

Relationship between Engineers and SHE professionals

Engineering for safety requires a new understanding between engineers and SH&E professionals—an understanding of the positive impact SH&E professionals can have if they are bought in at the beginning of the design process. Many engineers (myself included) have lacked awareness regarding the positive impact SH&E professionals can have on design.

For me, this problem became most apparent when I was thrust into the position of communicator and mediator between engineering and safety departments. To fulfill my responsibilities, I had to commit time and effort to learning the safety side of the equation. Ultimately, I self-taught myself about safety and safety management systems. Through this process, I came to understand that effective "engineering for safety" lies in the ability of engineers who typically control the design process-to understand and apply the basic principles of the SH&E profession.

SELLING SAFETY IN THE DESIGN

Traditionally, engineers design a facility, a piece of machinery or an entire process for the occupants, operators and end users. While this design work must occur, the negative side to the traditional practice is the lack (or even absence) of consideration of other people who inevitably will be affected by the design. Another area that typically receives insufficient attention during the design stage is the impact a design will have on production, equipment, the environment and public relations as it relates to this "other" group of people.

This has become a significant issue for several reasons:

- Most engineers do not take courses on safety in school nor do they attend safety seminars or conferences after they graduate. It has been found that 80 percent of engineers had not taken any safety courses in college, and 70 percent had not attended any safety seminars or conferences.
- Design codes and standards are predominantly written for building occupants and users, not the people who assemble and maintain buildings and equipment. Although building codes prohibit a person walking to the copier to pass by an open atrium with only a 12-inch guardrail, in some facilities, maintenance personnel routinely pass by an open atrium to access the roof and all of its equipment.
- While an emergency light placed high above a stairwell will prove helpful to the building occupants in the event of an emergency, it's a different story altogether for the contractor who must install it and the maintenance personnel who must test and service the light periodically. The safety of contractor or maintenance crew was not taken into consideration in the design process for the installation of the emergency light at this particular facility.
- Engineers believe they have already tackled pertinent safety concerns in their designs. Their examples of safety design considerations dealt with safety factors against failure of a machine or building component, which can have a tremendous effect on people. However, those issues alone do not address many of the safety concerns found in facilities.
- Management does not realize the total cost associated with the traditional design process or is unduly influenced by short-term requirements.

One global industrial firm reviewed its data to determine costs associated with safety and the design process and took into account

1. costs associated with safety elements when they were integrated into the original project program
2. costs of incorporating safety elements after the design drawings were completed
3. cost of adding safety elements during the installation process
4. costs associated with adding safety elements after the process was in production

This analysis showed that the cost of adding in safety elements was more than process was running than if those same safety considerations had been included in the original project design program.

Another company was about to receive some new equipment when it realized the equipment required lockout/tagout components. The cost of adding these components at the factory was INR 24,500 per machine. Had the firm waited until the equipment was delivered, the cost would have been INR 266600 per machine. We have always done it this way! My daughter once cut her hand on a can lid that was opened with a traditional can opener-a cut that required a quick trip to the emergency room and several stitches to close. Until then, I had never given any thought to the safety of a can opener or the razor sharp surfaces it created. The appliance was just like the one I used growing up.

Had I opted to continue using the traditional can opener design, I could have put my daughter through extensive training on the proper handling of an opened can, or I could have purchased safety gloves for family members to wear whenever a can needed to be opened. I didn't choose either of these post-design options, but rather took the "engineering for safety" approach. I bought a new can opener designed with safety in mind-one that cuts the seal of the can leaving no sharp edges behind.

INCORPORATING SAFETY

The goal of incorporating safety into all levels of the design process is not impossible to achieve. However, it requires a shift in how industry implements the design process. We need to include hazard analyses and risk assessments at the beginning of the design process. Short-term costs associated with getting a design to production still must be managed, but we also must research long-term costs. We need to train engineers in safety so that design professionals are able to identify, evaluate and control hazards.

More than 12 years ago, an industrial company presented us with a design challenge involving safety. The project required our engineers to move away from their comfort zone of providing strictly traditional engineering services and invest in a considerable amount of safety training. The ultimate benefits of a design approach that blends engineering and safety are evident in the progressive manner in which facilities perform.

For example, consider a parts manufacturer with whom we have worked for many years. When this company began the process of procuring new production equipment, we were brought in to train and to assist the procurement team. Initially, we heard the typical objection: "You want us to include all of this safety stuff and still meet the timeline and the budget?" With the previous equipment, maintenance personnel frequently had to perform work tasks at heights. Through the use of hazard analyses and risk assessments, along with traditional engineering, the team

produced new equipment in which no activities required personnel to work at a height of more than four feet. After the equipment was up and running, the team leader acknowledged that no significant cost or delay could be attributed to the process of engineering for safety.

RETROFITTING FOR SAFETY

This process of designing for safety is most effective on new designs, but has been used with great success in solving safety problems with existing equipment and facilities. A large cooling tower (40 feet tall x 120 feet long) offered no safe means for maintenance personnel to access the fan drive units. The tower was designed to cool, not to be safely maintained.

After hazard analysis and risk assessments were performed, the best solution was engineered. It involved the installation of an access floor constructed with grating that has a large percentage of open area to accommodate the airflow requirements of the cooling tower. An interesting note to this is the design was presented to the cooling tower's manufacturer for its review. The manufacturer's engineering group did not want to accept the design, but its marketing department liked it. The floor system is now a standard option for new cooling towers. Effective communication between engineering and safety, training engineers in basic safety principles and management support is all key to designing and engineering for safety. Engineering for safety is not a quick fix. It is a commitment to an innovative and more inclusive design approach. And, as some industries have already seen, it is well worth the effort and investment.

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