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THE IMPLEMENTATION OF MARITIME RESOURCE MANAGEMENT IN JACK-UP RIG MOVE OPERATIONS

Bachelor's Thesis 2014

ABSTRACT

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HOLMROOS, KAI	The Implementation of Maritime Resource Management in Jack-up Rig Move Operations
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This thesis was composed to study the implementation of maritime resource management within jack-up rig move operations. In addition, the moving process of a jack-up rig and the common practices used from an anchor handling vessels' point of view are widely discussed.

The objective was to determine the common perception in various MRM related questions within this offshore environment. This thesis aimed to question the sustained and unrefuted methods in tug / tow-master interaction, expose the inconsistencies and benefits of MRM within a complex setup and explore how various drafted instructions are complied with in reality or experienced in practice.

A web based qualitative questionnaire was established, measuring opinion by percentile proportion and ranking scales in addition to option for comments for each question. Thirty respondents representing a wide scope of professions and nationalities participated in the questionnaire.

The analyzed results indicated further maritime resource management implementation possibilities in jack-up rig move operations. The key personnel such as tow-masters, rig personnel and tug crew are ought to reconsider their roles from a maritime resource management point of view. In addition, the authors are recommended recognize their responsibility in writing accurate procedures, guidelines, books or checklists, with legal status or superiority since the altering opportunities are limited due to their time sensitive nature. The reader's fundamental confidence is easily misled.

TIIVISTELMÄ

KYMENLAAKSON AMMATTIKORKEAKOULU
Merenkulku

HOLMROOS, KAI	Merenkulun resurssien hallinnan toteutuminen öljynporauslauttojen siirto-operaatioissa
Merikapteenityö	82 sivua + 25 liitesivua
Työn ohjaaja	Tapani Salmenhaara
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Tämä päättötyö on koottu tutkimaan merenkulun resurssien hallinnan toteutumista öljynporauslauttojen siirto-operaatioissa. Lisäksi öljynporauslauttojen siirtoprosessi ja siinä hyödynnetyt yleiset käytännöt on käyty läpi kattavasti ankkurinkäsittelyaluksen näkökulmasta.

Tavoitteena on selvittää yleisiä käsityksiä koskien merenkulun resurssien hallintaa offshore-ympäristössä. Päättötyö pyrkii myös kyseenalaistamaan vakiintuneita ja kiistattomina pidettyjä hinaaja/tow-master-yhteistyömenetelmiä, osoittamaan hyötyjä ja epäjohdonmukaisuuksia monimutkaisessa offshore-ympäristön resurssien hallinnassa sekä selvittää monien dokumentoitujen ohjeiden todenmukaista noudattamista ja niihin suhtautumista.

Laadin internetpohjaisen kvalitatiivisen kyselytutkimuksen, joka mittasi mielipide-eroja monivalinnoin, arvoasteikoin sekä tarjoten prosentuaalisia eroja. Vastaajilla oli myös mahdollisuus avoimesti kommentoida jokaista kysymystä erikseen. Kolmekymmentä vastaajaa osallistui kyselyyn, ja he edustavat eri kansalaisuuksia ja ammattialoja.

Tulokset viittasivat mahdollisuuksiin lisätä merenkulun resurssien hallinnan merkitystä öljynporauslauttojen siirto-operaatioissa. Keskeinen henkilöstö, kuten tow-masterit, öljynporauslautan sekä hinaajien miehistö voisivat uudelleen harkita roolejaan merenkulun resurssien hallinnan näkökulmasta. Lisäksi haluaisin peräänkuuluttaa toimintamenetelmien, ohjeiden, kirjojen sekä tarkistuslistojen kirjoittajien vastuuta heidän tuottaessa opastavaa ja laillisen statuksen omaavaa sisältöä. Niiden muutosmahdollisuudet ovat rajalliset aineiston aikasidonnaisen luonteen vuoksi ja lukijan luontainen luottamus tulee helposti harhaanjohdetuksi.

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1 ABBREVIATIONS AND TERMS

AD HOC	Latin phrase, translating in this context to: "for this job specifically".
AHT	Anchor Handling Tug
AHTS	Anchor Handling Tug / Supplier
BIMCO	The Baltic and International Maritime Council
BP	Bollard Pull (usually measured in metric tons)
CMID	Common Marine Inspection Document
DEMOB	Demobilization, charter related term ref. to costs or geographical point
DP	Dynamic Positioning
ED50	European Datum 1950
FIXTURE	Conclusion of shipbrokers' negotiations to charter a ship – an agreement
GOMO	Guidelines for Offshore Marine Operations (NWEA replacement 2014-)
HFO	Heavy Fuel Oil
LUB	Lubrication oil
MGO	Marine Gas Oil
MGRS	Military Grid Reference System
MSF	Maritime Safety Forum, An incident reporting system, guideline author
MOB	Mobilization, charter related term ref. to costs or geographical point
NWEA	North West European Guidelines
OCIMF	Oil Companies International Marine Forum
OIM	Offshore Installation Manager
OMC	Offshore Marine Contractors
OVID	Offshore Vessel Inspection Database
ROV	Remotely Operated Vehicle
SG	Specific Gravity (e.g. metric tonnes / m^3)
SWL	Safe Working Load or Safety Weight Limit
TMS	Tug Management System, position information sharing utility
Tow-master	Overall responsibility moving the rig (ship vs. pilot)
UTM	Universal Transverse Mercator co-ordinate system
VHF	Very High Frequency radio band
WGS84	World Geodetic System 84 Datum

2 INTRODUCTION AND HISTORY

The background behind this study was to explore the implementation of maritime resource management in jack-up rig move operations. The broad selection of material, personal familiarity and proximity with this branch drove my decision making process.

I chose to write the thesis in English because the offshore industry is nonexistent in the northern Europe and expertise could therefore only be found through an international approach. Additionally, offshore vocabulary would have had posed some serious difficulties in terms of translation.

The main objective was to study the implementation of maritime resource management in jack-up rig moving operations. This was carried out by establishing a qualitative questionnaire in order to

a) To expose and to demonstrate the inconsistencies and benefits of Maritime Resource Management implementation within jack-up rig move environment.

b) To question the sustained and unrefuted methods in tow-master / tug interaction

c) To resolve priorities in complying drafted instructions and how various maritime resources are managed in practice

A secondary by-product of this thesis is to progress through the details of common practice in jack-up rig moves and provide an initial assistance to new or seasoned mariners in orientating to this branch from an anchor handling vessel’s point of view.

It is worth noting that the following key concepts all address the same topic and may therefore be treated as synonyms.

MRM – Maritime Resource Management

MCRM – Maritime Crew Resource Management

BRM – Bridge Resource Management

The subject of this thesis was confined to the description of common practices used in jack-up rig moves and the human performance aspects involved in it. Technical details, oil drilling and area specific phenomena were either minimized or excluded from this text.

Jack-up rigs together with tugs employ a large number of people vulnerable to misunderstandings, human errors and cultural differences. Industry characteristic features and implementation of Maritime Resource Management within jack-up rig moves was studied through a qualitative questionnaire. These questions measured opinion by percentile proportion or ranking scales in addition to option for comments for each question. Thirty respondents participated in the questionnaire through a web link.

The prominent intensions were to analyze the results, point out the observations and generate recommendations by resorting to a selection of MRM-material such as *Bridge Resource Management for Small Ships.*

The description part is an attempt to bring together topics in jack-up rig moves by unfolding the process of moving a jack-up rig from one offshore location to another in a chronologic order while representing a scale of variations. Emphasis is put on combining the large variety of material available on individual themes covered either to their full extent or excessively generalized, while only a few describes how various phases are linked together.

2.1 History

In the early 20th century, the increasing scarcity of natural resources impelled man to develop novel means for easier access to oil. Land based oil drilling was already utilized. Many nations urgently constituted exclusive economic zones to maximize the pace against other countries. The technological development dragged decades behind the unrecognized rising economic benefits, hence the zoning imbalance. Norway is a

good example of how the gross domestic product has since the 1960s shaped its way on top of the world almost single handedly due to export oil. Even wars, the ultimate reason for technological development were started over oil.

The story of jack-up rigs begins in the mid 1950s, in fact before the huge potential for offshore oil extraction was recognized. The first self-elevating units were built in 1954. At the time, it was a random event to actually finding any oil. Initially jack-up rigs were deployed close to the shoreline into shallow waters where the presence of oil was self-evident. Approximately a decade later the deployment progressed further to open sea as the level of knowledge and skills started to support even more inventive means. (Rigzone 2014)

The early stages of offshore oil industry focused more on efficiency and quantities drilled. Accidents or near catastrophes were not that unusual to occur, not to mention the overall standard at the time did not exactly promote environmental protection any more than safe working practices. Many mishaps well beyond increasing environmental awareness threshold, has shaped what the industry has developed into and what it is headed towards. No capital is spared developing new technology. Business is now more than just production rates and money. Safety and reputation have improved parallel among priorities and opportunities – of course ultimately translating into profit.

2.2 Working Environment

2.2.1 Jack-up Rigs

Today's typical jack-up rig consists of a superstructure with 3-6 legs. The term jack-up refers to the legs upon which the hull is raised above the waterline. The unit is moved by raising the legs, which puts the construction afloat. Jack-up rigs are not self-propelled.

The unit has its own generators for power production, storages, tanks, manifold, chemical stores, pipelines, accommodation, helicopter-deck, rescue appliances, radio-

room, pilothouse, jacking control room, cranes or a drill with a cantilever beam and other appliances needed to complete the work.

In comparison with a ship being dry-docked, the rig is the opposite. Only the period when the unit is elevated generates revenue – moving the rig is necessary but rather expensive and the risks are high. The assumption of a jack-up rig being a sea-going vessel is most unwise. The normal perils of the sea represent an alien environment for the rig while afloat (Hancox 1993, Jack-up Moving: 10).

Figure 1. Jack-up Rig

Figure 1 above shows a modern 3-leg jack-up rig with cranes. The drilling unit with the cantilever beam is extended on top of the yellow platform. The unit is elevated to a safe working air gap. On the opposite side of the cantilever beam is the helideck.

Moving such a unit takes great effort and co-operation. A large number of crewmembers are involved. Working practices have dramatically changed since the 1950s. Automation and technological solutions have never been as highly utilized. Nevertheless, the basic functions remain.

Modern rigs are more functional, and larger variety of work is carried out by jack-ups – they are not only limited to oil drilling anymore. Many are used as service platforms for various offshore installations such as wind farms or pumping stations, while others serve as support for the building of fixed stations. Since the early years, the tools have become bigger, better, more complex and durable. Many of the systems are now more technologically advanced and the significance of redundancy and duplication have been discovered since the 1950s.

Given the rig's size it accommodates a rather large number of personnel. The majority of the personnel is involved in the rig's primary function – oil drilling. Once the rig needs to be moved, dispensable crew is dismissed and diverse roles are assumed. Specialized extra-personnel, such as tow-master, surveyors, client and marine-representatives join the rig. See attachment 1 for further details about standard crew configuration.

2.2.2 Fixed Platforms

Figure 2. Platform Helwin Alpha

Figure 2 Illustrates the final construction phase of the yellow platform supported by a jack-up rig with a crane. This specific platform functions as an offshore wind-farm electricity switch station in the German sector.

Such fixed platforms are built for long-term use on feasible locations, limited by water depths up to approximately 500 meters. The structure is fixed to the seabed and cannot be moved. Fixed platforms often function as pumping stations or as hubs to submerged oil pipes. With a connection to shoreline, they can also serve as initial petroleum processing stations. Platforms in active use are manned. (Global Security).

The position of a fixed platform is marked on maps together with the platform's name and often a number/letter combination referring to an offshore block location. For safety, they all have a 500 m exclusion zone.

The majority of all jack-up rig units are moved in or out of the platform proximity utilizing the anchors discussed in Chapter 3.

2.2.3 Subsea Installations

Other subsea installations besides fixed platforms include manifolds, wells, pipelines, mooring-points and sensors. A subsea well is a drilled hole in the seabed ready for oil extraction and is maintained using jack-up rigs. The maintenance of manifold, pipelines and sensors may be carried out for example, using the jack-up rig as a base-station for a ROV (Seaworks).

2.2.4 Anchor Handling Tug

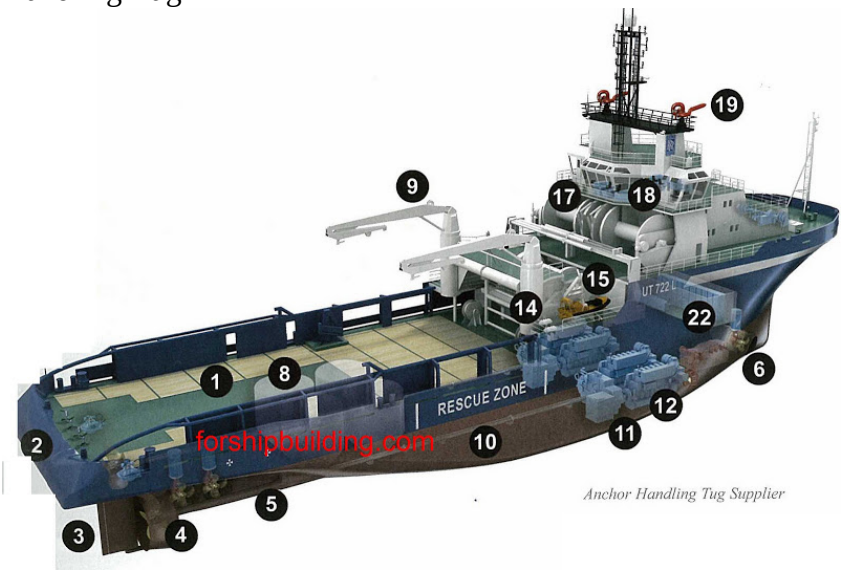


Figure 3. Anchor Handling Tug / Supplier

Anchor handling tugs are purpose built vessels for offshore and especially rig moving duties, able to deploy and recover 3rd party anchors. AHT's features towing abilities and accommodates a selection of equipment and hardware allowing the handling of heavy anchors, buoys and wires in a safe manner.

The towing abilities may be utilized in numerous applications, not limited to offshore operations alone. The variable tow wire lengths used are normally between 50-500 meters, while total capacity may exceed 1000m entailing restricted maneuverability under towing conditions.

An AHT is more maneuverable than average freighter ship. Additional features may represent firefighting capabilities with powerful FiFi-monitors, often driven by the main engine.

Size dependent, AHT's may carry out cargo runs, crew changes and provide standby readiness for various offshore locations such as platforms, rigs and semisubmersible units.

Should the normal freighters be compared through their cargo carrying capacity, the equivalent benchmark in towing environment is the Bollard Pull (BP), often measured

in metric tons. Inconspicuous features such as Dynamic Positioning capabilities determine the vessel's abilities to cope with the highest offshore positioning demands.

Depending on the size and working environment an AHT is normally manned with 6-15 crewmembers. More than 30 may be accommodated on the largest units, however the routine anchor handling duties may be carried out with a relatively small crew.

Due to the notoriously large power to size ratio, AHTs are often ideal for carrying out icebreaking duties as well.

3 COMMON PRACTICES IN JACK-UP RIG MOVES

3.1 Commercial Aspects

The logistics chain set in motion a by a jack-up rig move is impressive. A single operation may involve several charter parties responsible for hiring personnel, logistics, subcontractors and supplies, for example. The following will only describe the distinctive pattern in hiring tugs.

First of all, planning the move of a jack-up rig starts well before the tugs are chosen for the job. Oil companies, the owners of the rigs normally hire a team and the maritime knowledge that comes with it from a 3rd party. There are rig specific tailor made procedures for each move. When the destination and timeframe have been decided, the charterers can start offering the job to tug companies. Expenses are determined based on the tugs' main features, such as HFO/MGO consumption, BP, and vessel size. There is no discount for hiring a large vessel. The following paragraphs are describing the charter parties' role in more detail.

Tugs and especially AHT tugs are often operating on a spot-market for a reason. There is hardly enough work for a fleet of AHTs inside a single company. Large corporations are the exception here, and even they may have to tender their AHTs to outside operators in order to compensate for the costly upkeep.

A common charter party used is BIMCO and its sub-agreement *supplytime 2005*. The bill of lading does not apply under "*supplytime 2005"* unless otherwise stated ad hoc. (*Simon Rainey, 2012).* The demand for the features of the tug can be dictated by insurance policy as well as the planned scope of work. Vessels within reasonable distance – minimizing mobilization and demobilization costs – are naturally in a better position for returning the offers. There are numerous possibilities for chartering agreements varying from lump sums to daily rates and combinations of the two with possible compensations. In-house chartering terms can be used to complement or replace the BIMCO frame, for example. Additional terms of insurance deductibles may apply. A mundane additional clause between tug and tow could for instance declare a mutual agreement of waiving the right for compensation from each other

should an accident occur. Chartering terms in the offshore industry normally include the following:

- Conditions and rules to be met for on hire, or reference to charter party rule.
- Daily rates, mob/demob costs, economic fuel consumption, lub and bunker rates
- BP
- Features and equipment
- Operational capability 24 hours / 7 days a week
- Two men bridge-watch readiness
- Valid audits and certification, e.g. CMID,OVID, MSF-data, crew experience and certification matrix
- Two-week bunker and supplies endurance
- Up-coming crew changes announced
- Representing and bolstering sufficient stability for the proposed work to be carried out
- Compliance with charterers safety policy, inspections and NWEA / GOMO

(Shell Charter Party, 2014)

As the chartering agreement is nearing fixture the concept ‘daily rate’ needs to be further explained. Bunkers and lubricant oils are paid separately, or lubricant oils are incorporated into mobilization/demobilization costs. If no MOB/DEMOB exists, the consumables are incorporated into the daily rate. The daily rates materializing on spot market vs long term market tend to be higher in general. Vessel availability in certain areas sometimes creates very profitable contracts. Hiring a tug for long term could yield under such conditions, even if the vessel was idling for some of the time. The market demand status may quickly shift from very quiet to a lack of available vessels. It is possible to have as much as 300% difference in daily rates between sister ships in a consecutive two weeks period.

Should a broker be involved, a commission, usually 2.5%, is included. Alternatively, if there are various services involved and commissions are overlapping, the MOB/DEMOB can be adjusted functioning as a buffer to balance unfair trade. Such cases could include direct continuation of chartering to another sublet, or the changing destination of redelivery where "equal distance" would apply. Perhaps there is a deadline for a redelivery in order to commence work for another charterer.

Allow me to quote a professional concerning the concept '***1st Refusal'.*** This expression has many different meanings in a variety of professions. A precise explanation within the offshore chartering context is essential.

*"First refusal used in a brokering context is a verbal agreement between the broker and the boat owners at the request of the Client. When their vessel is of interest but we cannot commit to hiring it at that time. **

The way it works is if there is any interest from a 3rd party for the vessel the boat owner is obliged to call us and give us that first right of refusal. At this point if they are calling it should be because the 3rd party 100% wants to charter the boat not because someone else asked about it but is not ready to charter it there and then. So we must ask our client to make their choice of chartering the boat from that point or turn down the boat and let it go to the 3rd party.

*** E.g. - In a normal situation a rig move might be 4 days away, the client already knows which boats they want but financially they don't want to start paying for boats 4 days before the work begins, so they ask us to take a first right of refusal between the owners and ourselves. Now they might save 3 days financially on each boat if they are lucky or they may only save 6 hours on a boat before they have to commit, they also have the ability to cancel the first right 'Refuse' if suddenly the move is delayed further or cancelled without financial penalty as most offers unless stated otherwise have a minimum of 24 hours hire to protect the Owners.*

When agreeing a first right of refusal sometimes a duration is asked e.g. first right of refusal for 48 hours, When the duration is up if not already chartered or refused you can negotiate an additional duration." (Hugo Westveer, OMC Operations)

For long-term contracts, it is common to choose partners with at least some history with working together. Should the parameters described in the following chapter be

met, contracts are fixed by the tug companies in the right place at the right time and returning offers with convenient daily rates / lump sums.

3.2 Operational Aspects

A widespread standard is to hire 2-3 tugboats. Insurance companies have predetermined the minimum total BP required in conjunction with wind area. With the minimum BP available, the unit should be at least in theory maneuverable within the maximum weather criteria given in the procedures.

A good example is 180 t total BP and for the leading-tug minimum 80-100 t. With three tugboats, the configuration usually includes one or two AHTs and one to two offshore certified harbor tugs (Seafox 2 procedures 2013-0910WN). For shorter moves with smaller weather window required, two AHTs is a common choice as both can participate in anchor deploying minimizing the overall on-hire time. Additionally, the timeframe is no issue once the rig is in place and anchor recovery can be carried out with just one AHT.

3.2.1 Vessel Features and Selection

Outside the regular rig moves, common features the vessel charterers are interested in include deck area in square meters, tank capacity for cargo purposes and wire drum capacities. General endurance consists of the following factors: crew rotation, stores, provision, fresh water, bunkers. With endurance in question, there is no need to state exact figures but the master usually declares the maximum timeframe for the intended voyage prior to need for replenishment.

Although bollard pull is a major factor, the maximum BP alone is an inadequate attribute, as fuel economy is a direct consequence of engine power. Dynamic Positioning capability can affect the daily rate on which a vessel is hired. Unless supply duties are combined with tow and anchor handling duties, DP-vessels features are not necessarily needed.

Due to the outside forces generated by the tow- or anchor-wire, dynamic positioning cannot or should not be used while the towing wire is connected to the rig. No computer logic existing today is able to adapt or anticipate variable dynamic loads created by towlines. The problem with writing such algorithms for computer controlled maneuvering is that it occurs as a result of human action – a random decision with no predictability or linearity unlike the weather or current for example (Ian Clark, 2005).

According to captain / tow-master *Rob Breure* tow-masters attend the tug selection dialogue by providing the numbers for the minimum BP, given it is feasible in terms of financial and insurance policy. Some tugs are more maneuverable than others; the structure of the vessel is something that cannot be substantially modified. Finding a perfect match for the job is not important here. However, some level of minimum capabilities and features in a long term is vital. It is a matter of "scoring" the best on the list of what is available. Tow-masters if anyone are fully aware of whom they should be working with based on previous experience. This does not apply to tugs alone, the crew and especially the master's performance is observed as well.

Tugboats are often pitching and rolling terribly in heavy seas – in a safe way. They are designed with initial high GM in ballast condition to ensure sufficient stability in all towing conditions. A typical design flaw is good stability in fully fueled condition and insufficient Gravity point to Metacenter (GM) leverage in light condition. This of course is in conflict with the endurance requirement.

Other factors reducing productivity are design flaws with in the hull and layout of the equipment. The stern roller could simply be situated too high from the water level reducing visibility from the bridge. Propellers may be too exposed or vulnerable for anchor handling. The position of the capstans, pins, rollers or towing-gog may not provide desired leverage.

The anchor handling gear is normally carried onboard the rig during the transit. It could also be rental equipment from ashore. Occasionally, an adequate deck space is questionable should the rig request the AHT to carry the equipment onboard during the tow. Deck cargo should be arranged in such a way that the towing wire has the

space to swing around from one side to another on a 180° envelope. High crash rails enable some overlay and space for the wire to swing above the deck cargo. A deck with sufficient capacity to load all anchor handling gear at once saves time as well by omitting extra loading cycles from the rig.

3.2.2 Equipment

Equipment onboard an AHT can for example include tow-wire, spare tow-wire, stretcher, pennants, shackles, hinge links, grapnel, J-chaser or J-lock chaser, chain, pelican hook, pins or shark jaws, towing gog, any chain stopper, (karman fork, triplex stopper) and a roller.

Normally the basic equipment needed to complete the work is provided from the rig such as; anchors, buoys, pennants, shackles and chains. Here is a brief overview of the most basic tools:

Figure 4. Commonly used 64 mm tow-wire

Figure 5. Stretcher

Figure 6. Shackles

Figure 7. Hinge link

Figure 8. Hard eye pennant

Figure 9. Fish plate

Figure 10. Grapnel

Figure 11. J-Hook

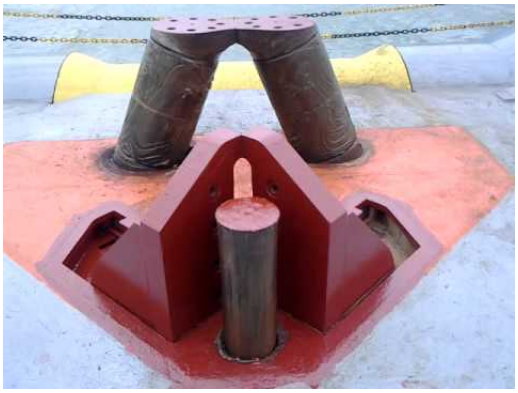


Figure 12 & 13. Pins with red top and shark jaws in red, roller in yellow

Figure 14. Karm Fork and Pins

Figure 15. Smit Bracket

Shackles are often color coded into their correspondent safe working load - SWL. A common certification interval is 25, 35, 43, 55, 85 and 120 tons (Hancox, 1992). Hinge links or Kenter links are used to minimize clinging over regular shackles with pins. Grapnel and J-Hook are mostly used in deep water or special recovery operations by simply dragging them behind and waiting for them to catch on wire.

Pins and a fork or equivalent are a minimum requirement to carry out risk free duties. They hold the tow or working wires still and relief tension enabling deck crew to safely work around them. Figures 12 – 14 illustrate at least two different branches of equipment. The *Karm fork* utilizes inserts in order to fit a varying scale of wires and chains. A *Smit Bracket* is a strong hold alternative to a regular bollard. With the *Smit Bracket* the SWL is more than doubled.

Tow-wires and spare wires should be identical and certified. Certification provides detailed information on weight to length ratio, structure and they prove that the tow and spare wires have been test loaded. Common sizes vary between 48 – 120 mm in diameter. Decision on wire strengths should always be consistent with the drum spooling capacity, winch pulling and brake holding force.

Water depth, displacement of the unit towed and weather determine the features and length selected for the tow-line used. The stretcher is used to compensate against spikes in tension in high seas. Heavier tow-wires are stable and produce less twitching. Lighter wires require less drum capacity, and handling on deck is smooth and safe. Pennants provide modularity and compatibility connecting wires varying in size, weight and methods of affixing.

To illustrate the idea of just how complex the connection between a tug and a rig can be, here is a breakdown in a realistic sequence: **tug – wire – socket - shackles – stretcher – shackles – hard/hard-eye pennant- shackles – bridle – shackles – fishplate - shackles – chain – shackles - hard/soft-eye pennant – fairlead / Smit Bracket or bollard - rig.** Connecting all this by manual labor means it is no surprise that wire related accidents are a major concern on tugboats (Seafox 2 procedures 2013-0910/WN).

Tow-wire, of whatever size and diameter, has another indirect impact on navigation. The heavier the wire, the more tension is required to keep it from touching the bottom. This induces a challenge on slow-down maneuvers. Spooling the wire in often takes time, preparations and extra hands.

3.2.3 Anchors and Buoys

The enlisted equipment in the last paragraph is used to serve one purpose: to safely handle large - scale heavy equipment such as anchors, wires and buoys.

Anchors in particular exist in all shapes and sizes. Their holding and handling properties are well worth a discussion. Anchor size and type are chosen based on holding requirements. The seabed features have a direct impact on how easily the anchor will dig into the bottom. Certainly soft clay will not generate as many concerns as rocky slope. A slip bottom unfortunately is usually not subject to our choices and extra chain or heavy *stevpris*-type anchors are sometimes required to gain a grip (Hancox, 1993).

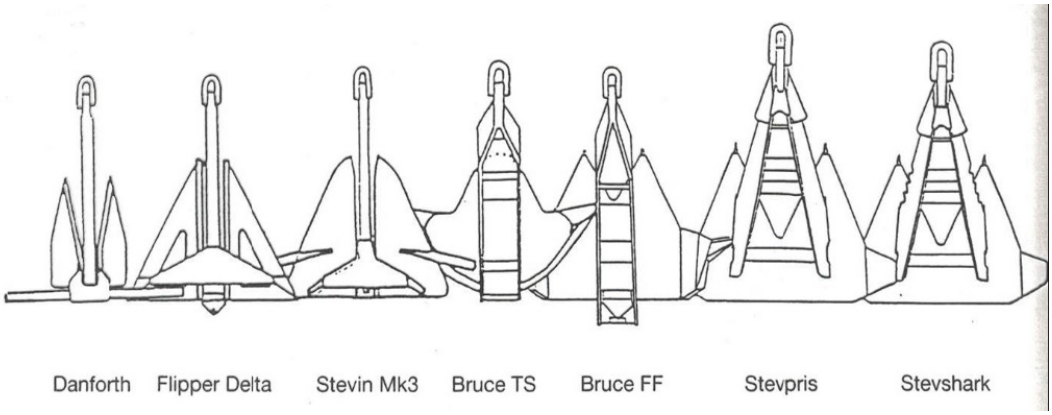


Figure 16. Offshore Anchors 1

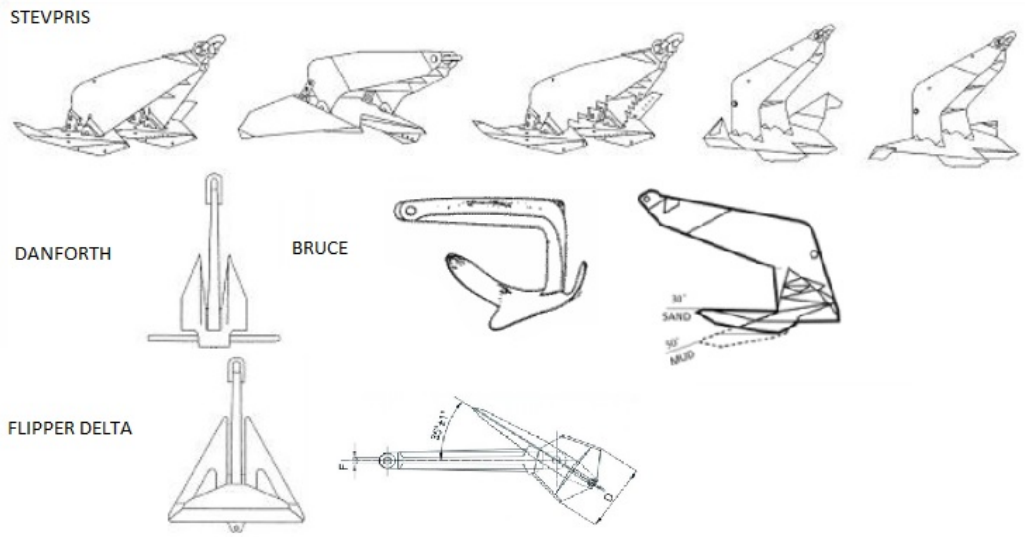


Figure 17. Offshore Anchors 2

As Figure 17 shows, most of the anchors in the offshore industry are adjustable. Fluke-angles are set according to the seabed features. If the seabed features are known, the anchor selection can be based on that knowledge. A hard bottom will not allow penetration at extreme fluke angles, and then again angles too small will not allow the anchor to dig in deep enough, risking a pop-up. There is a fluke angle vs seabed features matrix for every anchor type. *Stevpris* for example is stable and provides the best holding force. A *Bruce*-type anchor however, digs into the seabed every time. With *Stevpris* however, it is always a concern whether the anchor has landed in the bottom upside down providing zero drag (Marine safety forum).

Always the desired anchor types are not available, or the tug may not be able to handle them. Additional chains or *piggy-back* arrangements can be used in such cases. A piggyback extends the connection by connecting additional anchor(s) in the end – not only increasing the hold but making use of the extra weight.

Riser pennants, chosen according to the water depth, connect the anchors to the buoys. Heavy duty offshore buoys are deployed to indicate the approximate position of the anchors. Offshore buoys are equipped with gussets connected to a weight distributing flanges which allow light loads to be applied on them upon recovery.

Figure 18. Offshore Buoy

“The buoys are made with highest quality closed-cel PE/EVA foam. This resilient foam make the buoys self fendering with high impact absorption capacity. Even the skin was punctured, it also is unsinkable without absorbing water. With our unique

laminating process, each foam core is integrity. The foam core cannot be ruptured after long time service" (Ever Green Maritime).

3.3 Vessel Certification

Besides the common trading certificates required of all seagoing vessels, offshore tugs need to be BP certified. The BP certification test is carried out based on criteria set by classification societies. Bollard pull, rating refers to the maximum continuous force the tug is able to hold for at least one hour. All normal utilities such as main engine driven pumps and generators remain connected affecting the result in the end. This figure is nevertheless important for vessel marketing purposes.

Other certificates relevant to AHT vessels are extra crew member capacity, man overboard recovery capability, firefighting capability and DP classification. Should AHTs carry out supply or extensive standby duties, the following may be questioned as well: container capacity, tank capacity and its certified maximum Specific Gravity in liaison with the Certificate of Fitness.

3.3.1 CMID

According to IMCA, the Common Marine Inspection Document, CMID, can be considered an inspection report for the vessel similar to a Port State Control Document tailored to offshore vessels. Emphasis is put not only on the vessel's observable condition, but also on whether the required safety, health, environment and technical standards are exercised on the tug. It needs to be evident that the industry procedures and guidelines are followed.

The CMID certificate has no legal status and a vessel not holding the certificate can be just as seaworthy, properly manned and potent as any. This is an additional requirement established by the commercial operators promoting universal safe and efficient working practices. A similar system exists in the tanker environment: vetting inspections carried out to help the charter parties make the best choice.

It is of great importance that such inspections are carried out by independent contractors. Therefore, it is not uncommon to see an Asian individual inspecting European vessel and vice versa.

3.3.2 OVID

The Offshore Vessel Inspection Database, OVID, is the future replacement of CMID. The Oil Companies International Marine Forum suggests it has a number of benefits over the CMID. The OVID is a database instead of piece of paper. It is planned to be a living document whereby vessel owners can “showcase” their vessel capabilities and inspectors can implement their remarks on the same database. This information can then be shared or sold as needed.

The idea is to keep the information as up to date as possible. There is no need for a remark to denigrate a vessel’s reputation, if the problem can be sorted out sooner than what inspection interval decrees. The problem with the CMID is that this vessel specific document needs to be requested by the charterers in order to review the vessel. A database on the other hand is instantly updated for everyone and details of other vessel are available to standard users’ as well (OCIMF).

3.4 Crew Certification and Matrix

Although not mandatory, a DP certificate may be needed depending on vessel type. DP is a common feature in offshore vessels. However, this feature is utilized in numerous other applications not limited to rig related operations alone. DP is a complex science and a topic on its own, therefore the relevant factors are only briefly discussed in this paper.

A standard STCW-certification is required from the personnel. Currently, the vessel minimum safe manning certificate fulfills the need. The common perception is that this is going to change at some point. Tankers, ropax, and passenger ships for example all have their own required special certification. The DP is a good example of what used to be a certificate exclusively for the offshore industry and nowadays its use has

widely extended outside this context. The latest STCW Manila amendments indicate increasingly specialized certification to be introduced in the future.

What is more interesting is the crew experience matrix often required by the charterers. The idea is to establish a minimum combined level of experience onboard. This can be considered as risk assessment on its own. As an example, it can be required that the master and the chief officer share a minimum of 3 years' worth of experience between them. The same rules apply to the engine department as well. Each department should have at least one member familiar with operating the vessel inside his department. His second in command should be able to fulfill his position if needed, granted, with small vessels this may be impossible to accomplish as one crew member inside a department could represent the entire other half. MSF sheet or Maritime Safety Forum form covers this by providing a matrix to be filled in (KRS).

3.5 Rig move Procedures and Execution

Procedures written for each rig move are extensive and detailed. The following paragraphs are an overview of OMC rig move procedures which normally should be carefully studied in conjunction with North West European Guidelines (NWEA) and rig specific manual prior to the move. [OMC/RMP/2012/07/10 Ensco 80], [2011-0406/WN Noble Byron Welliver], [2013-0705/WN Atlantic Rotterdam].

3.5.1 Responsibilities and Insurance Policy

The initial information in the introduction paragraph of a rig move procedure states the name of the rig, the location of the move, the charter parties and where the possible change of charter party is taking place. Various responsibilities are explained in more detail, for example the specific duties of an OIM, jacking engineer, tow-master, warranty surveyor, marine representative, position surveyor and tug master (OMC/RMP/2012/07/10 Ensco 80).

Insurance policy has a great significance in the decision making process regarding the tug configuration and weather criteria. One person – the warranty surveyor – is dedicated to supervising the implementation of the procedures from the insurer´s point

of view. Tugs must meet the minimum bollard pull capability, weather criteria must be met with, and safe working practices must be followed. The warranty surveyor is one of the persons who can always call a stop should a potential risk be recognized.

3.5.2 Weather Criteria

Weather criteria may be given for both jacking operations and open sea passage. Jacking the legs down against the bottom of the sea is a delicate process and allows for little heaving or rolling movement. Should the wave or swell period exceed the rig's hull cross length the unit starts to roll. For open sea passage some rolling is acceptable, but for jacking operations a more sheltered location must be found or weather is to be waited out. For this very reason forecasts need to be examined well prior to and during a move. A quote from a *Seafox 2-Procedures* allows for a better understanding of the weather scale acceptable for departure or arrival:

Maximum significant sea state 1.5 meters, visibility no less than 500 meters, wave or swell maximum period of 6 seconds, wind speed 14-18 knots, favorable weather window for xx hours prior to departure

For weather sensitive operations such as departure and arrival, a strict adherence to the weather minima and following the operational manual restrictions is justified. Whereas during a long term tow, greater wind speed is often acceptable, provided that the tug is able to hold the unit and the wire length is sufficient.

3.5.3 Departure and Arrival Locations

DEP/ARR locations (see attachments 1 & 2) include detailed coordinates, water depth, seabed analysis, expected leg penetration, prevailing current and wind, tidal range and information, rig heading, position tolerance, obstructions, sailing distances to relevant ports and distances to heliports (Seafox 2 procedures 2013-0910WN).

3.5.4 Emergency Jacking Locations

Emergency jacking locations must be considered for longer tows. They might have to be used for sheltering the weather or resolving a technical difficulty. The easiest way is to browse through the past locations where the rig or its sister ship has been jacked. This minimizes the risk in entering non-surveyed locations and perhaps makes use of existing footprints (2011-0406/WN Noble Byron Welliver).

3.5.5 Towing Details

Towing details provides the towing distance. An expected towing speed is estimated. A time frame for tidal current sensitive arrival is displayed. A sketchy plan for weather window minima vs expected duration of each working phase is outlined. Any possible remarks affecting the schedule are usually stated in this context. Expected towing speed lower than usual or a short period of transit allowing for inadequate rest periods are issues worth review (2011-0406/WN Noble Byron Welliver).

3.5.6 Departure Procedure

Departure procedure outlines the sequence of events. The checklists and toolbox triggering points are discussed. It is outlined what working phases are subject to risk assessment. The exact change of charterer and consumable recording point is brought up. This can actually read as a checklist:

- crosschecking weather window
- securing the cranes
- tug connection, pennants to be used, connection build, configuration
- shutdown requirements
- leg raising sequence
- watertight integrity checks
- informing the authorities

(Seafox 2 procedures 2013-0910WN)

3.5.7 Transit Procedure

Similar to the departure procedure, this is a written sequence which can be read as a checklist:

- tug reconfiguring
- tow-master handing over navigational responsibilities to leading tug
- adjusting tow wire lengths for open sea passage
- issuing navigational warnings
- following agreed waypoints and minimum object clearances
- observing weather and studying forecasts always ready to divert for shelter
- filling in progress reports
- adjusting ETA towards the end

(2013-0705/WN Atlantic Rotterdam)

3.5.8 Emergency Procedure

The emergency procedure is essentially the same as arrival procedure in the next paragraph however, it is discussed in an improvising manner and applied as a general guideline providing shorten up distances, legs lowering schedule, tug reconfiguration, current setting, plan for an approach line, checklists to be completed, notifying appropriate parties. The provided information in this section has no reference to time or location (Seafox 2 procedures 2013-0910WN).

3.5.9 Arrival to Standoff Position

Arrival can be split into two phases: arrival to standoff and final locations. The latter is further discussed later as it includes the phases of anchor handling procedure between. Thoroughly done ETA adjustment allows for shortening the tow wires and

slowing down in time without losing the tidal opportunity. If the unit is brought alongside to a platform a VHF contact by the rig should be established early on to discuss shutdown requirements, recording events and special arrangements where platform personnel might be needed. Tugs are normally reconfigured to star formation while closing in on the standoff location (Seafox 2 procedures 2013-0910WN). Standoff is usually located just a few hundred feet from the final location.

As the unit is closing in on the final approach line (if such exists), a toolbox talk and risk assessment are carried out. As a part of entering the 500 m exclusion zone, redundancy is maximized. Tugs are prepared to their full maneuvering readiness, both steering gear are selected on, thrusters are fired up, accessory hydraulics are turned on, navigation systems are checked, communications are checked and all stations are properly manned.

The heads-up for entering the 500 m zone can be deemed equal to vessel berthing preparations. Once everything is up and running and checklists are complete, a permission to enter is granted and recorded on the logbook.

Rig heading and position in mind, the unit is pinned to the stand-off position. The rig personnel go through some additional checklists such as water integrity checks. The preload procedure should be initiated without delay in order to use the cranes for further phases of the work. Once the unit is standing stable against the bottom, the last tug may be released for anchor handling preparations, while rig finishes off the preload. TMS or Tug Management System is transferred and installed at this point if it has not been done earlier (2013-0705/WN Atlantic Rotterdam).

The rig move procedures are composed with the following items

- Anchor handling procedure (discussed in 4.14), possible spanset arrangements,

- Final Positioning procedure: anchors test loaded, current setting, weather criteria, platform shut-in requirements met, survey and deck crew in standby, connecting tugs, jacking down, pinning the rig with in position criteria,

position approval, raising the unit to an appropriate air gap and releasing the tugs, preload, anchor recovery, notifying authorities

- Further details of anchor connection, survey equipment, weather forecasts and environmental criteria, location approval, possible ROV equipment, remarks on key personnel and communication details, administrative requirements

- Generally amended in the end is the tide tables, passage plan, unit drawings, scheme drawings, unit elevation drawings, seabed data and charts with a survey statement, anchor plan, possible buoy catenary points, illustrating images, management of change form

  ([OMC/RMP/2012/07/10 Ensco 80], [2011-0406/WN Noble Byron Welliver],[2013-0705/WN Atlantic Rotterdam])

Consider the above as a compact illustration of the rig move procedure contents. Procedures may vary from 30-150 pages of detailed heavy information which is a vast number of details to comprehend in a short period of time. Complex figures and sequences are burdensome reading, most of the comprehending responsibility falls on tow-masters in overall responsibility of the rig move. Ideally it is not deemed necessary to remember the contents by heart but rather cover the sections synchronized with the actual phases of work.

3.6 Voyage Planning

The voyage plan for a rig move, as stated above, is initially planned in the procedures. Regular transit voyage planning for the tugs is omitted in this context since it is done globally in identical manner. However, it is worthwhile to review what makes rig move voyage planning special.

The following paragraphs describes the primary ingredients to proper towing voyage plan in reference to rig move procedures [*2013-0910/WN Seafox 2], [OMC/RMP/2011/07/08 Ensco 92]* and *[2012-0611/WN Noble Ronald Hoope]*.

The initial position information provided in liaison with the chartering query is often rather vague. Without the procedures the departure and arrival positions often need to be found with block designators, (see attachment 4) or by searching with platform or oilfield name.

With the procedures available, the waypoint coordinates are put in and double checked as in any voyage plan, e.g. under keel clearance (UKC), safe passing distances, optimization and nav-text messages in force affecting the route.

Transit length in nautical miles is reviewed against a variety of expected towing speeds and timeframes. Potential emergency jacking locations are copied as per procedures to the electronic chart interface.

Agreed waypoints may be altered for better optimization. The vessel traffic service (VTS) or pilots may have their own requirements for shifting waypoints. Nonessential waypoints may be omitted. However, any changes should be discussed and approved by the tow-master and participating vessels should be informed (2012-0611/WN Noble Ronald Hoope).

Authority approvals and reporting responsibilities should be clarified. The rig will normally look after the authority approvals, while the VTS-reports are on the leading tugs responsibility, often reporting in the assisting tugs as well.

Schedule for desired ETD/ETA needs to be endorsed by the tow-master as there could be constraints to daylight operations only (OMC/RMP/2011/07/08 Ensco 92).

A tidal timing should be discussed since various sources may indicate diverging information and the most reliable source must be sought. To allow a safe departure and arrival, the current should be setting away from structures should a blackout occur, resulting in a loss of maneuverability (OMC/RMP/2011/07/08 Ensco 92).

The minimum weather window required is written in the procedures, however a close examination of forecasts is part of the standard voyage preparations. The latest forecast should always be studied since the tug crew may asked an opinion of the expected weather conditions.

A complete voyage plan from a tug perspective includes stability information calculated, bunkering, provision and possible crew changes to be carried out prior to the departure in order to meet the endurance requirements.

3.7 Checklists

Checklists are carried out onboard both the rig and the tugs. Often the homespun checklists created by those involved in the heart of operations are viable. The purpose of checklist is to ensure that the minimum steps are taken to safely carry out the work. They are not supposed to be detailed or explanatory. Manuals and guidelines should include such information.

Nevertheless, a good checklist leaves no room for interpretation. Consider '*Engine room manning*' vs. '*Engine room – **watch keeping engineer on station***'. The latter should be favored for clarity.

Universal references should always be favored. Although everyone would most likely find a valve under the instruction '*below Pete's window*' more easily, the location should be stated in an official way as in '*deck 4, port side of the monkey bridge ladder*', so that even the least experienced crewmember will not need to struggle to understand the information.

Checklists should always be practicable as written. Special attention should be sought to exclude duplicate duties; one man cannot be in two places at once. Overlapping events should only be written if they are possible in reality. Assuring steps in a chronologic order is essential. For example, starting a thruster with insufficient electric power available could be catastrophic (Parrot, 2011).

There are various ways in utilizing checklists. Others promote teamwork, some secure your action when working alone while a few allow for speedy flows. There is one shared feature though: every checklist should be planned and written in a logical manner. The checklist whether it is type A, B or C as described below, should not be mixed. Here are a few examples:

A. Read and do.

B. Run a flow of tasks / memory items and complete the checklist afterwards.

C. Read out loud, delegate action and expect confirmation.

A good checklist takes time to form, no matter how short. The creation phase takes brainstorming, perhaps trial and error. Once it is functional, it really relishes the crew's trust. Should the checklist be completed by a team, it is important to actually wait for the '*clear*', '*checked', 'on', 'off',* or '*complete'* - read back before proceeding with corresponding action. An inconspicuous function of the checklists is to establish a logical sequence between phases, not only by doing it right but in correct order as well. Having the need to sort out a checklist in order to continue working, indicates the checklist obviously is not serving its purpose. There is only a thin line between these two extremities whether the checklist is ensuring safe and fluent action or just needless paperwork. A good checklist will always lighten the burden.

When or how the checklist is triggered should be either self-evident or an agreed plan should exist. A bad example is to start early, stall for a step that cannot be completed yet and continue (should one recall) later on. Having one printed version flying around the bridge, another incomplete version open on a computer awaiting to be archived – the workload may end up being increased rather than decreased. In such cases, it might be worth considering checklist type B.

3.7.1 Rig

The large organization onboard a rig allows for better distribution of responsibilities and carrying out their corresponding checklists in comparison to small teams onboard

the tugboats. Many of the checklists are therefore carried out according to the employment position rather than operational triggers. In his book *Jack-up Moving* (1993), Hancox enlists the primary pre-move checklists. This certainly does not cover all possibilities but the vast number of preparation checklists are carried out at least by the following individuals:

- Tow-master, in conjunction with OIM / Barge Master
- OIM / Barge Master
- Senior Toolpusher
- Toolpusher
- Driller
- Radio Operator
- Welder
- Crane Operator
- Chief Electrician
- Mechanic / Motorman
- Electrician
- Instrument technician
- Rig Medic

In addition to the employment position based checklists, the primary operation triggered checklists used throughout the rig move onboard the rig could include the following:

- Watertight integrity
- Intact stability
- Afloat operations
- In transit
- Operations planning
- Tow-masters towing vessel checklist

3.7.2 Vessels

Routine checklists for a tug would normally include departure, arrival, entering 500 m zone and possible DP checklist if applicable. Regarding routine operations, the 'ENTERING 500m ZONE' checklist is the most important of these. It is to be completed and reported to the radio room prior to entering the exclusion zone. If not reported, the vessel is most certainly challenged to do so. Transparency in any defects found is to be taken seriously as well (AHT Zeus, bridge documentation).

3.7.3 Toolbox Talk

Toolbox talk, in a nutshell, is briefing the dedicated team involved in the job to be carried out face-to-face. Safety is the number one topic in this forum. Regardless of title, this is your chance to speak out if something in your opinion is compromising safety. Toolbox talk is known as eventless, the team is simply briefed on how the routine is progressed through, reminding everyone the safety aspects. Execution is often painstakingly boring for cohesive teams already predicting each other moves. The challenge is to properly carry out such a routine, should a new team member join, or to ensure everyone is looking at the same scenario no matter how experienced they are.

3.7.4 Risk Assessments

Risk assessments – salient in many branches is used to determine a numbered value for the risks involved. Risk is always represented in a magnitude multiplied by its potential loss. The number is either acceptable, not acceptable, or acceptable after applying countermeasures. A matrix, displaying risks without protective action and with all precautions taken is often represented side by side. This allows establishing clear boundaries between GO/NOGO situations. An example of *Seafox 4 risk assessment* is displayed below.

Activity	Hazards	Consequences	Initial Risk			Control Measures	Residual Risk			Actions
			S	L	RR		S	L	RR	
Rig under tow legs raised clear of subsea assets.										
Moving off location up on to tight tow.	Failure of tow wire or tugs	Uncontrolled vessel movement, collision.	4	B	M	Certified towing equipment/ Ensure tug redundancy/ Toolbox meeting	2	B	L	
In transit	Vessel navigation/ positioning equipment fails	Unknown tow position relative to other vessels / infrastructure.	2	B	L	Tug and Unit have GPS system / 100% redundancy. Tow master to monitor passage plan updated charts available on unit.	2	B	L	
	Tug boat failure / breaking of towlines	Rig drifting, potential equipment damage, collision.	4	B	M	Shell Vessel assurance / Sufficient tug redundancy/ Emergency tow line	3	B	L	
	Conflict with vessel traffic / crossing traffic lanes	Collision, structural damage	4	B	M	Rig move notification / Tug master in control of vessel movements/RMP / safe navigation on lead tug. Lead tug will issue navigational warnings via VHF on regular basis	2	B	L	
	Weather deteriorates during the move	Use emergency location or appropriate surveyed site. Loss of unit / collision / Unable to Pin.	4	B	M	As per RIG owner Marine Operating manual and Rig Move Procedure (RMP). Weather forecasts available x2. Lowering of legs according to storm procedure in Rig operating manual..	2	B	L	
	Reduced visibility	Increased risk of collision	3	C	M	Tow master to monitor. Good Seamanship COLREGS	2	C	L	

3.7.5 500 m Exclusion Zone

This exclusion zone is not only important for the vessels and rigs to trigger the checklists, but it also functions as a commercial boundary upon entering or leaving, where change of charterer may take place and various responsibilities are changed.

3.8 Chart Projection

In seafaring, ellipsoid projections has been the established position coordinate system for some time now hence the numerous GPS appliance compatibility. However, in the offshore industry the rampant positioning method used is the grid-based coordinate system.

Conversion between these two is somewhat complex, and often requires transformation programs. The reason for this is to combine information from both grid based coordinates and spheroid projections. A grid system allows for better angular accuracy as well as simple, on-the-field distance calculations between objects close to each other utilizing the Pythagoras method. Spheroid projection then again provides better general sense of whereabouts in a more global way.

3.8.1 UTM

The Universal Transverse Mercator *"divides the Earth into sixty zones, each a six-degree band of longitude, and uses a secant transverse Mercator projection in each zone. A position on the Earth is given by the UTM zone number and the easting and northing coordinate pair in that zone. The point of origin of each UTM zone is the intersection of the equator and the zone's central meridian, but to avoid dealing with negative numbers the central meridian of each zone is set at 500,000 meters east. In the northern hemisphere positions are measured northward from zero at the equator; the maximum "northing" value is about 9,300,000 meters at latitude 84 degrees north.* (Wikipedia).

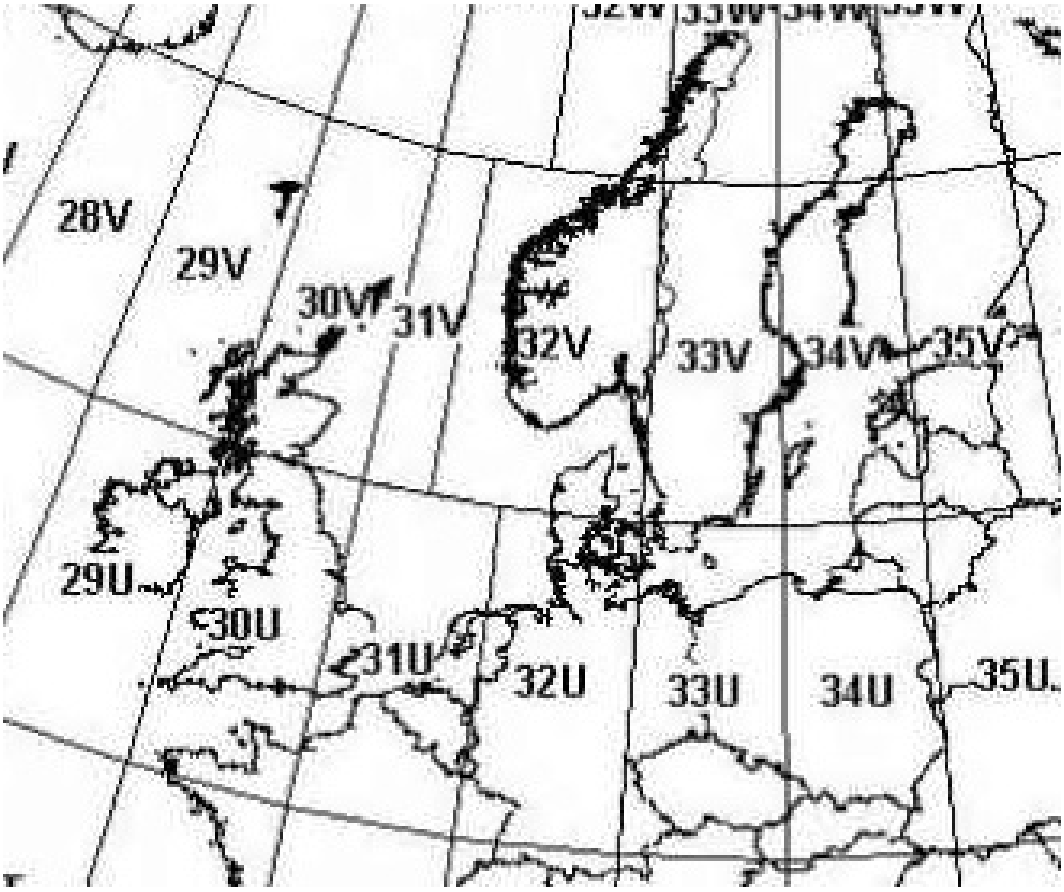


Figure 19.UTM Grid Zones

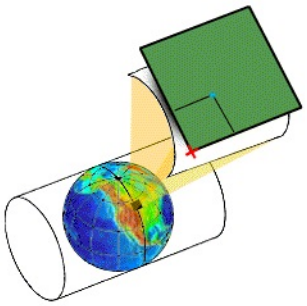


Figure 20. UTM Zone section

UTM zones may not be combined. It is possible to have the exact same coordinates within two different zones. Figure 20 Illustrates the zone size inside which all distance and heading calculations must be made.

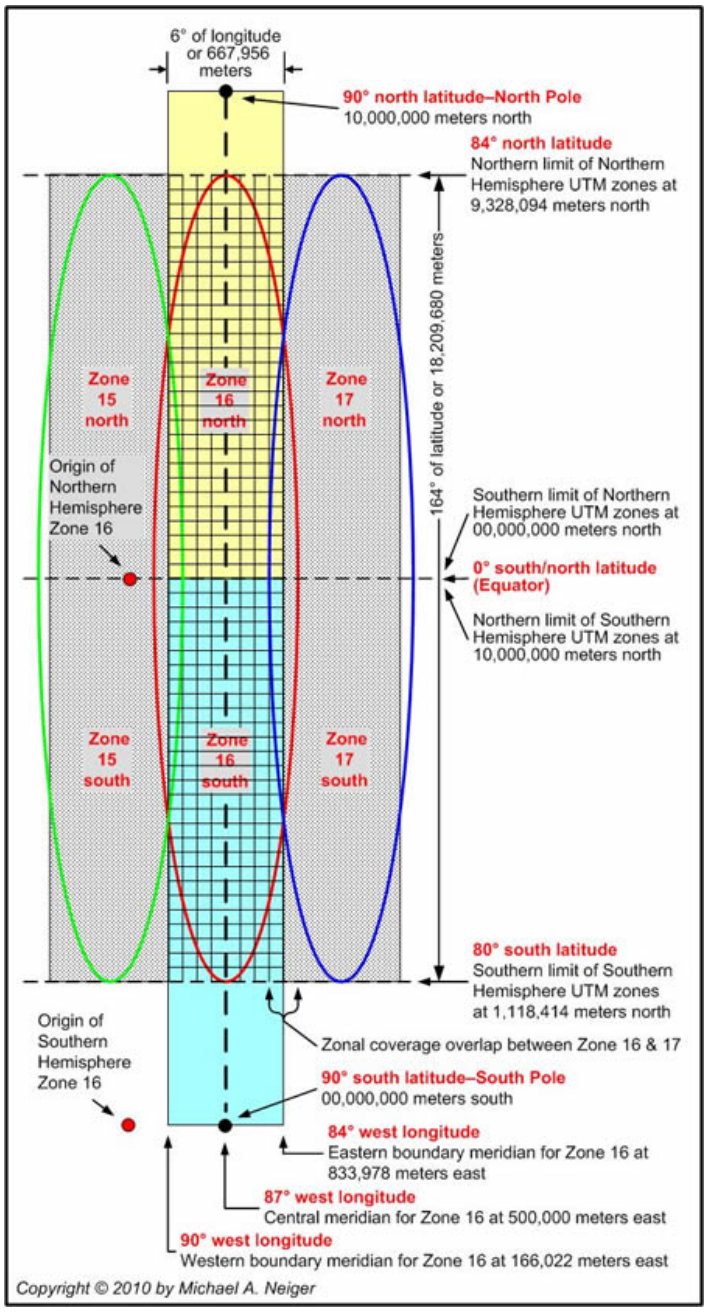
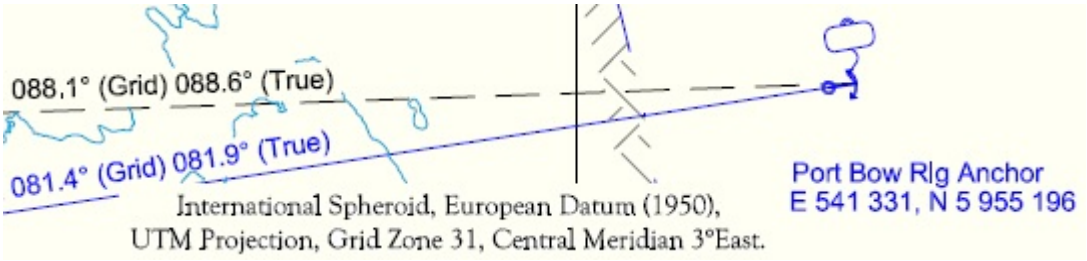


Figure 21. UTM breakdown

With UTM it is worth noting that there are various ways of indicating the northern hemisphere, this is further discussed later in this chapter. Offshore industry in the North Sea uses labeling as displayed below.



(*Seafox 2 anchor- plan screenshot)*

The screenshot above displays the position origin in the bottom, European Datum (1950) and its central meridian 3° east. This establishes the origin of the grid zone 31 displayed in this example. Other datums may be used as well. An easting value of 500 000 is in the middle of the grid zone 31.The northing value is derived from distance between equator and the position of interest. In the southern hemisphere the figures are reversed, indicating a maximum value of 10 000 000 at the equator in order to preserve the logic of values increasing towards the north.

There is a great chance of mixing the occasionally used N indicating northern hemisphere with abbreviated designator N as in northing value**.** The Military Grid Reference System (MGRS) used in conjunction with UTM, adds the confusion even more. In MGRS the latitude band designators are labeled with characters. The letter designators indicate latitude zone (see Figure 19) and character N by coincidence indicates the first latitude band in the northern hemisphere.

In MGRS, a few exceptions exist regarding grid zones being identical to each other. Letter designators I and O have been omitted from the MGRS system in order to avoid similarity with numbers one and zero. In addition some latitude bands have been extended or shrunk to accommodate for a shared coordinate bed. To avoid confusion, here is what MGRS coordinate looks like:

4QFJ 12345 67890

According to Wikipedia this is how it may be interpreted:

An example of an MGRS coordinate, or grid reference, would be

4QFJ12345678, which consists of three parts:

4Q (grid zone designator, GZD)

FJ (the 100,000-meter square identifier)

12345678 (numerical location; easting is 1234 and northing is 5678, in this case specifying a location with 10 m resolution)

3.8.2 ED1950

The ED1950 is a World War II era coordinate system. It was widely used between European nations to agree postwar territorial boundaries. As it was an approved and internationally recognized coordinate system, it was ideal for early 1960s offshore industry, providing consistent position information across nation borders. It has been replaced in many applications by now.

'Seafox 2 Anchor Plan screenshot' also shows that the eastings and northings are given in European Datum 1950 form. Initially this may create some confusion whether the UTM is a datum itself. It is a cross section of a Transverse Mercator projection as the name suggests. The coordinates may still be given in various datums of which ED1950 is one among others (John D. Bossler, James B. Campbell, Robert B. McMaster, Chris Rizos).

3.8.3 WGS84

World Geodetic System 1984, refined from its predecessors WGS72 and WGS66, was first introduced in the early 1980s. It is the most widely used coordinate system. Many standards have been replaced to support this datum and GPS of course during its 30 years of history. WGS84 is the most accurate ellipsoid model of the earth. Latitude and longitude provide an easy understanding of how the coordinates translate into position. International navigation is based almost exclusively on this datum (hydrographic and marine software solutions).

3.8.4 Position and Datum Conversion

Coordinate conversions allow combining information from the procedures and provide redundancy should a TMS system for example malfunction. When converting from UTM to WGS84 one should always remember to check the origin datum as well, ED1950 in most cases. Conversion is therefore carried out from UTM / ED1950 eastings and northings in meters to WGS84 latitude and longitude degrees minutes and fractions or equivalent.

The philosophy behind implementing two different coordinate systems is to provide better angular and distance information using UTM. Many offshore positioning systems especially prior to the GPS era used lasers and prisms. Light as in laser of course does not travel along a rhumb line.

When positioning subsea assets with accuracy calculated in centimeters, it is better to use UTM because of less local angular distortion, and a good compatibility with programs using metric system such as *Autocad*. This allows the engineers, survey team and those navigating to combine the information. It may sound strange, but two vessels exact parallel relative to each other 30 meters apart, for example, according to WGS84, are actually on a different geographical heading. For navigation or anchor deploying this accuracy is good enough. However, it may not enough to align several bolts together in a large unit.

UTM is not very navigable, which is why conversion to WGS84 is needed in order to place points of interest on the navigation screens of the vessels.

3.9 Offshore Positioning Methods

A regular differential corrected GPS signal is sufficient for most applications in offshore positioning, tugs can be maneuvered and a rig can be put to standoff with high accuracy. Final position approval often requires laser beams and prisms to be used, allowing for even better precision while DGPS still provides redundancy. Subsea sonar reflectors are used where applicable, for ROV operations as an example. Radioactive measuring is used in oil drilling – a rather extreme but nevertheless essential to data gathering through a solid seabed in drilling operations (Fugro).

3.9.1 Survey Gear

The survey gear in a towing environment consists of a DGPS unit, GPS compass, data-link and a display unit. This configuration is called the Tug Management System (TMS). A dedicated position survey team onboard the rig provides the equipment for the tug in order to send its positon and heading data back to the rig where every action can be reviewed and accepted, especially in anchor-handling operations. A display

unit with shared data is onboard the tug as well. Live interaction with the survey team enables new anchor or midline buoy positions to be drawn on the screen with no action required from the tug.

3.9.2 Final Positioning Criteria

The position accuracy demands vary. The seabed, the legs, crane operational limits, cantilever beam and drill, antenna transceiver coverage, helideck clearance all affect the requirements. Even for open locations some aspects need to be reviewed. A quote from a *Seafox 2 procedure* to illustrate the position tolerances "*1x1,5m box with a rig heading 150°T ±1°"* This is the main reason why anchors need to be deployed.

3.10 Redundancy

Redundancy is present everywhere in offshore. Almost every key system is duplicated. Blackout standing orders for example provides the details in a written procedure of what to do should one of the tugs have a blackout. Redundancy is planned for various operational levels such as maneuvering inside the 500 m zone. According to *GOMO 2014* the bridge must be manned by minimum of two STCW-certified officers under such conditions.

Strength calculations are done for almost every tool. A minimum SWL of the hardware is usually enlisted for example in the procedures: chains, shackles, delta-plates, bridle, pennants or stretcher.

Redundancy could also mean safe working practices over practical solutions. Collecting the towing pennant with a bosun hook is not an industry approved method. There is a possibility to do it without exposure to danger. A heaving line is thrown to collect a light tugger wire from the tug. The tugger wire is then connected to a running shackle around the towing pennant and it is brought on deck in a controlled manner between the pins and secured in the fork before connecting it to a towing wire.

3.11 Sequence of Events

In order to maintain the red thread between chapters, it is a good idea to recap chapters 3.5 Rig Move Procedures and Execution and 3.6 Voyage planning. The following paragraphs describe the events in continuation to that.

A rather sketchy approach on topics such as anchor handling was chosen. These topics are not covered to their full extend to avoid discussion on overlapping topics in more detailed books.

3.11.1 Positioning to Standoff Location

During the open sea passage vessel headings are used to carry out course alterations, however, the transit from open sea passage to standoff positioning takes place 1-3 NM before arrival. It is an ineffable rule that heading commands from this moment on should be considered as line headings.

The tow-master engineers a plan and briefs the tugs and rig crew accordingly. Such plan includes where the tugs are to be put into star formation and unit to be turned around, or brought to a standstill. An “approach line” can be used, normally it is a 0.5-1.0 NM line drawn as an extension from the standoff to the direction of rigs standoff heading. Ideally, the unit should be brought to this line, turned to the desired standoff heading, and balance any cross-track deviations while establishing a steady ~0.5 KTS approach speed. Current is often interfering with this plan, and constant adjustments are needed. One could say it is a form of energy management. Fighting the current to stay on a preplanned line does not always pay off. Finding a convenient mean without compromising the safety margins often poses a challenge.

When the tugs are in a star formation and connected with heavy wires, large changes in tow-wire bearings should be carried out through a sidestep maneuver. This guarantees sufficient tension. Touching the bottom is not the main concern, but it takes planning to keep the tug-rig configuration stable by minimizing sudden drops in BP in one direction.

How stable the rig will remain depends both on the tow-master's discretion and the maneuver performed by the tug. It may be challenging if the current is pushing directly from the side and the thrusters are already nearing maximum operational limits to keep the relative position with the unit moving more than 1 KTS upstream. Predicting such a situation takes practice, and occasionally there is no other choice but to compromise the vessel pulling force in order to remain in the correct relative position to the rig. Choosing the tug position according to their maneuvering capabilities also helps to solve the situation.

Standoff positioning is not very position sensitive, however finding the balance for a steady approach early on is challenging to accomplish. A 'smooth landing' without any last minute yanks is everyone's goal.

3.11.2 Preparations for Anchor Handling

Once the rig is pinned in standoff position, preparations for anchor handling begin by finishing off preload or pre-drive as required by rig manual and seabed features. Normally, cranes cannot be used until the legs are stable and pinned deep enough to the bottom. Attachment 5 provides a good overview of the anchor plan.

The AHT then positions itself near the crane to load a set of anchor handling gear on the deck and spools in the necessary pennants on the working drum and loads the shackles, buoys and anchors. Procedures provide a useful buildup overview. There are plenty of personnel making sure everything is in correct order. However, no one should lull him or herself into thinking "my coworkers have it covered".

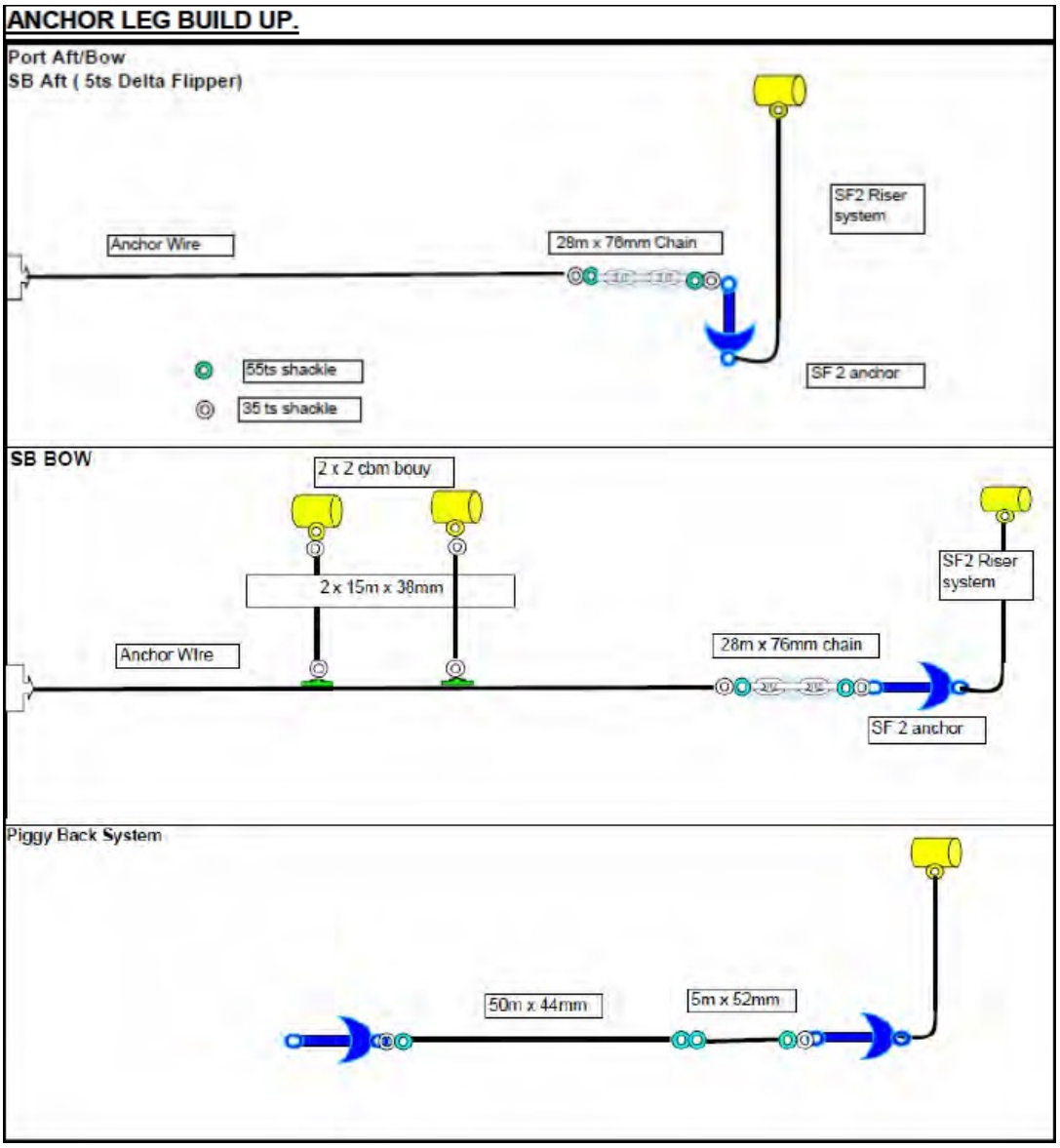


Figure 22. Anchor leg build up (above)

Should the tow-master take more active and authoritarian role while positioning the rig, during anchor handling the communication is more reciprocating. This team together decides which anchors are most reasonable to deploy depending on the current direction and strength.

Pre-drive or preload together with tidal situation often provides a small gap in hectic situations, allowing rest-period requirements to be met. Anchor handling is the most grueling effort, often requiring the whole crew's input.

Midline buoys have to be measured on the working drum in order to determine the correct position providing buoyancy to the anchor wires above vulnerable pipelines. There are at least two ways to do it. One is to measure it on deck and use paint to mark the wire at 10 meter intervals, for example. The easier way, when pipelines are not an issue, is to proceed to a survey team designated point, at an equal distance of midline buoy respective position, and mark the wire from the rig-end. The wire is then spooled in to the working drum between the tug and the painted mark.

Anchor nexus sometimes deviates from the procedures. In such an unexpected situation, the bridge team must be alert and receptive to copy the tow-master's revised instructions. Considering the information exchange would be done via VHF, the challenge is to forward the unmodified message to the deck crew in order to comply with the approved anchor leg build.

3.11.3 Running the Anchors

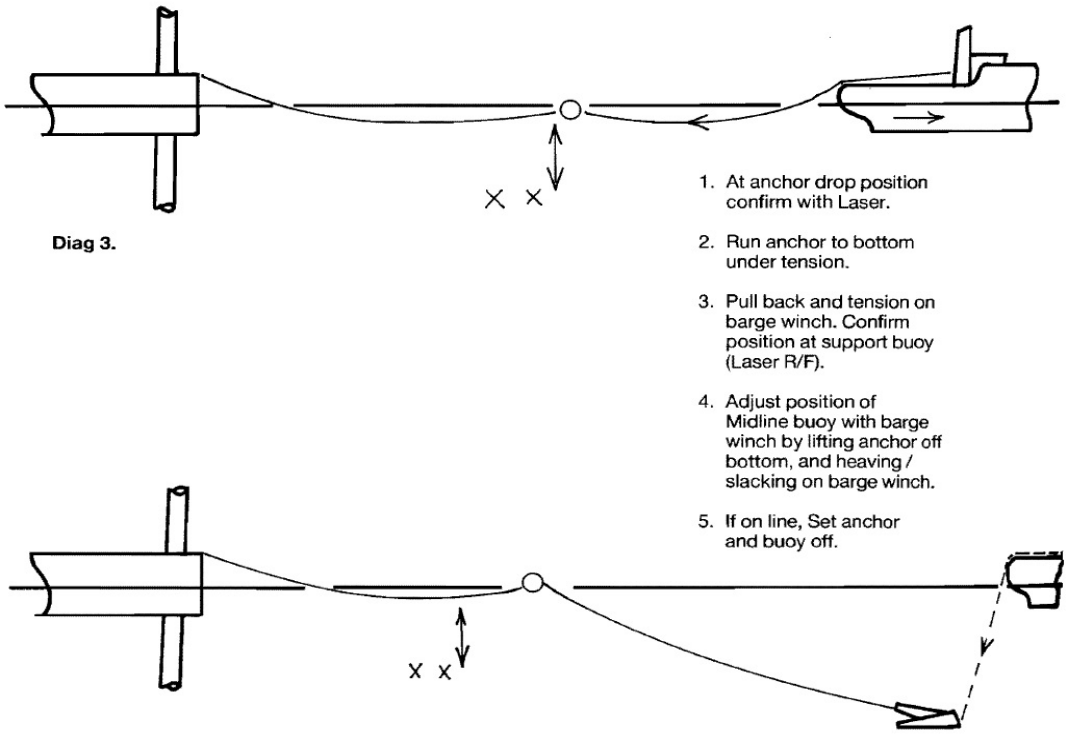


Figure 23. Running Anchors

Illustration in Figure 22 helps unfolding the equipment involved in the connection in its simplest form: **anchor wire – shackle/shackle – pigtail – shackle/shackle – anchor – shackle/shackle – pigtail-shackle – riser pennant – shackle/shackle – buoy – messenger line.**

In addition to this chain, ground pennants or extension wires are sometimes used. Clamped or delta-plate connected midline buoys and piggyback arrangements may be required. These are connected and dropped into their planned slot prior to connecting to the anchor.

The idea is to have the anchor wire from the rig connected to the tug's working drum with the anchor connected in between. The anchor is then dropped past the stern roller. With the AHT proceeding towards the drop point, the survey team and the tow-master will approve the position and the anchor is dropped into the seabed as per Figure 23. The riser pennant from the anchor is connected to the buoy and it is deployed by simply maneuvering the tug away from the anchor position, allowing the pennant to drag the buoy off the deck over the stern roller.

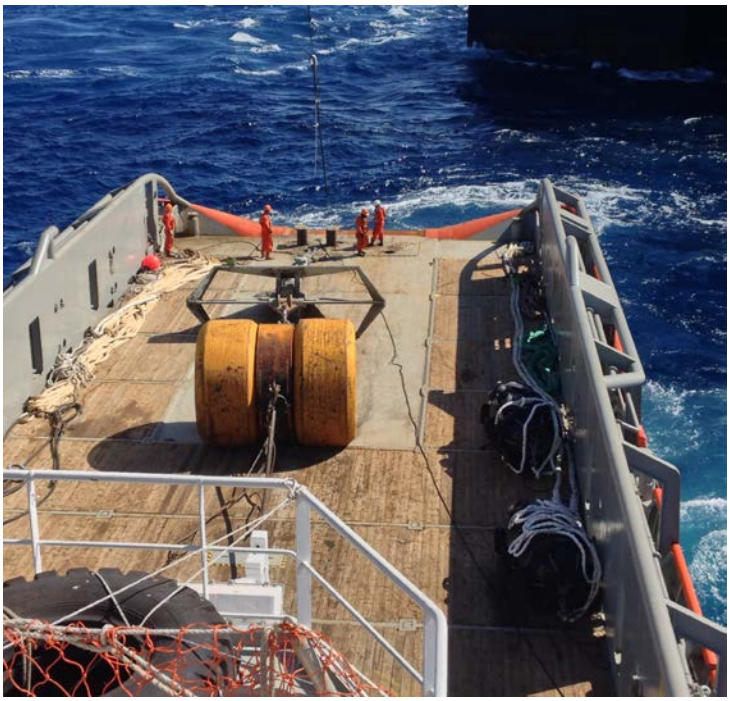


Figure 24. AHT Preparing for anchor run

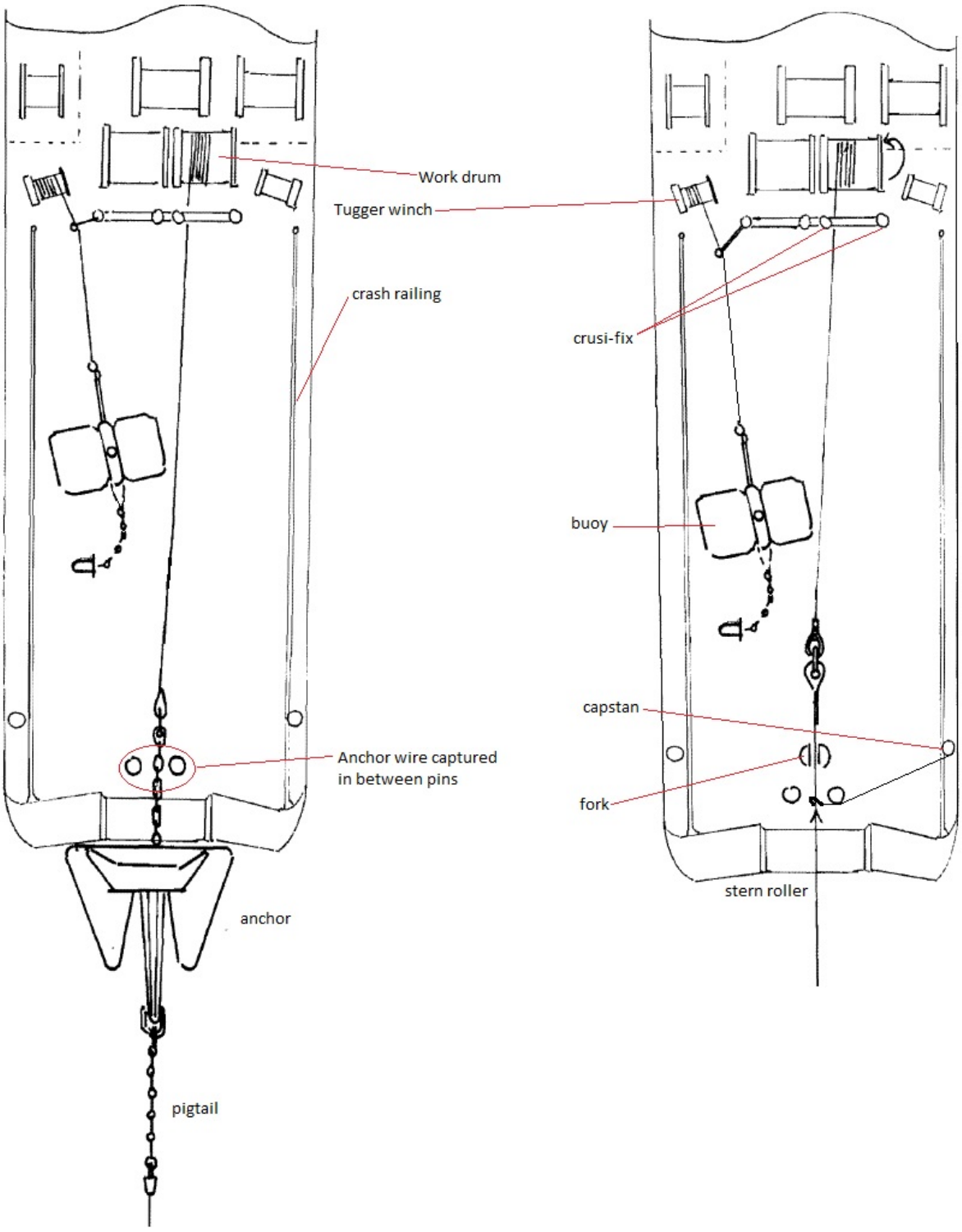


Figure 25. Deck layout

The more complex equipment combinations are used the more workload it generates to the crew. The sheer size of the buoys and the diameter of pennants alone can for example double the time to carry out one anchor deployment. Physical stress is

naturally carried by the deckhands. However, the importance of teamwork cannot be underlined enough. A considerable amount of time is spared if the deckhands know what to expect and if the captain–officer teamwork is fluent, since the handling of the winches connected to the anchor wire directly affects maneuvering and the other way around.

Anchor handling is always carried out using available means to promote safety. Whenever possible, wire is captured in between the pins and wire stopped in the fork while making further connections. There should be a constant communication between the deck and the bridge. Whether it is only nodding heads or giving a thumbs up or verbal confirmation via VHF, the crew must be aware of the next move so that they do not inadvertently enter a danger zone. Fluent interaction means almost completely omitting titles and authorities. A deckhand, for example, witnessing a dangerous situation developing, intermittently makes him or her the most important part of the team. Observations from the bridge could be flawed or occasionally obscured and in such cases there is no choice but to further weigh in the crews' verbal reports.

Despite the good intentions, this does not always prove to be reliable as VHF traffic can be rather intense and there is a great risk of overlapping transmissions, which is fine as long as the awareness is raised to address this. Thinking "silence means assent" is dangerous in this context. The tug crewmembers are not the only individuals exposed to the risks here. The tow-master may suddenly need a full attention as he or she may need to stop spooling out the wire and nimble moves may be needed promptly.

Once all the anchors have been deployed, they are test loaded to make sure none of them are dragging along the bottom. Obviously no vessel should cross the anchor wires while tension is applied on them.

3.12 Final Positioning

With the anchors deployed, preparations for jacking down are carried out. All tugs are called in to connect on the rig in a star formation and the unit is put afloat secured by anchor wires and tugs. From standoff to final position it is usually less than a100 meters or so. The anchor wires for example provide the stability to make the fine adjustments required in the proximity of platforms. It is a rather slow process to pay out the anchor wires on the one side and heaving in on the other. Same rules apply on final positioning and the current should be taking the unit away from the platform during afloat period in case the unit breaks free.

The tow-master directs the tugs, jacking control and anchor wire adjustments. Unlike standoff positioning, there is a potential risk of lowering the legs prematurely or too late in which case one may risk creating a crater where the legs are being sucked in slightly off station on the “wrong footprints”. Correcting such footprints could prove impossible, so close attention to observe the correct position while lowering the legs for the first time is essential.

When the rig is finally pinned to the final location, position is approved by all parties. The unit is raised to a couple of meters’ air gap. Preload or pre-drive is needed once again. One or more tugs may be kept connected during this time. Pinning the legs is always stressing the structures and constant monitoring of rig attitude and reading the hydraulic pressure is needed on the rig to avoid leg bending. Once a sufficient air gap is reached to prevent swell hitting the unit’s bottom, and legs are stably pinned to the bottom, the assisting tugs can be released and the AHT can prepare herself for anchor recovery.

3.12.1 Anchor Recovery

The tow wire is stowed away and work wire prepared on the deck to pick up anchors. The first step is to locate the buoy and the direction of where its’ messenger line is pointing to. It is a good practice to approach the messenger line from below the current or wind, whichever is greater, generating less propeller wash taking the messenger line even further away.

Recovering the anchors is perhaps even more challenging than deploying them since the only trusted position information is displayed on the screen and no visual reference of where the anchor exactly lies in exists. The buoy position of course provides some idea of the approximate position. However, a riser pennant twice as long as the water depth only entails a radius inside which the AHT must be initially positioned in. It is a combination of visual observations and interpreting the navigational aids correctly to position the tug in the right place when the anchor is reaching the roller. One could also say that gut feeling of building tension and varying pointing direction of the riser pennant or messenger line is a very good indicator to alert the one maneuvering to ease the power early enough and re-position the tug and preserve the weak links such as buoy messenger line.

Once the buoy is decked, the anchor recovered and disconnected, the anchor wire is kept captured in between the pins and socket secured in the fork. Unless the anchor is racked, the rig spools in the anchor wire and is towing the tug close to the rig to slip the socket by lowering the fork at close range. Alternatively, the socket can be slipped away once the anchor has been disconnected should the subsea obstructions allow it. Bringing the socket nigh the rig is more common to avoid wearing out the hardware.

The remaining anchor handling gear is then discharged with a crane, and the AHT can be released unless designated stand-by duties are appointed.

4 QUESTIONNAIRE STUDY

4.1 Methods

A large part of this thesis is the study, carried out in a form of web based qualitative questionnaire. The 17 questions measured opinion by percentile proportion or ranking scales in addition to the option for comments for each question. The answer selection was manipulated with exclusion logic or by providing multi-choices accordingly in order to avoid both yesses and noes as per single respondent.

4.2 Reliability

According to Colin Phelan and Julie Wren, reliability is the degree to which an assessment tool produces stable and consistent results (College of Humanities and Fine Arts Student Outcomes Assessment).

When weighing out the reliability of the questionnaire study, majority of the answers inside a question constituted a consistent set of data. The questions that did not indicate consistency, raised comments as expected. While some questions served in establishing background information on the participants, the others were created merely to evolve discussion and an inconsistency to be analyzed.

"Inter-rater reliability is a measure of reliability used to assess the degree to which different judges or raters agree in their assessment decisions. Inter-rater reliability is useful because human observers will not necessarily interpret answers the same way; raters may disagree as to how well certain responses or material demonstrate knowledge of the construct or skill being assessed." (College of Humanities and Fine Arts Student Outcomes Assessment).

While working hard creating questions and minimizing the possibility for misinterpretation, I reckon the reliability objectives according to the quote in the last paragraph was not reached to a satisfying level. Fortunately however, this does not mean the questionnaire itself would not have succeeded reaching the original objective: finding and sharing the common perception in various MRM related topics, outside daily discussion within jack-up rig move operations. It may be outlined that

only a vague link exists between studies measuring opinion and definitive studies such as whether a cure for a cancer has been found.

4.3 Validity

"Validity refers to how well a test measures what it is purported to measure.

Sampling Validity (similar to content validity) ensures that the measure covers the broad range of areas within the concept under study. Not everything can be covered, so items need to be sampled from all of the domains. This may need to be completed using a panel of "experts" to ensure that the content area is adequately sampled. Additionally, a panel can help limit "expert" bias (i.e. a test reflecting what an individual personally feels are the most important or relevant areas). What are some ways to improve validity?

1. Make sure your goals and objectives are clearly defined and operationalized. Expectations of students should be written down.

2. Match your assessment measure to your goals and objectives. Additionally, have the test reviewed by faculty at other schools to obtain feedback from an outside party who is less invested in the instrument.

3. Get students involved; have the students look over the assessment for troublesome wording, or other difficulties."

(College of Humanities and Fine Arts Student Outcomes Assessment)

As per item 2 above, the questionnaire was crosschecked for clarity and contents by a few seasoned foreign and native English speaking mariners prior to release. In addition, spelling and grammar checks were carried out by the supervising English teacher.

The *Survey Monkey,* a web based research software used provided many powerful tools to work with. Functions such as IP-filtering, prompts for required fields, duplicate identifier and bot blockers we in use. In addition, the participants were prompted for a name / identifier, positon and employer. Naturally, in this text such details were omitted to protect the anonymity. The questionnaire was only distributed through an emailed link requiring an invitation and a password.

Expectations and target group in addition to all details were clearly displayed on the first page as per item 1 in the previous quote. The questions were carefully chosen in respect with the expected target group e.g. not only limited to seafarers or tow-masters. A broad selection of answering choices pertained each question accordingly. Comments were enabled for each question to promote discussion and they are published in this text for transparency.

5 ANALYSIS

I chose to explore human performance through the means of Maritime Resource Management topics. The contents of the MRM holds in many of the factors resulting in human performance related accidents. Jack-up rigs together with tugs comprises a large number of people, vulnerable to misunderstandings, human errors and clashes between cultural differences. The objective was never to seek definitive answers with a conclusion. The initial goal was to find and share the general perception in various questions outside daily discussion in this branch. Especially the tug / tow-master interaction was closely examined. In addition, many common MRM-features materialized in my questions in a branch specific manner.

5.1 Q1 Are you familiar with the concept MRM - Maritime Resource Management?

The sole purpose of this question was to establish the background of the respondents. The majority of the respondents were either remotely familiar or familiar with this concept. It was acknowledged that part of the participants would not have seafarer background. However, it would not jeopardize the quality of their input.

MRM as a course is nowadays mandatory by STCW standards in bridge officer studies which nevertheless does not reflect the number of actual certificate holders due to transition periods. The answering distribution, however, does provide a reasonable average figure across this branch.

5.2 Q2 As tugs are connected to a jack-up rig - choose the options that best describe the bridge team in terms of Maritime Resource Management (MRM)

According to Captain Daniel S. Parrott (Bridge Resource Management for Small Ships) the bridge team consists of members openly communicating, verifying and monitoring each other’s actions.

The bridge team definition can be further illustrated with a communication loop.

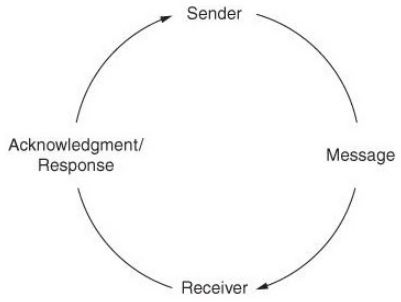


Figure 26. Communication loop

- Build the loop: Establish who is in it, what is expected of them, and the means of communication to be used.

- Maintain the loop: It does no good to issue an order, ask a question, or report traffic if the receiver's attention is elsewhere. Also, don't muddle the message or distract others with unrelated information.

- Get in the loop: If you have information or a concern that is relevant to the situation, don't keep it to yourself and stay in the loop

- Close the loop: Close the loop by only move forward on the basis of assumptions. An unanswered message sows uncertainty.

- Explain your intentions: Create the necessary mental model. Don't assume everyone knows your plan

- Follow up: After a message has been sent and confirmed, watch to see if the actions of the receiver are consistent with the message.

- Listen: Above all, listen. No one learns anything when they're talking.

- Talk the talk: Officers are leaders and will be emulated. Model the communication approach that you expect and require. If you expect a crew member to repeat a command, then you owe them an acknowledgement.

(Parrott, 2011).

A minor majority of 38% selected an answering option "Tug-masters and tow-master form one bridge team in addition to the bridge team inside every unit or vessel" and 31% selected "Tug-masters and tow-master form their own bridge team". Even though the question was represented in a multi choice form, it is evident that the remaining 31% chose a selection outside the definition described above.

The MRM code does not provide an exact definition to who should be included in the bridge team. Bridge team is a vague expression in defining roles unless agreed and well established.

5.3 Q3 Choose the personnel you think should be included in the bridge team.

Regarding the question 2, the objective was to further sort out the general perception purely out of ignorance. Although the tow-master and tug masters appeared obvious members of the team, the numerous comments revealed the absence of OIM, marine representative, assistant barge engineer and jacking engineer from the list of selection. In addition, the membership of the remaining roles was not as definitive (less than 75%).

The idea was to demonstrate the non-shared mental model in liaison with question number 2. While a possibility for multiple interpretations was present, it is worth reviewing whom are supposed communicate with each other. This does not translate into bigger - the better. Comment #3: *"Bridge teams should be very select and only consist of essential members."* sums up the thought appropriately.

5.4 Q4 Do you feel the tow-master's actions are monitored in appropriate way?

23 out 29 respondents replied "yes" and little less than half of them chose "*Yes. Tow-master's actions are monitored to a MRM-standard."* as well. The significance between these two alternatives is in the phrase 'MRM-standard' defined in chapter 6.2.

There is no doubt tow-masters action require planning, briefing, assent and feedback from a carefully selected team onboard the rig such as marine rep, OIM and the barge engineer for example, numerous comments will back this up. MRM-code, however, addresses more specific items such as tug heading and power commands and maintaining a situational awareness as a team.

Ten percent advocated for second guesses creating more confusion. While this may be considered case sensitive, both may be true.

Fourteen percent voted against sufficient monitoring level. Granted, although the tow-masters performance is hardly ever an issue, concerns may be raised in the future regarding the implementation of MRM standards already present onboard the vessels and not as evident on the rigs.

Comment #3 raises another concern.: *"If a marine rep is on the rigmove he should monitor the Towmaster. unfortunately these days most marine reps are inexperienced. The OIM and barge eng. should be able to question the towmasters actions if unsure or in any doubt."*

A larger team better accommodates for filling in the situational awareness gaps. While the comment prevail a universal truth present both on the rig and the tugs, vessels and units are always undergoing a transit period. Someone is always the least experienced or under an ongoing orientation.

5.5 Q5 Do you believe the duties of a tow- master could be further delegated?

In the spirit of MRM, a majority of 17 out of 29 reckoned the tow-masters actions could be further delegated or further delegated at least during high workloads. One could make the conclusion that is possible to direct a jack-up unit, the tugs and leg operation as a team with monitoring elements rather than holding all the strings in one hand.

Yet, eight participants input stated "*No - overall situational awareness is better maintained by one person*" in addition to the four participants answering a simple "no". It is easy to understand, since all the said actions in the last paragraph are tied together in a time sensitive manner and do not promote the teamwork possibilities. It is evident that only one VHF channel is used in coordinating the action, should a tow-master for example make a mistake, there is hardly room for the team around him to point this out, since the channel must stay open for immediate corrective action, carried out in form of verbal commands using the very same VFH channel. The odds

are slim for a pre-emptive monitoring action suspending an undesired event taking place as well. This is mainly because of aforementioned VHF limitations or other physical constraints such as pilothouse and jacking control room being situated in different locations.

"With a solo watch stander, team navigation is a rare event and the wheelhouse is configured accordingly. A benefit of this situation is that it teaches self-sufficiency and working within one's limits. The problem with self-sufficiency is that a person can get used to it, leading to difficulties when the need for teamwork arises. In a team you have to trust others to do things you might normally do yourself. Instead of working at the speed of thought, cognitive resources become maxed out simply staying on top of details, and there is nothing to spare for communicating with the team. While the skill and experience that go into the team-of-one are impressive, teamwork benefits from practice. Going it alone all the time can be a handicap when a team approach is needed. Talk of teams may seem unnecessary to those accustomed to the team-of-one, yet sooner or later, perhaps in an emergency, all mariners end up functioning as part of a team, and it quickly becomes apparent if they are out of practice." (Parrott, 2011).

There is no doubt a tow-master must be a team player. However, the unrefuted method of solo directing is questionable if teamwork has hardly ever been attempted to put through a rehearsal. The highly controversial result of this question indicates the industry approved methods may be undergoing another transitional period in terms of working practices. As discussed in chapter 3.10, almost everything is subject to duplication and double checks. While carrying out the tow-master duties may not seem to fit in this context today, it may not seem out of the ordinary to witness working policies reshaping for the sake of redundancy and bureaucracy in the future.

It should be duly acknowledged though, that many respondents may have interpreted this question referring to times under low workloads as well e.g. arranging anchor handling gear or carrying out pre-transit checks and other duties subject to elementary delegation.

Regarding the comment #2: *"- 2 Tow-masters during high performance moves"* it is unclear in what proportion the two tow-masters onboard a rig would be each other's relievers (full filling the rest period requirements) and help providing a monitoring resource.

5.6 Q6 As a tow-master I would be interested in...

Identity of the tug masters, earlier working history together, tug BP and features, crew nationality, age and experience were appealing fragments of information to a great majority of the respondents.

Comment #2 *"It will very soon be evident whether the tug controls are in the hands of a professional. Most of the questions raised are already covered by todays exchange of paperwork between tugs and rigs/towmasters."* reflects this by endorsing the tow-master *Rob Breure*'s observations when asked what would pay off in tug selection: *"Obviously bollard pull and anchor handling capabilities, more and more DP requirements, maneuverability. Another big one is earlier experience with a tug/ahv. If a tug gives problems during rig moving, this info goes around really fast. Reputation damage for the tug owner is quickly made and it takes long to recover from it. This is not only for tug but also for captains."*

In the light of these comments, it is inevitable to highlight the indisputable effects of crew performance to the vessels marketing value and generating hidden pressure.

5.7 Q7 The safety and fluency of a tug - rig interaction is best assured by focusing on...

The question is rather self-explanatory and provides reliable results on average priorities of various items. The question, even though not essential, was ideal creating an interesting comparison of mental models with personal input since the results were promptly visible upon completing the survey.

5.8 Q8 Given the rig is approaching standoff position and the tow-master is in command. Describe your perception of the balance in influence between these two roles (tow-master / tug) by selecting values on this ranking scale.

An indisputable fact is that, regulations, laws, procedures and certification dictates the fundamental responsibilities between various positions. The question was an attempt in seeking the human performance aspect.

The exact results in attachment 6 should be studied in order to understand the distribution of perception. It is however, worth noting that actions were considered a shared result of tug and tow-master input in majority of sub questions.

It is obvious, that personal features are broadcasted through our individual performance. Some may appear authoritarian to an excess level while others are more easily influenced.

"Leadership doesn't always come with a title. It may be exhibited at the lowest levels of a hierarchy, reinforcing what some have always suspected, that leadership involves certain intangibles of character that transcend rank, credentials, and connections. But while some people seem to be born under a leadership star, leadership can be learned, improved, and cultivated by example, necessity, or sheer determination. People grow into it all the time.

Like other arenas, the nautical world contains a full spectrum of leadership types. There are some who bully and belittle while others go out of their way to mentor and instill confidence. There are extroverts who narrate every thought, and introverts whose concerns and expectations are a mystery to the crew, keeping everyone slightly off balance.

There are reluctant leaders who are exceedingly skilled in all things nautical, except in projecting an aura of leadership; people know who is in charge, but they don't feel it (Parrott, 2011).

As a general rule and according to the procedures, the tug masters are a subordinate to the tow-master. An officer is under master's command. These roles however do not always come to realize in the real life. A spectrum of collisions and merging of egos and personalities takes place in many ways.

It is these findings that explain the inconsistency in balance of affecting the end result. An example, should the tow-master command a power setting of 40%. The tug may interpret this command as in a pulling force equal to 40% is needed, while the captain recognizes the fact that a great proportion of the pulling force is shortly going to be depleted due to a side step maneuver. As the tug is completing the maneuver, straightening the rudder and aligning with the commanded line heading results in increase of the BP. Now, the tow-master may be aware of this and readily command a new power setting. However, the benefits of the tug taking this into account in a preventive manner are not discussed. One might raise a concern that acting on your own to a certain extent is impairing the tow-masters conception of how his or hers commands are materialized. Others address the 'common sense' benefits and carrying out commands in a suggestive manner, possibly beneficial in an eventful situation where scarce VHF-share is already present. Nevertheless, it is always a good practice to warn in time when the tug is reaching her limits if applicable.

5.9 Q9 Does commercial pressure have any impact on your working performance?

This statement holds in my favorite - controversial issues. Should the operational needs be tailored to the preference of commercial requirements? Only 15% reckon 'yes, *this is the way it should be'*. If it is not the commercial requirements then what is driving the need for progress? A majority of 54% answered "no" which in this context indicates that the current balance-frame allows for properly carrying out the duties without the anxiety of fulfilling commercial requirements.

In addition to the three simple yesses, another 15% selected *"Yes, I find it challenging to compromise between commercial and operational requirements"* In rare occasions the operations must be adversely ceased and revenue is suspended. A compromise may be in the verge of safety margins.

Comment #1: *"Normally commercial pressure doesn't have impact on the operations. But when the rig is waiting on weather for weeks it sometimes happens that the required weather window is implemented more creative"*

The proportion of pressure behind decision making and working contribution is role dependent. It is the guidelines and procedures that help us to establish quality decisions, in other words sharing such responsibilities with a superior.

5.10 Q10 The rest period regulations are strictly followed.

I read a great book widely used as a source analyzing this questionnaire: *Bridge Resource Management for Small Ships*. I was impatiently waiting for a chapter or a paragraph of 'non-existent resource management' to come by. While this opus provided many answers and new aspects, the rather soft approach to this subject endorses the obvious. There is no substitute for lack of resources, only means of coping.

Human resources are limited and exceeding them, according to many respondents is tacitly accepted. No brainstorming of the reasoning resulted in any answers of why some regulations are followed, while neglecting others. Falsifying the rest-period documentation as needed makes no sense since the laws and regulations for the most part are on our (the employee) side. The bottom line is, falsifying a vessel document in such way would be stressing the working moral, since it is outside our personal space of which we consider having the full control.

A collective assent in bending the rules, in order to finish what have been started lightening the overall burden, is a feature found in many associations. 12 % of the respondents reckon the slow process behind implementing maritime regulations could be the reason why compliance is dragging behind the laws in force.

5.11 Q11 Should normal rest periods be compromised; on- duty rest for a short period of time during non-critical phases of the job should be widely accepted and duly acknowledged.

64% either addressed the common sense as it is for the greater good to take rest when the situation allows or would allow as long as there is no impact on working performance and delegation is appropriately carried out.

Twelve percent selected *"Everybody does it, allowed or not. There's no need for a new regulation or guideline"* A regulation is not indeed needed for everything, sometimes things work out better when common sense prevails. It is the long living myth that the employer pays the employee for the hours he or she has contributed, while nowadays this obviously is not true in many cases as progress results in revenue. There is no reason why the very same ideology would not work in employer / employee – relationship.

5.12 Q12 How would you describe the safety culture in your working environment?

This question introduced seven sub statements, measured with a rating scale. The sub statements worth analyzing were:

- Safety is important, however exaggerated to some extent.

A majority appeared to agree or somewhat agree to this. The objectives of safety standards appear obvious, the less accidents, the more progress and revenue is generated. In addition, everyone is entitled to safely carry out his or hers job.

A majority quite surprisingly reckon the opposite. Safety is nowadays much more than just protection against accidents: pre-emptive measures and establishing safety records in order to prevent accidents from occurring in the light of statistics. Using a helmet is not a subject to accidental susceptibility. It is an industry established statute created by the fact that a helmet will protect your head against probable and improbable accidents.

Pre-emptive measures however, may decipher a large variety of means reducing risks, where only the sky's the limit. While many of the pre-emptive measures provide notoriously beneficial and effective practices, others may seem discontinued from the original context, appearing confusing, dispensable or generating needless work to be done.

Establishing a benchmark for genuine and dispensable measures may prove to be difficult since the general perception is that all forms of safety are beneficial. Widely accepted safety routines are difficult to alter afterwards. An individual doing so is at a great risk of being labeled as a person poisoning the safety and good faith atmosphere. Despite the good intentions of weeding out safety measures with questionable benefits, the opposite will often take place. Further regulations are augmented and the bureaucracy-level is increasing to accommodate for this. Suddenly the benefits of common sense are forgotten. In the wildest thoughts, compliance with the mass of safety standards may be considered as a hidden marketing strategy. Companies taking care of business in a responsible manner are always deemed better than those not promoting it. This conclusion does not however indicate the companies should disregard safety, but instead recognize the difference between genuine and polished safety standards.

The comment #1 prevail another misuse of safety standards: *"Safety is important. But it often influences the efficiency of an operation, given a potentional hazard a longer time to materialize. Some personnel develop an attitude problem because of safety, they hide behind it, when there is something they don't like doing they state that they can't do it because it is no safe."*

- Safety should be incorporated to routine work - not the other way around.

One may have discovered the safety equipment matrixes used onboard the rigs and towing vessels. Such matrix will provide the appropriate safety equipment to be used in conjunction with the job requirements and the working areas. As an example, safety shoes are always mandatory when working on the deck, while it is mandatory to use them everywhere if it involves welding work.

This may initially seem reversed. Putting the gloves and helmet on hardly provides any additional protection if you are splicing on the deck for example. This example illustrates the difficulty with excessive production of regulations. Surely the crew acknowledges the compliance problem of such guidelines. No one puts goggles on and then decides what can be done. I would address the lost confidence in mariners. Inarguably such posters and guidelines are in place for a good reason, however to what extent does it cover the managements back? MRM constitutes for a blame-free culture to which these findings are in conflict with.

- The objectives of safety and productivity do not meet.

Comment #2: *"Safety cannot be breached. If it collides with produtivity, time-out, another way to be found. A towmaster cannot afford to trust individuals too far/too much. He needs to check, check and check again to ensure his commends contain the correct amount of safety mixed with progress needed."*

The overall average in this statement was evenly distributed. An accident is the biggest possible collision with the productivity suspending all progress. The comment above sums up the thought appropriately.

- "Safety related" accidents are real, too much concentration on safety and guidelines tends to draw the focus away from the work, increasing the likelihood of accidents to happen.

It is surprising to find that respondents agreed to this in a proportion of 60-40. According to the Nautical Institute in association with the Royal Institute of Navigation, VHF-assisted collisions for example are not just a myth. Numerous accident reports will back this up.

Relying on this, I reckon it is possible to be focused on routine work with all the quality ingredients: a shared mental model, experience and training present – only it would be confusing and distracting to find the procedures or guidelines in conflict with the next step. Experience and confidence will help us to overcome the limitations

of written information, although potentially risk developing an excess self confidence in a long run.

- I trust every colleague and outside operator to be fully qualified and trained to one standard.

References to age, nationality, ethnicity, gender or experience were deliberately omitted from this context. A healthy suspicion is always in place and assessing co-workers abilities, weaknesses and strengths takes time. On the other hand, one might adopt new skills, knowledge and a widen his or hers aspects through a fresh colleague.

5.13 Q13 I am ready to hand over my duties and controls to my second in command officer, junior officer or trainee, to promote training and share responsibilities with future prospects.

A conclusive majority considered being ready to hand over the controls to his or hers second in command officer, junior officer or a trainee in order to promote training and share responsibilities with future prospects. Luckily nowadays dual controls in many occasions allow this.

All responsibilities are not shared physically though. The decision making responsibility for example often requires support and an overlapping period. Many of us remember being in the decision makers role for the first time recognizing the helpless feeling of doubt. Confidence will build up only as a result of time and repetition. Mentoring will in most cases only help you halfway through. Taking over the responsibilities for the first time often reflects the commonly used phrase ‘a license is an approval to start learning’

The crew training and expertise status is a nonstop process. A school does not prepare one for the reality. Experienced and senior crewmembers will often shoulder the burden of orientating new crewmembers to their tasks. This is often the case even though only a few have been coached to mentoring and teaching. This causes a significant variation in the quality of teaching. Others may deem it nonessential, outside their job description, while others easily jump in the other persons’ shoes on mental level. Mentoring may be difficult to someone shining with his own

performance. Explicating may be someone's strength without possessing the coordination skills.

"People can find themselves in leadership roles for reasons other than their leadership skills. This may seem backward but reality often imposes other criteria; timing, availability, the right license or endorsement, special skills, experience, local knowledge, seniority, and personal connections can all play a part in filling leadership positions" (Parrott, 2011).

As described above, opportunities and demands often do not meet. When the time comes in handing over the duties, it is not always self-evident that the skills have been transferred accordingly. Most blatant and irresponsible examples represent responsibility exchange taking place without the possibility for training.

How effectively the knowledge and skills are adopted and transferred, is often subject to personal chemistry. This is a good reason for anyone to reconsider and duly acknowledge their responsibility in transferring knowledge regardless to personal preference.

5.14 Q14 Building a good confidence to use the full array of bridge / pilot house equipment takes practice and should be utilized as often as reasonable

The results were not surprising and it is hard to imagine this branch appealing to anyone not feeling comfortable with technical accessories and systems. However, the assumption of anyone mastering the full array of such equipment is simply nonsense. Even the most seasoned (or should I say especially?) must study and re-study the manuals in order to stay in the loop. Mastering your arena helps you building confidence to your subordinates.

Real operations are no place to study the manuals and time will hardly ever allow for it. Another aspect worth of introducing, is practicing. Mariners are often put through a stressful test of practicing in a real situation. Granted, even the wealthiest owners hardly can afford training sessions with hourly rates exceeding thousands of euros.

In order to demonstrate my concern on engineering quality, allow me to state the following: as to my experience, a great deal of attention has been given to working ergonomics during past years. Office chairs, for example, are available with many functions, features and ergonomic attributes. A chair with converging features and functions may exist however lacking the ergonomic qualities, making its use awkward, abrasive and possibly intolerable in a long run.

Such engineering roses exist in software and hardware environment as well. The presence is evident in many systems. It takes an exercised eye to pick up the bad quality in engineering and evaluating a smooth operation of such accessories. The fluent operation of a new bridge element is sometimes invisible to us due to the strong coping strategies set up with old technology, obstructing us in adopting more thoroughly thought designs and ideology.

5.15 Q15 Jack-up rig move procedures

A great majority of 63% reckon the rig move procedures should be followed as far as practicable. 52% also thought it provides an excellent frame to carry out the common practice and 42% considered the procedures allow room for individual solutions.

A slight minority selected answering options outside the ‘comfort zone’ addressing potential issues in credibility and questioning the integrity should the procedures be deviated for the demands of the situation.

All three comments red flagged the significance of differences between procedures, composed to various extents and purposes. Inarguably the rig move procedures are essential. Living without them would be something in between vague and chaotic. A frame must be provided in order to set a large organization in motion. Many details are not easily obtained. An assembly is needed to address the entity.

Entity by definition accommodates a touch of generalization though. With all due respect to the authors of procedures, guidelines and books, the contents are not always waterproof. Flaws in procedures, guidelines or books are not put under suspicion on a light basis. Perhaps it is due to the legal status or superior nature of written guidelines.

For example, it is easier to question or challenge the given information face to face with the ability to adjust your output by body expressions. However, to deviate a procedure or a guideline does not allow for settling - it is either complied or breached.

Even admitted flaws generate extra work. Normally, infeasible findings must be recycled in order to meet the legal requirements. A verbal rearrangement is often insufficient. Common sense may be saying ‘the biggest shackle will permit the weight anyway’, however, to what extent is subject to documentation in order to obey the law and regulations.

The more inaccuracies the documentation contains, the bigger the chances of breaching it. Frequent incompliance may inconspicuously become a new standard which in many contexts is dangerous. It becomes unclear which of the rules and guidelines must be obeyed and which may be disregarded by the prevailing standard.

5.16 Q16 General verbal communication

According to the unified results, good communication is established by minimizing VHF-chatter and exercising direct commands preferably reviewable against written instructions. More than half conceded multiple nationalities creating extra challenge. One third granted offshore vocabulary rather extensive and unique.

The characteristic features of communication were already discussed in the paragraph 6.2 and therefore not further analyzed in this context.

5.17 Q17 Risk assessment and toolbox talk

The last question results did not evolve discussion since all respondents appeared to be sharing the same point of view: risk assessment and toolbox talk must be carried prior to work involving risks, brings various parties physically together, helps sharing the mental model, and genuinely reduces the risks.

One selection perhaps furthest to the ideology of the others, *"Are good tools if utilized as a checklist"* gathered seven votes. The objectives of a risk assessment or a toolbox talk are hardly to educate people but instead bring everybody to the same page.

The comments however, did not reflect the results:

Comment #1 *"They are good tools to increase safety as long as it is done before non routine jobs If it is done forstandard jobs it is just extra paperwork. Also during the time I was still working on vessels it was extra paperwork as we were with a small crew only (7 to 9 crew) and things were already discussed during coffee time."*

Comment #2 *"When working with the same crew and doing the same works you don't need to point out the same things with every move you take."*

Comment #4 *"Some RA are not fully taken inboard by rig crew just signed and filed"*

Bureaucracy is a rising concern on ships. Increasing quantities of documentation requirements have been introduced in the past years, up to the point that a mariner may feel the contents of the job discontinued from his or hers original training and education. The most striking examples of irrelevance that have been brought to my knowledge include sending copies of toolbox talk or a risk assessment carried out to the management. Without questioning, it is the mariner's legs and fingers in danger. Carrying out ones's duties in a safe manner is the cheapest known life insurance. An airline does not request a copy of a takeoff checklist from the pilots prior to departure – it is part of their fundamental duties.

Only because a bridge of a vessel is a place where various documents can be produced, it does not mean they should. Sending verifying copies in order to satisfy documentation demands may sound crazy with often the small resources onboard a tug. There might be a lot more essential things going on behind the scenes like familiarizing a new crew member by having dual men watch. The vessel may be dealing with a technical difficulty altering the routine. The bridge really is not the ideal place to modify the documentation to satisfy the evident safety policy as in

management would probably be reluctant to receive copies of checklists filled in half way through.

6 CONCLUSIONS AND RECOMMENDATIONS

In the light of the questionnaire survey results I would like to address the following items:

For the various individuals involved in jack-up rig moving to reconsider their roles from a maritime resource management point of view.

For masters, mates and tow-masters, it would be worth considering to what extent we permit sustained methods to obscure our development of new strategies.

The authors for recognizing their responsibility in writing accurate procedures, guidelines, books or checklists, with legal status or superiority which cannot be altered because of their time sensitive nature. The reader’s fundamental confidence is easily misled.

7 SELF-ASSESSMENT

The most difficult part of setting up the survey was creating the right questions evolving discussion, without excess provocation.

Too simple questions would have appeared self-explanatory and leave no room for academic analysis. An excess complexity increases the chances of misinterpreting and possibly frustrates many to the point of discontinuation. In order to avoid this, many of the questions were created in a multi-choice or a ranking scale form in addition to retaining the possibility for comments.

Yet after closing the survey I found some of the questions either slightly irrelevant, too extensive or providing too many alternatives and lacking the red thread in between. The possibility of respondents skipping the questions was recognized early on and the filtering feature helped a lot to come up with a consistent legible proportion.

I experienced the questionnaire target group cropping challenging. Tuning the questions to a more general level solved the problem, as well as it probably increased the number of respondents. Regarding my initial goal, I consider the number of respondents to be more than adequate.

Creating the answering options was challenging. A convenient blend of objectiveness and provocation had to be found almost completely without outside opinion. Exposing personal preference in the process and providing appropriate scale of answering selection forced me to step outside the box. It was not until a good friend of mine cross checked the questions, when I realized the numerous interpretation possibilities and the vague expressions he kindly pointed out.

8 EPILOGUE

At the time of writing this thesis and during the past 4 years I was an active duty 1st officer on an anchor handling tug operating mostly in the North Sea area.

I would like to thank captain Mikael Stude, captain Nils Erik Westerholm and tow-master Rob Breure for providing their knowledge and assistance in orientating to this profession, allowing me to pass forward and merge the surfacing thoughts.

In addition, I would like to thank all the questionnaire participants for allowing me to gather a sufficient selection of data.

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Attachment 3. *Arrival location*

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Attachment 5. *Seafox 2 Anchorplan*

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Attachment 6. *Questionnaire Study*

TABLE 14.6—TYPICAL JACKUP MODU CREW COMPLEMENT AND JOB RESPONSIBILITIES

Job Classification	On Rig	Total On/Off	Job Description
Offshore Installation Manager (OIM)	1	2	In charge of all activities and legally responsible for the MODU.
Senior/Day Toolpusher	1	2	In charge of drilling activities and directing personnel that support the "hole making" activities on the MODU
Night Toolpusher	1	2	Similar duties to Day Toolpusher but works at night and usually subordinate to the Day Toolpusher
Driller	2	4	In charge of the drillfloor, drill crews, well progress and reports to the Toolpushers.
Assistant Drillers	2	4	Assists Driller, in charge of drillfloor when Driller is not present. Assists Driller in his duties.
Derrickman	2	4	On trips in and out of the well racks pipe in the derrick at the monkey board level and also assists with mud solids equipment and monitoring mud condition.
Floorman	8	16	Supervised by the Driller and works primarily on the drill floor, substructure and with drilling tools.
Crane Operator	2	4	Operates the rig's cranes and supervises the Roustabout crews.
Roustabout	4	8	Performs manual labor such as painting, unloading boats, carrying supplies to store rooms and other manual labor under the direction of the Crane Operator.
Mechanic	2	4	In charge of all rig mechanical equipment but particularly engines.
Assistant Mechanic	1	2	Splits tours between two hitches of Mechanics. Aids in Mechanic's work and is in training.
Motormen	2	4	Primary duty is to monitor and attend the engine room. Reports to the Mechanic.
Electrician/Electronics Technician	2	4	In charge of all rig electrical and electronic equipment and their maintenance.
Assistant Electrician	1	2	Splits tours between two hitches of Electricians. Aids in Electrician's work and is in training. Reports to lead Electrician.
Welder	1	2	Welds plate and pipe as necessary for drilling contractor and operator.
Materialsmen	2	4	Handles materials, data entry for maintenance, purchasing, inventory, etc.
Communications Operator	1	2	In charge of communications.
Barge Engineer	1	2	In charge of the marine equipment and its operation. In charge during rig moves and jacking. Generally the maintenance crews and specialists report to the Barge Engineer.
Catering/Camp Boss	1	2	In charge of hotel function on rig such as food, laundry, etc.
Cooks	2	4	Prepares food.
Galley Hands	10	20	Helps with food, cleans rooms, laundry, etc., under the Camp Boss
Total	**49**	**98**	Totals for basic complement

1. Crews work 12 hour shifts and usually change at 6:00 AM/PM
2. Individuals with no onboard relief are on call 24 hours per day but usually only work 12 hours per day.

LOCATION DEPARTING		
Designation	**K5-A (South)**	
Co-ordinates ED50	**53° 41' 47.09" North.**	**03° 20' 24.83" East.**
UTM TM (CM = 3º East)	**522 464.7 Eastings**	**5 949 926.1 Northings**
Bow CL SF2 (CM = 3º East)	**522 475.95 Easting**	**5 949 901.44 Northing**
Water depth	**40.8 m LAT**	
Seabed data	**0.0 – 2.0m Fine, silty, slightly clayed, very loose sand;** **2.0 – 3.0m Medium dense sand;** **3.0 – 3.8m Soft clay;** **3.8 – 4.2m Medium dense sand;** **4.2 – 11.0m Dense sand.**	
Penetration	**2.7 – 3.4m**	
Prevailing current	**Turns clock wise, no real slack, max 0.7 kts**	
Prevailing wind	**NW – SW**	
Tidal range	**Spring 1.7 mtr Neap 0.9 mtr**	
Time of High water at Location	**HW Immingham + 15 min** **LW Immingham + 15 min**	
Heading	**296.4º True**	
Closest Point	**Crane housing SF2 to Platform: 4.42m** **PS Bow Leg – Pipeline: 14.40m,**	
Air gap	**± 19.0 mtr**	
Obstruction	**Seventeen sonar- contacts: 11 x debris (of which 8 possible sub-sea marker buoys), 4 x old spudcan depressions and 2 x single mattresses.**	
Distance to shore Distance to Den Helder Distance to De Kooi airport Distance to closest platform	**62.4nm Texel** **79nm** **70nm** **Within 6 nm 4 Satelites in block K/4 and K/5** **Main Platform K6-C 18.8nm**	
Remarks	**Sticky Legs may be expected.** **New module has been installed on K5-A (not shown on departure drawing.)** **Cantilever beam sticking out on the SB side of the SF2.**	

4.

LOCATION ARRIVING		
Designation	**K5-F**	
Co-ordinates ED50	**53° 44' 30.144 North**	**003° 37' 05.798" East**
UTM TM (CM = 3º East)	**540 783.771 Eastings**	**5 955 091.821 m Northings**
Bow CL SF2 (CM = 3º East)	**540 818.05 Eastings**	**5 955 096.20 Northings**
Water depth	**37.5m LAT at the template location.**	
Seabed data	**0.0 – 0.8m: Sand, very silty, very loose** **0.8 – 2.5m: Sand, medium dense with possible thin clay limitations.** **2.5 – 6.0m: Sand, dense to very dense with possible thin caly limitations.** **6.0 – 7.0m: Firm clay** **7.0 – 10.5m: Loose to medium dense sand.**	
Expected Penetration	**2.2 – 2.8m, as per last visit in 2011. Returning to the previous footprints.**	
Prevailing current	**Turning clock wise max 0.7 kts**	
Prevailing wind	**NW – SW**	
Tidal range	**Spring 1.75 mtr Factor: 0.27 x Range Immingham** **Neap 1.00 mtr Factor: 0.31 x Range Immingham**	
Time of High water at Location	**HW = HW Immingham + 0h 41m** **LW = LW Immingham + 0h 06m**	
SPS / Proposed SF2 Heading	**044.2˚ True**	**126.4˚ Grid**
SPS dimensions	**L x B x H 22.2 x 14.2 x 7.1 m (6.6m above seabed level)**	
Tolerance	**A circle with a radius of 0.5 m and heading +/ - 1˚**	
Air gap	**Maximum 33m on 5m penetration (if penetration 4m, for example, 34m airgap is also accepted.)**	
Obstruction	**Subsea Template and Pipelines.** **Single Mattress is observed to the North East of the template.**	
Closest Distance	**Umbilical and pipeline exiting the Template, closest distance to umbilical; SB Bow Leg – 7.95m** **SB Bow Leg to template: 10.17m** **SB Aft Leg to template: 8.97m**	
Distance to shore Distance to Den Helder Distance to De Kooi airport Distance to closest platform	**54.2 nm to Vlieland** **75.0 nm** **63.9 nm** **4.3 nm from K/5-EN/C** **5.3 nm from K/6-N** **10.3 nm from K/5-A** **9.3 nm from K/6-C** **24.2 nm from L/7-QP**	
Remarks	**Cantilever beam pre welded on deck. Sticking out 8.52 mtr.** **Tugs to be warned.**	

5.

Blocks
- Blocks
- Exploration Licences

Fields
- Oil
- Gas

Pipelines
- Oil
- Gas
- Oil & Gas
- Proposed Pipeline

Terminals
- Terminals

Cities
- Capital City
- Major Town

Abbreviations

BAYERNGAS	BAYERN	ENTERPRISE	ENTER	PA RESOURSES	PA
BHP BILLITON	BHP	EXCELSIOR	EXCEL	PARKMEAD	PARK
BLACK SAPPHIRE	BSAPP	EXXONMOBIL	EXXMOB	PERENCO	PEREN
BOW VALLEY	BOW	FAIRFIELD	FAIRF	PETRO-CANADA	PCANA
BURLINGTON	BURL	FIRST OIL	FIRST	PETROFAC	PETROF
CAITHNESS	CAITH	FREQUENT	FREQ	PREMIER	PREM
CANAMENS	CANA	GAZ DE FRANCE	GDF	PROVIDENCE	PROV
CENTRICA	CENT	HOLYWELL	HOLYW	ROUNDSTONE	ROUND
CENTURY	CTURY	HURRICANE	HURR	SCOTSDALE	SCOTS
CHALLENGER	CHALL	HYDROCARBON	HYDROC	SENDERO	SENO
CHEVRON	CHEV	IDEMITSU	IDEM	SINGLETON	SINGLE
CHRYSAOR	CHRS	INFRASTRATA	INFRA	STATOIL	STAT
CONOCOPHILLIPS	CONOCP	LANSDOWNE	LANSDOWN	STAVANGER	STAVA
CORSAIR	CORS	MARATHON	MARA	STELINMATVIC	STELIN
DELIVERIT	DELIV	NAUTICAL	NAUT	TALISMAN	TALIS
DET NORSKE	DETN	NEWFIELD	NEWF	VENTURE	VENT
ENCOUNTER	ENCNTR	NORFOLK	NORF	VOLANTIS	VOLAN
ENDEAVOUR	ENDEV	NORWEGIAN	NOR	WINTERSHALL	WINTER
ENQUEST	ENQ	OILEXCO	OILEX		

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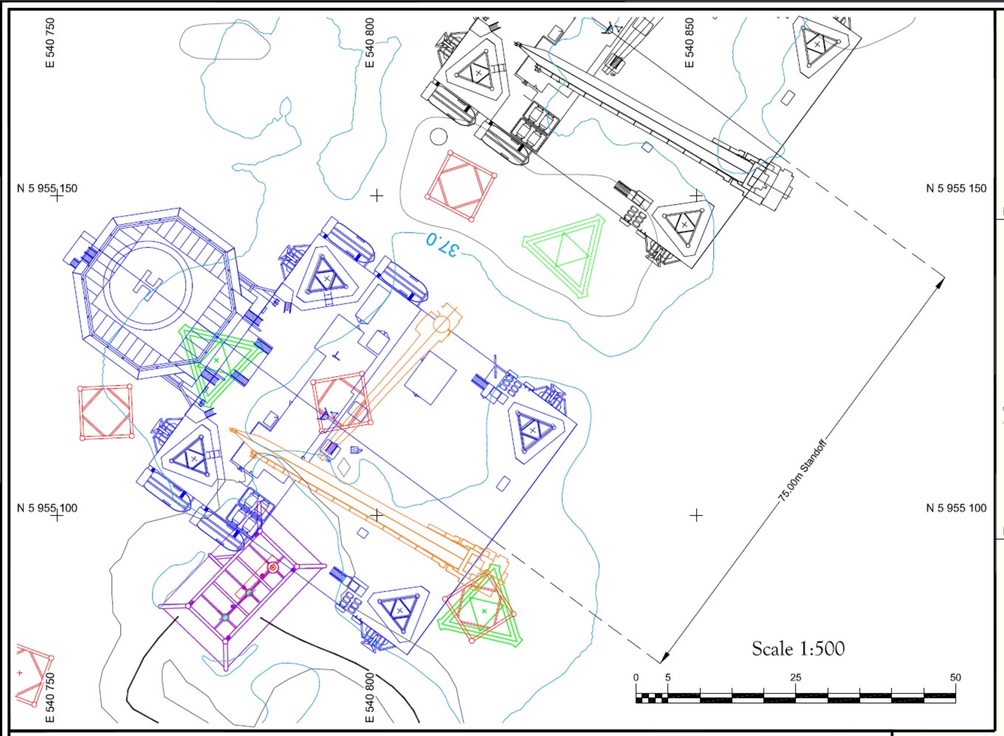
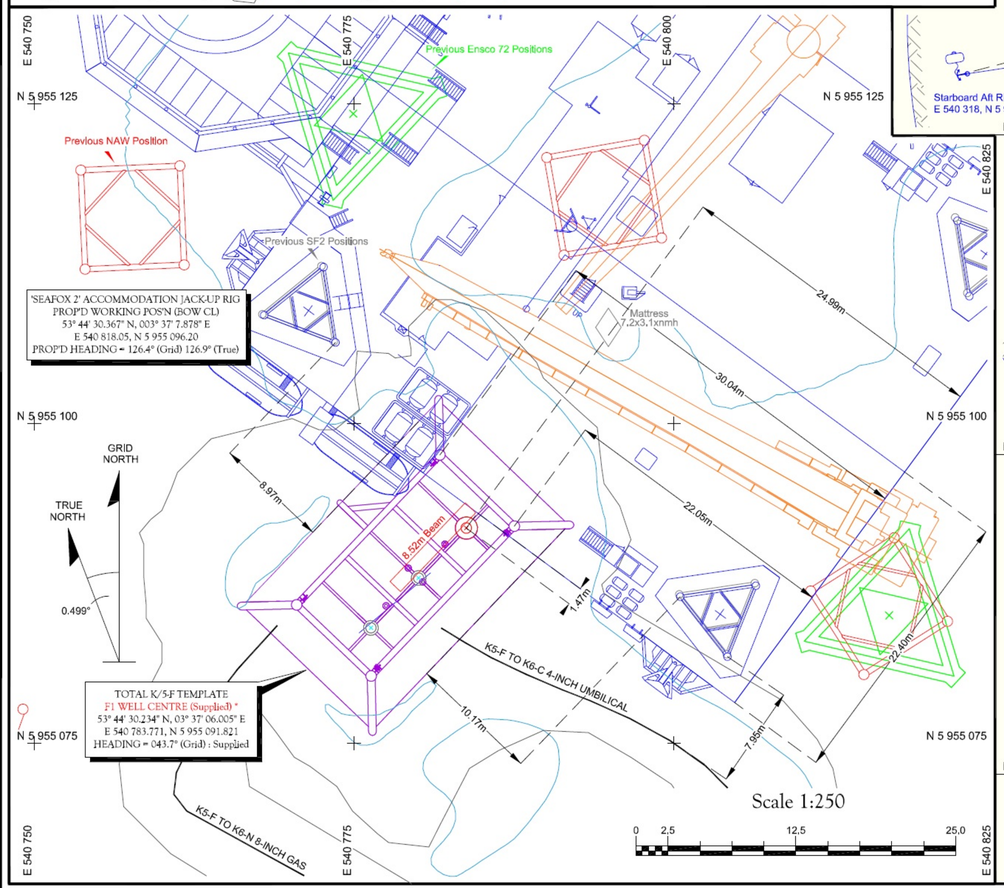
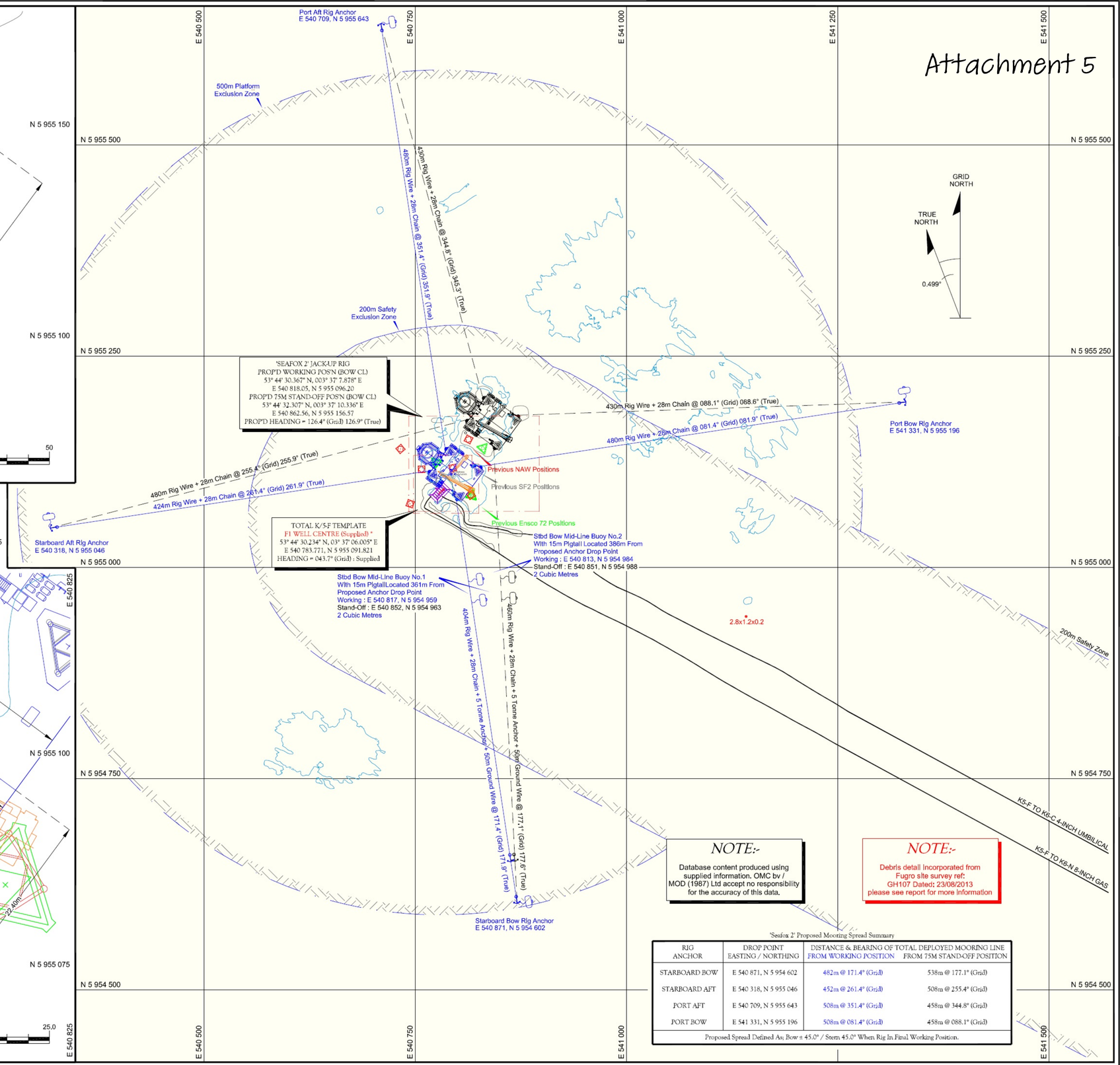
UK - DEAL; Norway - Norwegian Petroleum Directorate;
Netherlands - TNO;
Ireland - Geological Survey of Ireland/ Department of Communications, Energy and Natural Resources;
Denmark - Danish Energy Agency.

Attachment 5







NOTE:-

Database content produced using supplied information. OMC bv / MOD (1987) Ltd accept no responsibility for the accuracy of this data.

NOTE:-

Debris detail incorporated from Fugro site survey ref: GH107 Dated: 23/08/2013 please see report for more information

'Seafox 2' Proposed Mooring Spread Summary

RIG ANCHOR	DROP POINT EASTING / NORTHING	DISTANCE & BEARING OF TOTAL DEPLOYED MOORING LINE FROM WORKING POSITION	FROM 75M STAND-OFF POSITION
STARBOARD BOW	E 540 871, N 5 954 602	482m @ 171.4° (Grid)	538m @ 177.1° (Grid)
STARBOARD AFT	E 540 318, N 5 955 046	452m @ 261.4° (Grid)	508m @ 255.4° (Grid)
PORT AFT	E 540 709, N 5 955 643	508m @ 351.4° (Grid)	458m @ 344.8° (Grid)
PORT BOW	E 541 331, N 5 955 196	508m @ 081.4° (Grid)	458m @ 088.1° (Grid)

Proposed Spread Defined As: Bow ± 45.0° / Stern 45.0° When Rig In Final Working Position.

Produced By:
Marine Offshore Designers
Marine Offshore Designers (1983) Limited
[Project No. PR1787/OMC/2013]
And:
Offshore Marine Contractors b.v.
Client Ref: OMC/2013-09-10_1

And:
Workfox B.V.
On Behalf Of:
TOTAL E&P NEDERLAND B.V.

When printed At A1 Chart Scales Are
Scale 1:2,500, 1:250
0 25 125 250
0 2,5 12,5 25,0
Distance In metres

International Spheroid, European Datum (1950),
UTM Projection, Grid Zone 31, Central Meridian 3°East.

ISSUE / REVISION INFORMATION

ISSUE No.		DRAWN	REVISIONS CHECKED	DATE
2	MIDLINE BUOYS ADDED TO STARBOARD BOW ANCHOR	[redacted]	[redacted]	05/09/2013
1	ISSUED FOR INFORMATION	[redacted]	[redacted]	04/09/2013
0	DRAFT	[redacted]		21/08/2013

DRAWN [redacted]
DATE 21/08/2013
CHKD
DATE

Offshore Marine Contractors b.v.

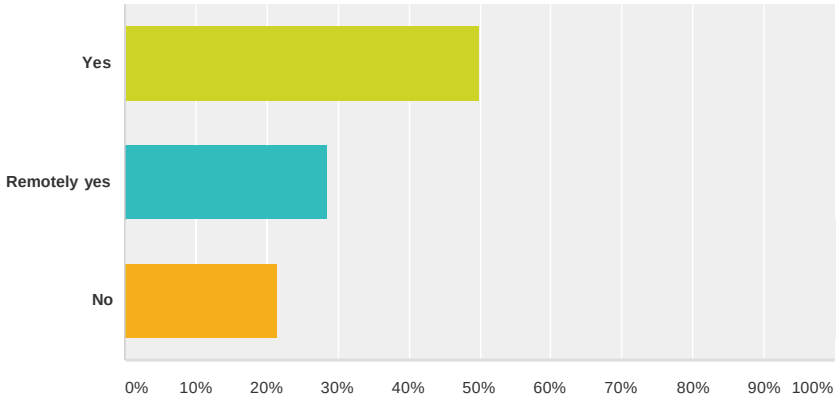
PROPOSED ANCHOR PLAN
'SEAFOX 2' ACCOMMODATION JACK-UP RIG AT
Total E&P NEDERLANDS 'K/5-F' TEMPLATE

DRG No. Pr1787_1
ISSUE No. 2

Attachment 6

Q1 Are you familiar with the concept MRM - Maritime Resource Management?

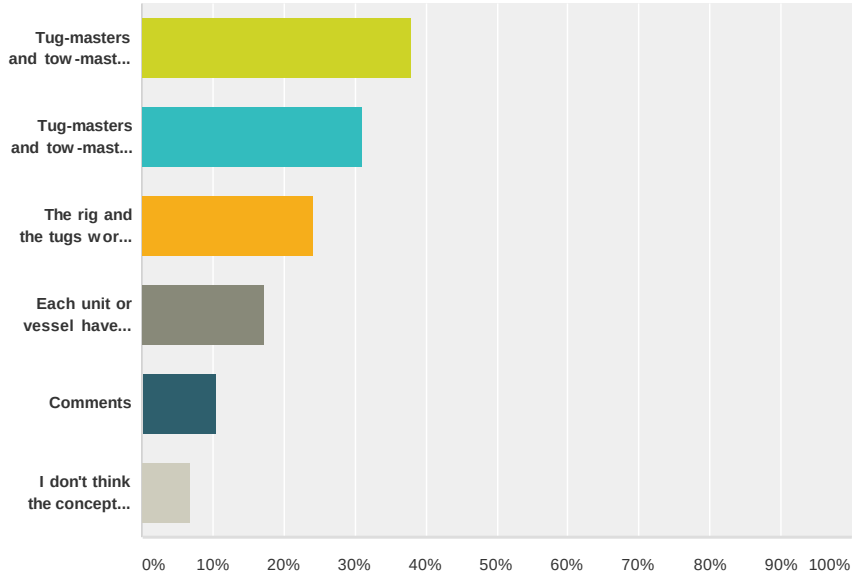
Answered: 28 Skipped: 3



Answer Choices	Responses	
Yes	**50.00%**	14
Remotely yes	**28.57%**	8
No	**21.43%**	6
Total Respondents: 28		

Q2 As tugs are connected to a jack-up rig - choose the options that best describe the bridge team in terms of Maritime Resource Management (MRM)

Answered: 29 Skipped: 2

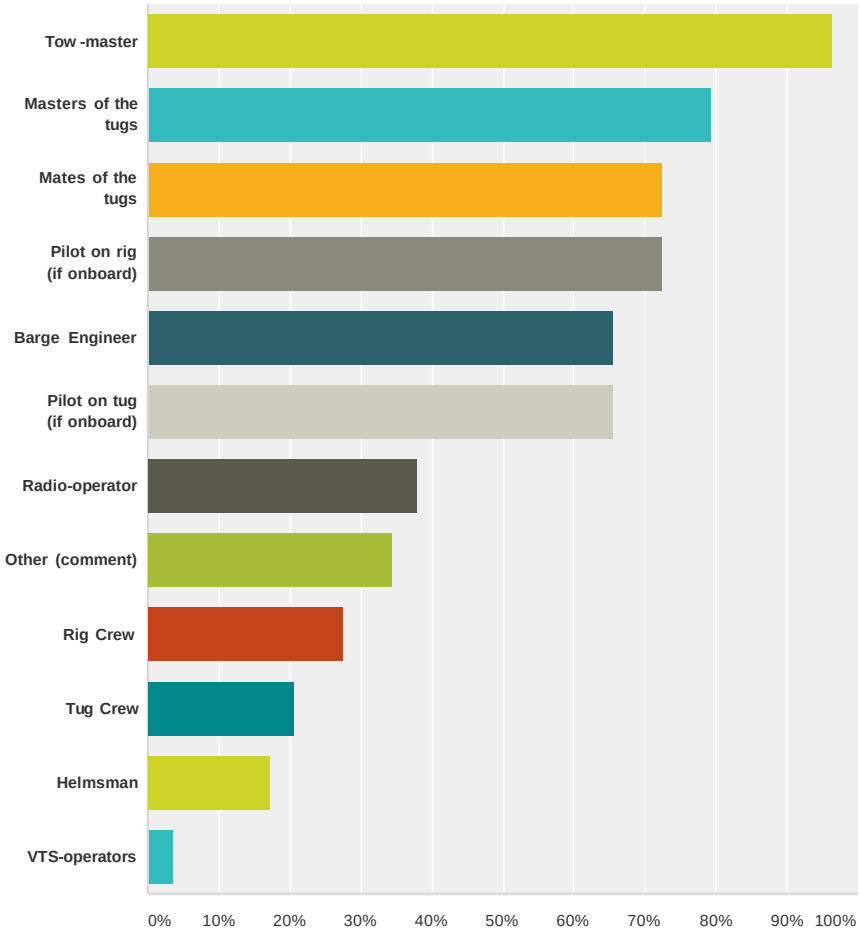


Answer Choices	Responses	
Tug-masters and tow-master form one bridge team in addition to the bridge team inside every unit or vessel	**37.93%**	11
Tug-masters and tow-master form their own bridge team	**31.03%**	9
The rig and the tugs work together in one bridge team	**24.14%**	7
Each unit or vessel have their own bridge team	**17.24%**	5
Comments	**10.34%**	3
I don't think the concept applies here	**6.90%**	2
Total Respondents: 29		

#	Comments
1	Don't know whether "Bridgeteam" applies, but a close bond always exist between Lead Tug master and Towmaster. That doesn't exclude other participating tugs/masters - It's all really a close knit group
2	-Tow master in overall charge of departure and final positioning, OIM in charge of MOU and tug masters in charge of their respective units. Possible dispute in interests?
3	The tow master is in direct contatct with the Rig Management plus crew and the tug boat captain. This includes the barge engineer and client representative and the positioning team on board

Q3 Choose the personnel you think should be included in the bridge team.

Answered: 29 Skipped: 2

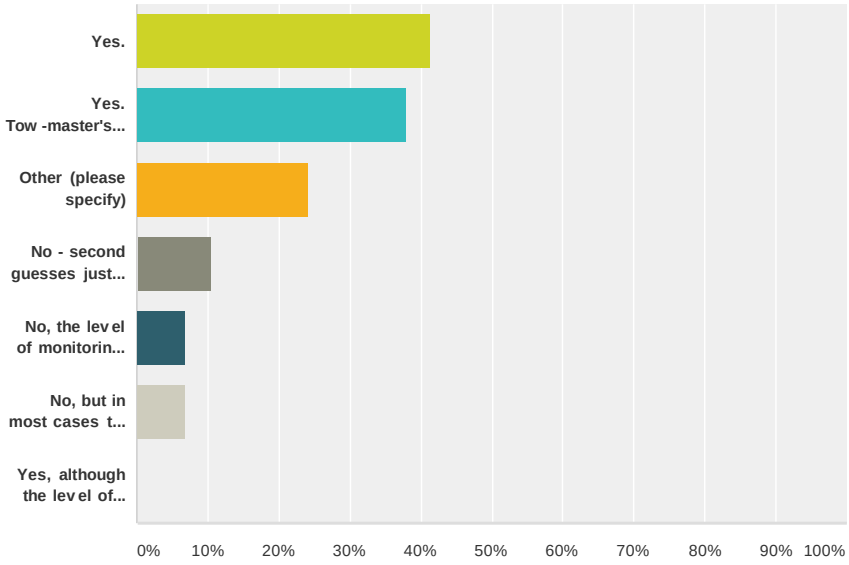


Answer Choices	Responses	
Tow-master	**96.55%**	28
Masters of the tugs	**79.31%**	23
Mates of the tugs	**72.41%**	21
Pilot on rig (if onboard)	**72.41%**	21
Barge Engineer	**65.52%**	19
Pilot on tug (if onboard)	**65.52%**	19
Radio-operator	**37.93%**	11
Other (comment)	**34.48%**	10
Rig Crew	**27.59%**	8
Tug Crew	**20.69%**	6
Helmsman	**17.24%**	5
VTS-operators	**3.45%**	1
Total Respondents: 29		

#	Other (comment)
1	Each unit will have their own communication with respective crew onboard but the crew should have access to hear the Bridge teams conversation and also to be briefed
2	OIM and company man,marine representative if on board
3	Bridgeteams should be very select and only consist of essentiel members. Too many peoples muddles the waters. Tugs will have their own team working seperately, but the person on the controls will still be close connected to the rigs bridgeteam In situations with a pilot on board, the situation is different as mostly the pilot brings along his own team/boats, which answers to him only. But the pilot will still be part of the bridgeteam on the rig.
4	-Tow-master and Barge engineer might be the same person.
5	Everyone who has anything to do with any part of the rigmove should be included at some point or points before or during the operation.
6	The Rig manager is missing from the list. The involvement of the Rig Crew and the Tug Crew is done via the management of the rig and the tugs. There are normally two Tow-Masters, One from the oil company and one from the jackup rig. Prior to the move it is determined which of the two will do the actual move. The other is there to assist. The Tow-Master (Rig Mover) from the jackup rig is always in direct contact with the crew. The Tow Master from the oil company is delegating his commands via rig management (Barge Engineer).
7	Assistent Barge Engineer Rigmanager OIM
8	Marine Representative of the Oil Company + OIM + Jacking Engineer, if applicable
9	OIM, Jacking Engineer
10	Marine representative from oil company or drilling contractor

Q4 Do you feel the tow-master's actions are monitored in appropriate way?

Answered: 29 Skipped: 2

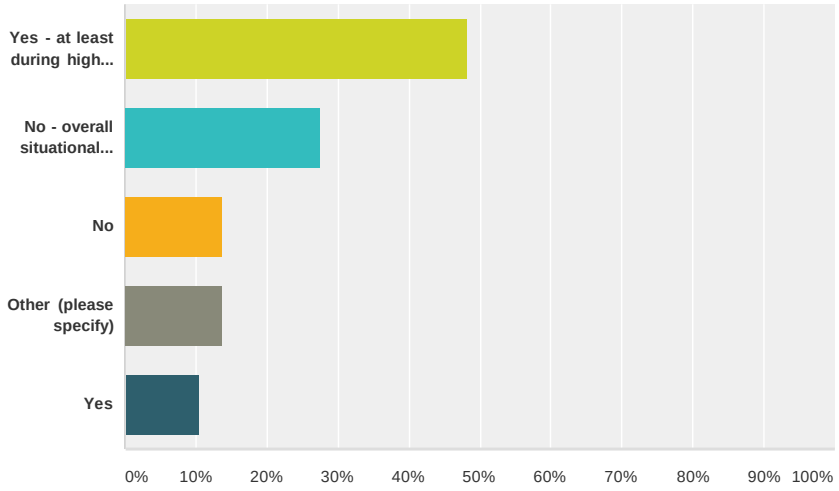


Answer Choices	Responses	
Yes.	**41.38%**	12
Yes. Tow-master's actions are monitored to a MRM-standard.	**37.93%**	11
Other (please specify)	**24.14%**	7
No - second guesses just create confusion	**10.34%**	3
No, the level of monitoring should be more emphasized..	**6.90%**	2
No, but in most cases the tow-master will manage	**6.90%**	2
Yes, although the level of monitoring should be more emphasized.	**0.00%**	0
Total Respondents: 29		

#	Other (please specify)
1	Whether there are a MRM monitoring or not, the towmasters/tugs manage quite well. On the day to day basis neither towmasters/tugs can do anything that is not seen or observed and possibly remarked upon - mostly by third party individuals.
2	- Tow-masters actions are monitored and approved by OIM, company rep., warranty.
3	If a marine rep is on the rigmove he should monitor the Towmaster. unfortunately these days most marine reps are inexperienced. The OIM and barge eng. should be able to question the towmasters actions if unsure or in any doubt. similarly tug masters.
4	As decribed above. There are always two Tow Masters. Unless spcificatlly agreed upon during a rigmove meeting onshore between all parties prior to the rigmove. With two on board here is sufficient monitoring between them.
5	During positioning of a jack up there is always a marine representative on board which monitors the actions of the towmaster.
6	Tow master is busy as the flight control, he does not have extra time for small talk.
7	Tow masters actionist are monitoren by the marine representative during rigmove operations.

Q5 Do you believe the duties of a tow-master could be further delegated?

Answered: 29 Skipped: 2

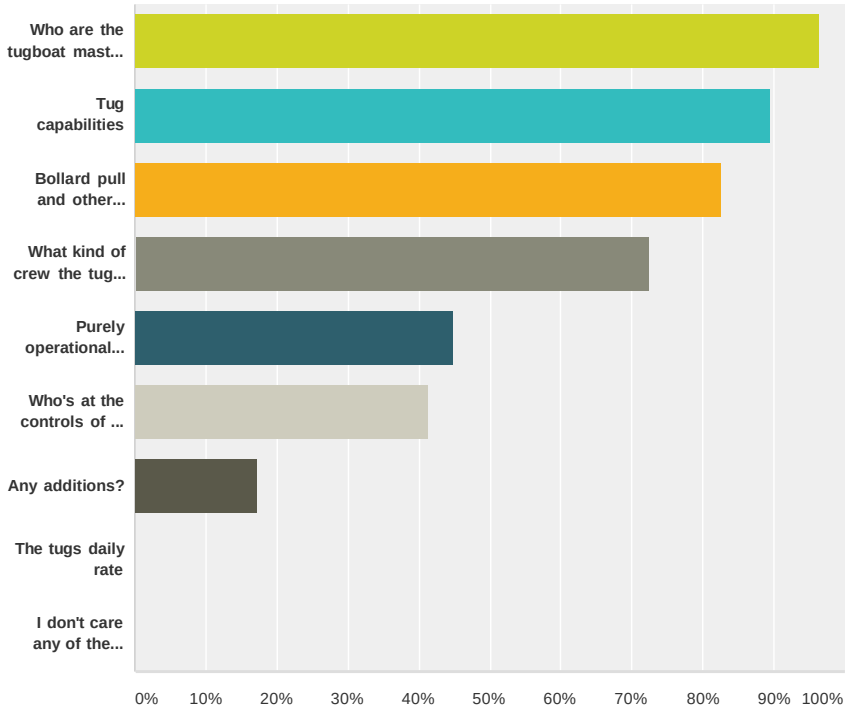


Answer Choices	Responses	
Yes - at least during high workloads	**48.28%**	14
No - overall situational awareness is better maintained by one person	**27.59%**	8
No	**13.79%**	4
Other (please specify)	**13.79%**	4
Yes	**10.34%**	3
Total Respondents: 29		

#	Other (please specify)
1	Like on a vessel, there is only one captain! The same apply in this situation - otherwise it would be chaotic - and the all over touch with the present situation would be lost.
2	- 2 Tow-masters during high performance moves.
3	Clients reluctant to pay for 2 towmasters. In fact due to shortage it is unlikely 2 experienced towmasters will be on same job. Possibly a trainee might act as second Towmaster.
4	Occasionally some of the tasks could be shared between the two Tow Masters. There is normally a good working relationship between them to agree on this.

Q6 As a tow-master I would be interested in...

Answered: 29 Skipped: 2

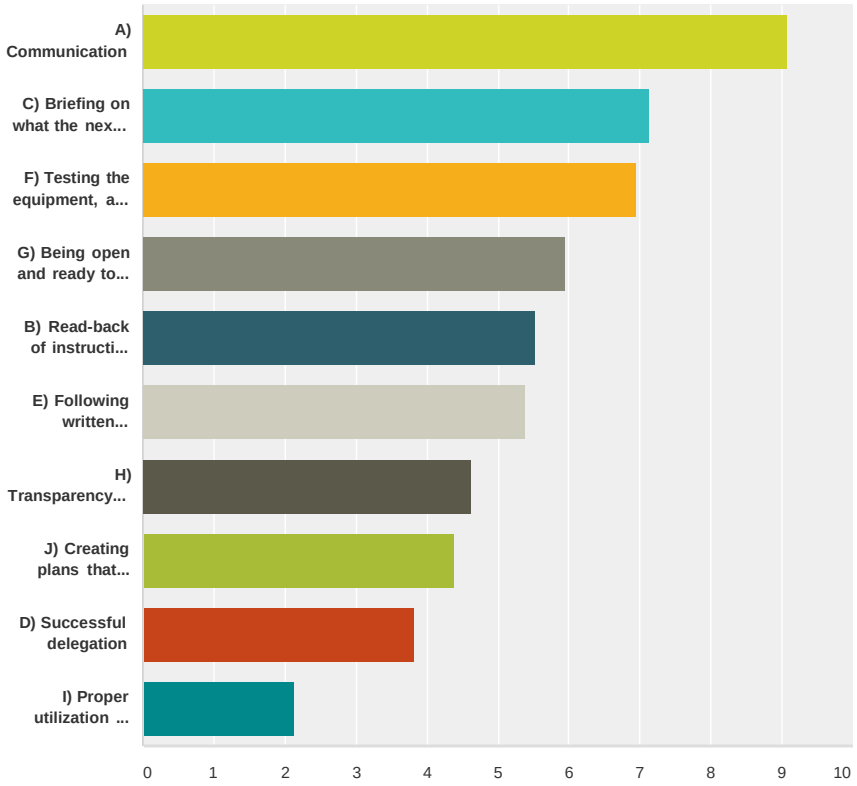


Answer Choices	Responses	
Who are the tugboat masters and any reference to earlier working history with them	**96.55%**	28
Tug capabilities	**89.66%**	26
Bollard pull and other features of the tugs	**82.76%**	24
What kind of crew the tug has, nationality, age, experience etc..	**72.41%**	21
Purely operational aspects e.g. whether the given tug configuration would meet the towing or anchor-handling requirements	**44.83%**	13
Who's at the controls of a tug should it come down to the performance of an individual	**41.38%**	12
Any additions?	**17.24%**	5
The tugs daily rate	**0.00%**	0
I don't care any of the above, as long as we understand each other.	**0.00%**	0
Total Respondents: 29		

#	Any additions?
1	Operational, the 3 above mentioned items are most important. Adminstrative, Features and aspects are the important issues there.
2	It will very soon be evident whether the tug controls are in the hands of a professional. Most of the questions raised are already covered by to days exchange of paperwork between tugs and rigs/towmasters.
3	Tugboat response to seaconditions
4	Anchor handling experience and performance
5	Nationality no mater.

Q7 The safety and fluency of a tug - rig interaction is best assured by focusing on...Click and hold to drag the boxes - top being high and bottom being low in priority or use the drop down menus to prioritize the following:

Answered: 24 Skipped: 7



	1	2	3	4	5	6	7	8	9	10	Total	Average Ranking
A) Communication	**66.67%** 16	**16.67%** 4	**4.17%** 1	**4.17%** 1	**0.00%** 0	**4.17%** 1	**0.00%** 0	**0.00%** 0	**4.17%** 1	**0.00%** 0	24	9.08
C) Briefing on what the next phase of work will include	**8.33%** 2	**20.83%** 5	**16.67%** 4	**16.67%** 4	**16.67%** 4	**12.50%** 3	**4.17%** 1	**4.17%** 1	**0.00%** 0	**0.00%** 0	24	7.13
F) Testing the equipment, and making sure it's functional	**8.33%** 2	**20.83%** 5	**25.00%** 6	**8.33%** 2	**12.50%** 3	**8.33%** 2	**4.17%** 1	**8.33%** 2	**4.17%** 1	**0.00%** 0	24	6.96
G) Being open and ready to receive suggestions	**0.00%** 0	**8.33%** 2	**16.67%** 4	**16.67%** 4	**12.50%** 3	**20.83%** 5	**16.67%** 4	**8.33%** 2	**0.00%** 0	**0.00%** 0	24	5.96
B) Read-back of instructions over VHF	**0.00%** 0	**16.67%** 4	**12.50%** 3	**12.50%** 3	**8.33%** 2	**4.17%** 1	**25.00%** 6	**8.33%** 2	**8.33%** 2	**4.17%** 1	24	5.54
E) Following written procedures as far as practical	**8.33%** 2	**12.50%** 3	**12.50%** 3	**4.17%** 1	**12.50%** 3	**4.17%** 1	**8.33%** 2	**12.50%** 3	**20.83%** 5	**4.17%** 1	24	5.38
H) Transparency in reporting any potential or existing problems	**0.00%** 0	**0.00%** 0	**4.17%** 1	**20.83%** 5	**16.67%** 4	**8.33%** 2	**16.67%** 4	**16.67%** 4	**8.33%** 2	**8.33%** 2	24	4.63
J) Creating plans that leave some room for human and automation errors	**8.33%** 2	**0.00%** 0	**8.33%** 2	**8.33%** 2	**8.33%** 2	**12.50%** 3	**4.17%** 1	**16.67%** 4	**16.67%** 4	**16.67%** 4	24	4.38
D) Successful delegation	**0.00%** 0	**4.17%** 1	**0.00%** 0	**8.33%** 2	**12.50%** 3	**12.50%** 3	**12.50%** 3	**20.83%** 5	**8.33%** 2	**20.83%** 5	24	3.83
I) Proper utilization of automation (tug management system, following vectors, autopilot-systems,planning maneuvers on screen etc...)	**0.00%** 0	**0.00%** 0	**0.00%** 0	**0.00%** 0	**0.00%** 0	**12.50%** 3	**8.33%** 2	**4.17%** 1	**29.17%** 7	**45.83%** 11	24	2.13

Q8 Given the rig is approaching standoff position and the tow-master is in command. Describe your perception of the balance in influence between these two roles (tow-master / tug) by selecting values on this ranking scale.

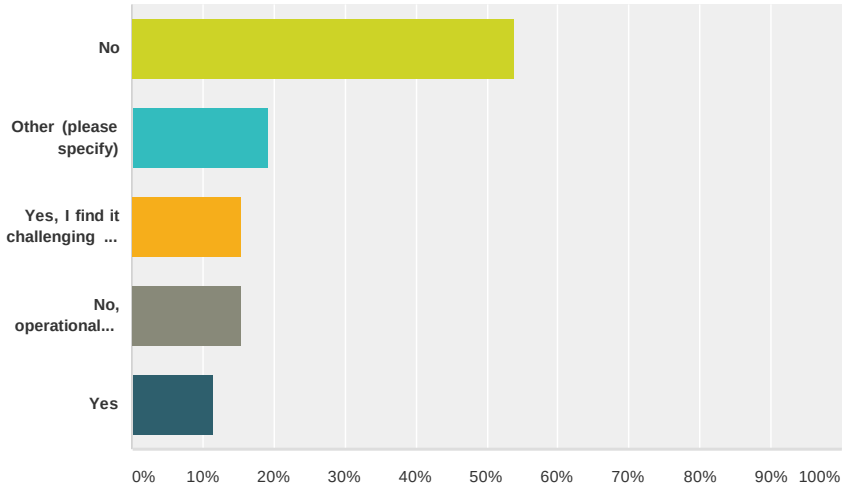
Answered: 26 Skipped: 5

	Tow - master				It's teamwork					Tug
Outcome of the executed maneuvers (for example carrying out maneuvers to comply with the commanded line heading regardless to the vessel heading)	11.54%	3.85%	11.54%	3.85%	38.46%	3.85%	0.00%	7.69%	7.69%	11.54%
	3	1	3	1	10	1	0	2	2	3
Overall responsibility	57.69%	11.54%	11.54%	3.85%	11.54%	3.85%	0.00%	0.00%	0.00%	0.00%
	15	3	3	1	3	1	0	0	0	0
Pointing out deviations to the planned maneuvers (as an example to point out the need for shortening the towing lines in time)	7.69%	7.69%	11.54%	3.85%	34.62%	11.54%	3.85%	3.85%	3.85%	11.54%
	2	2	3	1	9	3	1	1	1	3
Correcting deviations to the intended track, rig heading or speed of approach	48.00%	8.00%	12.00%	12.00%	12.00%	4.00%	0.00%	0.00%	4.00%	0.00%
	12	2	3	3	3	1	0	0	1	0

#	Comments
1	There can be no doubt that the overall command of any operation jack up/tug lays with the towmaster. The tugmaster will be in overall control with what happens to/with his vessel. Therefore again, a close knit operation between Towmaster/Tugcaptain is essential for a successfull operation.
2	Ultimately towmasters responsibility but any input from tug should be fully considered
3	Tug Captain should always be in charge of his own vessel, Towmaster can only suggest deviations to get his vessel in the right configuration
4	During the approach to a stand-off position / final position the towmaster should be in full control. Motions to be monitored / feedbacked from 'bridge team' to be given. Commands / comms should be more or less one way. During anchor running this is somewhat more 50 / 50 concerning the control. Commands / comms should be more two - way.
5	Tugboat should warn in time reaching his limits
6	Of course the start of the approach is an interaction between the towmaster and the Tug captains. Usually way in advance of arrival the arrival plan has been discussed and the time of shortening up has been agreed between tug captains and towmaster.

Q9 Does commercial pressure have any impact on your working performance?

Answered: 26 Skipped: 5

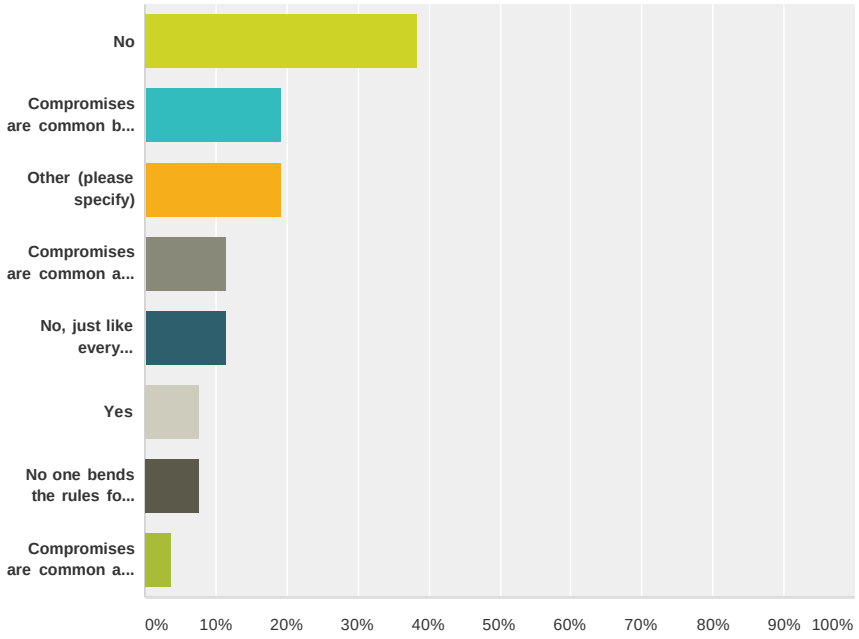


Answer Choices	Responses	
No	**53.85%**	14
Other (please specify)	**19.23%**	5
Yes, I find it challenging to compromise between commercial and operational requirements	**15.38%**	4
No, operational needs should be tailored to the preference of commercial requirements	**15.38%**	4
Yes	**11.54%**	3
Total Respondents: 26		

#	Other (please specify)
1	Normally commercial pressure doesn't have impact on the operations. But when the rig is waiting on weather for weeks it sometimes happens that the required weather window is implemented more creative
2	No impact on safety. Has anyway to be kept on mind
3	There will always be pressure on the Towmaster. Mostly from the rigs clients, who can't get on location early enough, and also trying to minimize any waste time spent on manouvres with the rig. At times the rigs manager will have issues as well. In these situation towmasters will succee if they possess some degree of diplomatic ability, without loosing the fact that the rig must be brought in position the safest possible way.
4	All jobs should be done as well. The customer who pays the tug has right to get good job for the money.
5	The end goal will be bring the rig safe and responsible from position a to b.

Q10 The rest period regulations are strictly followed.

Answered: 26 Skipped: 5

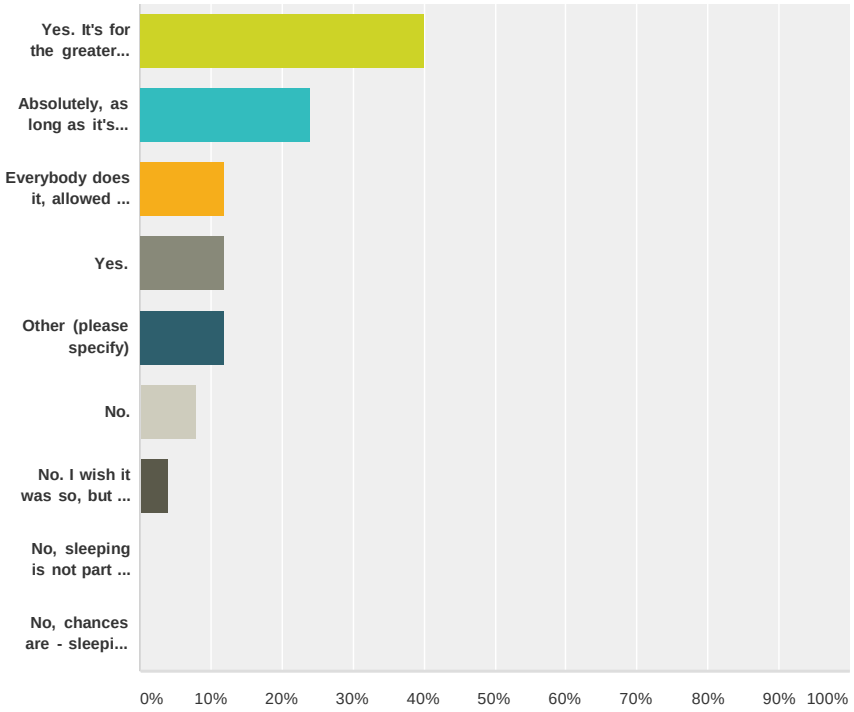


Answer Choices	Responses	
No	**38.46%**	10
Compromises are common but not desired - and I'm ok with it.	**19.23%**	5
Other (please specify)	**19.23%**	5
Compromises are common and I wish my superiors would act on it.	**11.54%**	3
No, just like every regulation implemented in maritime industry - it takes time to adapt it in practice.	**11.54%**	3
Yes	**7.69%**	2
No one bends the rules for no reason.	**7.69%**	2
Compromises are common and I often find people bending the rules, but I'm ok with it as long as I'm compensated	**3.85%**	1
Total Respondents: 26		

#	Other (please specify)
1	When the situation allows rest periods is adhered to. Unfortunately, there will be situations where this rules is bent, i.e. weather issues, mechanical isues etc -but in general, it is sought to avoid such situations where the rest period is jeorpardized.
2	Compromise to a certain extent but if safety of rig, vessels or personnel are at risk then no compromises
3	The rest period regulations are not 100% clear to all involved. Therefore it is difficult to state if and when the rules are violated. In the 20 years I have been ofshore, no rigmove was ever placed on hold due to rest period regulations. To ensure that we comply at all times, it would be necessary to employ two tow masters. As indicated before, as there are normally two tow masters on board, (one from oil company and one from the jackup rig), resposibilities could be shared so all can have decent rest.
4	No, Especially during short moves from platform to platform long hours are made. Never the less I always try to let the people have at least a few hours rest before we commence the final move in.
5	The rest periods for officers are carried out fine. Captain and the deck crew do exeding long periods of work that does cause severe fatique.

Q11 Should normal rest periods be compromised; on- duty rest for a short period of time during non-critical phases of the job should be widely accepted and duly acknowledged.

Answered: 25 Skipped: 6



Answer Choices	Responses	
Yes. It's for the greater good, to be able to stay more alert when really needed.	**40.00%**	10
Absolutely, as long as it's done in turns and no work performance is reduced.	**24.00%**	6
Everybody does it, allowed or not. There's no need for a new regulation or guideline	**12.00%**	3
Yes.	**12.00%**	3
Other (please specify)	**12.00%**	3
No.	**8.00%**	2
No. I wish it was so, but I would be offending my employer by doing so.	**4.00%**	1
No, sleeping is not part of one's duty	**0.00%**	0
No, chances are - sleeping will make one even more tired	**0.00%**	0
Total Respondents: 25		

#	Other (please specify)
1	With jack-up moves, specially if you are to operate in close proximity of offshore constructions - the rig is 100% weather bound - depending fully on present wind- and sea state. At times this will jeorpardize ever so well laid plans for the individuals rest and time off.
2	Normally a Tow Masted has no fixed on duty time. The weather, tide and location of the rig determins his duty schedule. He takes breaks wherevere he feels he can take them based on his planning so he is as rested as can be during critical parts of the operation.
3	As a towmaster and tug master you have to sleep short hours in between the hectic hours. This will always compromise your normal rest period. Of course I will delegate the job when I go for a little rest.

Q12 How would you describe the safety culture in your working environment?

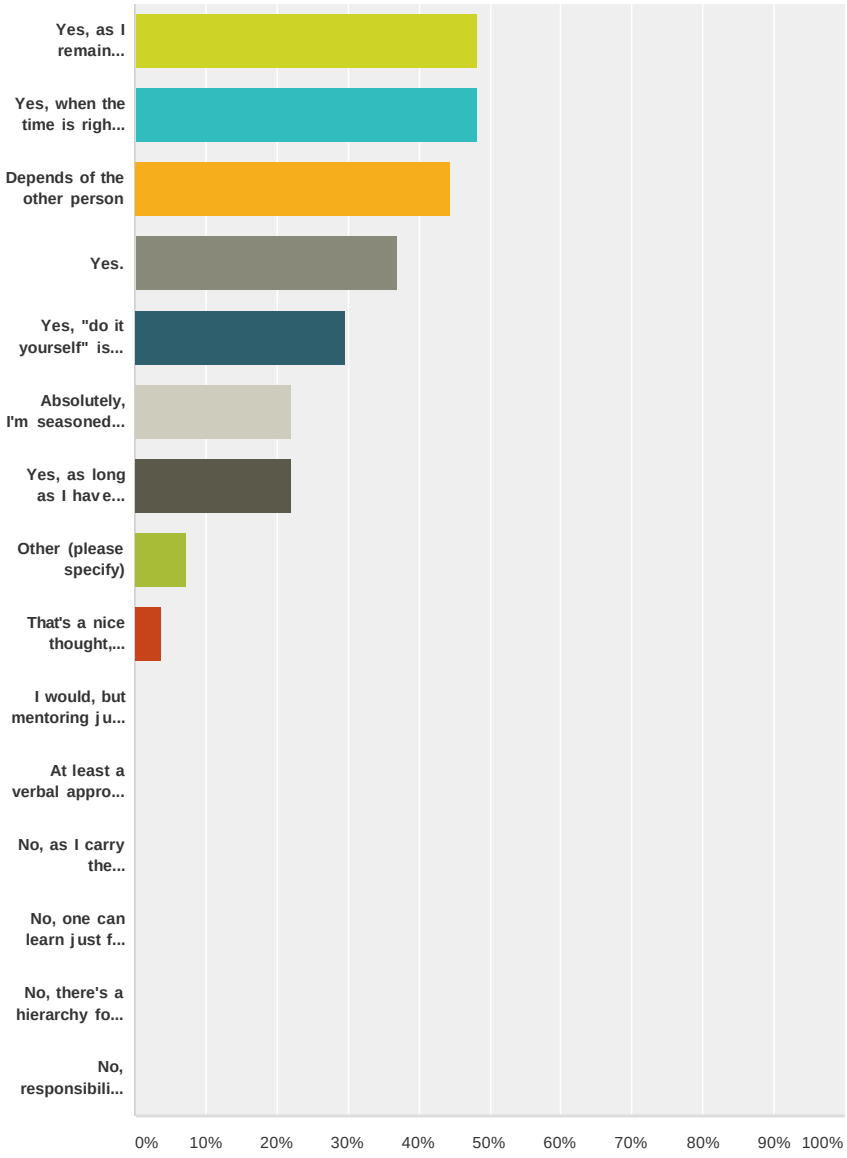
Answered: 26 Skipped: 5

	Agreed	Some what agreed	Consider it neutral	Some what disagree	Disagree
Safety is important, and no rushed actions should be carried out.	84.62% 22	15.38% 4	0.00% 0	0.00% 0	0.00% 0
Safety is important, however exaggerated to some extent.	36.00% 9	40.00% 10	8.00% 2	0.00% 0	16.00% 4
Safety should be incorporated to routine work - not the other way around.	64.00% 16	16.00% 4	20.00% 5	0.00% 0	0.00% 0
The objectives of safety and productivity do not meet.	8.33% 2	29.17% 7	16.67% 4	16.67% 4	29.17% 7
"Safety related" accidents are real, too much concentration on safety and guidelines tends to draw the focus away from the work, increasing the likelihood of accidents to happen.	15.38% 4	38.46% 10	11.54% 3	11.54% 3	23.08% 6
The prevailing safety atmosphere can be sensed when working with complete strangers and the attitude is transmitted even through VHF.	30.77% 8	30.77% 8	34.62% 9	0.00% 0	3.85% 1
I trust every colleague and outside operator to be fully qualified and trained to one standard.	19.23% 5	15.38% 4	23.08% 6	26.92% 7	15.38% 4

#	Comments here
1	Safety is important. But it often influences the efficiency of an operation, given a potentional hazard a longer time to materialize. Some personnel develop an attitude problem because of safety, they hide behind it, when there is something they don't like doing they state that they can't do it because it is not safe.
2	Safety cannot be breached. If it collides with produtivity, time-out, another way to be found. A towmaster cannot afford to trust individuals too far/too much. He needs to check, check and check again to ensure his commends contain the correct amount of safety mixed with progress needed. A towmaster cannot work 24/7, hence there are now 2 towmasters present to share the workload during a rigmove. The trust is 100% between the towmaster - shoud be.
3	It depends a lot on the operator / rig owner. UK rigs tend to, as you say it, exaggerate the safety. While on Danish / Dutch rigs there is a much more 'common sense' attitude, as to my experience.
4	Off Shore is due its nature professionally and safely carried, avoiding accidents keeps business running..

Q13 I am ready to hand over my duties and controls to my second in command officer, junior officer or trainee, to promote training and share responsibilities with future prospects.

Answered: 27 Skipped: 4

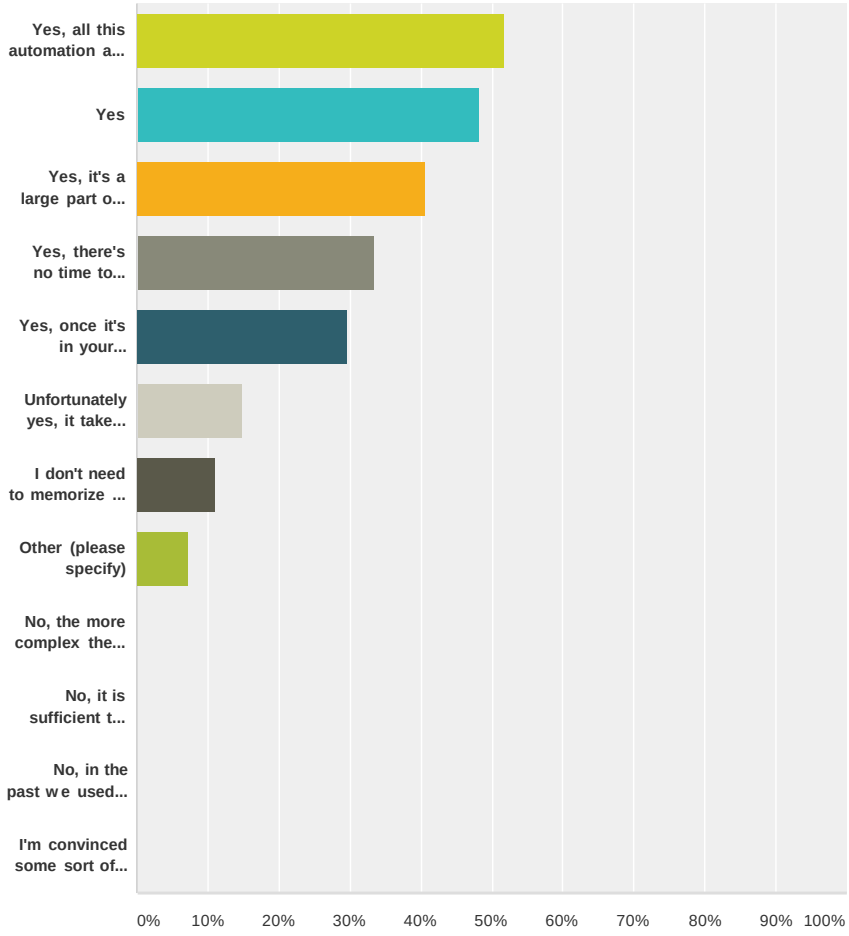


Answer Choices	Responses	
Yes, as I remain available and ready to jump back "behind the wheel"	**48.15%**	13
Yes, when the time is right and challenge is feasible for practice	**48.15%**	13
Depends of the other person	**44.44%**	12
Yes.	**37.04%**	10
Yes, "do it yourself" is the only real way of learning	**29.63%**	8
Absolutely, I'm seasoned captain / tow-master / etc... and "talk through" as a mentor is my next challenge	**22.22%**	6
Yes, as long as I have enough recent experience myself to cope with the situation.	**22.22%**	6
Other (please specify)	**7.41%**	2
That's a nice thought, however I reckon real operations are no place for practice	**3.70%**	1
I would, but mentoring just doesn't work for me	**0.00%**	0
At least a verbal approval from a superior to hand over controls would be required	**0.00%**	0
No, as I carry the responsibility and possible consequences - there must be other ways.	**0.00%**	0
No, one can learn just fine by monitoring	**0.00%**	0
No, there's a hierarchy for a reason, I worked my butt off to get into this position.	**0.00%**	0
No, responsibilities must be officially exchanged and I need my superior's approval.	**0.00%**	0
Total Respondents: 27		

#	Other (please specify)
1	A Towmaster always ensure that the next person to take over command of a jack-up rigmove, is adequately brought up to date, and fully understand what he is undertaking. The towmaster always make sure to inform of his whereabouts on his time-off - should his precense be needed on the bridge. At times where a trainee is present, unfortunately, he will often be allowed to observed only, due to the nature of the present situation.
2	Delegating duties to other officers is an essential part of the work. Trainees are onboard for learning, not for carrying severe responsibilities.

Q14 Building a good confidence to use the full array of bridge / pilot house equipment takes practice and should be utilized as often as reasonable

Answered: 27 Skipped: 4

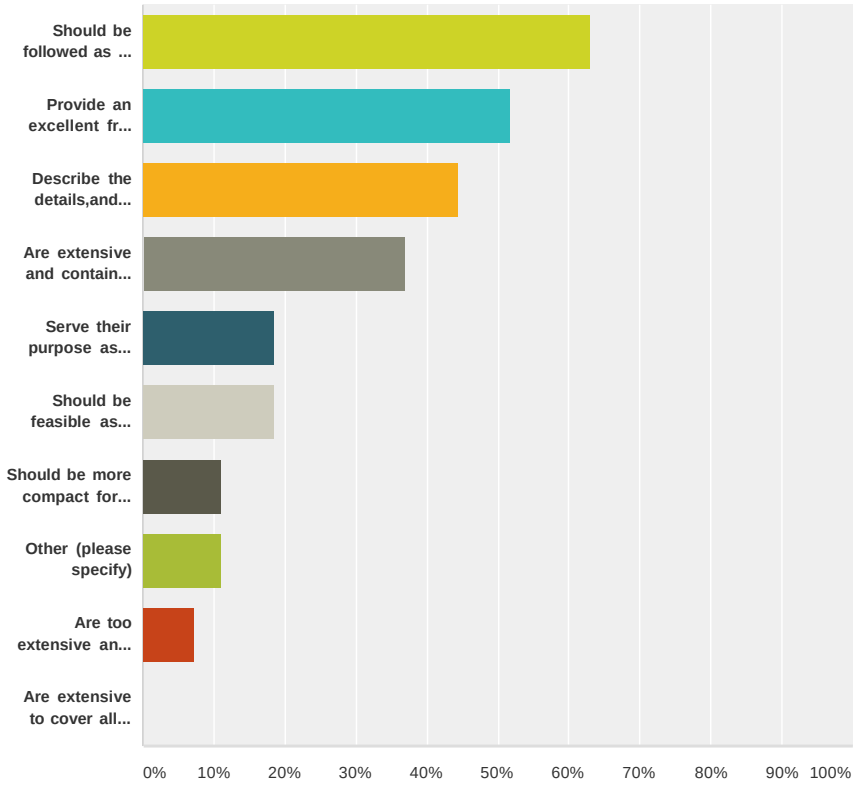


Answer Choices	Responses	
Yes, all this automation and equipment is there for my assistance	**51.85%**	14
Yes	**48.15%**	13
Yes, it's a large part of my job to know how they work	**40.74%**	11
Yes, there's no time to study the manuals during high workloads	**33.33%**	9
Yes, once it's in your backbone, it's like riding a bicycle	**29.63%**	8
Unfortunately yes, it takes time and effort to keep up with the development	**14.81%**	4
I don't need to memorize all the knobs and functions, as long as I know what's relevant and remember the essential stuff by heart	**11.11%**	3
Other (please specify)	**7.41%**	2
No, the more complex the design the less it should be observed.	**0.00%**	0
No, it is sufficient to have "somebody" onboard able to manage it	**0.00%**	0
No, in the past we used to do this with a fraction of the equipment with no problems.	**0.00%**	0
I'm convinced some sort of magic is involved. Malfunction or strange behavior is a nightmare, and I'm happy to pass the problem to be solved with the professionals	**0.00%**	0
Total Respondents: 27		

#	Other (please specify)
1	When operation rigs instrumentation/propulsion etc it is always good to have a crewmember at hand, should you feel uncomfortable with the set-up. If you are on a particular rig for the first time, require a crewmember to be of assistance, or a proper training session before utilisation in earnest.
2	The traditional methods are good to keep in fresh memory, it helps also understanding new technology. Modern technology is a great help!

Q15 Jack-up rig move procedures

Answered: 27 Skipped: 4

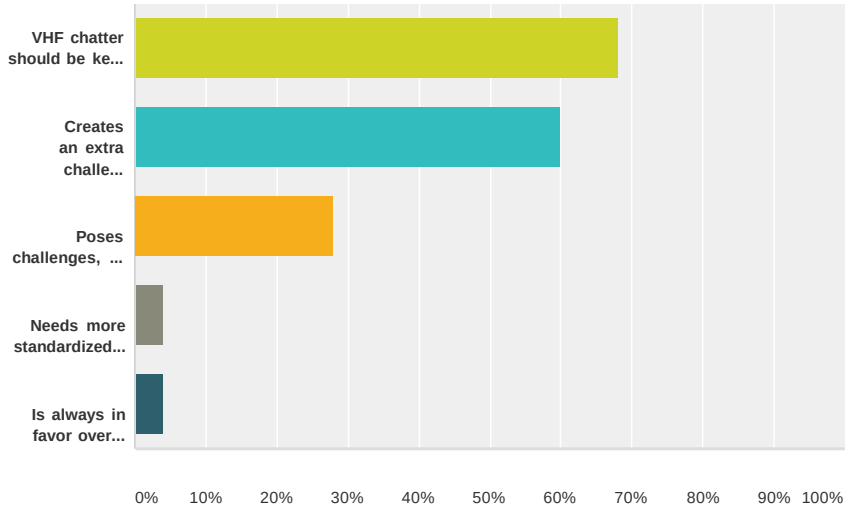


Answer Choices	Responses	
Should be followed as far as is practicable	**62.96%**	17
Provide an excellent frame to carry out the common practice	**51.85%**	14
Describe the details, and leave room for individual solutions	**44.44%**	12
Are extensive and contain everything one would need to know for the move	**37.04%**	10
Serve their purpose as guideline, although actual implementation cannot be written on a piece of paper	**18.52%**	5
Should be feasible as written, otherwise integrity suffers and deviating the procedures becomes "normal"	**18.52%**	5
Should be more compact for clarity and leave mandatory legal or chartering information in the office.	**11.11%**	3
Other (please specify)	**11.11%**	3
Are too extensive and difficult to apply in real life operations, I just read the essential pages with operative details	**7.41%**	2
Are extensive to cover all the legal issues, and therefore it takes practice to find relevant information.	**0.00%**	0
Total Respondents: 27		

#	Other (please specify)
1	Rigmove procedures is as different as the people who writes them. Hence always study the procedures carefully, and never trust them to be fully correct/workable. Remember it is a piece of work-paper, albeit it should be followed where possible.
2	range of detail depends on who and why the procedures are prepared by and for, range from extensive to serve their purpose
3	Note that there can be enormous difference between RMP's and RMP's.

Q16 General verbal communication

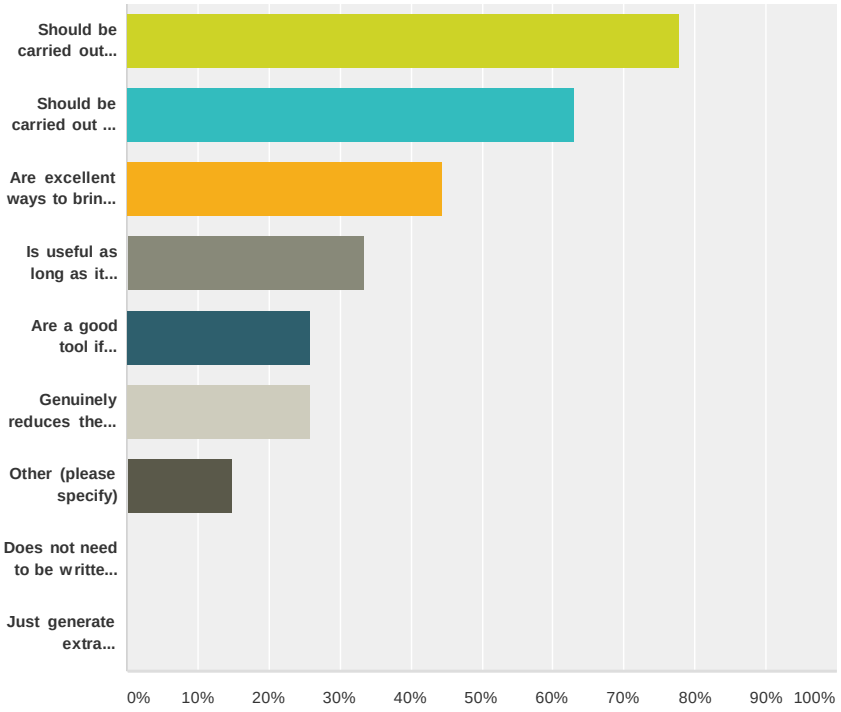
Answered: 25 Skipped: 6



Answer Choices	Responses	
VHF chatter should be kept to a minimum and only use direct commands which can be reviewed preferably against procedures or a written plan (email, etc...)	**68.00%**	17
Creates an extra challenge when working with multiple nationalities	**60.00%**	15
Poses challenges, as offshore vocabulary is rather extensive and unique	**28.00%**	7
Needs more standardized phrases to avoid confusion	**4.00%**	1
Is always in favor over written instructions (email for example)	**4.00%**	1
Total Respondents: 25		

#	Other (please specify)
1	The combination of procedures and verbal instructions is the right way Procedures so everybody involved know there role and what to expect. Verbal communication is needed to confirm the understanding of he procedrures and to discuss deviations and improvements and to discuss operaional matters like how to make a connection or how to transfer an anchor.
2	Communication is always a challenge, often the biggest problem is to find a "quiet" channel. Communication is a very important aspect of the job, and will/should be brought up at every "tool-box" meeting prior to a job task. This should include channel nr. - way of talking/responding - and how to ophold a proper and healthy invironment on the VHF.
3	Working in the North Sea sector, my experience is that english language between different nationalities is not an issue that influences a safe execution of the work.
4	There is always time to do the personnel vhf chatter offline, even over vhf. During situations which need full concentration, keep the communication short and to the point.
5	Some of the english is unclearly articulated. Specially for the towmasters the clarity of speech should be an item of monitoring.

Q17 Risk assessment and toolbox talk



Answer Choices	Responses	
Should be carried out prior to commencement of work.	**77.78%**	21
Should be carried out for every project involving risks.	**62.96%**	17
Are excellent ways to bring everyone on the same page	**44.44%**	12
Is useful as long as it serves its purpose preventing accidents and providing a plan if something goes wrong.	**33.33%**	9
Are good tools if utilized as a checklist	**25.93%**	7
Genuinely reduces the potential risks involved.	**25.93%**	7
Other (please specify)	**14.81%**	4
Does not need to be written and signed.	**0.00%**	0
Just generate extra paperwork.	**0.00%**	0
Total Respondents: 27		

#	Other (please specify)
1	They are good tools to increase safety as long as it is done before non routine jobs If it is done forstandard jobs it is just extra paperwork. Also during the time I was still working on vessels it was extra paperwork as we were with a small crew only (7 to 9 crew) and things were already discussed during coffee time.
2	When working with the same crew and doing the same works you don't need to point out the same things with every move you take.
3	Risk assesments and specially Toolbox meetings are important, as they bring various parties face to face who normally only have contacts via VHF, they bring various tasks up front for all to see/hear.
4	Some RA are not fully taken inboard by rig crew just signed and filed