

Risk management in anchor-handling operations: The balance between control and autonomy (summary poster)

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Introduction

Anchor-Handling Tug Vessels (AHTVs) perform what is known as *advanced and extreme marine operations*, or simply *anchor-handling operations*. Anchor-handling vessels are an important part of the offshore operations in the production of oil and gas at the Norwegian continental shelf (NCS). The operations on board an AHT vessel involve many dangerous work situations, which demand a strong focus on safety before and during operations.

The standard rig move operations are integrated; anchors are recovered to the AHTVs, the rig moved to a new location, anchors are placed at the new location and connected to the rig - all in one operation. The alternative Pre-Lay type operation consists of one recovery and pre-lay operation and one concerted rig move. Anchors are all (usually 8) recovered and brought to a new location to be spread according to a spread plan and buoyed with light buoys. On the rig move day the anchors on the "old" location are all buoyed, rig moved by the help of usually two AHTVs, wires are recovered and rig connected.

The discussion in the paper is based on two research projects conducted in 2009 and 2013, focusing on safety conditions at anchor-handling vessels.

The setting

The offshore petroleum industry in Norway is controlled by regulations, guidelines, and standardization of operations. In this way the industry is characterized by a rule-based organizational culture and structure with normative concepts of behavior. The aim of a rule-based safety regime is to reduce accidents on board and to develop a safe workplace. The planning of offshore operations has to follow certain guidelines. A "Risk assessment document" is prepared by the operator, the oil company, or a contracted company. The planning is based on experiences of what could or previously have occurred. This is the basis for the task plan, or scope of work, which represents the structure, is detailed and is supposed to be meticulously followed. However, the seabed, the equipment or the people may represent surprises requiring flexibility from the total crew.

Results

From the moment that the wire is connected to the vessel and it is applied tension to the system, the situation and thus the atmosphere is changed dramatically from the periods in between operations when work is related to pre-operational tasks or waiting situations. Everyone, and the boat itself as a collective, go in to a concentrated state of mind. A state of silent concentration falls over all aspects of the boat and crew; all interaction is reduced to carry out the operation, like a purposive bubble of extreme presence.

Balancing regime 1: *Control vs. autonomy*

It is literally a matter of life and death for the bridge crew to maintain their focus and control the situation in order to follow the precise line of motion which ensures the tension and pull to affect the vessel correctly. The great tension of winch and lines, pose a danger not only for capsizing the vessel. More often, accidents or so called near-accident-incidents endanger the sailors working on deck. The wires recovered from the sea bed might be twisted and thus release energy stored by the twist

when they are pulled up. If a line (wire, fiber or chain) brakes, the backlash would seriously hurt anyone being hit. Therefore, it is of great importance that there are no misunderstandings, that the deck is clear when tension is released on the system, that a bolt is not left inside or not fastened when it should not and so on. The bridge and the deck crew are therefore depending on knowing that the other knows every situation as they do themselves.

Usually, decisions regarding how to perform are made at the front end of the operation, rather than at the top. This recognizes and takes care of the knowledge held by front end operators. In anchor handling operations the expertise on how to best perform safely stays with the deck team as a team. The Captain is in charge of what to do according to the scope of work, but he mostly leave to the team how to perform. The effectiveness of knowledge and experience sharing in a team will, however, depend upon the openness and trust established. The bridge officers supervise the operations from their overview at the bridge. This gives them an opportunity for intervention when necessary. However, too frequent control may impact the flexibility and autonomy of the crew team adversely.

Balancing regime 2: *Structure and standardization vs. flexibility*

The mooring equipment such as anchors, links and buoys are often hired for Pre-Lay operations from a mooring company. The company will then supply and control the complete logistical chain including control work on board. Controllers are positioned on board to control in detail mooring equipment and register all numbers on individual pieces. They are socialized with the crew, as they are located in the dirty mess together during waiting in between operations. In addition to other possible gains, this position may be seen as serving the needs of both the organization (by auditing the work, registering and reporting) and the situation (as the controller is not disturbing the performance or presence of the sea farers). As the controllers through the year are working onboard several vessels, they represent an added competence of innovation onboard as they may suggest different modes of working between the vessels. Although the formal reason for this position is to serve the control function, it is socially accepted by the added value and the position amongst and together with the ABs in the dirty-mess. Ideally, this type of resource is thus both adding to structure and standardization (needs of the organization) and contributing to on board flexibility by offering supplemented competence.

Balancing regime 3: *Standardization vs. improvisation*

Standardization may be contrasted with improvisation. Improvisation refers to what is not planned for and involve a low degree of predefined structures. The weakness concerning standardization may be less room for improvisation. There is a need for improvisation skills when unforeseen situations appear on board. In such situations the management and crew have to quickly adapt to solutions that are not planned for or made procedures for. The ability to improvise is very much dependent on the empowerment and autonomy among the crewmembers, in addition to knowledge of each other's experience and competence. This kind of expertise develops in a strong community where the seafarers share norms and identity. Leadership practice influences the crew's ability to act in such situations.

Conclusion

We found that the seafarer's skills, experience and close collaboration are strengths concerning safety on board. Safety is to a great extent a matter of maintaining control over work in an organization. In this paper we have discussed how control is gained through good seamanship characterized by a culture of empowerment, responsibility, experience, and not at least high focus on safe behavior during the operations.

We conclude that rule-based safety and the work practice among the crew on board are mutually dependent. Safety management systems (regulations, procedures, work processes) influence safety on board in a positive way, such as necessary planning of the operations. However, the need for control in the offshore oil and gas industry seem to increase, through the control position and function on board. In the future the challenge is thus to maintain what is considered to be good seamanship; professional knowledge, professional pride, and experience-based common sense.