Accidents and accident prevention

What is an accident?

1. Oxford Dictionary

An unforeseeable event often resulting in injury.

2. British Safety Council

A management error; the result of errors or omissions on the part of management.

3. Royal Society for the Prevention of Accidents (RoSPA)

Any deviation from the normal, the expected or the planned usually results in injury.

4. Frank Bird, American Exponent of 'Total Loss Control'

An unintended or unplanned happening that may or may not result in personal injury, property damage, work process stoppage or interference, or any combination of these conditions under such circumstances that personal injury might have resulted.

The pre-accident situation

In any situation prior to an accident taking place, two important factors must be considered, namely:

a) The objective danger

This is the objective danger associated with a particular machine, system of work, hazardous substance, etc. at a particular point in time.

b) The subjective perception of risk on the part of the individual

People perceive risks differently according to a number of behavioural factors, such as attitude, motivation, training, visual perception, personality, level of arousal and memory. People also make mistakes. Ergonomic design is significant in preventing human error.

The principal objectives of any accident prevention programme should be, firstly, that of reducing the objective danger present through, for instance, effective standards of machinery safety and, secondly, bringing about an increase in people's perception of risk, through training, supervision and operation of safe systems of work.

Pre-accident strategies

These can be classified as 'Safe Place' and 'Safe Person' strategies.

'Safe place' strategies

The principal objective of a 'safe place' strategy is that of bringing about a reduction in the objective danger to people at work. 'Safe place' strategies may be classified under the following headings:

• Safe premises

• Safe plant, equipment and machinery

• Safe processes

• Safe materials

• Safe systems of work

• Safe access to and egress from the workplace

• Adequate supervision and control

• Competent and trained employees.

'Safe person' strategies

Generally, 'safe place' strategies provide better protection than 'safe person' strategies. However, where it may not be possible to operate a "safe place" strategy, then a 'safe person' strategy must be used. In certain cases, a combination of 'safe place' and 'safe person' strategies may be appropriate. The main aim of a 'safe person' strategy is to increase people's perception of risk. One of the principal problems of such strategies is that they depend upon the individual conforming to certain prescribed standards and practices, such as the use of certain items of personal protective equipment.

Control of the risk is, therefore, placed in the hands of the person whose appreciation of the risk may be lacking or even non-existent.

'Safe person' strategies may be classified as follows:

• care of the vulnerable, such as pregnant employees and young persons;

• personal hygiene;

• personal protective equipment;

• safe behaviour;

• caution in the face of danger.

Post accident (reactive) strategies

Whilst principal efforts must go into the implementation of proactive strategies, it is generally accepted that there will always be a need for reactive or 'post-accident' strategies, particularly as a result of failure of the various 'safe person' strategies. The problem with people is that they forget, they take short cuts to save time and effort, they sometimes do not pay attention

or they may consider themselves too experienced and skilled to bother about taking basic precautions.

Post-accident strategies can be classified as follows:

• 	disaster/contingency/emergency planning;

• feedback strategies, such as those arising from accident investigation;

• improvement strategies.

The cause of accidents

The actual causes of accidents are many and varied. In endeavouring to identify the causes of accidents, the following more common contributory factors to the causes of accidents should be considered:

• the design and layout of the workplace or working area;

• structural features, such as floors, staircases and elevated working platforms;

• environmental factors, such as temperature, lighting and ventilation;

• operational methods;

• mechanical or materials failure;

• maintenance arrangements;

• machinery safety elements;

• personal protective equipment;

• cleaning and housekeeping arrangements;

• the level of supervision;

• health and safety training provided;

• rules and instructions to employees and others;

• unsafe attitudes to work;

• ergonomic factors in the work;

• physical and mental disability or incapacity;

• safety monitoring systems in operation; and

• stress arising from work activities.

The prevention or control of risks

One of the significant outcomes of the risk assessment process is the identification and specification of preventive and protective measures.

The risk assessment process incorporates the following procedures:

Recognition/identification of hazards

Recognition of the hazards implies some form of safety monitoring, such as a safety inspection or audit, together with feedback from accident investigation in certain cases.

Assessment and evaluation of the risks

Risk assessment requires a measurement of the magnitude of the risk based on factors such as probability or likelihood of the risk arising, the severity of outcome, in terms of injury, damage or loss, the frequency of the risk arising and the number of people exposed to the risk. Following assessment, evaluation of risk must take into account the current legislation applying to that particular risk situation.

Implementation of a control strategy

Once the risk has been assessed, it must either be eliminated or controlled. Elimination or avoidance of the risk may not be possible for a variety of reasons

and, inevitably, some form of control must be implemented.

Monitoring of control strategy

It is essential that any control strategy applied is subject to regular monitoring to ensure continuing effectiveness and use of the control.

Prevention and control strategies in accident prevention

Prohibition

This is the most extreme control strategy that can be applied, in particular where there is no known form of operator protection available e.g. in the case of potential exposure to carcinogenic substances, or where there is an unacceptable level of risk in certain activities.

Substitution

This implies the substitution, for instance, of a less dangerous substance for a more dangerous one, or of a less dangerous system of work for a more dangerous one.

Change of process

Design or process engineering can usually change a process to afford better operator protection.

Controlled operation

This can be achieved through isolation of a particularly hazardous operation, the use of Permit to Work systems, method statements, mechanical or remote control handling systems, machinery guarding, restriction of certain operations to highly

trained operators, i.e. competent and/or authorized persons, and in the case of hazardous airborne contaminants, the use of various forms of arrestment equipment.

Equipment does not cause accidents, people do!
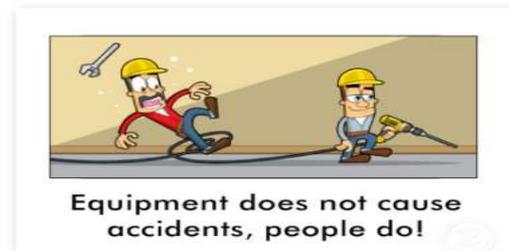
Limitation

The limitation of exposure of personnel to specific environmental and chemical risks, e.g. noise, gases, fumes, on a time-related basis, may be appropriate in certain cases.

Ventilation

The operation of mechanical ventilation systems e.g. receptor systems and captor systems, which remove airborne contaminants at the point of generation, or which dilute the concentration of potentially hazardous atmospheres with ample supplies of fresh air (dilution ventilation) is generally required where substances are known to be hazardous to health.

Housekeeping, personal hygiene and welfare amenity provisions

Poor levels of housekeeping are a contributory factor in many accidents. The maintenance of high standards of housekeeping is vital, particularly where

flammable wastes may be produced and stored. Staff must be trained in maintaining good standards of personal hygiene, particularly where they may be handling hazardous substances. The provision of suitable and sufficient sanitary accommodation, washing and showering arrangements, facilities for clothing storage and the taking of meals must be considered.

Personal protective equipment (PPE)

The provision and use of various items of PPE, e.g. safety boots, eye protectors, gloves, etc. is a commonly used strategy. It has severe limitations in that an operator must wear the PPE correctly all the time that he is exposed to the risk.

However, the provision and use of any item of PPE must be viewed as the last resort, when all other strategies have failed, or an interim measure until some other form of control strategy can be applied. The limitations of PPE should be clearly established and systems for maintenance and cleaning of same established and implemented. Employers should ensure that PPE is 'suitable' in that it is appropriate for the risks and conditions where exposure may occur, takes account of ergonomic requirements and the state of health of the wearer, is capable of fitting the wearer correctly and, is effective in preventing or adequately controlling the risks without increasing the overall risk.

Health surveillance

Health surveillance implies monitoring the health of identified persons on a regular basis. It may include the exclusion of certain people from specific processes or practices e.g. women and young persons, medical surveillance of certain personnel, medical examinations, health checks, health supervision, biological monitoring e.g. blood tests, urine tests, and other forms of testing, such as audiometry.

Information, instruction and training

The provision of information to staff and the instruction and training of specific management, safety personnel and operators in the recognition of risk and the assessment of same is crucial to the success of any accident prevention programme. Staff must know why certain management action is taken and orders given, and must be fully aware that their cooperation is needed to make the workplace a safe and healthy one for themselves and others.