Workplace health and safety

Safety Engineering

TMA 1

At the start it is fair to surmise that health and safety was never at the forefront of any business or company. But over many years it can clearly be seen and noted that a company cannot flourish without it. This being said it was not until the early 1930’s that the first formal Health and safety text book was introduced by H. W. Heinrich which speaks volumes of how poor the health and safety situation was coming up to this time. Moving forward through the ages it can be seen that things where moving in the right direction from the emergence of more responsible and co-ordinated attitudes in the 50’s to the all powerful Health and Safety at Work Act in 1974 to our current day Acts that protect workers in every which way imaginable.

Companies that work hard and invest in overall workplace health and safety should experience reductions in illnesses, injuries and fatalities. This will return financial savings in a number of the companies sectors, such as reducing employees’ compensation fees and medical costs, avoiding preset penalty fines, and reducing the amount of money used to train new/replacement staff and the cost of conducting accident investigations. Overall, employers commonly find that improvements to workplace health and safety can mean substantial improvements to their companies’ financial performance and productivity.

By investing in health and safety a company can improve business and must see that complying with health and safety should not be looked at as a

regulatory load that has been forced upon them as it offers significant opportunities. Benefits can include:

- Cut costs;
- Lower risks;
- Reduce employee sickness/absence and staff turnover;
- Less accidents;
- Smaller risk of lawful action;
- improved status with suppliers and partners;
- Greater reputation for business responsibility among investors, customers and communities;
- More productivity, because employees are happier, fitter, healthier and more motivated.

HSE figures show the personal and economic cost of failing to meet health and safety standards each year:

- Masses of working days and hours are used up because of work-related illness and injury.
- Thousands deceased from occupational diseases/illness.
- Over a million employees have self-reported distress from a work induced illness.
- As much as one worker is fatally injured every working day.

It is clear to see that without an adequate health and safety setup within a company no matter how big or small they may be that they cannot compete or even exist without Safety.

From a purely financial business mind the risks are far too great to waver safety and from a humanist perspective the loss of life should never be something to be risked against.

2A.

1. What caused the event
2. By what route(s) or mechanism(s) did the deviation or hazardous event occur?
3. What should be done to prevent its recurrence or, if it is not technically or economically possible to prevent repetition, how can its probability be reduced to an acceptable level?
4. Can the knowledge gained be applied elsewhere?

2B.

The quantitative approach to health and safety simply put can be defined as a set of equations used to determine levels of safety.

Quantitative safety levels are data and numbers put forward in order to try and estimate achievable levels of safety and measure how well they perform in quantitative results.

It should be made clear that if a quantitative safety performance level has been set, it must be able to be measured or estimated in quantitative terms. Quantitative data does give a very clear picture of a system and should be applied if possible.

Setting up a reliable quantitative system for safety target levels helps and enables companies to measure and record all achieved levels of safety, and

could help provide a sound basis for managers and directors to make decisions.

The desired target safety outcome should be presented in either relative or absolute terms. Mathematical models are the common practice used to define quantitative safety target, for example to make an estimate of a target rate of safety occurrences of a stated severity. It is also very important to note that it is often impractical or even impossible to quantify all factors.

3A.

What is a hazard?

The meaning of a hazard is often very misleading and can be very confusing as many dictionaries do not give specific definition and at times combine the term “ risk” causing great confusion between the two. Most describe a hazard as a danger or a risk which explains why many substitute one for the other.

The way that I feel best describes a hazard is- any source of potential harm, damage or ill health effects on someone or something under normal working conditions.

Realistically it is something that can cause harm or ill effects to either individuals (health effects) or organizations (property damage or equipment loss).

For example any working system whether it is mechanical, electrical or chemical can reach its potential to destruct through use by any amount of means i. e.; fire, explosion, mechanical fault. It would not be good practise to measure a hazard confidently against size or severity.

What is risk?

Risk can be foreseen as the probability or the chance of ill effect that someone may experience an adverse health effect or even be caused harm by being exposed to a hazard. It can also very easily apply to a companies, property or equipment loss or damage.

An example of risk could be: the risk of developing lung cancers from smoking could be shown as – “ smokers are 10 times (for example) more likely to contract and die of cancer than non smokers”.

An alternative way of reporting risk is by using a number or lettering system i. e. “ a number “ X”, of smokers per 100 smokers will have a chance of developing lung cancer” (dependent on age and the amount of years they had been smoking).

This type of risk is expressed a likelihood or probability of a person developing a disease or incurring an injury. These differ to hazards because they refer to the likely or possible consequences (e. g., emphysema, lung cancer and heart disease from cigarette smoking.)

3B.

Ordinary (industrial)

Ordinary risks are a common in all industry related businesses and are caused predominantly by employee’s everyday work and activity whilst carrying out their jobs.

Classic examples of these can range from; slipping and tripping hazards, objects falling on personal from heights, personal falling from heights, physical injuries caused from lifting, physical injuries causes from interference with industrial equipment.

All of the above risks are only applicable to staff working in an industrial environment and not the general public

Residual

A danger or risk of an event or action irrespective of being in line with science and fact can be seen as a residual risk, residual risks can and will conceive dangers, even if all possible measures of safety are theoretically applied. An example could be of a water tank or pump failing and the residual risk being flooding.

Process

Process risk can be seen as the result of a risk differing from predicted estimates based on the pure random chance of an event.

For example if a die is thrown 6 times. It could be estimated that it will land on the number 1 once every 6 throws if the nice is fair. Process risk can be explained that the number of one’s thrown could be more or less than once due to the randomness of chance in the dice throwing process

Societal risks

Societal risk, as its name suggest is the risk to the society or local group of people that may be subject or exposed to a major hazard. The risk is best surmised and worked out by area and location ranging from factors like blast radius, flood radius, predictable wind direction when measuring a gas release.

An example where societal risk would need to be factored in would be when any company plans to build or produce something that could/would hold some kind potential societal hazard. This can be plotted and calculated using a FN curve to determine the full risk of the set up.

4.

Classify the following situations in terms of type of risk and complete the

risk table by assigning probabilities between 0 (not possible) and

1 (certain) with 0. 1 – 0. 3 (low), 0. 4 – 0. 6 (average), 0. 7 – 0. 9 (high) for

injury and equipment damage for each hazard.

State concisely the reasons foryourchoices and any qualifications you feel are required.

Factors such as weather, location and population density should be

considered and stated.

(i) Object falling from scaffold.

(ii) Tripping over a low level pipe in a petrochemical plant whilst on nightshift.

(iii) Electric shock from overhead cable/line struck by lightning.

(iv) Radioactive leak into a river from nuclear power station.

(v) Electricity supply interruption in an equipment store with emergency lighting.

(vi) Not replacing a walkway grating on an oil rig.

(vii) Hydrogen sulphide release from pocket in the end of a blanked off pipe in a crude oil fractionation plant.

Situation	Ordinary risk	Residual risk	Process risk	Societal risk	Probability of risk	Probability of damage
(i)					0. 5	0. 8
(ii)					0. 3	0. 2
(iii)					0. 1	0. 9
(iv)					0. 1	1
(v)					0. 1	0. 1
(vi)					0. 9	0. 9

(vii)			0. 3	0. 7

(i). I have selected the object falling from a scaffold as an ordinary risk and scored the probability of risk as 0. 5 as is the nature of the risk there will always be the risk of objects falling from a height when working at height, I have not scored it to high as safety measures are always in place when working at heights to prevent and limit this type of risk. I have scored the probability of damage higher as generally anything falling has the potential to cause damage and at 0. 8 this highlights that fact.

(ii) I have categorised the tripping situation as a ordinary risk as well as a process risk, ordinary because tripping situations are overly common and happen day to day in industry and a process risk because process risks can be seen as the result of a risk differing from predicted estimates based on the pure random chance of an event i. e. tripping over a low level pipe that you may or may not have passed over safely 100 times before. I have scored the probability as low because if it was a pipe that has always been there it should be clearly marked as a danger and known to employees working around it and scored the risk of damage as low to reflect the low risk of probability of falling over the pipe and causing injury or damage to equipment.

(iii) I have selected residual risk, process risk and societal risk to cover this as all 3 risks or at least parts of them can be seen. Residual as all risks and dangers can be covered and measured but not account for a lightning strike, process risk as the chances of lighting striking are extremely low but the pure chance and randomness of the event prove the process risk element

and societal risk as the local area may be affected be power cuts and disruptions to their everyday functions. I have scored the probability as low as the chances statistically of lightning striking are low but have scored the risk of damage as extremely high as damage to life and equipment could be irreversible.

(iv) I have selected the radioactive leak as a societal risk as the potential ecological damage to the surrounding area would be detrimental, not only affecting local wildlife but also human life and in fact any other business or being that depended on the river. I have scored the probability as low as current nuclear Power stations operate under extremely strict safety laws and practises. This being said I have scored the probability of damage as 1 the highest possible as this sort of incident could not happen without massive amounts of damage.

(v) I have scored this event very low on both damage and risk probability as the only risk present would be ordinary and since safety measures are in place i. e. emergency lighting I could not foresee a high risk or probability of danger.

(vi) I have scored this risk as high as the risk is very high that damage or injury will occur. I have classed it as a ordinary industrial risk as it would be caused by employee’s everyday work and activity whilst carrying out their jobs or negligence thereof.

(vii)

A danger or risk of an event or action irrespective of being in line with science and fact can be seen as a residual risk, residual risks can and will conceive dangers, even if all possible measures of safety are theoretically applied. An example could be Hydrogen sulphide released from a pocket in the end of a blanked off

pipe in a crude oil fractionation plant, and the societal risk would be placed on anyone in the direct area.

5.

The incident in my opinion could very easily been avoided, to look at the reasons why I will discuss measures that I feel should have been in place and followed, and as a result of them not being followed the incident occurring.

What where the operators training and skills? Was the operator fully trained to operate is this kind of hazardous environment? Could the operator have been trained but simply forget a crucial step by not replacing the man hole cover and put it down to human error.

What was the H&S culture like in the workplace? His own and the companies? Could this be to blame, was there a permit to work in operation? Safe system of work in operation? Had the operator read it and signed on. These are all vital steps that need to be taken into account when working in hazardous areas and are often over looked. These would have highlighted what he could do and how to complete the task, including replacing the manhole cover when not in use.

Had the operator carried out this task before? If not should the operator been supervised by someone with experience of the job at hand? And should the operator been working alone at all?

Should the vessel have been charged again with nitrogen before work began again to ensure/minimize low chance of ignition? As the manhole had been left open allowing air to fill the chamber.

Could an intrinsically safe scraper rod have been used? One not causing a spark?

Risk Assessment/COSHH assessments? Were any done?

Had the user Followed " Safe working with flammable substances" regs and abided by the five principles of control;

- Ventilation
- Ignition sources
- Exchange of a flammable substance for a less flammable one
- Separation.

Without knowing the answer to any of the questions above any of them could very easily caused the incident. In my personal opinion I would have put the incident down to not following safe working practise on the job, i. e. not replacing the manhole cover and not re-charging the vessel with nitrogen to minimise the chance of ignition.