REIMAGINING SAFETY

Matthew Boucher,
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reveals how a different perspective on risk management can deliver creative solutions that improve worker safety.

The oil and gas industry today is safer than it has been at any other time in history, but statistics indicate that in the US, workers in upstream oil and gas operations have one of the highest accident rates across industries. Statistics from the US Bureau of Labor Statistics show the fatality rate for the oil and gas industry accounted for 71% of the fatal injuries in the mining, quarrying, and oil and gas extraction sector between 2003 and 2016 – this is despite having one of the most thorough safety training programmes.

A huge amount of legislation and a long list of regulations have been put in place to address the dangers inherent to upstream oil and gas operations, and individual companies have invested millions of dollars in developing programmes that focus on behaviours and processes to improve safety culture.

With all the time and effort going towards improving worker safety, why is the number of lost time incidents, injuries and fatalities still high?

Maybe it is time to re-think the industry's approach to safety and reimagine how safety could be addressed to diminish the risk to workers.

A look back

Laws and regulations have made a dramatic impact on improving work conditions around the world. In the UK, legislation began changing the face of factories in 1833, when the first factory inspectors were appointed under the provisions of the Factories Act, which

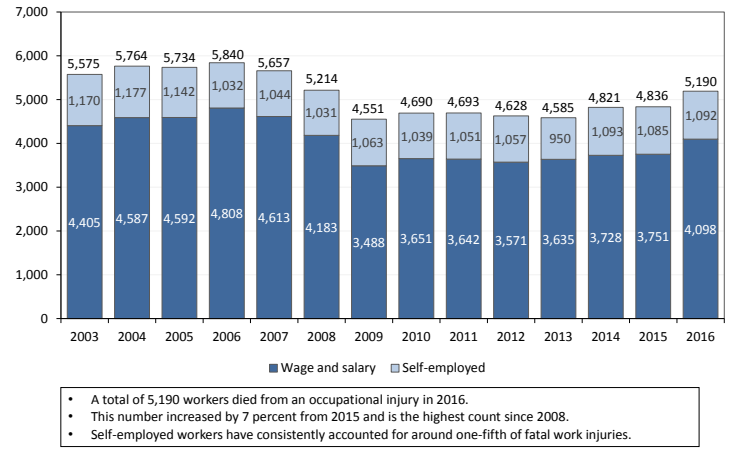

Figure 1. *US Bureau of Labor statistics data show that oil and gas industry fatalities made up 71% of fatal work injuries in the mining, quarrying, and oil and gas extraction industry in 2016.*

Figure 2. *Although New York City became the first state to pass a workmen's compensation law in 1910, two decades later, when the Empire State Building was under construction, worker safety still was not a top priority.*

Figure 3. *The Valemon Field is Norway's first platform to be remotely operated from land. Photo courtesy of Equinor. Photographer: Harald Pettersen.*

was formed to prevent injury and overwork in textile mills that employed child labourers. In 1840 a Royal Commission began investigating working conditions in the mining industry, and in 1895, a similarly tasked Quarry Inspectorate was formed to address safety in open pit mines.

The *laissez faire* approach to workplace safety that predominated at the turn of the 20th Century in the US meant injuries and tragedies were commonplace. The introduction to the workplace of chemicals, large-scale furnaces and other machinery created everyday hazards that workers had never had to contend with previously. Because responsibility for overseeing worker health and safety was a state responsibility, not the responsibility of employers, there was a lack of interest in creating a safe work environment.

In 1908, the US Congress passed the Federal Employers' Liability Act (FELA) – which applied to railroad workers in interstate commerce – to compensate railroad workers injured on the job. Despite the fact that railroad employers fought the adoption of a workers' compensation system for railroad employee injuries and severely restricted what an employee could claim, FELA became law. And even though the legislation was far from adequate by today's standards, it made injuries and fatalities more expensive for employers, who, as a result, began to pay more attention to safety issues.

In 1910, New York became the first state to pass a workmen's compensation law that automatically compensated injuries at a fixed rate instead of requiring injured workers to prove employers were negligent. There was a cap placed on the payouts, however; so even if the injury resulted in death or rendered the worker incapable of earning a living, the payout could not exceed US$10/week, and could only be collected for eight years.

Limited as this was, it represented a significant step toward improved worker safety and initiated the move for other states to follow suit. Between 1911 and 1921, 44 more states passed similar compensation laws.

In Norway, which today is viewed as a safety leader in the oil and gas industry, industrialisation came later, beginning around 1905. Originally, operational 'safety' took the form of posting medical personnel on work sites to deal with injuries, and it was not until 1917 that the focus changed from dressing wounds to proactively addressing workers' health. Though this was an improvement, there was no official legislation in place until the 1970s.

The same was true in the US, which took its next major step to improve worker safety in 1970, passing the Williams-Steiger Occupational Safety and Health Act federalising worker safety issues and creating the US Occupational Safety and Health Administration (OSHA) and the National Institute for Occupational Safety and Health (NIOSH).

In 1974, the Health and Safety at Work etc. Act was passed in the UK. It was the primary legislation addressing occupational health and safety in the country. The Health and Safety Executive, with local authorities (and other enforcing authorities) is responsible for enforcing the Act and a number of other Acts and Statutory Instruments relevant to the working environment.

Occupational health services were not regulated until 1977 in Norway, when the Norwegian Working Environment Act was passed, making preventive measures the primary

focus of company physicians and requiring all land-based operations to adopt a systematic approach to the work environment.

One of the biggest changes to legislation in the US took place much more recently, following the *Deepwater Horizon* incident in 2010, after which the US Department of the Interior formed two independent agencies to be responsible for offshore energy management and enforcement.

The Bureau of Safety and Environmental Enforcement (BSEE) enforces safety and environmental protection regulations for the offshore oil and natural gas industry on the US outer continental shelf. The Bureau of Ocean Energy Management (BOEM) is responsible for offshore renewable energy-related management activities and development.

The modern safety era saw the introduction of a law that makes Safety and Environmental Management Systems (SEMS) a requirement. SEMS II, a mandatory programme enforced by BSEE, is a tool that rig operators use to improve training and auditing procedures and empowers field-level safety managers with the authority to make safety management decisions.

These moves to legislate safety have had positive consequences, but the continuing occurrence of accidents, incidents, and fatalities illustrates that laws and regulations, even if they are followed to the letter, cannot eliminate all risk.

All the work to improve safety done to date has focused on mitigating hazards, not removing them. If legislation and regulations cannot fully eliminate fatalities in the oil and gas industry, what can companies do to reduce the risk of injury and accidents?

Continuing down the present path is not going to lead to a different destination.

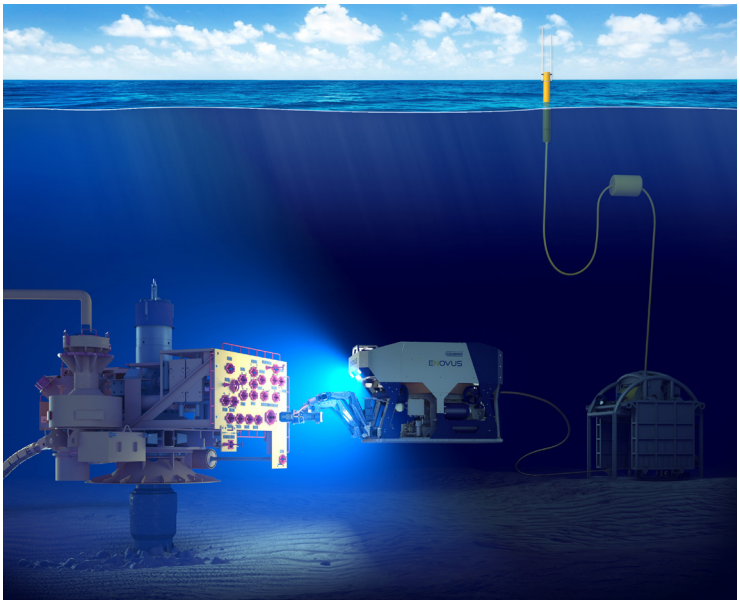

Figure 4. *The E-ROV improves safety by eliminating the need for a surface vessel onsite and allowing the unit to be piloted from onshore using specialised remote piloting and automated control technology. Image courtesy of Oceaneering.*

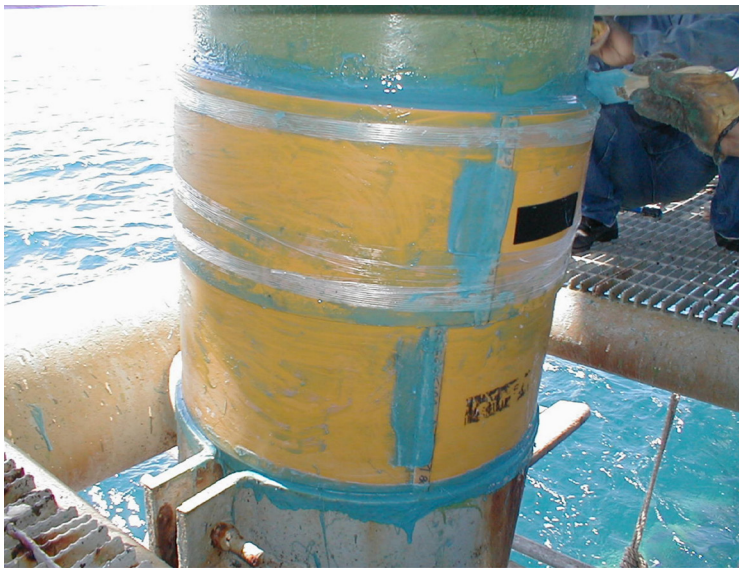

Figure 5. *Clock Spring composite repair sleeves arrive on site ready to install, eliminating heavy lifting and welding risks and delivering a completed repair in a matter of hours. Photo courtesy of Clock Spring Company, Inc.*

Implementing change

A disruptive change is needed to improve worker safety, and that change can take place only if the industry increasingly employs ways of working that do not introduce hazards in the first place. Eliminating hazards means working in a different way.

One of the ways companies have eliminated hazards is by introducing automation, which removes people from harm's way.

An example is National Oilwell Varco's NOVOS reflexive drilling system, which was awarded an OTC Spotlight on New Technology Award for 2018. NOVOS automates repetitive drilling activities like making a connection, coming off bottom, and managing specific parameters for circulation and weight-on-bit. This allows human drillers to focus on consistent process execution and safety and benefits operators by optimising drilling programmes. According to the company, NOVOS delivers greater consistency for every driller, regardless of a worker's experience level, repeatedly delivering the same improved performance. By providing precise control and customisation, the system removes some of the opportunities for mistakes. Consistency improves performance, which means there is minimal disruption to drilling activities and no risk of mistakes being made during a shift change.

Automating activities works, but it is not the answer to every challenge. Sometimes, the solution is found in developing ways to work remotely. This is something Oceaneering has achieved with its newly introduced E-ROV, which also won a 2018 OTC Spotlight on New Technology Award. The E-ROV is a self-contained, battery-powered remotely operated vehicle that uses a 4G mobile broadband signal transmitted from a buoy on the water's surface. This eliminates the need for a surface vessel onsite and allows the E-ROV to be piloted from onshore using specialised remote piloting and automated control technology.

Norwegian operator Equinor, with partners Petoro, Centrica, and Shell, applied this same concept of remote operations to the Valemon Field, which is Norway's first platform to be remotely operated from land. Although Equinor has used land-based surveillance and control for offshore operations for some time, Valemon marks an important step forward because it was designed and constructed for remote control. The operators are using Valemon as a test case, gathering performance data to apply lessons learned to other smaller platforms and fields.

Even when work has to be performed on site, there are ways to remove hazardous variables. In the case of repairs to

risers, caissons, and topsides piping, risks can be eliminated by using composite materials instead of steel, which requires heavy lifting and welding, both of which introduce safety hazards. Using composite repair kits that arrive on site ready to install allows heavy lifting and welding risks to be removed from the equation.

Clock Spring Company, a provider of composite repair solutions, has found a number of ways to control fabrication and installation variables to manage risk. Clock Spring repair sleeves are manufactured in an ISO 9001 certified facility where the ratio of glass to resin can be verified. The unidirectional glass strands are positioned, pre-tensioned, and aligned, and the composite is wound, cross-linked, heat-treated, fully cured, and inspected before being shipped to the repair location. This is a key principle in product development – to design products that are easy to install and can deliver long-term, validated performance.

Focusing on controlling the weight of the products is critical because it is one of the ways of removing safety hazards. Workers can hand pass the sleeves during installation, eliminating the dangers associated with managing heavy equipment. The installation process requires no welding, so the physical risks associated with welding are removed from the picture. Such is the case with the recently introduced extended width Snap Wrap product for use offshore in what is one of the most corrosive naturally occurring environments. The composite repairs have been installed in this environment, delivering durable repairs.

Even when it is not possible to eliminate installation variables, it is important to mitigate them to the greatest extent possible. When executing repairs offshore, installers generally access the repair sites by being suspended by ropes. Using traditional repair methods requires workers to manage heavy components that have to be welded into place, which generally takes 2 - 3 days. Using composite products that arrive on site ready to install allows workers to execute a repair in a matter of hours. Composites have proven themselves in this environment, delivering successes that are a testimony to their viability for offshore repairs.

Taking the next step

It is time for industry to take a different approach to safety and to change the focus from legislating safety to eliminating the need to perform activities that can result in injury. The solutions that are available today have the potential to achieve that goal, providing ways to work that no longer endangers workers.

If the industry is serious about improving safety, it has to be willing to look at things from a different perspective and to adopt new ways of working, using products that offer safer installation without sacrificing quality and performance.

It is possible for companies to become better stewards of assets as well as the environment if there is a willingness to step off the beaten path and consider a different road forward.

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