SafetyInfo

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Controlling the Human Element

Despite the best efforts of safety professionals, accidents happen. Most studies of industrial accidents cite human error as the root cause. In the oil and gas industry, human error has been found to be responsible for 70 percent of all accidents and accounts for 90 percent of the value of all resulting losses. Studies in other industries have similar conclusions.

As humans, we are driven by production concerns and are likely to pursue work methods that allow us to complete the job faster or with less effort. This and other human limitations such as memory lapses can cause people to circumvent or ignore training in the methods of how to safely interact with hazardous equipment and processes. These tendencies and limitations are the real culprits in the breakdowns in safety programs and procedures that result in accidents.

How can we control the human element in industrial settings and thereby improve safety performance? The answer can be found by analyzing risks presented by industrial machines and processes.

When assessing risk present in a machine or process, hazards are typically easy to identify—energy sources, stored energy, pinch points, ergonomic concerns. The best (safest) approach is to remove the hazard from the design. By eliminating the hazard, any risk of an accident is eliminated. Unfortunately, this is often impossible. Also, many processes and pieces of equipment are already in existence; replacing or upgrading them is not economically feasible.

When removing the hazard by design is not possible, efforts focus on limiting the chances of an accident via some type of administrative control. These include operator training, permit to work procedures and lock-out/tag-out programs. Such programs are largely dependent on human performance, which leaves them vulnerable to human error and, therefore, accidents. So, facilities most often rely on administrative controls while admitting that the primary cause of accidents, human performance, is at the core of these controls. We should not allow ourselves to live with this paradox.

A middle ground can be found between designing out the hazard and using administrative controls. Alternative technologies, such as trapped key interlocking, eliminate human error by physically denying workers access to the equipment or process until all the hazards are neutralized. Trapped key interlocking sequentially traps and releases keys from control device to control device (from switches to valves to access doors, etc.), literally locking people into a safe, predetermined sequence of operation. The person interfacing with the hazard has no choice but to isolate all energy sources and wait until stored energy is dissipated or controlled before s/he gains access. Trapped key interlocks, as well as other alternative methods of control such as light curtains, laser scanners, two-hand control devices and safety mats, are easily incorporated into new equipment designs or fitted to existing equipment or processes. It should be noted that not all of them apply in all situations and each has its own "best fit" applications.

A case is easily made that where the risk is high enough, one should not rely on administrative control methods. This means that where … the probability of an accident is high enough or… the potential injury is severe enough or . . . the frequency of human contact with the hazard is often enough … we should pursue an appropriate alternative method of control such as trapped key interlocks. This will result in a workplace where the human element is controlled to the maximum extent possible and the residual risk posed by our processes and machinery is kept to a tolerable level.

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