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Worker safety at highly corrosive offshore platform

The Evolution of Worker Safety and the Next Step in the Journey

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ABSTRACT

Approximately 13 people die on the job in the United States each day from fatal injuries. Great strides have been made since 1970, when nearly 40 workers per day were killed on the job, but there is still room for improvement.

Safety standards have advanced, and worker deaths have trended downward, but job sites continue to be dangerous places. Regulations have greatly improved worker fatality rates, but guidelines and legislation can only go so far. More work needs to be done to protect workers' lives, and that work needs to take a different form. The criticality of these changes cannot be overstated because even a single death is one death too many.

INTRODUCTION

In 1970, President Richard Nixon signed the Williams-Steiger Occupational Safety and Health Act, federalizing worker safety issues and creating the United States Occupational Safety and Health Administration (OSHA) and the National Institute for Occupational Safety and Health (NIOSH). OSHA, an agency of the United States Department of Labor, is responsible for assuring safe and healthful working conditions by setting and enforcing standards and by providing training, outreach, education and assistance. NIOSH is a part of the Center for Disease Control and Prevention within the United States Department of Health and Human Services and is responsible for conducting research and making recommendations for the prevention of work-related injuries and illnesses.

The passage of this act and the creation of these agencies were the result of a hard-fought legislative battle and a struggle on the part of many to address and remediate workplace hazards dating back to the 19th century.

While these advances in safety were groundbreaking, they have not eliminated worker fatalities. It is time to take the next step on the road to eliminating accidental deaths in the workplace.

From Indifference to Awareness

There is little data to measure worker safety before the 19th century, though we do know that pre-industrial laborers faced risks working in farms and fields. Industrialization and the introduction of the steam engine, which replaced animals, introduced different hazards, but whether these new technologies generally worsened the dangers of work is unclear.

The second industrial revolution, also known as the Technological Revolution, began in the United States shortly after the end of the US Civil War. While the first industrial revolution focused on textiles, coal and iron, the second industrial revolution saw the expansion of electricity, petroleum and steel.

Westward expansion spurred nationwide railroad construction, and as cities grew, they took on a different appearance. Buildings became taller, with Chicago's 138-foot tall Home Insurance Building, the tallest of its time, opening in 1884. Construction of this type required iron and steel, which were produced in huge volumes. During this time, there was extensive use of machinery in manufacturing, a great increase in the use of steam power, and widespread use of the telegraph. Petroleum expanded as a fuel, and the world saw the beginning of electrification. The introduction to the workplace of chemicals, large-scale industrial furnaces, extrusion methods, and machinery introduced hazards never previously encountered by workers. The net result was that workplace injuries and tragedies became commonplace.

The second American industrial revolution followed a different path from the parallel revolution going on in Great Britain. Owing to abundant natural resources and relatively higher wages, manufacturing in America encouraged the use of machines and processes that reduced the amount of labor required to produce goods. These developments occurred within a legal and regulatory climate that diminished employer's interest in safety. Consequently, Americans developed production methods that were both highly productive and often very dangerous.

Because companies bore no responsibility for the consequences of worker injuries and fatalities, they

had no reason to be concerned about dangerous production methods. They pursued anything that would expedite production regardless of the physical consequences to employees. Injured workers or surviving heirs could sue employers for damages, but survey data suggest that these lawsuits were successful only about 50 percent of the time and resulted in awards equating to approximately six months of pay.

The most dangerous places for workers at the turn of the century were coal mines. Coal seams in England were deep, and the coal was expensive to produce. In America, coal was abundant and in many places was near the surface, which meant it could be mined less expensively. In Britain, rock held up the roof of the mine, and companies sought to exploit all of the coal in a relatively small space, working in concentrated areas that made worker supervision easier. American mines used coal pillars and wood beams to hold up the roofs, and workers were spread out across many rooms, which meant supervision was difficult. Blasting, a dangerous practice of using dynamite or other explosives to break rock, was routine. Since miners were paid by the ton, whenever safety interfered with productivity, safety took a back seat.

Legislating Safety

The 1907 Monongah, WV, mining disaster, in which 367 workers died as a result of an explosion, shocked the nation and led to the creation in 1910 of the U.S. Bureau of Mines to promote mine safety.

That same year, a journalist named William B Hard, published an article in “Everybody's Magazine” called “Making Steel and Killing Men.” In the article, he estimated that every year, out of a workforce of 10,000 workers 1,200 were killed or seriously injured. He urged the steel industry to work to reduce its injury and casualty rate. In 1908, U.S. Steel formed a safety committee with a mandate from company president Elbert Gary to reduce the accident rate as much as possible. A highly successful “safety first” movement developed from this, spilling over into other industries and resulting in the creation of the National Safety Council in 1915.

The most important legislation came in 1908 when Congress passed a federal employers' liability law that applied to railroad workers in interstate projects. This made worker injuries and fatalities more expensive, and as a result, employers began to pay more attention to safety issues. Two years later in 1910, New York became the first state to pass a workmen's compensation law that, instead of requiring injured workers to prove employers we negligent, automatically compensated injuries at a fixed rate. Forty-four more states passed similar compensation laws between 1911 and 1921.

Significant increases in accident costs resulting from compensation laws and increased employer liability sparked the modern concern with safety and led to a long-term decline in worker related injuries and fatalities. Companies installed guards on open machine parts and machinery manufacturers developed safer designs. Management began identifying hazards, requiring PPE, and setting up safety departments and committees. The results were dramatic, reducing manufacturing injury rates by nearly 40 percent between 1926 and 1939.

Results since the 1970s have been even more impressive. Since 1970, fatalities in the workplace have dropped by 66 percent.

Making Strides toward Reducing Safety Incidents

A careful analysis of OSHA data reveals that the pipeline industry's strong focus on ensuring worker safety has resulted in remarkably few serious injuries each year. The data are not complete, but they provide a window to workplace hazards in the pipeline industry.

Nearly 60 percent of workers injured in the pipeline industry were involved in day-to-day pipeline operations, maintenance and repair. Almost half of the non-fatal injuries were the result of overexertion when lifting or moving heavy objects and nearly one-third were the result of slips and falls. More than half of the non-fatal injuries resulted in workers missing more than 21 days of work, with more than 40 percent of injured workers missing more than 31 days of work. Nearly all of the fatalities in the pipeline industry were the result of contact with motorized highway vehicles. The remainder were the result of being crushed by objects. This data does not include work in terminals and tank farms commonly associated with pipeline operations.

Most of the safety improvements made to date address these sorts of incidents, providing life-saving rules that include things like:

- Making sure not to override or defeat safety guards

- Securing work permits
- Tying off to fixed points when working at height
- Properly locking out and tagging out energy sources when working on equipment
- Not walking under suspended loads, etc.

While the guidelines exist, they are meaningless if there is no safety culture – a pervasive safety mindset that drives personal behavior.

Life Lesson - Brad Livingston's Safety Story

In examining how safety culture impacts workplace safety, it is helpful to look at the story of Brad Livingston, a retired laborer from Colorado Interstate Gas and professional safety speaker. In 1991, he was severely injured in a welding accident, and the person he was working with was killed when a series of gas storage tanks exploded. Brad now travels around the United States telling his story and encouraging improved safety consciousness.

Brad explains the ripple effect accidents have, using as an example the shortcuts he and his partner took when the accident he was injured in happened, describing the three or four minutes he and his coworker saved that resulted in Brad's two-year convalescence and permanent disfigurement and the death of his co-worker.

During his presentation, which is available on the Internet at www.bradlivingston.com, Brad explains the importance of following all the steps in the safety process and double and triple checking the hazards before carrying out dangerous work. Walking through the steps he and his coworker took on the day of the accident, he illustrates the dangers they faced when they decided to welded on the tanks that exploded, pointing out that before any work began, the tanks should have been emptied and rinsed and filled with water to prevent the explosion that severely injured Brad and took his coworker's life.

There are welding crews at this moment welding on or against live pipe. They are working with heavy equipment and lifting heavy objects over their heads and into ditches. They are taking risks that can cause pollutants to be released in the atmosphere, damage equipment and assets, and possibly result in the loss of life. Companies preach constant vigilance, but people still get hurt.

It is apparent when examining data from years for which complete OSHA data exist (2012, 2013, 2014) that safety advances have plateaued. Further gains will be difficult unless there is a step change in the way work is carried out and how safety is managed.

The Next Step

The disruptive change that is needed to improve worker safety is to increasingly employ ways of working that do not introduce hazards in the first place.

Options must be considered before hazards are introduced. For example, if it is possible to repair a pipe without welding it, then welding should not be done. If it is possible to repair a pipe without using heavy lifting equipment, then heavy equipment should be eliminated.

Lean principles, which are common in manufacturing environments, can help identify how and where to implement new methods and tools in pipeline maintenance and repair.

The goal of Lean management is to eliminate impediments so a process flows unimpeded by obstacles.

The first step in implementing Lean is to understand and then identify the eight forms of waste.

1. Transport, which refers to the movement of goods with machines or equipment
2. Inventory, which, in this case, means unnecessarily stocking repair products
3. Motion, which refers to the movement of people
4. Waiting, which is unproductive time
5. Overproduction, which creates unneeded products or components that introduce avoidable cost and take up space that could otherwise be used for something productive.
6. Overprocessing, which adds time to production without delivering value
7. Defect elimination, which removes the need to rework
8. Skills – Underutilizing capabilities, delegating tasks with inadequate training, in other words, safety

Everything that has been done to date has focused on mitigating hazards, not removing them. The only way to make significant progress is by removing hazards in the workplace. Eliminating hazards means working in a different way.

Clock Spring is focused on removing the most hazardous variables in pipeline integrity operations – welding and lifting. While lifting introduces physical hazards, welding creates pollution as well. Developing products and procedures that circumvent hazards is a better solution than contending with hazards. Simply put, if it is not necessary to weld, a safety risk can be avoided. A solution that does not require welding clearly is a better choice.

The objective is to minimize sources of variance by reducing variables. That is a key design principle in product development and why Clock Spring products remain the easiest to install and offer the best long-term, validated performance in the industry.

The original Clock Spring product is a perfect example. It is a precured laminate composite repair sleeve that is manufactured inside an ISO 9001 certified facility, where manufacturing is quality controlled. Constructing the units in this environment eliminates many installation variables. The weight of the products allows workers to hand them down into a ditch, removing the need for heavy machinery and lifting straps. The installation process requires no welding. And the resulting repair is durable.

Building on the success of proven technology, the company is expanding its offerings, most recently introducing extended width Snap Wrap, which has the potential to revolutionize work on offshore platforms in one of the most corrosive naturally occurring environments.

Traditionally, when repairs are done on decks, rope access is required. Common repair methods take two to three days to execute – a long time to subject workers to exposure to the elements and on rope access.

The new composite solution takes a few hours, which is less tiring for workers and considerably less risky.

Conclusion

It is time for industry to take a different approach to safety with a focus on eliminating the need to perform activities that can result in injury. Research and development efforts should target lightweight products that do not require overhead lifting, and as far as is practical and possible, construction should avoid hot work. Eventually, innovation and creativity will produce solutions that no longer put workers in harm's way.

By looking at things from a different perspective, designing quality products, and following a safe and certifiable installation method that eliminates hazard risks, it is possible to become better stewards of assets as well as the environment.

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President and Chief Executive Officer of Clock Spring Matt Boucher understands the importance of asset integrity, maintenance, and reliability and has a career history of leveraging that knowledge to transform companies, managing growth and bringing process maturity to businesses. His more than two decades of operational, sales, and finance leadership experience with public and private companies includes private equity portfolio companies ranging from $10 million to $40 billion in revenue. He understands that people are a company's greatest asset and is passionate about building winning teams. Boucher, who joined Clock Spring in 2016, is an agent of change who understands that culture starts with leadership – finding ways to help organizations define desired behaviors and understanding the values that those behaviors imply. He holds an MBA from the University of Texas at Austin and a BS in Economics from Bentley University in Waltham, Mass. He is a Six Sigma Green Belt and is a member of the Interstate Natural Gas Foundation Board of Directors.
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