



Training, Competency Checking and Professional Development of Masters for Omni-directional* Tug Boats

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SYNOPSIS

This paper focuses on two aspects of the training and professional development of tugmasters: the training of tugmasters comparing the 'old' on-board operational training versus the 'new' simulator tugmaster training; and the need and benefits of annual competency checking of tugmasters in both operational and procedural knowledge.

INTRODUCTION

As tugboats become more sophisticated in design, resulting in powerful and highly manoeuvrable tugs that are servicing larger ships with less assets, a superior standard of tugmaster competency and operational knowledge is required, especially when considering current manning levels. Time and time again on my travels as a consultant, I see how tugmasters' skill-sets are insufficient to safely, effectively and competently operate today's new generation of tugboats. By the very nature of the work, tugmasters tend to remain in a port and have little, if any, outside influence or stimulus, in effect becoming inwardly focused.

Only over the last decade or two have omni-directional tugboats become the norm in ports; to a large extent the original tugmasters were left to their own devices, with no formal or appropriate training to figure out how to operate omni-directional tugs effectively. This has resulted in mixed abilities, usually based on an adaptation of conventional twin-screw knowledge. This original generation of omni-directional tugmasters, with the best of intentions but in ignorance, has then passed this inferior skill-set on to the next generation of omni-directional tugmasters.

Previously this was to some extent manageable, as the earlier classes of omni-directional tugs were more forgiving owing to their:

- heavy deadweight;
- higher length/width ratio, giving good course stability;
- relatively low horsepower;

resulting in, by today's standards, a slow-responding tug.

The new generation of highly manoeuvrable, lightly built and powerful tugs, commonly around 30m LOA

or less and upwards of 6,000hp, are far less forgiving of inferior or inadequate skills and driving techniques. These tugs are best described as the 'Ferraris of the sea' and, as with any high-performance vehicle, require specialised skills, both to operate to their full potential and also to use safely at the same time. Literally every time the tugmaster moves the control levels, even minutely, the tug responds instantly, particularly in the case of individual controls.

Of the many variables the controls can create, there is only one correct combination and this changes all the time that the tug is operational. A tugmaster does not have the luxury of time to figure out how to get it right. Added to this, tugs have now been de-manned to a point where tugmasters have a lot more on which to focus, and multi-function items with which to contend, than previously.

Given the varying and constantly changing forces, influences and requirements while operating in close proximity to a ship, the tugmaster is continually assessing and making alterations to control settings. To do this correctly and effectively in a timely manner, say when it is 2am and you are tired, there is a howling gale and the pilot is demanding responses, requires competencies of an extremely high standard. Remember that when a tugmaster gets it wrong, people can get hurt and assets damaged.

WHERE ARE WE AT?

As with all industries, times and standards are changing. In ours, commercial pressures are demanding safer operations, higher skill-sets, lower operating costs but, at the same time, shorter training periods.

The first step to resolving any problem is recognising there is an issue to address; reassuringly things are improving as managers and authorities are now

*In this paper 'omni-directional tugs' means tugs with omni-directional propulsion units, being tugs with Azimuth thrusters, ie Azimuth Stern Drive (ASD) or Azimuth Tractor Drive (ATD) or Voith propulsion units

realising the need for proper professional competency-based training for tugmasters, while accountants are realising training is an investment that pays dividends. This commercial need is further supported by Resolution 8 of STCW95 – promotion of technical knowledge, skills and professionalism of seafarers, which basically states: “A seafarer must not only be qualified to fulfil an operational role on board a vessel, but also be competent to perform the assigned role.”

Following investigations into a number of tug incidents, in 2005 the UK Marine Accident Investigation Branch (MAIB) strongly urged:

1. All tug operators review their training schemes to ensure that tugmasters receive comprehensive familiarisation training before taking control of a tug that is equipped with significantly different propulsion systems. Such training should incorporate instruction and validation on all manoeuvres that the master is likely to undertake in their port or operations;
2. All harbour authorities, pilots and tug operators regularly review the capabilities and limitations of their harbour tugs and their crews; (see Capt Henk Hensen, *Bow Tug Operations with Azimuth Stern Drive Tugs*, NI, UK, 2006).

Furthermore, to be compliant to a formally accredited and audited QA system such as ISO 9001: 2008: From *Clause 6 Resource management – 6.2 Human resources*:

6.2.1 General

Personnel performing work affecting conformity to product requirements shall be competent on the basis of appropriate education, training, skills and experience.

6.2.2 Competence, training and awareness The organisation shall:

- a) determine the necessary competence for personnel performing work affecting conformity to product requirements;
- b) where applicable, provide training or take other actions to achieve the necessary competence;
- c) evaluate the effectiveness of the actions taken;
- d) ensure that its personnel are aware of the relevance and importance of their activities and how they contribute to the achievement of the quality objectives;
- e) maintain appropriate records of education, training, skills and experience.

TRAINING PROGRAMMES

Professional towage companies have come to the conclusion that the cost of training is an investment. There is no doubt that training is vastly more cost-effective than repairing people, vessels, third party assets and the company's reputation. Furthermore, in the event

of a serious incident, companies are now being called upon in court to prove their operating standards are appropriate and their tugmasters are competent.

As an example of a professional training programme, the Seaways Tugmaster Training Program has six differing modules that clients can elect to take. All have unique skill-sets to suit differing towage operations, ie training for a harbour towage operation involves four streams of training taking place simultaneously:

- ASD Tug Handling;
- Undertaking Harbour Towage Operations;
- Learning the company's Safety Management System (SMS) and procedures;
- Learning the management of the tug, including PMS, booking system, ordering system, crew management etc.

The process is about setting high competency standards and then having tugmasters operate on a day-to-day basis well within their skill-sets. This ensures that when operations start to become more challenging, the tugmasters remain within their skill-sets, resulting in appropriate and safer outcomes.

Humans are genetically programmed for 'flight' or 'fight' when overly challenged. In the tugmaster's case this often results in the tugmaster, when scared, failing to respond at the controls (in some cases I've actually seen them taking their hands off the controls) or giving the controls fist fulls, and thus dramatically overdriving the tug. Both scenarios are equally dangerous.

Proper training helps to manage this. Importantly, having a highly developed and diverse skill-set helps prevent tugmasters going into sensory overload. Furthermore, if this should happen their reactive subconscious instinctive actions are the ones that have been preset via the training.

TUGMASTER TRAINING

A good training system should:

- Lay out clearly in writing the whole structure of dos, don'ts, whys and wherefores;
- Design the structure to protect the rights of all parties concerned, ie:
 - the trainee;
 - the training master;
 - the competency check master;
 - the clients (pilot and ship-owner);
 - owners of third party assets (port authorities etc);
 - the towage company.
- Ensure competency-based training starts with the basic steps and works its way through listed and identified steps one by one, thus climbing a ladder of competency and confidence to an agreed predetermined standard;

- Use skilled, respected and qualified trainers who can 'walk the talk', who have empathy with the trainees and are adept at getting the message across to colleagues;
- Include repetitive training that fixes the basic moves in the subconscious minds of the trainees;
- Ensure trainees are trained to competently drive the tug before undertaking towage operations;
- Give equal emphasis to operational and procedural knowledge;
- Develop a tugmaster's professionalism in all facets of the job;
- Be designed to cope equally with timid, apprehensive trainees as well as overconfident egomaniacs;
- Be based on an effective 'style' of tug driving using a combination of authority, control and finesse.

Some of the inferior training programmes I have seen on my travels have included:

- Attempting to train a tugmaster to undertake harbour towage without training him first on how to effectively and instinctively handle an omnidirectional tug to its fully capacity;
- Training programmes that are time- or job-number governed;
- Training given in-house by tugmasters who are passing on their own bad habits, albeit in good faith and intent, and who have no experience or qualifications as trainers;
- Insufficient time given on controls to ensure base competency is firmly entrenched in the subconscious mind of the trainee;
- Training masters pushing the trainees way beyond their comfort zones and, in so doing, taking away their confidence and raising stress levels to an unacceptable level;
- Lack of formal structure and record keeping;
- *Ad hoc*, non-standardised training that has differing levels of skill, knowledge and competency outcomes between graduating trainees;
- Too much subjectivity in assessing whether a trainee is competent or not;
- Overestimating the benefits of simulator training, particularly in the case of trainers with questionable towage skills, experience, respect and qualifications;
- Not understanding or recognising the limitations of a simulator and the handling behaviour of tug models and that, as good as they may be, they do differ from real on-board operations.

COMPETENCY CHECKING

At the completion of training, and every 12 months thereafter, the Seaways Training Programme graduate has a formal competency assessment. There are two parts to this assessment, operational competency and procedural competency.

A good competency checking system should include:

Operational competency

- Driving the tug through a non-subjective competency circuit that comprises all the basic manoeuvres that an omnidirectional tug can perform and in a style of driving that is based on a combination of:
 - Authority: to ensure timely responses to the pilot's orders and minimization of effects around a ship;
 - Control: to ensure safe and effective operations at all times;
 - Finesse: to ensure no damage or injury when touching down alongside or to push up;
- Driving on the secondary steering system;
- Driving on one engine;
- Emergency response exercises;
- Onboard equipment and systems operation;
- If 'Undertaking Harbour Towage' is a component, observing a towage operation;
- If 'Undertaking Escort Towage' is a component, observing an escort towage operation;
- Driving standards and skills set at an appropriate level that all tugmasters can realistically achieve;
- Tug driving competency checks that are carried out in real time on board a tug, not in a simulator;
- Issues which are identified, dealt with and remedied immediately by the competency check master.

Procedural competency

- Recording the company's SMS, which has been read and understood by the tugmaster, within the previous six months;
- Nine questions from the SMS to ensure there is a thorough working knowledge;
- Three questions from the Security Manual to ensure there is a thorough working knowledge;
- The questions should be relative to issues that have occurred in the company during the previous 12 months, or likely to occur in the coming 12 months;
- The nine questions should be chosen to bring focus, education and better understanding and, as such, time taken by the competency check master to fully explain incomplete or incorrect answers;
- Word-perfect answers are not a requirement, but a meaningful working knowledge is;
- There is no failure involved; the process is about development of the tugmaster's knowledge and understanding.

A sub-standard competency check system

- Overly subjective in assessment;
- Peer group self-assessment-based;
- Has no outside influence to establish industry best standards;

- Has no outside influence to stimulate broadening of experience and knowledge base;
- Has driving standards and skills set at a level that only the better tug-masters can achieve;
- Uses simulators for the operational tug driving assessment;
- Requires word-perfect answers, rather than a sensible, pragmatic working knowledge;
- Is used as a policing tool;
- Is driven or influenced by internal politics;
- Has competency checks that are not totally without 'fear or favour';
- Has too long between competency checks, allowing bad habits to become entrenched.

BENEFIT OF ANNUAL COMPETENCY CHECKING

Annual competency checks ensure standards and skills are maintained, especially those that are rarely used, ie driving on one engine. Furthermore, in the event of an incident, both the company and the tugmaster can clearly demonstrate they have been trained and assessed to operate competently and professionally to recognised industry best practice standards and these competencies have been regularly maintained via a structured, pragmatic and independent assessment.

In my experience, it is rare that a tugmaster can undertake an annual competency check without requiring some additional training to reset skill-sets or correct bad habits. Any issues can be dealt with immediately via training as part of the competency check. As such, there is never failure attached to competency checks, because training is given to correct the issues and then the competency check redone. The whole process is about development, education and growth, not about policing or penalising, and takes some eight to 10 hours per tugmaster. A number of marine authorities, organisations, and client companies are now starting to require towage companies to have proof of professional operating standards and competency of operational personnel. The very nature of a professionally developed and administrated tugmaster training and competency-checking programme ensures this can be readily established.

Critical to the success of any training programme is that it educates and develops individuals for the common good. Specifically, competency checking must never be used in a negative or penalising manner or it will become counterproductive owing to a loss of support, credibility and effectiveness. If a towing company decides to carry out annual competency checking internally, it is imperative it invests in training and qualifying its competency check master to ensure he is a skilled, respected and qualified trainer. The alternative is to engage an outside specialist consultant.

PROFESSIONAL DEVELOPMENT

In many cases, tugmasters have a background either in the small boat industry, as a seaman or deckhand, or in the fishing industry. Personnel coming from this background have many enduring traits:

- Can-do attitude;
- Small boat handling experience;
- Professional work ethic;
- Small boat husbandry skills.

But some do not necessarily have a high degree of:

- Safety culture;
- Towage industry knowledge;
- Personal presentation;
- Administrative and computer skills;
- Crew management skills, particularly in a unionised environment.

An effective and well thought-out training programme should endeavour to address these points so as to ensure a fully rounded, competent and professional tugmaster who has the mindset and skills to be the company's on-board line manager of the facility. A component of SeaWays Tugmaster Training Programme is specially designed to address this.

PSYCHOMETRIC TESTING

The basis of the SeaWays Tugmaster Training Programme came from my experience in the 1990s while observing my son learning to fly F18 Hornet fighter jets. In my view, the process for tugmaster selection can be similarly structured.

Candidates for fighter pilot training go through a rigorous selection process, including psychometric testing of the natural abilities required to fly a jet fighter in stressful circumstances. We have all met tugmasters whom we assess as 'naturals' or 'wire to drive tugs'. There are prerequisites for this 'natural' ability that I believe can be identified in advance of a tugmaster being selected for training.

These 'natural' abilities include:

- eye/hand coordination;
- Multi-tasking;
- Situation awareness;
- Spatial awareness;
- Intelligence;
- Quick reflexes;
- Calm disposition;
- Quick witted;
- Naturally confident;
- Self-belief;
- Trustworthy;

- Empathic;
- Good communication.

Currently, by the time an accurate assessment has been made, if a trainee is 'wired' to drive tugs, the trainee is well into the training process and the company has not only made a substantial investment in the training., but is also locked into a time frame – the only reason a company trains a candidate is to fulfil a requirement, so to stop the training will mean a substantial delay in this requirement being actioned.

To some degree, selecting tugmasters from a small vessel background, rather from a deep-sea master or seaman/deckhand background, is a safer option as there will have been a certain amount of natural selection process taking place with the small vessel masters.

For a small vessel master, an omni-directional tugmaster's job is the pinnacle of his career. The reality is that they would not be considered for the position if they hadn't previously proven themselves as superior vessel handlers, 'naturals'. This is not to say trainees from small vessel backgrounds should be the only ones considered, as there are definite benefits to be gained by having a diverse combination of backgrounds and certificates in a towage company and then encouraging cross-pollination of skills, knowledge, abilities and attitudes.

If there is confidence that a master of average 'natural' talent can be trained to a high standard of tug driving competency via a proper training programme, then a company can make other assessments in the selection process, such as what other skills, experience, contacts, reputation the prospective master can bring to the company. As an example, SeaWays for many years has proven it can train tugmasters who have had no towage experience whatsoever to operate solo on highly manoeuvrable and powerful ASD/ATD tugs in major general cargo ports in around three weeks.

SIMULATORS

For the past couple of years I have been researching the use of simulators in the training of tugmasters. While I firmly believe the better systems have a place in the overall training and development of tugmasters, I am not aware of any that can achieve a result whereby a simulator-trained tugmaster can board an omni-directional tug and competently operate it or undertake harbour towage operations without significant additional on-board training. We should not lose sight of the fact that a simulator only replaces a tug, it does not train tug masters.

Another issue with some simulators is that of the qualifications, experience and skills of instructors; too often tugmasters are instructed on a simulator by people who have never or rarely handled a tug themselves. Therefore, qualified instructors are needed with extensive experience and credibility in handling the specific type of tugs they are training for.

Simulators can be a useful and meaningful support to on-board training, but it is important that the techniques, driving style, terminology and methodology are the same on the simulator as on the tug, ensuring both training programmes complement and support each other without adding confusion or frustration.

SeaWays has entered into a joint venture with Transas Simulators to develop exactly this type of seamless Tugmaster Simulator Training Programme, which includes a 'Virtual Training Harbour' specifically modelled to facilitate SeaWays' onboard training exercises and competency circuit.

SUMMARY

There is a view that omni-directional tugs have been developed beyond the skill-set of most tugmasters. What does this mean in a practical sense?

- Companies are investing significant additional amounts of money to have omni-directional tugs that can operate at very high standards;
- Clients are paying significant additional hire and charter fees to have the benefits of this type of tug;
- Due to the lack of skill, directly related to inferior or inadequate training, at best most tugs are operated to approximately 60 to 80 per cent of their designed capacity to perform and, consequently, the capital investment is not being fully utilised;
- Accidents and the associated costs are on the increase as tugs become far more responsive and powerful and, as a result, are being much less forgiving of poor skills and techniques;
- Shorter towlines are used as it is easier and faster to respond to a pilot's orders, but this may lead to less effective BP being applied. A tug can readily lose up to 50 per cent of its BP due to the tug's propeller wash hitting the ship's hull. Consequently, if these effects are unknown tugs may be needlessly made more powerful, involving more capital and operational costs (see Capt Henk Hensen, *Tug Use in Port*, 2nd edn NI, UK);
- During towage operations, tugs are resting on a ship's sides rather than standing off, resulting in a detrimental effect on the ship, which pilots dislike immensely, along with additional fender wear and damage to the ship's paint work.

Proper professional training and ongoing development via annual competency checking must be viewed not only as an investment due to lower operating costs, but also an absolute necessity to ensure safe and effective operations. It should also be possible to lower a company's insurance premiums if a professionally training programme is in place that is statistically proven to deliver safer operations.

In this day and age, the cost of not ensuring this can be huge in terms of:

- Overall safety;
- Wellbeing of marine personnel;
- Risk to the environment;
- Risk to third-party assets such as wharf facilities and channel access etc;
- Capital and operational costs;
- Damage to the company's reputation;
- The company itself in the case of a serious incident that results in litigation.

Finally, while the focus of this article has been on tugmaster training to ensure safe and effective operations, it is important that pilots are also trained in the capabilities, limitations and effective use of omni-directional tugs. SeaWays has developed a workshop on the effective use of omni-directional tugboats for pilots.

In closing, I would like to pose a question to the industry: Currently there is a requirement for formal endorsements on a master's certificate to operate:

- An oil or gas tanker;
- A passenger ship;
- A square rigger sailing ship;
- A high-speed ferry;
- A dynamically positioned vessel.

It is also a given that it is impossible for a master to undertake towage operations on a new generation omni-directional tug without significant specialised training. As a professional industry that prides itself on high standards, have we matured sufficiently to take the next step and promote **formal endorsements** on a master's certificate to operate an omni-directional tugboat?