

Ergonomic Involvement for Occupational Safety and Health Improvements in the Oil and Gas Industry

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Introduction

Oil and gas resources are essential to many industries and significant to the maintenance of industries in their current arrangements. With the world's voracious need for energy, the role of oils and gases is now more important than ever. The world's oil and gas resources provide some of the richest, solidest, and valuable energy sources available [1].

The works in the oil and gas industry are usually performed in open and exposed fields, constrained areas, restricted spaces, and other outdoor environments such as offshore rigs and platforms [1,2]. Workers in the oil and gas industry continuously experience the problems of noise, slippery surfaces, and numerous manual material handling exposures of carrying, lifting, lowering, pushing and pulling tasks. There are electrical issues and fall protection challenges, as well as repetitive tasks such as valve turning, which increases the force risks to the employees [2].

The workers in the oil and gas industry are also exposed to heat stress as a potential safety and health hazard so that guidelines for the heat exposure have been formulated [3]. According to a six-year fatal occupational injuries census conducted by the US Bureau of Labor Statistics, workers in the oil and gas industry from the Gulf countries could be up to seven times more likely to be fatally injured than workers in other industry sectors [4].

To keep workers safer and healthier, the oil and gas industry has invested much improvement to reduce accidents and injuries over the years. For example, they introduced a fall protection belt to an innovative full-body harness with a shock-absorbing lanyard or added a five-minute escape/egress cylinder to an airline respirator, or the evolution of gas detection [4].

Despite such advancements in the oil and gas working environments, further improvements are still needed to keep worker secure and better from their jobs. In order to fully eradicate accidental deaths from the works, the fast development of new intervention technologies and strategies is necessitated to keep people safer at work. For this reason, occupational safety and health (OSH) issues are a major concern in the oil and gas industry, especially in developing countries with improving worker productivity.

However, there are hard to find specific ergonomics studies and/or approaches to enhance OSH problems for the oil and gas industry in the literature. Therefore, it would be essential to concern the application of practical actions in the oil and gas business to reduce and prevent work-related accidents, injuries, and illness.

OSH Issues in the Oil and Gas Industry and Ergonomic Intervention

Work risks

Numerous reports express that the oil and gas business sector has many innate environmental, safety and health risk factors. Working conditions in the oil and gas industry change radically by handling jobs. The majority of works involve long period standings, lifting moderately heavy objects, and climbing and stooping to work with tools that often are oily and dirty [2]. Hence, workers' physical strength and stamina are important to conduct their jobs.

Oil and gas well drilling and servicing works operate continuously and can be hazardous. If the offshore rig is located far from the coast, drilling workers stay on ships anchored nearby or in facilities on the platform itself [2]. Workers on offshore derricks continuously evacuate during the stormy weathers [2]. Many oilfield workers leave their home for weeks or months at a time. Field surveying personnel and drilling workers are often transferred from place to place as works at a particular field are completed.

On the other hand, well operation, maintenance, and natural gas processing crews generally stay in the same location for extended periods. Work activities from the oil and gas industry also include many different types of equipment and materials. Hence, recognizing and controlling hazards and potential accidents are critical to preventing injuries and deaths in the oil and gas industry.

Ergonomic Stances

Working in the oil and gas industry can be generally characterized by diverse schedules, long working hours, and hot weathers [5]. Poor environmental conditions, especially noise and heat, are common to the oil and gas fields [6]. Such hostile working conditions would increase accidents and injuries.

More specifically, workers from the oil and gas industry are largely uncovered to ergonomic-related injuries and injury risks such as repeated bending, lifting heavy items, pushing and pulling weight loads, reaching overhead, performing the same or similar tasks repetitively, and working in awkward body postures [7]. As a result, managers in the oil and gas business have frequently received worker complaints such as chronic fatigues, back pains, headaches, upper body pains, sleep disorders, and stresses [8]. These complaints are indications of ergonomic deficiencies in the work system from the industry.

The majority of oil and gas business managers either did not have knowledge in ergonomics, not access to ergonomic information or

simply ignore it as constraints, and consider it as extra expenses [9]. However, the oil and gas industry has recently experienced many changes and growths in the prevention of work-related injuries and incidents. One of the notable transformations is recognition on the safety and health improvement for the workers and subcontractors employed at the onshore and offshore to create an injury- and accident-free environment [10]. Extensive recognitions have been made to achieving this goal, but one of the most significant attainments has been the understanding of ergonomic contributions to establishing safer workplaces and to reducing overall lifecycle costs of operating the oil and gas facilities.

Many of the oil and gas corporations have instigated to comprise ergonomic interventions to their plants and managerial areas [10]. For example, Royal Dutch Shell has developed several design engineering procedures covering many aspects of ergonomics for their projects. Shell has adopted ergonomics as part of its corporate health management guidelines. The other example is that ChevronTexaco is upgrading its Safety in Design manual to integrate ergonomics and assesses subcontractors on their ability to perform in this area [10].

Because of the work nature from the oil and gas industry, promoting ergonomics can be a challenging task, but is a necessary endeavor. Therefore, it is vital that the advice and recommendations need to be executed and the corresponding feedbacks (i.e. injury records) are essential on a continuous basis to ensure positive results, such as reduced injury levels, absenteeism, increased worker morale and productivity. Following examples of ergonomic solutions are suggested to successfully manage OSH problems in the oil and gas industry [11]:

1. Use ergonomic concepts and information in the designing of jobs and even choosing equipment and tools.
2. Establish ergonomic policies, procedures, and review programs throughout the corporation, no matter what the size of industries.
3. Train workers in ergonomics for the appropriate handling and use of the special tools required during drill stem testing.
4. Ensure all workers on the location to understand the risks and dangers before starting any drill stem test. They should be fully informed and trained in appropriate safety procedures, including the use of safety equipment and breathing apparatus.
5. Utilize ergonomics for the design and layout of control rooms to eliminate human errors and increase comfort, fit, user performance, and functionality.
6. Ensure all signs and symbols are placed in areas that everyone can see and read clearly. Use larger fonts and consider both indirect as well as direct glare.

Conclusion

Job requirements from the oil and gas industry show labor-intensive and workers are frequently exposed to harsh working environments. As discussed in the above, ergonomic involvements would be a valuable tool for the oil and gas industry's safety and health improvements that can provide significant returns on investment.

It would be far more effective to implement ergonomic interventions at the design stage or renovation of a facility, although it can be applied to a facility during any phase of its lifecycle [12-14]. If an oil platform or facility needs to achieve injury- and incident-free performance, ergonomics must be a large part of that effort.

If the workers were not considered in the job design with their equipment and tools, then injuries and accidents would largely increase. To improve OSH problems and reduce injuries and incidents in the oil and gas industry, the following ergonomic recommendations are suggested:

1. Intervention should involve the development of ergonomically driven awareness programs for risk detection and injury prevention.
2. Ergonomic assessments need to be conducted extensively from managerial levels to on-site operators.
3. Development of educational materials is required to raise the awareness of ergonomics amongst employees across all the facilities and levels.
4. Ergonomic programs should involve broad and detailed evaluations of all facilities and services to identify specific ergonomic exposures that may create the potential risks for human errors, injuries, and incidents.
5. Practical ergonomic solutions need to be endorsed for implementation to decrease or alleviate the pre-identified risk factors. This practice directly affects productivity and performance of the workers.

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