The Harding derrick-inspection guide: Defying gravity!

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THE DRILLFLOOR HAS long been recognised in the industry as a potentially hazardous area, a fact borne out by the comparatively high incidence of both serious and fatal accidents on drillfloors worldwide. From IADC incident statistics[1], about 45% of drilling related accidents occur on the drillfloor or derrick, with a significant proportion of these involving equipment falling from the derrick. Indeed, drillcrew have been one of the highest risk group of workers offshore, not by virtue of their exposure to the threat of blowout, but due to their exposure to injury and fatality from their immediate working environment.

Figure 1: The Harding drilling team identified 336 potential "dropped objects" in the derrick and substructure as part of a comprehensive effort to eliminate the problem. The next step was to identify all derrick and substructure operations. Finally, the team sub-divided the derrick and substructure into 5 manageable derrick inspection areas. Colour codes were used to ensure check sheets were referenced to the appropriate area.

It was against this background that the Harding Drilling team identified dropped objects within the derrick and substructure as a key target within their ongoing safety-awareness and risk-reduction programme. A Derrick Inspection Guide, intended as a means of controlling, inspecting and maintaining both permanent and temporary equipment located within the derrick and which could therefore present a dropped object hazard, was seen as the way forward. Simultaneously, Step Change 2000, a pan-industry initiative established and coordinated by HSE, UKOOA and IADC with the intention of delivering a 50% improvement in offshore safety, had identified drillfloor safety as a primary target for improvement. With this in mind, the Harding Drilling Team committed to making their Derrick Inspection Guide work well on Harding, and also to make available to the industry at large all of the positive aspects of their initiative for the benefit of everyone.

The Harding Derrick Inspection Guide was implemented in advance of recently introduced UK legislation covering the use and maintenance of lifting equipment. This legislation imposes additional responsibility on employers with regard to the safety of personnel either involved or affected by lifting operations and equipment.

INVOLVEMENT

Workforce involvement has long been recognised on Harding as a prerequisite to the success of any safety initiative. This is evidenced through the highly successful Employee Led Safety Initiative (ELSI) implemented by the Harding Drilling Team in early 1997[2]. The drillcrew, in conjunction with the management team, scoped out, planned and implemented the Derrick Inspection Guide project. Without doubt, their contribution to, and subsequent ownership of, the Derrick Inspection Guide, is crucial to its long term success.

APPROACH

It was recognised early on that the main tangible outcome from the initiative would be a process in the form of a Derrick Inspection Guide. It was also recognised that several stages would have to be gone through in developing this guide and that if the guide was going to be used by the drillcrew it would have to be both concise and user friendly. An 8-step approach was developed to deliver the Derrick Inspection Guide, as outlined below:

• Hazard identification: A comprehensive review of all items in the derrick and sub-structure with the potential to become a dropped object. These items are inventoried and their method of securing recorded. On Harding 336 items were logged;

• Identification of all derrick and substructure operations: Based on a sequential review of all likely well operations to be carried out (drilling, casing, wirelining, etc.) a task analysis is conducted with each item of equipment required for each task being identified and its position within the derrick marked-up on derrick and sub-structure drawings;

• Derrick inspection areas: Sub-divide the derrick and substructure into manageable areas which have discrete physical boundaries. On Harding, 5 such areas were identified, as shown in Figure 1. These areas were further assigned a colour code to simplify and ensure check sheets were referenced easily to the appropriate areas;

• Verification process: Using the marked-up drawings and previously prepared inventory, a detailed inspection of the derrick

is carried out with any previously unidentified equipment being noted, together with its purpose and location. At this time, non-operation-specific items such as shackles, sheave blocks and handrails are documented also;

• Equipment rationalisation: In recognising that the best way to deal with a hazard is to remove it completely, equipment which was not required to be in the derrick was removed;

• Equipment tagging: All equipment to be retained within the derrick is tagged with a unique identification number;

Figure 2: A comprehensive equipment checklist was developed for each area. Photos were annotated as inspection aids to help locate equipment items.

• Derrick inspection guide and check sheets: For each of the defined areas, a comprehensive equipment check list is developed. To assist in the identification of the location of individual equipment items, the marked-up drawings are supplemented with annotated photographic images, such as shown in Figure 2. The check lists are marked up with non-conformances and other pertinent comments during subsequent inspections and the appropriate action taken where required.

• Inspection performance monitoring: Copies of the Derrick Inspection Check Sheets are forwarded to the shore base on a weekly basis in order to monitor the effectiveness of the inspection programme. A percentage marking system awards points for the number of inspection items completed satisfactorily in each Derrick Inspection Area, but deducts points for incomplete inspections, non-conformities or dropped object incidents occurring in the area. The scoring is collated onto a bar chart and performance data plotted weekly.

Thereafter the data is monitored and reviewed for trends which may indicate areas of weakness in maintenance, inspection, operation or design. This pro-active element of the process is aimed at preventing dropped objects incidents from occurring through the early identification of negative trends and the implementation of appropriate remedial action.

DERRICK INSPECTION PERFORMANCE REPORTS

The factors shown in the penultimate columns are representative of total number of checks identified on the weekly derrick inspection sheets for the respective derrick areas. The actual number of checks carried out multiplied by the factor will provide the optimum points score for the area. Points are deducted from the optimum figure as follows to arrive at the total score for the area:

• For each dropped or missing object: 50 points;

• For each outstanding non-conformance: 20 points;

• For each insecureitem found: 10 points.

The rig superintendent is responsible for completing this report and for forwarding to the rig manager each week.

THE OUTCOME

The programme to develop and implement the Derrick Inspection Guide Procedure commenced in September 1998 and by the end of December 1998 the manual had been fully developed and the system already up and running on Harding.

Because the drillcrew were instrumental in the development of the procedure, it was implemented enthusiastically and without difficulty. Additionally, the manual itself has proved to be a useful training aid in that new drillcrew members not entirely familiar with all of the equipment within the derrick and substructure and its purpose can quickly learn on-the-job through involvement with the daily inspections and with reference to the annotated drawings and photographs.

When operations that impose more severe load and vibrational forces on derrick equipment have been carried out, such as jarring and top hole drilling, inspections are carried out before resumption of normal operations.

THE FUTURE

Encouraged by the success of this initiative, the Harding Drilling Team is seeking to ensure the long term success of the Derrick Inspection Guide Procedure and to identify new areas to target and thereby improve safety performance. The Derrick Inspection Guide, together with the knowledge and experience gained in the process of implementing this procedure on Harding, has also been passed on to other industry organisations in support of the Step Change Initiative.

The hope is that other operators can develop their own Derrick Inspection Guide specific to their rig. Indeed, the Harding Drilling Team have been particularly pleased at the apparent early uptake of their guide by other North Sea rig operators. *(Contact names and information are given at the end of this article.)*

CONCLUSIONS

• The Derrick Inspection Guide developed by the Harding Drilling Team tackles the derrick dropped object hazard head on;

• The Derrick Inspection Guide not only makes a very positive contribution to personnel risk reduction, but also makes sound business sense through the reduced likelihood of rig down time due to equipment failures and accident investigations;

• The Harding Derrick Inspection Guide has also proved to be a useful training aid for some of the drillcrew;

• The successful outcome of this initiative is in large part due to the involvement of the drillcrew from the early stages.

FOR MORE INFORMATION

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2. "BP/Deutag Harding Drilling Team Develops Successful Employee Led Safety Initiative". *Drilling Contractor*, January/February 1999.

Field Service: A Necessary Evil or a Strategy for Cost Reduction?

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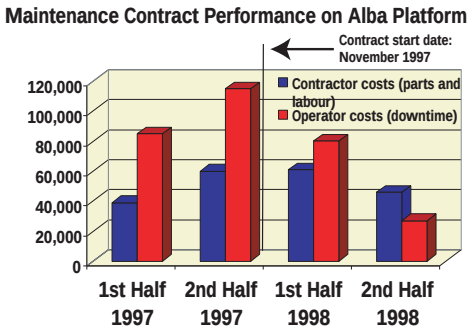
FOR YEARS, THE OILFIELD has accepted field service as a necessary evil—it's what you need when your equipment breaks down. With critical drilling equipment, (e.g., top drives, drawworks, pipe-handling equipment and automated roughnecks, etc), most contractors undertake the manufacturer's recommended field maintenance schedule, but this alone does not necessarily prevent costly downtime. From a service provider's perspective, the situation is no better: One day no customers call; the next day they all call. The level of attention and service per customer is therefore, at best, inconsistent. After a critical and honest review of our own practices, **Varco Systems** have concluded that there is a better way to provide equipment service; a level of service which is aligned with our customers goal, i.e., maximized "uptime" and "reduced cost of ownership".



Maintenance cuts costs: Implementing a systematic maintenance program on the Alba platform led quickly to sharp decreases in costs for parts, labour and downtime.

In the UK sector of the North Sea, Varco Systems has introduced a new approach to preventative maintenance. This system employs the latest online condition monitoring systems (CMS) to evaluate in real time the performance of the equipment from Varco. CMS consists of a series of dedicated accelerometer sensors which measure the vibration patterns of specific critical wear components and continuously compares these against acceptable thresholds. At this time, we have tested the prototype CMS and proved the hardware and we are currently collating data to evaluate the acceptable operating parameters of critical components. CMS will be administered by dedicated service personnel who will monitor the equipment and manage the associated maintenance contracts, both onshore and offshore. On a daily basis these "contract co-ordinators" would examine the online data available and based on this real-time feedback, an appropriate intervention plan can be mutually agreed with the Top Drive owner.

In addition to CMS and intervention, a key component in the success of an enhanced service will be our ability to stock the correct parts to do the job. This is a process that we believe should be "user driven": The person on the rig who uses the parts should be responsible for replacing them. By allowing all parties access to spares data—stock, availability, price, delivery, status and usage—a rig-specific stocking strategy can be established and monitored. Varco Systems are finalizing an EDI (Electronic Data Interchange) system that will allow a customer's existing stock management computer system to communicate with Varco's own system. As soon as a part is used, it is replaced automatically. The delegation of purchasing authority direct to the rig, coupled with online access to parts data helps eliminate the traditional administration steps in procurement and supply. In analysis, we have found that a rig driven spares management process can eliminate up to 10 administrative steps and, more importantly, the associated expense.

Based on our experience with existing contracts on North Sea platforms, we have shown that by co-operation and intervention, we can reduce equipment downtime and therefore 'lost revenue' by an average 45% in the first year, and further incremental reductions thereafter. It is this downtime that is expensive, not maintenance.

The above graph refers to the total Varco Systems' equipment covered under contract on **KCA** (Alba) Platform in the North Sea.

ABOUT THE AUTHOR

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