

Importance of Safety Engineering

by Ms. Tan Bee Hong

SAFETY. This simple word speaks volumes and can be what stands between life and death. We all want to be safe. We feel good when we feel safe, whether it's at home, in the streets or at work.

When dealing with the subject of safety in the engineering context, we may loosely divide it into two aspects – safety at the workplace and a career as a safety engineering professional – though the two are closely interlinked. Safety engineering aims to manage risk in the workplace by eliminating or reducing it to acceptable levels.

According to Wikipedia, *“Risk is the combination of the probability of a failure event, and the severity resulting from the failure. For instance, the severity of a particular failure may result in fatalities, injuries, property damage, or nothing more than annoyance. It may be a frequent, occasional or a rare occurrence. The acceptability of the failure depends on the combination of the two. Probability is often more difficult to predict than severity due to the many factors that could lead to a failure, such as mechanical failure, environmental effects, and operator error”.*

As its name implies, safety engineering is about reducing failure or, should failure occur, minimising it so that the consequences will not be life-threatening.

FROM THE BEGINNING

Christina Phang, Managing Partner of Asia Pacific Risk Practice at Environmental Resources Management in Kuala Lumpur, said that safety measures should, in fact, be included as early as possible in a project lifecycle.

Ideally, it starts during the early design of a system. Safety engineers consider what undesirable events can occur under what conditions, and project the related accident risk. In the oil and gas industry, for instance, safety measures such as requirement for fire/blast wall which will influence the overall structural weight of a platform, must be considered in the early stages as otherwise, in the event that an accident does happen, it will not only prove costly but it will also result in delays.

Indeed, it is the safety engineer's job to make sure an existing, completed design is safe. If a problem is located only after a building or the set-up is completed, it may cost much more to rectify. Apart from financial considerations, such design faults can also endanger human lives and cause



damage to the environment.

THE PIPER ALPHA TRAGEDY

This year is the 25th anniversary of the Piper Alpha disaster in the North Sea. On 6 July 1988, a massive explosion rocked the large oil platform, resulting in a fireball that ripped through the rig, killing 167 people. Only 61 men survived. Piper Alpha was operated by Occidental Petroleum, a wholly owned subsidiary of Occidental Petroleum Corporation. The tragedy, said to be “the worst offshore oil disaster” in terms of lives lost and impact, shook the industry literally to the core. The only positive thing was that it led to a review of safety practices. The total insured loss came up to £1.7 billion.

However, there are times when accidents still happen despite all the precautionary steps being taken. In the mining industry, for instance, the ground workers themselves are often to blame.

According to Tuan Haji Mohd. Za'im Abdul Wahab, Deputy Director of Operation Coordination and Implementation Division, Department of Minerals and Geoscience Malaysia, the professional engineers and the management are fully aware of the safety aspects and have taken the necessary steps to ensure this such as providing hard hats, boots and other necessary equipment including masks.

But there have been instances, he said, when the lower rung workers disregard these safety rules, thinking it's bothersome and cumbersome to be wearing safety clothing and all when down in the mines.

WEAK LINK IN BRIDGES

Another example is bridges. These are usually designed to withhold weight well in excess of anticipated traffic, to

reduce the likelihood of collapse should the bridge be overloaded. However, on 1 August, 2007, the I-35W Mississippi River bridge in Minneapolis, Minnesota, United States, suddenly collapsed during the evening rush hour, killing 13 people and injuring 145. The eight-lane, steel truss arch bridge carried 140,000 vehicles daily across the river and was Minnesota's fifth busiest.

The National Transportation Safety Board said the collapse was due to a design flaw and additional weight on the bridge at the time of the collapse.

WHAT SAFETY ENGINEERS DO

A professional safety engineer is trained in studies that include industrial hygiene, engineering hazard controls, system and process safety, ergonomics, system safety and fire control, safety and health management, product safety and construction safety. It also encompasses environmental safety and health, and safety, health and environmental laws, regulations and standards as well as accident investigation and analysis.

Safety engineers are usually already engineers in other disciplines such as industrial engineering, mining engineering etc. They develop procedures and design systems that keep workers, users of a facility (or even people in the vicinity) from getting sick or injured and keep property from being damaged. They combine their knowledge of health or safety and of systems engineering to make sure that chemicals, machinery, software, furniture and other products are not going to cause harm to people or buildings.

In other words, they anticipate, identify and evaluate hazardous conditions and practices. They develop hazard control designs, methods, procedures and programs which they implement, administer as well as advise others on such programmes. It is not unusual for safety engineers to consider software, chemical, electrical, mechanical, procedural, and training problems at the same time.

NEED FOR SAFETY ENGINEERS

Why is it imperative to hire safety engineers? Financially, it makes sense. With safety ensured, companies actually save money as they spend less on insurance and medical costs. Secondly, when workers know work place safety is being taken care of professionally, they will feel better about their jobs and become more productive in turn. They are also less likely to quit, which eliminates the need for companies to hire new staff whom they will have to train. Even if an accident should occur, the workers know there are personnel on hand who can act quickly to take care of the problem.



Safety engineers look for ways to prevent accidents in the workplace. Sometimes, it's their job to take into consideration the design and material of buildings and what a building would be used for, as well as emergency exits and installation of fire fighting equipment.

Depending on the industry they are employed in, they may also test air and water quality, noise levels and temperature and constantly monitor equipment to ensure all are in top working condition.

In conclusion, safety is, undeniably, one of the more important disciplines in engineering and, if not implemented, may lead to disaster and loss of lives. ■