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Incident Evaluation during Operations Carried out by Anchor Handler Tug Vessels

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ABSTRACT

This study analyses the incidents which took place on board Anchor Handling Tug vessels during the period from 2014 to 2015. The main objective is to determine which incidents are happening more often, with the view to develop, in a second study, their possible prevention.
By using a new approach, operators on board Anchor Handlers were contacted to answer a questionnaire. To the author?s knowledge, this subject has been scarcely investigated from the point of view of the operators serving on board this special kind of vessel, and it is always interesting to have the opinion of the people directly involved. The answers have been analysed using statistics software. The analysis included a profile of the seafarer, data about the vessel and her occupation and finally the incidents, indicating possible causes and outcomes of the same.
Based on the results, it can be concluded that equipment failure and human error have been the main causes of the incidents evaluated in the study.

1. Introduction

A lot has been written regarding the accidents and incidents in the offshore industry, and yet little has been researched on prevention of the same. The objective of the study in this paper is to analyse the reported incidents, with their causes and outcomes, and trying to define which situations can lead to incidents, or accidents, in order to establish a prevention pattern to follow.

Anchor Handling Tugs (AHT) and Anchor Handling Tug Supply Ships (AHTS) are offshore support ships which handle the anchors to position certain types of mobile offshore units.

They have add-on roles such as fire-fighting, oil pollution control and rescue capability, among other services (Hancox 1994).

This variety of tasks, added to the environment conditions where these operations are taking place, usually hard and demanding, make the design of the vessel one-of-a-kind in the industry (Ritchie 2011). AHTSs differ from AHTs in their additional capacity to act as suppliers for mobile offshore units, delivering items such as diesel fuel, drilling mud, fresh water and cement (Clarkson Research Services 2012).

Although there exist different designs, depending on the operating area (Hancox 1994), these vessels usually have a large after deck, used for deck cargo and for anchor handling and towing operations. To protect the deck, barriers and bulwarks are provided on both sides. The stern is however open to the sea, with a fitted roller to facilitate anchor handling operations. The accommodation structure is located on the forward section. Aft of the structure is the winch house, where the towing wires, winches and other anchor handling equipment are located.

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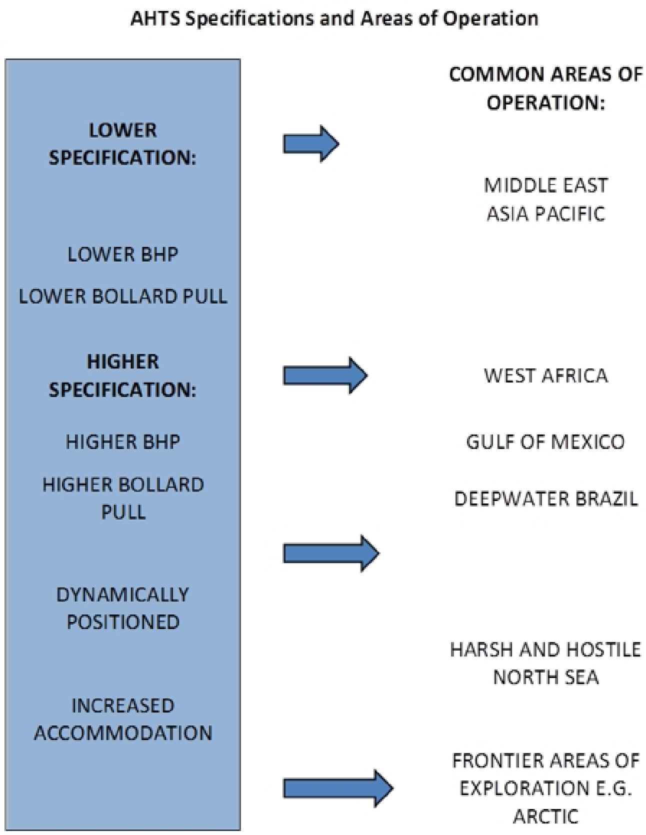
Figure 1: AHTS Specification and Areas of Operation.



Source: AHTS Vessel register, 2012, Clarksons.

These features, added to the powerful on-board thrusters, enable this kind of vessel to be extremely manoeuvrable. (Clarkson Research Services 2012). This manoeuvrability is one of their most important characteristics, and especially useful in deployment and retrieval operations.

According to (Clarkson Research Services 2012), the propulsion power, measured in break horse power (bhp) is the criterion used for classifying Anchor Handling vessels into "large" and "small". Thus, AHTSs with 12,000 bhp or more are large vessels, capable of transporting heavy structures in deepwater, whereas small anchor handlers of 8,000 bhp or less are used in operations in shallow-water and benign environments, as explained in Fig. 1.

The Guidelines for Offshore Marine Operations (G-OMO) (Norwegian Shipowners' Association et al. 2013) were first issued in November 2013 and are subsequently revised by a cross industry working group on a 6 monthly basis. These recommendations are used globally and they are a reference in the sector.

The objective of the document is to provide guidance in the best practice which should be adopted to ensure the safety of personnel on board all vessels servicing and supporting offshore facilities, and to reduce the risk associated with such operations.

At all times is the responsibility of the Master to assess the risks associated with any particular activity the vessel may be requested to support.

Risk Assessment (RA) is also known as Safe Job Analysis, Job Safety Analysis, Task Risk Assessment or other names ((Norwegian Shipowners' Association et al. 2013), Section 4 Operational Risk Management, 4.1 Terminology). The goal of RA is to identify and mitigate risks to a level "as low are reasonably practical". If the identified risk cannot be mitigated to an acceptable level, the work should not proceed in its present form.

Usually the seafarers on board AH vessels are certified according to STCW (International Maritime Organisation 2011), and issued Certificates of Competency, Safety Courses, Medical Certificates, etc. There are other special certificates that are not covered by STCW requirements, like for example Dynamic Positioning (DP) operators, which are certified according to the standards defined by IMCA and managed by The Nautical Institute. Competency is defined as "acquisition of knowledge, skills and abilities at a level of expertise sufficient to be able to perform a task to a required standard". ((Norwegian Shipowners' Association et al. 2013), section 5.1.1)

Senior watchkeepers on board AHT vessels, as per the G-OMO recommendations, require relevant expertise. This can be obtained by performing Mobile Offshore Units (MOU) moving operations accompanied by an Anchor Handling experienced Master, or by combining these rig moves with simulator training. At the same time, a Master who has not performed any Anchor Handling operation for the past 5 years should be having an overlapping period of 14 days with an experienced Master, during which at least one Anchor Handling operation will be performed.

In this paper, Section 2 is devoted to explaining the methodology used in the research, in Section 3 the results of the research will be presented, and discussed in Section 4. Finally, the conclusions are presented.

2. Methodology.

For the purpose of this study, a questionnaire was created and sent to Anchor Handling Vessel operators, and then the data retrieved was analysed using a statistical software.
It was found to be very interesting to get the data from the operators on board the vessels, as they know first-hand which kind of incidents are occurring on board.
(Psarros, Skjong, Eide 2010) indicated the problem in under-reporting of maritime accidents. The confidentiality of the study, where the answers were sent anonymously, suggests that the data is honest, in order to override the problem of under-reporting.
A questionnaire was prepared using the Google forms application. This questionnaire was sent to operators, via personal email. A link to the questionnaire was provided so they could be sending to other operators. The access link was also presented in Linkedin pages related to Anchor Handling Operations.
The questionnaire was divided into four sections: about the seafarer (rank, years in rank, level of studies, certificate of competence), about the vessel (type, age, bollard pull, DP class), anchor handling operations (number of days employed in AH

operations), and anchor handling incidents (description, causes, outcome, estimated cost of the outcome).
Although the number of answers received is not very high, this represents the actual state of the industry, where as a direct consequence of the oil price fall, seafarers (operators) are not having much employment in the sector, and only few of them are actually performing operations.

3. Results.

A total of 22 questionnaires were filled. The sample is not large, but taking into account the present crisis in the sector and the number of laid-up vessels in the offshore industry, it is considered to be representative of the current situation.

3.1. About the seafarer.

Over 45% of the questionnaires were filled by Masters, 36.4% by Chief Mates and slightly over 18% by other ranks.

Masters are in a 60% of the cases over 10 years in the current rank. For Chief Mates, the mean value is 6 years in the current rank. For the rest of the ranks, they were all over 10 years in the same current rank.

Regarding the highest education achieved, Masters have in most cases (70%) completed a Master's degree. However, Chief Mates have High School or Bachelor's degree in a 75% of the cases. For the rest of the ranks, 75% have high school studies, with only one Master's degree, which corresponds to the only engineer who answered the questionnaire.

Regarding the current Certificate of Competence (CoC) possessed by the different ranks, we can see how Chief Mates, in a proportion of 50-50, have Master or Chief Mate licences. Masters are in all cases in possession of a Master's license. Taking into account the sizes of these vessels, which are normally below the range of 3000 GT, it could be understandable that someone with a Chief Mate license would be having the position of Master as it falls within the limitations of the license.

3.2. About the vessel.

AHTS was the type of vessel where the contestants were working in 68% of the cases. The rest were other kind of vessels (13.6%), or no answer was given (18.2%).

From the total number of vessels, 50% had between 5 and 10 years of age. This is graphically shown in Fig. 2.

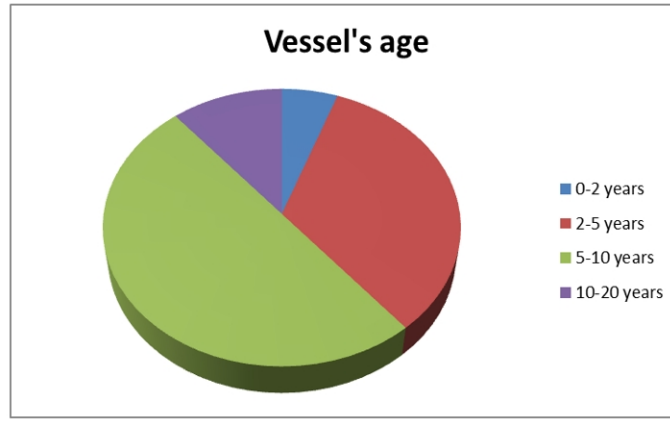
The mean Bollard Pull is about 120 tonnes, where the maximum is 200 t and the minimum 68 t.

Of the vessels, practically 95% is a DP-classed vessel, being DP Class2 the vast majority (82.4%).

3.3. About AH operations.

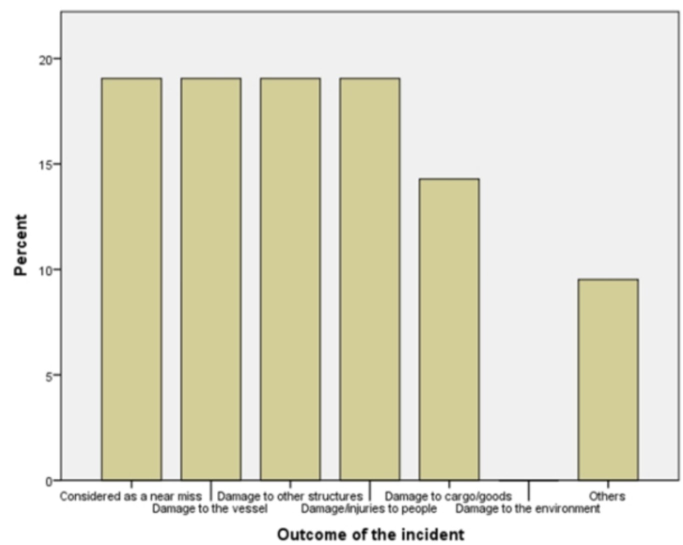
Regarding the AH operations section, the answers provided were confusing, as some answered in days as requested, while others were giving erratic data, indicating that the question was not fully understood. Thus, this section will be left out of the study for this time.

Figure 2: Vessel's age in years ? percentage distribution.



Source: Authors.

Figure 3: Outcome of the incident ? percentage distribution.



Source: Authors.

3.4. About AH incidents.

A total of 20 incidents were reported by the operators answering the questionnaire. One of the operators reported that no incidents took place in the period of the study.

The incidents are quite different in nature, to cite a few: wire parted, losing anchor system, bosun slipping on deck, or wire snap.

4. Discussion.

The aim of this study is to analyse the reported causes and their outcomes and make a discussion about them.

Human Error (including stress and fatigue) and Equipment failure account for 75% of the causes, while external causes (weather, for example) represent only 15% and the rest belongs to the "Others" category.

In reference with the outcomes, they are very variated, as we can see in Fig. 3:

Table 1: Incident cause against outcome of the incident.

		Outcome of the incident						Total
		Considered as near miss	Damage to the vessel	Damage to other structures	Damage/injuries to people	Damage to cargo/goods	Others	
Incident cause	Equipment failure	1	1	2	0	3	0	7
	Human Error (including stress and fatigue)	1	1	2	2	0	2	8
	External causes	1	1	0	0	0	0	2
	Other	1	1	0	0	0	0	2
Total		4	4	4	2	3	2	19

Source: Authors.

It is very interesting the fact that none reported damage to the environment, even when more than one answer was permitted to be selected. Using Crosstabs to better see the influence of certain causes in the outcome, we get Table 1, where we can see how when we consider the incident as a near miss, the causes can be very variated, whereas damage/injuries to the people happen when there is human error, and damage to cargo/goods happens when there is equipment failure.

Conclusions.

The first thing to mention is that the sample taken for this study is not big enough to extrapolate the results to the entire AHTS fleet. More investigation in the field should be desirable in order to have a significant conclusion about the subject.

The operators, that is, the crewmembers serving on board this type of vessels, think that most of the incidents occurring on board Anchor Handlers are due to human error and equipment failure. Underreporting, which was previously indicated by (Psarros, Skjong, Eide 2010), also needs to be taken into account, although the fact that the questionnaire was anonymous could have helped in this sense. In any case, the mentioned incidents could be a good starting point to gather attention towards the safety in the oil and gas industry and having more anonymous reports of this kind.

Anyhow, it is clear from this study that the sample operators are mainly concerned about incidents where the human factor and the equipment failure were main causes. We cannot conclude that there is a principal outcome in any of the incidents, as mentioned before it is possible that a wider sample would be proportionating wider answers in this sense.

The next step for this study will be to make a simulation of the incidents, using an offshore anchor handling simulator, and obtain more information on how to avoid this kind of incidents.

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