

The quest for optimum safety

Research in the oil offshore industry

Published June 2004 on Seaways magazine, the international journal of the Nautical Institute

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I have recently finished a work-based project for my MSc degree researching risk assessment and the accident hazard on a offshore drilling unit.

The project addresses the questions, "how can we identify a hazard on board a drilling ship? What kind of tools do we have ?How can/do we assess a risk?" It was carried out on a state-of-the-art DP Drilling Ship working off the coast of Brazil with a multinational crew of 130. The ship was built in 1999 and she is able to drill at 10,000 feet of water depth in dynamic positioning mode. The article is based on my research.

One of the company's goals is to conduct all operations in an incident-free workplace. This is a challenging task, and may appear idealistic; however the ship has remarkable safety statistics. She has achieved more than 18 months of a zero TRIR (Total Recordable Incident Rate). This is calculated by taking into account the medical treatment cases, restricted work cases, Severe injury cases and fatalities. (Note that the first aid cases are not included.)

My research analysed the tools available in the company (for which I work) to identify the hazards and assess the risks to see if they are effective, and to gauge whether the personnel fully understand and use the resources available to them in order to achieve the company's goals.

It must be also borne in mind that the environment played a significant role in this research as the study was based on offshore installations, where the crews operate in a specialised, highly controlled working situation.

This means that every operation is carefully planned and thought through beforehand using policies and procedures that cover virtually every aspect of the job.

In such a controlled environment the human factor plays an important role. Unfortunately incidents still happen in the industry so either there is a failure in the procedures or there is a human error responsible for these.

Risk Assessment

Risk assessment is a key issue in this research. It is sometimes argued that in order to work in an incident free working environment, the need is to reduce the risk to zero. This is

the so-called “zero risks” philosophy. At its extreme, this approach could lead towards the consequence of ceasing the work completely, with the operation losing all its benefits. This is obviously not what a commercial company is looking for.

I wanted to investigate a different approach: is it possible to achieve an incident free working environment using the company Risk Assessment approach ALARP (As Low As Reasonable Practicable), which is a pragmatic philosophy? The ALARP method, as the acronym suggest, is a method that, while reducing the risks to as low as reasonable practicable, doesn't eliminate them completely.

In the United Kingdom there is a specific regulation which is related to the safety at work. The UK Offshore Safety Act 1992, which came into force on 6 March 1992, transferred responsibility for offshore health and safety to the Health and Safety Commission and Health and Safety Executive and brought the regulation of safety offshore (on the UK Continental Shelf) within the compass of the Health and Safety at Work etc. Act 1974 (HSWA).

The offshore safety act extends the application of Part I of the HSWA. This includes: *“securing the safety, health and welfare of persons on offshore installations”*.

The HSWA sets out the general duties which employers have towards employees and members of the public, and employees have to themselves and to each other.

These duties are qualified in the Act by the principle of 'so far as is reasonably practicable'. In other words, the degree of hazard in a particular job or workplace needs to be balanced against the time, trouble, cost and physical difficulty of taking measures to avoid or reduce the risk.

What the law requires here is what good management and common sense would lead employers to do anyway: that is to look at what the risks are and take sensible measures to tackle them. But in some cases the law requirement is not quite like that. In 1987, for example the US Occupational Safety Health Act formaldehyde standard imposed a cost of \$72 billion for each life that the regulation is expected to save.

According to Ball (Ball, D.J. 2000) there are eight different concepts of safety, the politically inspired, formaldehyde zero risk type, the more scientific methods like risk factors, to the more pragmatic ones like the risk tolerability and the ALARP in use in my company. Every approach has different strengths and limitations and every approach applies to a predominant professional affiliation but the ones in use in the major industry are the pragmatic ones.

Changing Behaviours

I would like to highlight another feature of the human factor that came out in my research. Several offshore oil and gas drilling facilities are trying to control the Human Factor, by using behaviours modification programmes.

Obviously there are good reasons to target safe behaviours as part integrated approach to safety management. A significant percentage of accidents can be linked directly to unsafe behaviour, which occurred near to the time of the accident.

According to this theory consequences either enforce or discourage repetition of behaviours. A solution is based on the knowledge that people repeat behaviours for which they receive positive reinforcement.

However such programmes depend on the principle that the majority of work related accidents are only caused by the unsafe acts of performed by the workers. It is a mistake to think that behavioural changes will fix all the problem . The argument, instead, is that you cannot achieve more safety that your system is designed to deliver. If you have accidents, there must be a failure on the system and not necessarily only because of unsafe behaviours.

I personally believe that behaviour modification does not replace completely the need to modify unsafe conditions of work, make improvements or address root causes. Rather, this program is a support for safety management system in place in the company.

My own company uses a behaviour modification program called START, in this way. This is a monitoring process with the aim to observe and improve safety performance; the name is an acronym for See, Think, Act, Reinforce and Track. During observations safe and unsafe behaviour is recognised and then correct with a positive approach, highlighting and reinforcing the safe acts.

Project activity

The offshore industry has made a big effort was made to consider majors accidents that can occur on board a drilling unit, especially after serious incident such as the Piper Alpha in the North Sea in 1988 were 167 men lost their lives. The major concerns are fire, explosion, release of dangerous substance during the drilling activity, collision, helicopter crash, damage to the structure of the installation and any other event arising from a work activity involving death or serious personal injury.

On board of the ship I studied, there are adequate controls in place so that majors accidents risks can be considered both tolerable and ALARP. A risk assessment has been

carried out and the team that performed the job has developed seventy-nine recommendations, only seven ranked “High” risks. Every recommendation has been followed and measure puts in place.

However in the course of my project, I found that first aid cases were not taken into account when calculating the ship’s TRIR (total recordable incident rate). The biggest hazards are assessed and measures are in place to maintain the risk ALARP, which is very important, but smaller risks, are, in my opinion, often underestimated. although the total cases were only eight, I was surprised to discover that 75% of them were due to manual handling operations.

These kind of operations cut across virtually all offshore operations, from turning valves to preparing meals, and with space as a bonus, the provision of manual handling equipment is not always feasible. Even though safety has always been important in the industry, this area is where significant risks are often overlooked .

Several offshore tasks involve heavy loads such as pipes, barrel and sacks, which must be lifted, pushed or pulled. Unfortunately these tasks often lead to serious injuries which are both painful to the individual and costly to the employer.

In most of the eight accidents I looked at, the smaller risks were underestimate or the hazards weren’t properly identified, leading to a false confidence that routine, or should I say “so called” routine jobs, cannot lead to an accident.

Observation data

I was able to gather a lot of safety observations during the course of my project. In the 12-months period, the ship had a total of 75 percent safe and 25 percent unsafe acts.

Analysing the data, I could make the claim that this 25% might have lead to accidents. On the other, if the START program, previously described, had been followed correctly, all unsafe operations should have been identified and corrected.

According to company policy, a basic risk assessment (called THINK) has to be done for all the tasks and the monitoring process START should ensure that it is effective. I believe that if acts were unsafe the personnel performing the job may have failed to carry out a proper risk assessment. This is a key issue in my opinion; in order to be effective all personnel must follow the two processes at all times.

One positive example that came out of my observations is the correct use of personal protective equipment. In fact, 94 per cent of the total observations reported a correct use of PPE, only 6 percent of total were found to be incorrect or unsafe.

I believe older colleagues may recall that not long time ago it was unusual to see industry personnel wearing all the personal protective equipment. I am not talking merely about safety glasses, boots and hard hats, but also about the proper PPE to be used when, for instance, an employee is mixing chemicals.

This 'snapshot' taken on the drilling ship shows a good safety attitude and definitely a good step in the right direction.

Conclusions

My project was carried out on a single Drilling Ship, and in a specific context that may obviously differ from other units engaged in the same activity.

However, I think that some elements are similar throughout the industry and perhaps some of the outcomes that arose from the research may apply to different environment and perhaps make senior management consider how to improve safety.

An interesting point is that there are procedures in place to manage the big risks, but it is from the smaller risks that the rig has experienced incidents.

In light of that outcome, I believe that in order to be successful in safety terms, a company should have in place procedures adequate to *identify a hazard and assess a risk*, that are feasible for its working environment, easy to use and to understand.

I also believe that a key issue is that all personnel follow the safety policies and procedures in order to make the system to work. Failing to follow the process that is in place will jeopardise the safety of the operations.

One way to achieve this objective is the accountability, which means in my company that everybody is accountable for safety and that everybody has the authority, regardless his or her rank or position, to stop any unsafe acts.

I mentioned that the Human Factor plays an important role in the safety system. This is quite obvious, however the assumption that if only employees would do as they are told no accidents would occur is, in my opinion, very reductive.

I believe that the behaviour-modification approach is appropriate in this international contest, where we have to deal with different nationalities, believes and cultures.

This approach is based on the knowledge that people repeat behaviours for which they receive positive reinforcement. If applied correctly this is the tool to reduce the human error: positive feedback will help to change dangerous behaviours and then improve safety.

I think that the safety awareness in general should be raised in the industry; often the understanding of risk is not sufficient, especially the so-called routine job related to manual handling operations.

It is difficult to find the perfect safety management in order to achieve an incident free working environment; but on the other hand I believe that with the right attitude, culture and commitment it is a goal worth pursuing.

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