* and *KHANNUR*, were scheduled to call at the Guayanilla Terminal. These were significantly larger than other ships calling at that port and the existing tugs were clearly inadequate for handling them. South Puerto Rico Towing arranged for Z-drive tractor tugs for this mission; however, the local pilots and South Puerto Rico Towing had no experience with tractors. So, we set about putting a training program together.

By this time we had made some progress with our tractor tug simulations, but, we still had a long way to go. We set about fabricating a control console, with joy stick controls, where the tug operator could drive the light boat around a harbor, walk the boat sideways, push on a pier, shift positions, practice driving backwards and tethering to a ship. Initially this was to be done in a single independent simulator. However our ultimate goal was to produce an interactive simulation, where the pilot was maneuvering the LNG Carrier in one simulator which was linked to other simulators, both visually and electronically, that were operated by the actual tractor tug personnel. The objective was to remove the MSI systems operator from the loop so the pilot was working with the same people he would be working with back in his homeport.

At this time we also teamed up with two well known tractor / escorting experts, Captain Vic Schisler of the Jacobsen Pilot Service, Long Beach, CA, and Captain Greg Brooks of Towing Solutions to acquire the expertise to help refine our ASD models and to provide an improved Tractor Tug course of instruction.

This initiative paid off during the reactivation of the LNG terminals at Elba Island on the Savannah River and the Dominion facility at Cove Point on Chesapeake Bay. In each case the tug operators and the pilots needed training in how to use this new tool. The new tugs that were purpose built for these two facilities were ASD tugs and the operators were quick to realize that conventional tug techniques weren't directly transferable to the new ASD tugs. These boats were a new machine that was going to require a whole new set of skills if they were to get the maximum performance out of the boats. For example, a tractor tug, be it a Voith Schneider or a Z-drive, can safely work with its towline through the stem of the ship and gain maximum leverage to the ship's pivot point.





However, conventional tug operators have been told never to go to this operating position because it is unsafe. So the training of the tractor operators has to address many of the limitations of conventional boats, while the operator learns to quickly and competently conduct many new maneuvers. This is a great simulator problem.

It is interesting to note that approximately 10% of the conventional boat operators who attempt the transition will not qualify to operate the tractor as they never make the adjustment to thinking in terms of force vectors being applied to their boat.



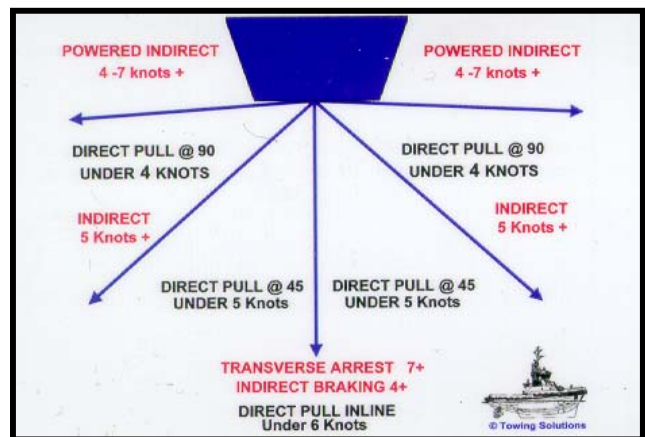
As part of this effort, MSI built a new tractor tug console with Ulstein ASD joystick controls identical to those found on most of the Z-drive tractor tugs operating in the United States. This new console allowed the tug operators to feel more at home with "his boat" as the console was equipped with winch controls, a tension meter, and "felt right" as he practiced the new maneuvers. By this time, the simulation system would allow us to train the operators to perform the round turn maneuver used to approach the ship's bow. Indirect and powered indirect maneuvers could also be conducted, and we could "jackknife" the boat. Essentially we could perform all of the unique tractor escort maneuvers.



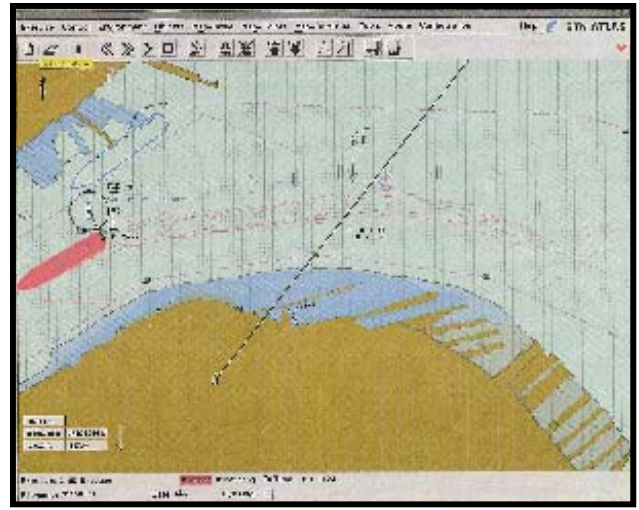
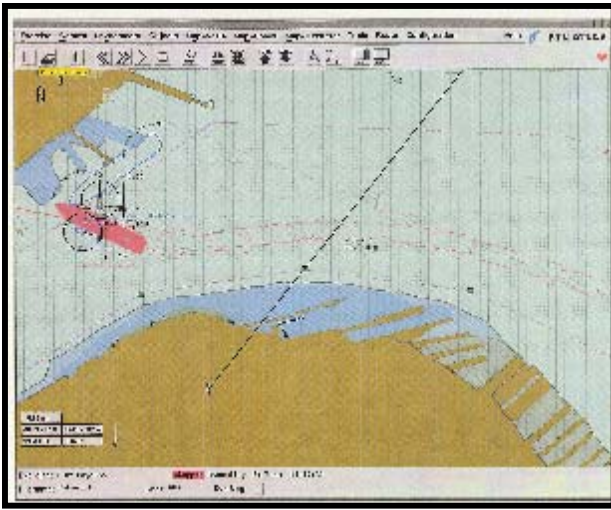
The next phase of this tractor training evolution was to develop integrated exercises using multiple simulators in the same problem. One simulator, with the pilot and master, would be the LNG Carrier. The other simulators would be configured as tractors with the tractor operator actually executing the pilot's orders. So, if you were on the LNG Carrier, you could go out on the bridge wing - look down and you will see the appropriate tug being driven by the tug operator for that particular port. And, if you were that tug operator, when you looked out the window, you would be seeing the appropriate LNG Carrier, with your pilot embarked.

This step was a major advancement because we now had all the members of the actual pilotage team working on the same problem together, where previously the system's operator was operating the tugs and executing the pilot's commands.

This also provided the foundation for introducing and enforcing a system of standard commands for tractor tug operations. Standard commands make it easier for the tug operator to meet the pilot's expectations, and it provided a standardized language for the ship's master rather than the current confusing and ambiguous commands that have developed over the years with conventional tugs and that are peculiar to each individual port.



With the integrated simulators we could now also work on tethered escorting operations. As the indirect and powered indirect steering forces are very large and unique to tractor operations, this affords the pilot the opportunity to explore how best to use these new maneuvers in their own homeport. Once we were able to perfect the indirect and powered indirect towing forces, we were able to work on addressing serious casualties such as engine and steering failures.



These are wonderful simulation problems because no port can afford to live with the risk of practicing such failures in real life, and during exercises the pilots get to see how they can now address these failures if they are prepared to use the tractor tug properly. In today's world where a marine casualty is not acceptable, we give our pilot students plenty of failures early in each class.



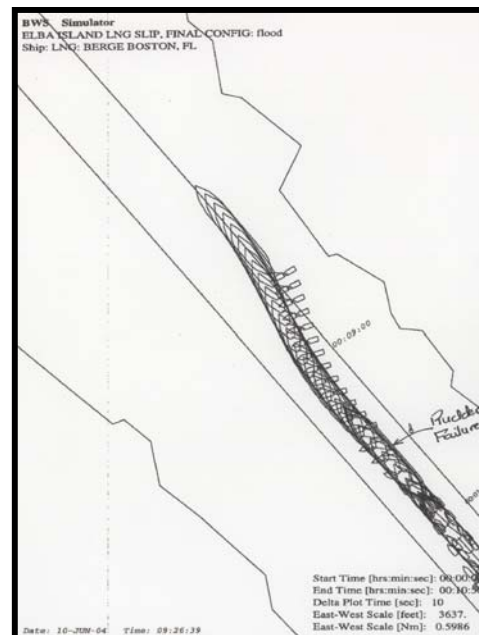
**Tandem Tractors (T2)
Powered Indirect**

It is a great opportunity to get them to see how much more capable the tractor tug is compared to a conventional tug, and we can drive home many teaching points.

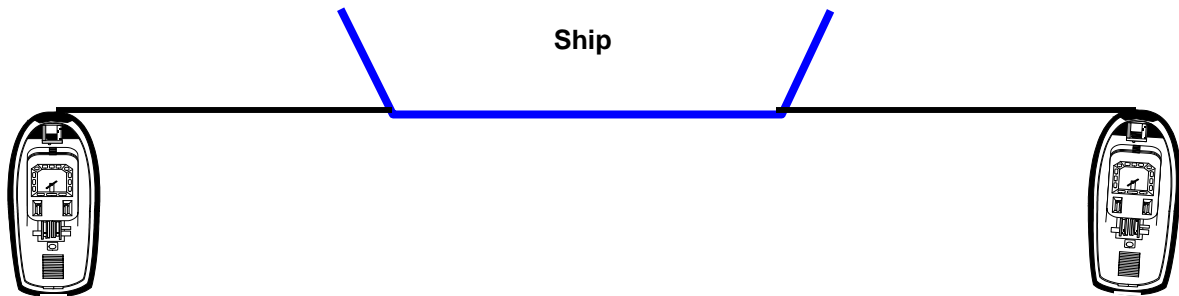
We currently have two ASD Tractor Tug models rated at 50 and 70 tons of bollard pull that can do most of the things that you would expect a tractor of that size and power. We still have some challenges to work out, but we have the ability to simulate the vast majority of the fundamental tractor tug functions.

**Savannah River "T2"
60 Ton Tractors (30s delay)**

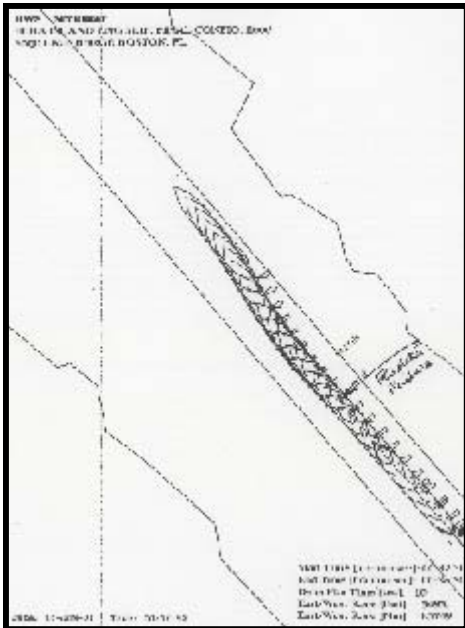
We have the ability to integrate all the members of the pilotage team and work on the "what ifs" that used to be too frightening to think about.



Tandem Tractors "T2" Deployed



"T2 Deployed" 80 Ton Tractors (30s delay)



We also have the ability to demonstrate and work on the more innovative maneuvers such as tandem tractors (or T²) and deployed tandem tractors.

We are deeply indebted to the folks at Moran, McAllister, Crescent, Providence Steamboat, and Boston Towing for their support and patience while we worked out the glitches. This has been a team effort that has occasionally taxed the patience of all who were involved. We continue to refine our models and our training courses, the result to date have been well worth the effort.