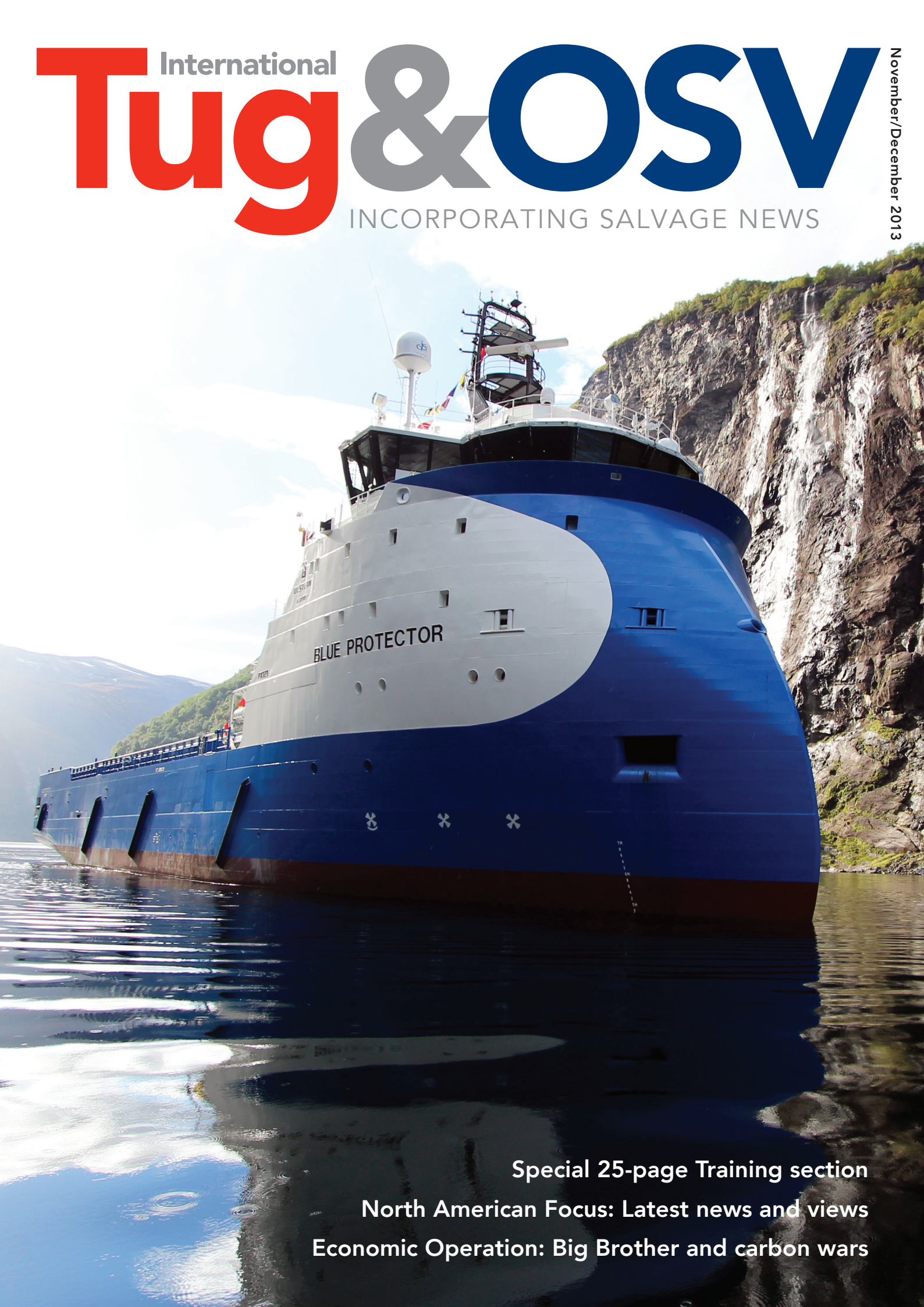
International Tug&OSV
INCORPORATING SALVAGE NEWS
November/December 2013



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Where is the practical know how?

Capt Henk Hensen, Capt Roger Ward and Capt Grant Livingstone all share a passionate belief in the need for experienced professionals to have a practical input to tug operations, training and accident investigation. They combine their joint wealth of experience in this in-depth explanation of their reasoning.

1. Introduction

This article focuses on the essential need for the input of practical, experienced professionals for training and accident investigation in the field of harbour tug operations, particularly ship- and barge-handling by tugs. It appears to be a simple subject, but as the reader will see, it is crucial for ensuring the safety of operations.

Too often, tugs are seen as just tugs; a realisation of the ideas of a naval architect or a product of the drawing board with input from the buyer. A towing company may purchase a second-hand tug for a reasonable price because it seems to meet a specific need. Nothing wrong with the process so far.

When a tug comes into use, it should be utilised to its full potential. The problem starts here, as modern tugs are not so simple. They are particularly complicated work horses. The system becomes even more complicated when the tugs are assisting a vessel in one way or another. Older, conventional tugs have specific capabilities, and of even greater importance are their limitations.

It should be understood that 'to its full potential' refers to specific ship-handling requirements. The tug is built for handling ships safely and efficiently in the circumstances and conditions of a specific port and its approaches. What works well in one port may not necessarily work well in another.

A high level of practical experience is therefore essential. The most suitable tug will only perform at its best with an experienced tug master and crew. For these reasons, the availability of trainers with a high level of practical experience on the same type of tug the tug master and his crew will be using is crucial, for it will enable them to handle the tug in a safe and efficient way whilst utilising its full capabilities.

Such experience is also needed for accident investigations involving tugs in order to develop recommendations which are applicable in day-to-day tug operations, and thus avoid similar accidents in the future.

We come to some very important questions: Do all shipping and towing companies have sufficient input from practical professionals? A very realistic question. For instance, can the towage company undertake thorough professional and practical research to determine what is the best tug type for the port? Can operational guidelines be given if there is not a thorough insight into daily practice? How does the towage company know if its policies and procedures are being complied with? How can it assess whether there is a need for training? For all these issues, the input of practical professionals is vital.

The same kind of questions can be asked for accident investigations. Can recommendations be made after an investigation, and in such a way that they provide practical solutions so similar accidents can be avoided? Again, in this case a thorough practical experience and knowledge is needed.

The importance of the input of practical professionals in towage operations, training and accident investigations cannot be emphasised enough, and in particular where ship-handling with tugs is involved.

2. Risk assessment and voyage planning

Before addressing accident investigation and training, risk assessment and voyage planning will be discussed. Risk assessment is something in which all relevant parties play a responsible role – the port authority, the towing company, the pilot, the tug master and, as far as possible, the ship's captain. Inherent in risk assessment is an assessment of whether a ship or barge can be handled safely, taking into account all influencing factors. The voyage planning is a follow-up of the risk assessment.

The towing company has the responsibility to provide a suitable tug, taking into account the size of ship and required assistance, with an experienced tug master and crew working under company standards and procedures that are appropriate to the operation.

The pilot and ship's captain, generally in co-operation with the port authority, should judge whether the passage of the ship and berthing/unberthing can be carried out in a safe way. They take into account the capabilities of the tugs, the fairway characteristics and environmental conditions such as currents, wind and visibility. The pilot should also know how tugs can be used in the most effective way, such as which tug type is most effective as a stern tug for giving steering assistance or for controlling the ship's speed, and what tug type can best be used forward.

◄ *Figure 1:* **TI Europe**, *the largest double hull tanker in the world, with assisting tugs, in the Port of Rotterdam. Whatever the ship size, utmost care is always needed.*
Photo: John van den Bergh, the Netherlands.

▲ *Figure 2: A bow tug assisting a container vessel.* *Photo: Harry van den Berg, Hook of Holland.*

With respect to a tug master, he should also assess whether he can assist a ship or barge in a safe and efficient way, taking into account all factors mentioned above.

To be able to assess the risks, it should be known what kind of risks may be encountered during a trip. This requires a good practical insight into all factors that may affect a smooth transit, including the characteristics of the ship, the capabilities and limitations of the tug(s), the fairway characteristics, information about depths, currents, wind, waves, fog, etc. These factors will be reviewed briefly.

The tug should be fit for the purpose. A tug owner will, or should, know the capabilities of a tug from manoeuvring trials and bollard pull tests. This does not, however, say anything about the ship assist capabilities of a tug. An owner of a new tug can ask the yard for polar diagrams, which give an indication of the towing, pulling, pushing and braking capabilities at different ship speeds and at different towing/pulling and pushing angles. Unfortunately, an owner seldom asks for such information, which is strange because it is essential, basic information about a tug's performance, and polar diagrams will also show the tug's limits.

Tug capabilities, with respect to ship-handling, can also be studied through

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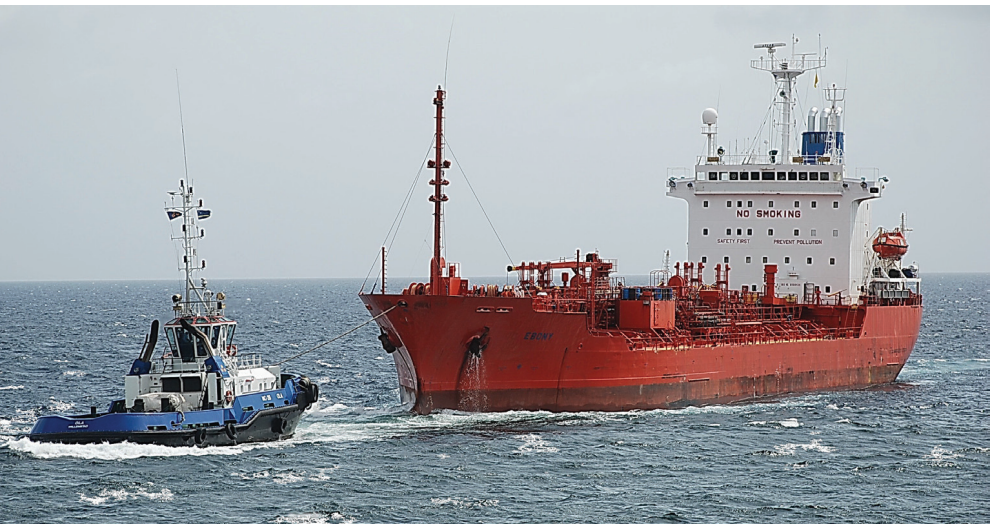

▲ *Figure 3: Operating in wave conditions.*
Photo: Cornelis Bustraan, Curaçao.

simulations in which tug masters and pilots take part. Very good insight into a tug's capabilities and limitations can be obtained afterwards from information provided by industry experts and tug masters through their experience in day-to-day operations. Assuming a good stability, specific practical aspects which make a tug suitable or unsuitable for a certain task are, amongst others: the tug's length, rudder and propulsion systems; manoeuvring characteristics; the location of the towing point on the tug's deck; including the height, the length and lead of the towing line; visibility from the wheelhouse; bridge layout, etc. Whether a specific tug is fit for the purpose depends furthermore on the required bollard pull ahead and astern and how the tug will be used, eg as a bow tug, or operating at the ship's side, or as a stern tug. As already mentioned above, a pilot should judge which tug, or tug type, can best operate at a certain position at the ship. He is responsible for the tug placement.

To what extent do towing companies know whether their specific tug is suitable for a certain task? Are their operating procedures complete enough to give a tug master guidance under certain conditions, eg making fast a bow tug at speed or operating in reduced visibility? If a towing company, tug masters, or pilots, are not able to assess whether a tug is fit for its purpose and whether sufficient bollard pull is available, or if they do not assess the circumstances and conditions they will encounter, problems may arise during a passage or when berthing or unberthing, which places the tug in a most unsatisfactory position, by which time it will mostly be too late to take remedial action.

Note 1: Several times the term 'bow tug' will be used. To avoid any confusion, in this article a bow tug is a tug made fast through the centre lead forward and running ahead of the ship, or in the case of two bow tugs, tugs made fast at the starboard and port side of the centre lead and running ahead of the ship, or tugs intending to make fast at those positions.

Apart from the pilot, it is also valuable for a tug master assisting a vessel to know the size of the ship, underkeel clearance, propeller type, the effects current and wind have on the ship and the expected speed through the water. A small underkeel clearance, the clearance between ship's keel and fairway bottom of, for example, 0.5m will make a ship more difficult to turn than in the case of a much larger clearance of, for instance, 3-4m. The effect of side currents on the ship will also be much larger, and the effect of a pulling tug will decrease because of the negative effect of the propeller wash impinging on the ship's hull. This means that in all these cases much more tug power is needed.

The same applies with high-sided ships such as car carriers and container vessels where, for instance, in the case of sudden strong wind gusts, much more tug power is needed.

It is also good to know the ship's propeller type in case the ship is going astern on the engine. If it is a right-handed propeller, the ship's stern will move to port, and if it is a left-handed propeller, the ship's stern will move to starboard. It all affects the work of a tug master, and the more insight he has into a ship's behaviour, the better he can anticipate situations. In addition, when making fast to the ship, it is also important to understand the tug's pulling or pushing effect on the ship. This depends on the tug's position in relation to the location of the so-called pivot point.

The size, manoeuvrability and draft of a vessel, as well as the environmental conditions, are of particular importance with respect to the navigability of a confined fairway with its specific characteristics. For instance, a navigational width of at least 2.6-3.0 times the vessel's width (depending on crosswinds) should be seen as safe, for example, for a bulk carrier in case of one-way traffic and a straight channel (PIANC). Bends will require additional width.

The environmental conditions, such as the effects of waves, wind, current, tides, ice, frost, and low visibility are important factors to be taken into account. Tides and currents follow a certain known pattern, and winds are, to a certain extent, predictable, although sudden strong winds (gusts and squalls) can be unpredictable. The time and places that fog may occur are less predictable. Therefore, although fog statistics are important for voyage planning, the local situation should be interpreted carefully. Limitations on operating under certain environmental conditions should be evaluated by the Port Authority in consultation with towage companies and pilots.

A very important aspect for a safe passage is the experience and training of the tug master. Consideration should be given to whether the tug captains have sufficient experience with the tug they have under their command – are they properly trained; have they sufficient experience with the type of work they have to carry out with their tugs; have they been trained to assist during fog in the relevant area; and have they had training in instrument navigation during fog?

Assisting large vessels during dense fog is a high-risk job and requires careful preparation. Several ports have shore-based radar coverage within the pilotage area and/or portable pilot units (PPUs) for pilots on the bridge. But there are still many ports that depend solely on the radar and navigation equipment on the bridge of the ship.

Also, few ports have specific guidelines for ship assistance during fog. By using the procedures for tug assistance during fog as mentioned in these guidelines, risks can be mitigated. Again, all factors should be taken into account in case a ship may encounter fog conditions during its passage.

Safe ship speed is another factor of importance, particularly when a bow tug *(see note 1)* has to make fast or is made fast. It becomes even more important in fog conditions. If possible, it is sometimes even better to release the bow tug during dense fog. A pilot should know the limitations of the tugs and should know what a safe speed is.

A number of important factors have been mentioned above which have to be considered before ships begin passing through a fairway, enter or leave a port and berth or unberth. These are crucial factors for risk assessment and voyage planning. Several of these factors will get further attention in the next paragraph where accident investigation will be discussed.

Note 2: Of relevance are two remarks. Firstly, obligations of towage companies and the importance of internal audits by practical, experienced towage professionals.

Most towage companies operate under a plethora of regulations, be it ISM, QA, their own policies and procedures or local regulations. On tugs today there are many manuals, but do the tug master and crew understand and comply with the contents?

It is apparent that some crews do not know or understand what the manuals direct them to do, as has been evidenced in lack of proper response in recent emergency situations such as engine room fires, groundings, safety issues etc.

The most effective way to ascertain whether

tug crews understand and comply with all the regulations is to conduct frequent internal audits by practical, experienced towage professionals. Crews are expected to show the auditor how essential operational and safety functions are carried out on their tug.

In addition, this process fine tunes some procedures which may be unclear, ambiguous or require more explanation. It also highlights where towage companies should give more guidance and direction to their employees in critical situations such as making fast at speed, in extreme wind/wave conditions and reduced visibility.

Secondly, it is interesting to note that the myriad changes and improvements to shipping is co-ordinated under the IMO. In the towage industry, there is nobody overseeing the changes or recommendations that should apply, because most harbour tugs are less than 500gt. In the absence of standards of training, or the lack of an oversight agency with legal authority, sub-standard operators are free to participate/compete in the industry and so no organisation is available to co-ordinate the many issues that need to be examined now and in the future.

3. Professional practical input in accident investigations – general findings

An accident investigation regarding a tug accident has to focus on three phases:

1. The situation before the accident happened with respect to whether the tug was fit for the purpose and training and experience were adequate.
2. Operational aspects: What was the reason that the tug became involved in such a risky situation? What was the root cause of the accident?
3. The technical aspects, such as quick-release system, stability, openings, etc. This has more to do with the consequences of the accident.

This article focuses on phases 1 and 2, the practical aspects.

Authors have reviewed a number of recent investigation reports of accidents in which a bow tug and ship or barge were involved and which had dramatic consequences for the tug crew. They analysed whether adequate use was made of the practical experience of ship manoeuvring and towing experts so that the practical operational root causes of the accidents could be found, and consequently similar dramatic accidents could be avoided. Specific details about the accidents will not be revealed.

Results of the review are discussed below. It concerns a number of important practical aspects that frequently do not get the required attention in accident investigations.

a. Risk assessment and voyage planning are certainly important practical subjects. However, these two important subjects seldom receive the degree of attention required or, in some cases, are not even examined. In an example of a case where a risk assessment was carried out, the available fog statistics were not properly interpreted and not taken into account. The consequence was that the ship, while proceeding in the fairway, encountered very unfavourable conditions, which increased the risk of an accident.

In another case, tests were carried out for the transport of a tow, but at speeds that did not represent the actual speed the tow would experience at the time the accident happened.

b. Safe procedures are another practical aspect that do not always get the attention needed. Not following safe procedures may result in accidents. This may involve:

– safe speeds for passing a towline near the bow of a ship having headway;
– safe procedures for approaching the bow of a ship at speed with a tug;
– safe procedures for passing a heaving line and towline;
– safe speeds for a bow tug, either secured to a barge or to a ship;
– safe procedures for tug assistance during fog, very strong winds/squalls.

Note 3: It should be well understood that only speeds through the water are of relevance here, and not the speed over ground or bottom speed. Assume a ship has a speed over ground of 12 knots and is proceeding with a tide of 3 knots. What is important is the speed through the water of 9 knots. Often, bottom speeds can be found in accident investigation reports.

In recent examples, the first aspect, safe speeds for passing a towline, was mentioned and discussed. The other procedures hardly got any attention although they contributed to fatal accidents.

For instance, safe procedures for passing a heaving line and towline, are something that absolutely needs consideration and especially in strong winds. It happened that a ballasted bulk carrier entered a port, where the tug tried to pick up the lowered ship's line from the vessel's centre lead forward. The tug, which was on the windward side of the ship, was forced to come too close to pick up the line, made contact with the ship's bulbous bow and capsized with two fatalities.

The following case is a typical example of how important 'safe procedures for approaching the bow of a ship at speed with a tug' really are:

In stormy weather with very strong crosswinds a high-sided vessel, such as a car carrier or ferry, has to steer with a drift angle to compensate for the drift. When a tug has to make fast, the ship has to lower speed and the drift angle will become large. To be able to pick up the heaving line and pass the towline to the drifting ship in the stormy weather and risky circumstances, the tug master needs a great deal of experience and has to realise the dangers involved.

The tug master could be informed by the pilot or captain about the drift angle. He will then know in what direction the ship actually goes and the tug master can take that into account when approaching the bow. However, what is needed in the first place is the extensive experience mentioned in order to be able to avoid the tug ending up in under the bow with fatal consequences: a crucial and practical safety aspect requiring careful attention in investigations of similar accidents.

An example of 'safe speeds for a tow': A barge was pushed by a tug with a second assist tug fastened forward with two short towlines, one to each corner of the barge. The tug was of the conventional type. The speed of the barge through the water was rather high, higher than approximately 50 per cent of the maximum speed of the forward tug. The 50 per cent can be regarded as a safe speed limit for the forward tug as is the case with bow tugs fastened to the bow of a ship having headway.

When the forward tug had to deviate from its course in order to give steering assistance, the speed of the tug dropped automatically and the barge collided with the tug.

It must be said that there are no strict guidelines for most of the safe procedures mentioned above: an extra reason why attention is needed and recommendations should focus on the necessity to develop safe procedures.

c. Tug fit for purpose: a most important practical aspect. This should be an essential part of the accident investigation, but often it is not, whilst a tug not fit for its purpose causes or contributes to an accident. The tug(s) should be an important part of the risk assessment and voyage planning.

A tug should be capable of assisting the attended ship or barge in a safe and efficient manner all the way through the fairway and near the berth, taking into account the ship particulars, the conditions and circumstance, and allowing for the tug's limitations.

Important aspects for assessing whether a tug is fit for purpose are:

Manoeuvrability; capabilities and limitations of tugs: This should be considered in relation to the following aspects:

– the location where the tug has to assist, eg at the bow, stern, or at the ship sides
– the confinement of the fairway, turning circle etc, which impacts on the required response times.

Some examples: If a bow tug is used in a confined fairway, it should be a tug with high manoeuvrability and fast response times, which can quickly change from pulling to starboard to pulling to port and vice versa without needing much manoeuvring space.

A long, slender, conventional tug of, for example, 40m in length, will need much more room and time to move from port to starboard than a short wide conventional tug with the same power. A long tug is therefore not the most suitable option for operating as a bow tug in confined waters, although twin-screw tugs will normally manoeuvre quicker than a single-screw tug. Maximum tug speed is also an important factor to be taken into account with respect to safety of operations.

Visibility from the wheelhouse; bridge ergonomics, radar picture: This is another crucial aspect which affects safe tug operations and which seldom receives the attention

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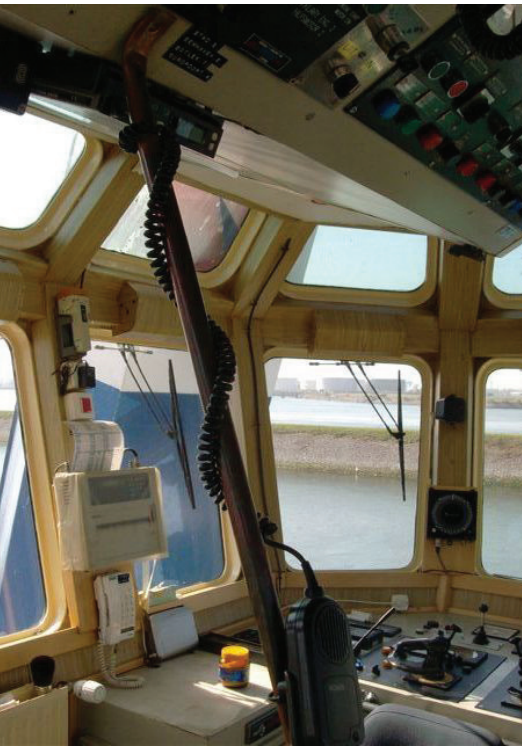
required during accident investigations. A tug master should have an optimum outside view from the manoeuvring station in horizontal, and, as much as possible, in vertical directions, as well. He should furthermore have a good view of the radar from the manoeuvring station. It is incomprehensible that this is not always well understood. For a forward tug, which gets the most attention in this article, the tug master should constantly have a good view of the bow and bulb of the attended ship and of the tug's deck and towline, without the need to shift from one leg to another or from one place to another. This becomes more important in adverse weather conditions and particularly in the case of fog; also because the radar picture in the direction of the attended vessel is normally useless.

Interrupted or lost sight of the bow of the assisted ship, or the ship to be assisted, will cause the tug master to become disoriented. This can be the case particularly in fog, unless he has had specific training and experience in operating in these conditions. It can all make a tug unsuitable for certain tasks or conditions. It will be clear that the aspect of visibility needs careful attention: which it often fails to receive.

Experience and training of tug master: Having the right experience (and training) is so very important. This is, however, very often not well recognised. It is often the main cause of serious accidents. Opinions differ about what can be considered as a well-trained and experienced tug master. Experience means the experience with the specific tug the tug master has under his command and with the specific way of ship- and/or barge-handling. Experienced ASD-tug masters in one of the busiest ports say that they are still learning even after three years as captain. Of course learning goes on, but it is realistic to assume that a tug master should have no less than three years' experience as tug master on the same tug type, and with the usual way of ship assistance, before he can be called experienced.



◀ *Figure 4: Limited outside view from manoeuvring station.*

For specific situations additional training may be needed, such as for critical ships and unfavourable conditions and/or for critical passages in the fairway. This would be the case, for example, for large LNG carriers. Training in ship assistance during fog is also strongly recommended, which should include fog navigation on instruments, as has already been mentioned earlier.

The training systems mentioned, carried out on a simulator, together with extensive practical experience on the specific tug type, makes a tug master capable of assisting vessels in critical circumstances. It is strange, but again, this most important practical fact seldom receives proper attention during accident investigations.

Towline and towing point: The towline is the essential link between tug and ship, and therefore requires careful attention. This is, however, not always the case in accident investigations. Questions that should be answered can be: Was the towline of a bow tug of an appropriate length for the expected conditions and circumstances, such as confinement of the fairway, visibility, speed, waves, etc? During dense fog a tug master of a bow tug prefers to tow on a relatively short line in order to be able to see the vessel behind, but it may even be better to release the towline during dense fog. All important aspects to be carefully investigated.

Some more examples:

1. When passing through a fairway, and particularly during foggy weather conditions, the length of the towline of a bow tug should not be more than half the width of the navigable fairway. If longer, and the tug has to pull full to one side, it may run aground.
2. When a tow has a rather high speed, the towing line(s) of the bow tug should not be too short, otherwise the tug may be overrun by the tow, because the time to react may become too short.

A very practical aspect is the safe speed of a tow through the water, which more than once did not get the attention needed, but which is crucial for the safety of the bow tug, in particular with conventional tugs (or other tug types operating in that way). As with ship-handling, the speed of the tow should not be more than approximately 50 per cent of the maximum free-running speed of the bow tug. If the speed is higher and the bow tug has to deviate from its course, the tug's forward speed will drop and the tow may overrun the tug or the risk of girting or tripping may arise.

3. Sometimes the focus of attention needed is not the length but the lead of the towline. Is the lead such that it limits the tug's movements, or may it affect the safety of tug operations? This aspect also does not get the attention needed.

▲ *Figure 5: Stern tug with gob rope (see yellow line aft). 1 = gob rope winch; 2 = swivel fairlead.*

See, for instance, *Figure 5*, where a conventional stern tug is working on a gob rope. In this way the tug can give steering assistance to the vessel to starboard as well as to port. It will be clear that the tug cannot turn to port because of the limitation by the gob rope. It is for that reason that when the same tug is working as a bow tug for a ship moving ahead, the gob rope should be released from the main towline to prevent the tug from being restricted in its movements and its steering capabilities, unless the gob rope can be slackened in time by the gob rope winch (if the tug is equipped with such a winch and the winch is operational).

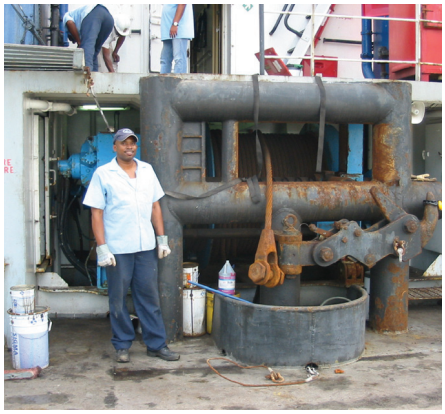
The same restrictions in movement may happen when the deck equipment of a conventional tug has been modified and the towing point has been shifted by, for instance, a new bitt or staple. The effect of it on the towing performance of the tug can then be disastrous, particularly when the position of the towing point has been replaced more aft and/or higher, as has been the case. Such modifications should carefully be examined before operations start.

4. Another issue is the height of the towing point (bitt or staple). In *Figure 6,* a towing staple that is too high for port operations is shown. When seeing the tugs that were involved in accidents, it is surprising that nothing is said about this subject. The higher the towing point, the larger the capsizing moment.

Communications: Although important, it is often difficult to find out what exactly has been communicated between, for instance, a pilot and tug masters. Differences in language may play a role. However, the importance of the information exchange between pilots and tug masters should not be underestimated, which sometimes seems to be the case.

These are all important practical subjects that often do not get proper attention, which contributes to the fact that the root cause of an accident may not be found and similar, often dramatic, accidents may happen again. Learning from accidents to improve daily practice then becomes problematic.

Legal constraints may be imposed on the investigators, but any constraints should in no way have the consequence that important and crucial practical aspects do not get proper attention, affecting the outcome of the investigations.



▲ *Figure 6: A very high towing point, about 2m high.*

There may even be more practical subjects requiring attention. Therefore, the input from towage and ship manoeuvring experts is absolutely needed to be able to find out why a tug got into trouble, how it was possible that a tragic accident could happen, and what should be done so that it does not happen again.

Note 4: It is recommended that there should be some means of automatically recording conversations either on board the tug (and attended ship) or ashore. The use of data loggers may also be useful.

4. Training

What is training and who is responsible for training tug masters? Training is a process that provides a person with the knowledge and ability to execute specific tasks at an agreed standard of proficiency through instruction and practice. In the case of bow tug operations, a very high standard of proficiency is required in order to safely execute the myriad possible tug manoeuvres that may be required. Great care should be taken by all parties to ensure that such a high standard of training is met. An 'agreed very high standard of proficiency and training' is not evident in the recent accidents involving bow tug operations. That begs the question, who then is responsible for training to such a very high standard and how can that be accomplished?

There are a number of stakeholders responsible for assuring that there is a very high standard of training for tug masters: the tug master or mate, the towing company, applicable shipping companies, pilot groups, training institutions, governmental oversight agencies and the general public in the arena of environmental public safety. Some will argue that it is the 'other's' responsibility, but when viewed from the perspective of on-going bow tug operational accidents involving loss of life, the reality of a shared stakeholders' responsibility becomes clear.

So how do these responsible stakeholders obtain a very high standard of training for tug operations? The input of highly-skilled towing professionals is essential. Utilising these practical professionals as trainers, taps into their invaluable experience on handling a specific tug to its full capabilities. They will know and understand the limitations of the tug and the risks involved in ship assist operations. In addition, trainers should have an understanding of how ships behave and should also have the ability to be a good instructor.

The challenge is that there are not enough qualified instructors available. In order to provide a very high standard of proficiency and training, not evident in recent bow tug ship assist operations, we must train the trainers. Trainers picked from the ranks of highly-skilled, practical towing professionals. In addition, we must prioritise the need to learn from accidents through assessment, instruction, practice, discussion and transparency.

Are the capabilities and limitations of a specific tug with respect to ship assistance fully understood by tug owners, tug masters and pilots? This applies to conventional tugs as well as modern tugs. If not, what should be done? Are tug masters trained, whether on-the-job or on a simulator, by fully-qualified instructors with extensive practical experience on the specific tug type and with the necessary theoretical knowledge? Or is there little amount of on-the-job training compensated by some simulator time that determines tug limits in an arbitrary way? Is voyage planning and risk assessment a part of the training? Does tug master training include training in emergency situations? Are the results of accident investigations included in the training? These are the types of questions that need to be discussed and assessed not only to develop a very high standard of proficiency and training, but also to learn from accidents and to prevent them from being repeated in the future, as much as is possible.

It can be concluded that it is a necessity to bring training of tug masters to a higher professional level. What is needed is summarised below:

1. In the first place trainers should be highly-skilled towing professionals, who have the ability to be a good instructor. Trainers should be qualified for their job as a trainer.
2. Training, whether on-the-job or by simulators, should focus on the specific tug type(s) trainees have to work with, which should include the capabilities and limitations of the specific tug(s), the type of ships calling at the port, and the ship assistance used.
3. Training should include:
– safety procedures;
– lessons learned from accidents;
– training for tug emergency situations and back-up systems.
4. A towage professional with practical experience should be employed as an internal auditor to determine whether the items listed above are understood and being complied with.

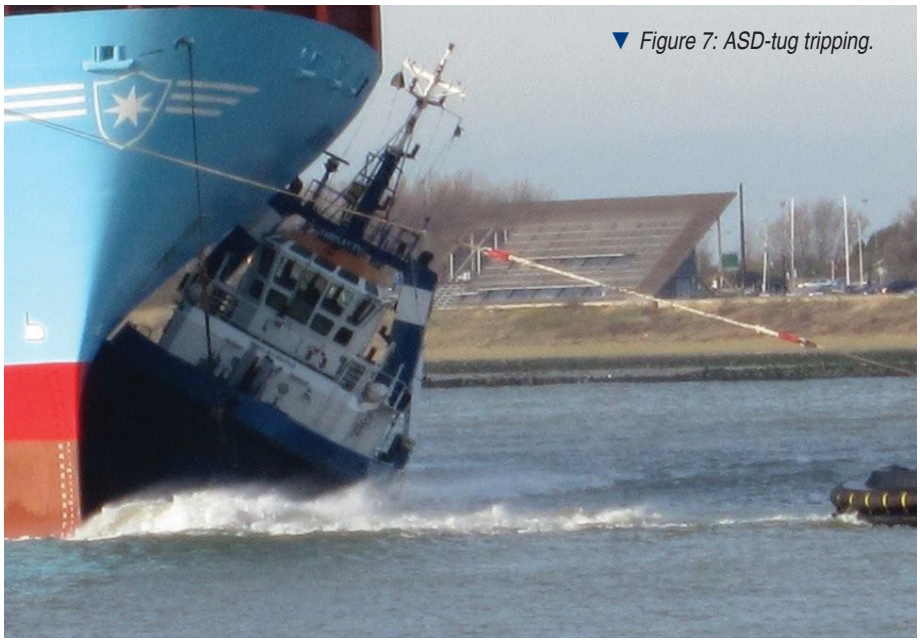
5. Summary

Accidents do happen, and will continue to happen in the future. Through detailed accident investigation the cause and consequences of an accident can be determined, resulting in the potential to avoid similar accidents or minimise the consequences. It is a very good system to increase safety.

Often, however, there is insufficient practical input into accident investigation, even in the case of dramatic tug accidents, which may have the serious consequence that the root cause is not found and similar dramatic accidents may occur again. This should not happen!

Therefore, for investigation of accidents in which ship- or barge-handling tugs are involved, it is of the utmost importance that there is an optimum input of towage and ship manoeuvring experts. This is not only to be able to find the root cause of an accident, but also to be able to make recommendations which are applicable for day-to-day operations in such a way that similar, often fatal, accidents can be avoided and that recommendations can be implemented in the training schedules of tug masters.

Lack of practical input can also be found in the training of tug masters. Such inferior training is of hardly any use. The instructors should have a high level of experience with the



▼ *Figure 7: ASD-tug tripping.*

type of tugs they are training on. The training should furthermore include lessons learned from accidents, training for emergency situations and training of back-up systems.

There is a great difference with training of airline pilots. For flying an airplane there are:

a. Strict procedures;
b. Training of airline pilots regularly on simulators;
c. Training programmes that include emergency procedures;
d. Results of the latest accident investigations included in the training programmes.

Simulator training for tug masters does not include any of these important safety aspects! It should be said that ship manoeuvring and tug-handling does not have such strict procedures as with airplane pilots. Much still goes on 'feeling' because ships and tugs are much less uniform than planes, a reason why 'feeling based on experience' is still important, although more and more instrument navigation takes place in confined waters and port areas. Nevertheless, the aspects mentioned above are most important for training of tug masters and marine pilots as well.

If an adequate practical input can be realised in accident investigation and in training, including the training aspects mentioned above, the level of safety in ship- and barge-handling with tugs can be improved to an acceptable level, which becomes more important with the increase of modern, high-powered tugs. It is also important to make sure that the concepts referred to above are complied with, ie it is not solely about written words and manuals, but also the need to conduct frequent practical internal audits. In doing so, not only safety in ship- and barge-handling with tugs will improve, and consequently safety in port and port approaches, but most importantly, also the safety of tug crews.

Finally, has it not become time that governments, port authorities and towage organisations develop requirements specifically for tug masters and tug crews with respect to training and certification of trainers?

● *Capt Henk Hensen is a Master Mariner FG and gained his master's certificate for all ships, unlimited, in 1964. After his career at sea he worked as a Port of Rotterdam pilot for 23 years. Since then he has worked as a marine consultant on the nautical aspects of port studies, harbour tug advice, simulator training, etc. He has published a number of maritime books and numerous magazine articles.*

Capt Roger Ward is a Master Mariner who has spent 30 years in the towage industry as a tug master and as Marine and Tug New Buildings manager. He has extensive experience in port towage reviews, appraisals and tug recomendations. He has been involved in a number of accident/incident investigations involving tugs. Ward is a director of Dale Cole & Associates Pty Ltd, a marine consultancy based in Sydney and Melbourne, Australia.

Capt Grant Livingstone graduated from California Maritime Academy in 1980. He has served on a variety of tug and ship types and jointly set up an ocean towing company. He has been employed as a First Class Pilot at the Port of Long Beach California for the past 22 years.

Seafarer course officially certified

Alphatron Marine, based in Rotterdam, has become officially certified to perform the ECDIS IMO Model course 1.27 for *Standards of Training, Certification and Watchkeeping for Seafarers (STCW)*, including Manila Amendments, and vessels under Dutch flag.

Due to IMO-Solas Chapter V Regulation 19.2 and the forthcoming ECDIS compliance dates, there is huge worldwide demand for ECDIS training courses, which heralds a new opportunity for companies to start offering training. To receive official validation, the so-called 'Letter of Recognition', which signifies acceptance of the certification by all affiliated European countries, a large investment is required in training facilities.

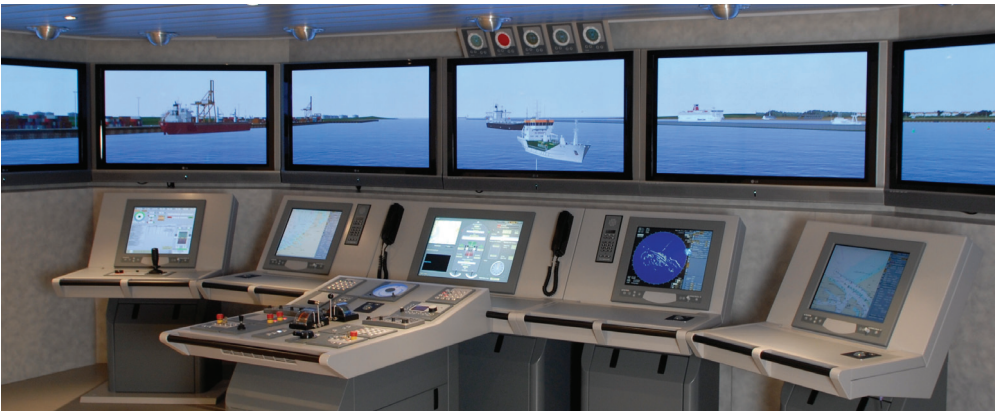
The Alphatron Training Centre offers the complete range of ECDIS training, both generic and type-specific in the same five-day course at its HQ in Rotterdam. The training is executed on individual simulators and complemented with theory. A full-size bridge simulator enables trainees to test learned competence together.

For the official IMO STCW training, both a generic and type-specific training course is mandatory to comply with the regulations and in order to receive the certificate.

With many different ECDIS systems currently on the market, research will be necessary to ensure training is on the same system which seafarers use onboard. In Alphatron's case, the majority of the more commonly-used ECDIS systems on today's market are offered in the training. It is worthwhile noting that when a seafarer changes jobs, they might also require new ECDIS training, as the new employer may use a different ECDIS system.

A well-equipped training centre such as Alphatron's is capable of offering much more than ECDIS training. Customers and dealers can apply for both operational and technical training as the company has an extensive line of own products varying from instrumentation packages, maintenance-free gyro compasses and DP systems to complete integrated bridge systems. The better-trained the staff are, the more challenges can be overcome during manoeuvres.

▼ *Full-size bridge simulator at the Alphatron Training Centre.*



Investment in safety

The Swedish Club has underlined its commitment to improving the safety culture in the maritime industry by allowing all member companies, whether lead hull or P&I, to sign up to its Maritime Resource Management (MRM) course free for a period of two years.

The move, which will take effect from 1st January 2014, is part of the Club's keenness to give all member companies the opportunity to have the right training procedures in place to help in the fight to prevent the unpredictable casualties that are so often related to human and organisational errors.

Managing director, Lars Rhodin, said it was all part of a determination by the Club to put safety at the forefront of the way its members own and manage their ships.

"This offer to our membership is a clear statement of how convinced we are about the effectiveness of our maritime resource management programmes in improving the safety culture both at sea and on shore."

Martin Hernqvist, managing director of The Swedish Club Academy, which runs the MRM courses, said: "The positive impact on accidents and claims that we have seen from MRM successfully implemented in a shipping company is extraordinary. We want our members to experience the same development and it will be a joint effort between the Club and our membership to reach the safety targets. It will not happen overnight."

The MRM course is designed to minimise the risk of incidents by encouraging safe and responsible behaviour. It aims to foster positive attitudes, favouring good personal communication, excellence in leadership and team-working skills and compliance with operating procedures.