CHAPTER 3

INDUSTRIAL SAFETY

3.1 Introduction

Industrial safety is mainly a management related process which is concerned with reducing, controlling and minimizing accidents at the workshops or factory units. We are living in the era of machines. Workers who work on machines, especially those machines which are dangerous need to be protected by the management so that they will not suffer with serious accidents. Industrial safety is certainly important and the management has to play an active role in identifying various hazards that are involved when a person works.

With special reference to the small scale industries, accidents that are ranging from minor accidents to accidents that can cause temporary or permanent disability are on the rise. When a particular accident happens it does not only cause pain and loss to the workers but it also causes a temporary cessation of work and wastage of man hours for the company. Besides this the management has to bear the cost of the medical treatment that must be provided to the employees. If fatal accidents happen, the management must wherever required, compensate the employees.

Following are some of the various dimensions from which today's managers must look at industrial safety:

1. Treating the injuries and illnesses that workers acquire due to a particular job that they work on.

2. Performing a medical examination of the staff that joins the organisation before appointing them on a particular job.
3. Arranging medical checkups periodically to make sure that the workers remain healthy and productive for a longer period of time and that if there is any health problem it is diagnosed the correct time and adjustments in the work can be made.

4. Identification of the various hazards involved by making measurements and keeping notes about effects of certain work practices on the health of the workers.

5. Providing the right kind of protective equipment and operating the equipment wherever it is required. Performing periodical checks for equipment and analyze the usefulness for preventing accidents and possible injuries at work.

6. Taking assistance from experts on safety measures and meeting the legal requirements according to the law of a particular country or state as applicable.

7. Educating the workers about safe practices and performing work in the right way to avoid different kinds of injuries like repetitive motion injuries etc.

8. Training the workers to work in specific ways on dangerous machines and giving them enough advice on the ways accidents can be avoided. It also involves training the workers for first aid, firefighting, CPR etc.

The above was a list of the various dimensions in which the management should look upon industrial safety. In the next section we shall throw some light on the objectives of industrial safety.
3.2 **Objectives of industrial safety:**

1. Preventing accidents and reducing the hazards.
2. Preventing financial losses that are caused due to lost production and work stoppage.
3. Minimizing the capital and revenue expenditure that is spent on accidents.
4. Boosting employee morale by providing them with safe and healthy working conditions.
5. Provision and upgradation of safety equipment.
6. Safety training and disaster management training.

3.3 **Safety Management:**

Definition of Safety management:

Safety management can be defined as a set of practices performed by managers to make sure that safety practices are planned, implemented and checked on a regular basis for performance and effectiveness in order to achieve maximum efficiency from the task force.

From the above definition can see that safety management is a continuous process. It starts with planning safety activities, implementing them and auditing them in order to bring about improvements. The reason why safety management is one of the most critical aspects for an organisation is that if safety practices are not implemented by the management, it certainly has been observed in various studies that the sense of belonging that the employees have about a particular firm or an organisation has reduced. There are various other reasons why safety management is important. They are as follows.

- Safety management ensures the legal requirements with regard to safety provisions of applicable laws are met.
- Proper safety management increases the motivation of the workers as workers work more confidently in safe environments.
• Safety management increases the efficiency of the entire firm because if safety measures are properly implemented and managed number of accidents certainly reduce. With a decreased number of accidents, the cost that is spent on injuries of the workers or the cost that is spent in paying the compensation of workers who have suffered temporary or permanent disability, is saved.

• A proper safety management team boosts the more along the employee and creates a sense of belonging whereby the firm can enjoy maximum efficiency from the entire set of human resources.

• Safety management when properly done, sends a clear-cut message not only to the employees but to the general public that they care for their employees about their surroundings. This helps in boosting the goodwill of the firm.

3.4 Safety committees:

Safety committees are one of those ways in which the management can improve employee participation in safety management. Such committees may take many different forms. Ideally, typical safety committees would have some representatives from the management and some representatives from the people who are workers.

As far as safety decisions are concerned, it is very difficult for a single individual who works on a particular process or who just supervises to make important decisions regarding safety equipment or safety facilities. Therefore it is suggested, that a group of individuals who work on different processes come together and discuss matters on safety bring about suggestions and help make improvements in the current safety provisions that are provided to the workers. Thus, we can see that there is one single objective by safety committees formed that is, giving the workers a safer place to work.
3.4.1 Tasks performed by the safety committee:

- The major task of safety committee is to form safety program and execute it.
- Safety committees are involved in workplace self inspections.
- Whenever an accident takes place they are the ones who investigated and find out the correct cause that was behind the accident.
- Their primary responsibility is to develop safe working practices.
- Safety committees also design or undertake safety training programs.

3.5 Safety Provisions - Factories Act:

In India, the first factories act was passed in the year 1881. The major objective of this factory act was to protect the children from being exploited in factories. The objective of this particular act was to protect the workers and safeguard their health to a particular extent. This particular act was then implemented only in those factories where there are more than hundred workers.

The next act was passed in 1891. This act was applicable to factories where there were more than 50 workers. After 1891, there were several versions of the same act up to the year 1934. Ever since then the act has been in a continuous state of refinement and tries to be more and more inclusive with the primary objective of making sure that the workers work in safe and healthy working conditions. The committee by the name Rege committee, made certain recommendations which were accepted by the government of India as a result of which The Factories Act 1948 was formulated and came into effect on 1 April 1949.

This act primarily aimed like the earlier ones, to provide and implement safety measures and to maximize the welfare and health of the industry workers. In addition to the safety measures, the act also aimed towards forming other regulations for workers, leaves, holidays,
overtime, women and young people etc. Thus it can be said that this act was more comprehensive than the earlier ones.

The State governments can frame rules and procedures to give effect to the objects of the factories act. For example, the state of Maharashtra has formulated the Maharashtra Factories Rules, 1963.

It is well known to all Indians that a major tragedy in Bhopal, widely known as the Bhopal gas tragedy, occurred in the year 1984. This tragedy revealed several weaknesses in the existing provisions in the factories act. The result was that the entire act was overhauled and many of the provisions were changed. New safety provisions and measures were made mandatory after this particular tragedy happened. Several penal provisions were also changed and special provisions were introduced to deal with chemical and air pollutants. Several new process were included in the list of hazardous processes.

"The first schedule: List of Industries involving hazardous processes"

1. Ferrous Metallurgical Industries
   - Integrated Iron and Steel
   - Ferrow-alloys
   - Special Steels
2. Non-ferrous metallurgical Industries
   - Primary Metallurgical Industries, namely, zinc, lead, copper, manganese and aluminium
3. Foundries (ferrous and non-ferrous)
   - Castings and forging including cleaning or smootherning/roughening by sand and shot blasting
4. Coal (including coke) industries
   - Coal, Lignite, Coke, etc.
   - Fuel Gases (including Coal Gas, Producer Gas, Water Gas)
5. Power Generating Industries
6. Pulp and paper (including paper products) industries
7. Fertiliser Industries
   - Nitrogenous
   - Phosphatic
   - Mixed
8. Cement Industries
   - Portland Cement (including slag cement, puzzolona cement and their products)
9. Petroleum Industries
   - Oil Refining
     - Lubricating Oils and Greases
10. Petro-chemical Industries
11. Drugs and Pharmaceutical Industries
    - Narcotics, Drugs and Pharmaceuticals
12. Fermentation Industries (Distilleries and Breweries)
13. Rubber (Synthetic) Industries
14. Paints and Pigment Industries
15. Leather Tanning Industries
16. Electro-plating Industries
17. Chemical Industries
    - Coke Oven by-products and Coal tar Distillation products
    - Industrial Gases (nitrogen, oxygen, acetylene, argon, carbon dioxide, hydrogen, sulphur dioxide, nitrous oxide, halogenated hydrocarbon, ozone, etc.)
    - Industrial Carbon
    - Alkalies and Acids
    - Chromates and dichromates
    - Leads and its compounds
    - Electrochemicals (metallic sodium, potassium and magnesium, chlorates, perchlorates and peroxides)
    - Electrothermal produces (artificial abrasive, calcium carbide)
Nitrogenous compounds (cyanides, cyanamides and other nitrogenous compounds)
- Phosphorous and its compounds
- Halogens and Halogenated compounds (Chlorine, Flourine, Bromine and Iodine)
- Explosives (including industrial explosives and detonators and fuses)

18. Insecticides, Fungicides, Herbicides and other Pesticides Industries
19. Synthetic Resin and plastics
20. Man-made Fibre (Cellulosic and non-cellulosic) Industry
21. Manufacture and repair of electrical accumulators
22. Glass and Ceramics
23. Grinding or glazing of metals
24. Manufacture, handling and processing of asbestos and its products
25. Extraction of oils and fats from vegetable and animal sources
26. Manufacture, handling and use of benzene and substances containing benzene
27. Manufacturing processes and operations involving carbon disulphide
28. Dyes and Dyestuff including their intermediates
29. Highly flammable liquids and gases

The main focus of Factories Act is towards the Health benefits to the workers. A specific chapter of the Act contains specification with regards to the health factors of the employees from Section 11 to 20. Health provisions according to The Factories act and the Maharashtra Factories Rules, 1963, have the following scope:

Detailed information of the sections is provided as under:

- **Section 11**: This section basically specifies the provisions related to cleanliness at the workplace.
- **Section 12**: This section relates to the provisions on disposal of wastes and effluents.
- **Section 13**: This section stresses on temperature and ventilation issues at workplace.
- **Section 14**: Provisions related to dust and fume in the Factory.
- **Section 15**: Provisions related to humidification- natural or artificial in factories.
- **Section 16**: Provisions that aimed towards avoiding overcrowding
- **Section 17**: Proper arrangement of lighting in factories.
• Section 18: This section specifies provisions relating to arrangements for sufficient and hygienic and clean drinking water for the individuals working in the factory. Provision of proper clean hygienic drinking water for example, in factories where there are more than 250 workers it is necessary that cold water must be provided to the workers when the temperature is high, especially during the summer season.

• Section 19: Provisions relating to urinals and latrine construction at factories.

• Section 20: This section is related to making necessary arrangements of spittoons in the factory.

The Factories Act, 1948 also provides provisions relating to safety measures for the workers employed herein. This is to ensure safety of workers working on or around the machines. The detailed information on each provision relating to safety measures is as under:

• Section 21: Fencing of machinery is necessary.

• Section 22. Work on or near machinery in motion

• Section 23: Provisions relating to prohibiting young person on dangerous machinery.

• Section 24: This section provides provisions with regards to striking gear and various devices that are used for cutting off power in case of accidents or emergency.

• Section 25. Self-acting machines.


• Section 27. Prohibition of employment of women and children near cotton-openers.

• Section 28: prohibiting women and children from working on dangerous machinery.

• Section 29. Lifting machines, chains, ropes and lifting tackles.

• Section 30. Revolving machinery.

• Section 31. Pressure plant.

• Section 32: In this section it has been specified that all floors, stairs, passages and gangways should be properly constructed and maintained, so that there are no chances of slips or fall.

• Section 33. Pits, sumps, openings in floors, etc.
• Section 34: This section specifies that no person in any factory shall be employed to lift, carry or move any load so heavy that might cause injury. State Government may specify maximum amount of weight to be carried by workers.
• Section 35: Protection of eyes of workers.
• Section 36: according the provisions of this section workers cannot be forced to enter any chamber, tank, vat, pit, pipe, flue or other confined space in any factory in which any gas, fume, vapour can prove to be dangerous.
• Section 37. Explosive or inflammable dust, gas, etc.
• Section 38: Provisions relating to precautionary measures built for outbreak of fire. The section deals with maintaining a safe means of escape in case of fire and fire extinguishing facilities and equipment.
• Section 39. Power to require specifications of defective parts or tests of stability.
• Section 40. Safety of buildings and machinery, Section 40A. Maintenance of buildings.
• Section 40B. Safety Officers.
• Section 41. Power to make rules to supplement this Chapter
• Section 45: this particular section actions that a proper first aid box or some container that contains equipment that is required to treat a particular worker in case of an accident or a mishap should be maintained in every factory.
• With reference to women the act has made specific regulations such as women are prohibited from working after 7 PM to 6 AM in the morning.
• Keeping floors, steps, stairways and gang ways in proper conditions.
• Regular examination and maintenance of pressure plants.
• Protecting workers when they are making adjustments of belts of moving machinery or making repairs adjustments to machinery that is in motion.

The Act was last amended in 1987 after the Bhopal Gas Tragedy.

A Cabinet Note for amendments in the Factories Act, 1948 was submitted in October 2008 which was referred to the Committee of Secretaries. The Committee of Secretaries examined the matter in January 2009 and made some important recommendations. As per the decision of the Committee of Secretaries on 10.01.2014, the proposed amendments in the Factories Act, 1948
are being placed in public domain (website of Ministry of Labour and Employment) for a period of 30 days for proactively sharing them with public. Ministry of Labour and Employment, New Delhi had proposed the amendment in Factory Act 1948 for development in Act which may be sent to Deputy Secretary (ISH), Ministry of Labour and Employment, of within 30 days from the date 05 June 2014.

THE FACTORIES (AMENDMENT) BILL, 2014

Section 22. Work on or near machinery in motion

Section 26. Casing of new machinery

Section 27. Prohibition of employment of women and children near cotton-openers.

Section 35- Added new section 35-A

Section 37. Explosive or inflammable dust, gas, etc.6. Precautions against dangerous fumes, gases, etc.


In addition to the above following are some specific provisions laid down by Maharashtra Factories Rules, 1963: (Source: Maharashtra Factories Rules 1963)

- Rule 19. Cleanliness of walls and ceilings: provides that ceilings and walls are kept in a clean state by washing, sweeping, brushing, dusting etc.

- Rule 22-A. Ventilation and temperature - (l) Limits of temperature and air movement - In any factory the maximum wet-bulb temperature of air in a work-room at a height of 1.5 meters above the floor level shall not exceed 300°C and adequate air movement of at least 30 meters per minute shall be provided; and in relation to dry-bulb temperature, the wet-bulb temperature in the work-room at the said height shall not exceed more than that shown in the Schedule hereto, or as regards a dry-bulb reading intermediate between the
two dry-bulb readings, that specified in relation to these two dry bulb readings, along with a schedule that specifies dry bulb and wet bulb temperatures.


- 73-Z. Making available Health Records to workers - (1) The occupier of every factory carrying out 'hazardous process' shall make accessible the health records including the record of workers exposure to hazardous process or, as the case may be, the medical records of any worker for his perusal under the following conditions:- (a) Once in every six months or immediately after the medical examination; whichever is earlier; (b) If the Factory Medical Officer or the Certifying Surgeon as the case may be, is of the opinion that the worker has manifested signs and symptoms of any noticeable disease as specified in the Third Schedule of the Act; (c) If the worker leaves the employment; (d) If any one of the following authorities so direct.

### 3.6 Safety Inspections:

In order to avoid accidents, it is necessary that a firm has a very sound policy that decides upon safety inspections and the health aspects of the workers. It is only with the help of a neatly designed safety policy that accidents within the workshops can be prevented effectively. It will not only amount to a reduction in the sufferings of the workers but will also help control the compensation costs that the company may have bear after a mishap has occurred. It is also essential that the people who inspect the safety issues are neatly trained and have the required skills to assess the hazards with particular processes. An efficient safety examination program will improve worker communication, confidence and, over time, improve the goodwill of the employer.

Many a times, safety inspections are aimed at finding and recording unsafe conditions. This thin focus tends to overlook other causes of accidents, such as dangerous actions and some other personal factors. In addition, workers and supervisors are commonly well conscious of the inspection team’s arrival a day or two before the inspection. This forewarning system sometimes creates a opening atmosphere before the inspectors arrive. That means the inspectors often
scrutinize the workplace and those within it only on a shallow basis. The outcome is that safety inspectors hardly ever see the real situations that are causing the incidents, injuries and damage to property. In order for an inspection team to be efficient, it is necessary that the team inspects the place of work in its day-to-day status. Checks must happen more frequently and not only based on demand. Safety is not a show-off. It must be considered as an important and routine activity to be performed by trained individuals. They must see the activities and the conditions in which accidents, injuries and property damage occur.

There must be a supervision system in place to preserve the reliability of inspections. There should be a provision for documenting and reporting any discrepancies found with regards to safety. Such reports must be action oriented. The management, the safety team and the supervisors should have direct access to such documents and reports related to safety issues. By being action oriented, it means that the reports should be suggestive in nature. The management should continuously monitor deficiencies, take actions by formulating plans from time to time. It is also essential that a proper feedback mechanism is put in place to monitor the implementation of decided policies and changes that are made to make sure that the workshop is a safer place to work.

3.6.1 Planning

Safety and health check up programs involve planning in advance. It is vital that managers have sufficient policies and procedures in establishing their safety inspection routines. When it comes to managing safety issues, it is essential to know that a majority of the principles of management, laid down by Henry Fayol, become applicable. To hold people accountable, it is necessary that they are given authority and their responsibility is clearly defined. In cases, they safety team receives extra allowances as they are performing additional work of assessing safety issues. Managers can expect people to work with responsibility only when they are given the reward for working sincerely on a particular task. It is required that the people who perform the inspections must be carefully chosen and must be informed about
CONSTRUCTION SITE WORKPLACE SAFETY PLAN

<table>
<thead>
<tr>
<th>TASKS</th>
<th>HAZARDS</th>
<th>RISKS</th>
<th>CONTROLS</th>
<th>Best way to prevent injury</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excavations</td>
<td>Person could fall into hole/ Could cut power, water or phone cable</td>
<td>Fatality</td>
<td>• Establish location of services prior to excavation&lt;br&gt;• Barricade holes/embankments&lt;br&gt;• Fill holes/trenches as soon as possible&lt;br&gt;• Shore up trenches and holes where necessary</td>
<td></td>
</tr>
<tr>
<td>General work creating airborne contaminants</td>
<td>Eye injury from flying particles/ inhalation of contaminants</td>
<td>Serious</td>
<td>• Damp down dusty areas&lt;br&gt;• Wear suitable eye protection&lt;br&gt;• Wear suitable dust masks</td>
<td></td>
</tr>
<tr>
<td>Handling demolished materials</td>
<td>Could be stabbed / cut</td>
<td>Serious</td>
<td>• Remove, cover or bend over sharp pieces&lt;br&gt;• Use sturdy gloves and shoes</td>
<td></td>
</tr>
</tbody>
</table>
the accident shall be prevented. The program should include a format that will document the inspections done and guarantee that any troubles identified are rectified by a responsible individual who has the skill to carry out the needed changes. A follow-up system should be engaged to make sure that every single item is followed up and rectified. This task can be achieved with the help of the safety committee and the management. Once the inspection routine is done, the safety program should offer a means of monitoring it to spot if trends arise that may be contributing to the firms accident or injury related issues.

In figure 3.6.1, that shows a Safety Plan, we can see the tasks, hazards, risk levels and control measures listed side by side. In the above figure, as far as Excavations are concerned, we can see that the hazard is that a person can fall into a hole. This can turn to be fatal for the worker. At the same time, the workplace may lose telephone connection or power due to such a kind of mishap. Though the above example is obvious and we all know that falling into a hole or an excavation can be fatal, there are several possibilities in which the risks might not yet be assessed. To conclude, it can be said that the managers and the safety team members should be continuously on the look to find situations that can cause certain hazards.

3.6.2 Inspection of Premises

There should be a provision for the scheduled inspection of premises, tools, work techniques and practices, at suitable intervals, to ensure that punctual action is undertaken to rectify any hazardous conditions if found. A proper schedule must be maintained for the purpose of scheduling inspection activities. The safety team must know as to when the inspection would start and when would it end. An inspection schedule should state clearly with regards to when certain milestones will be crossed prior to, during, and subsequent to the inspection. These should be approved by all candidates of the inspection squad and the administration. Managers should set a date for meetings before conducting the inspection. They must also decide upon the dates of the inspection itself, and dates by which the inspection report will be furnished.
3.6.3 Management

Any safety related program must be properly backed up by the management. It is the management that decides to take safety issues seriously. The managers should be committed to make the workplace safe. By showing commitment, the managers can be in a better motivation
to motivate not only the workers of the organization but also the safety team. In cases where there are departments, departmental managers should be alert of the environment that prevails in the workplace and the various procedures necessary to perform the work process. Management should allot reasonable time and attention to inspect the reports and ensure that appropriate action is taken to correct any hazards that are known.

**Image 3.6.3: Safety Report Sample**

![Safety Report Sample](image)

In the above figure, we can see a safety report that has categorized the hazards as A, B and C, based on the level of potential danger to the well being of the worker. The report carefully contains provisions to mentioned cases where permanent action is taken. It can be seen that the
3B has a cross on it which according to the instructions at the right hand side bottom means that a "permanent action has been taken as far as that hazard is concerned.

### 3.6.4 Supervisors

Regular inspections are generally undertaken by the supervisors and foremen. They do these inspections every time they pass through their designated area of responsibility. Supervisors are usually held accountable for the safety of personnel under their jurisdiction. Thus, they must be continually on the lookout for any risk that might arise in the work area. Supervisors should make sure that employees are carrying out pre operational checks whenever and wherever required. In some firms, added responsibility is also given to safety captains and/or other workers who are on the alert for unsafe conditions and actions.

Area supervisors should be included during the regular planned safety inspection of their area. This has a number of benefits for both the supervisor and the inspection team. First, the supervisor gets to see firsthand, any hazards noted and written down by the team and is not ‘surprised’ at the end of the inspection by a written report. Secondly, the team can often assign any corrective action of any hazards noted. In some minor issues, the hazard might be corrected before the inspection team leaves the area. This becomes a win-win situation for both the parties.

Inspectors may inspect other areas where they have the qualifications to do so. For example, in some workplaces supervisors of adjoining work areas will inspect each other's area to ensure that a more efficient inspection is carried out. Inspectors should ensure that afternoon and night shifts are not forgotten and are also inspected during their work periods.

There are various types of inspections that must be done at the workplace. Some will be done on a daily basis by operators before using equipment and machinery, others are ongoing by supervisors each time they pass through the workplace. Some inspections will be done after an accident or the purchase of new equipment. Although this workbook is concerned with planned inspections, the other types must be included in the overall inspection program.
Surprise or Special checks should be performed by the management, supervisors and safety committee members time and again. The intention behind a spot or a surprise inspection may be to follow up on corrective action after an incident or accident. Such inspections are most effective where certain changes have been made to a process or a new machine or tools has been introduced in the workplace. When procedures and equipment changes take place, the management needs to consider reviewing the safety policies.
3.6.5 Follow-up

Corrective action should be taken as soon as possible on any discrepancies observed in the inspections. Feedback on this action must be communicated to the inspection teams. There should also be a system installed to follow up on any remedial action that will require time for completion, i.e., procuring new equipment, workshop, new facilities, etc.

3.6.6 Inspectors under the Factories Act 1948:

Section 8 of the Factories Act deals with particulars related to inspectors. According to the act: "The State Government may, by notification in the Official Gazette, appoint such persons as possess the prescribed qualification to be Inspectors for the purposes of this Act and may assign to them such local limits as it may think fit."

3.6.7 Powers of Inspectors - According to the Section 9 of The Factories Act 1948 are as follows: - Source: Bare Act.

"Subject to any rules made in this behalf, an Inspector may, within the local limits for which he is appointed,--

(a) enter, with such assistants, being persons in the service of the Government, or any local or other public authority, or with an expert, as he thinks fit, any place which is used, or which he has reason to believe is used, as a factory;

(b) make examination of the premises, plant, machinery, article or substance;

(c) inquire into any accident or dangerous occurrence, whether resulting in bodily injury, disability or not, and take on the spot or otherwise statements of any person which he may consider necessary for such inquiry;

(d) require the production of any prescribed register or any other document relating to the factory;
(e) seize, or take copies of, any register, record or other document or any portion thereof, as he may consider necessary in respect of any offence under this Act, which he has reason to believe, has been committed;

(f) direct the occupier that any premises or any part thereof, or anything lying therein, shall be left disturbed (whether generally or in particular respects) for so long as is necessary for the purpose of any examination under clause (b);

(g) take measurements and photographs and make such recordings as he considers necessary for the purpose of any examination under clause (b), taking with him any necessary instrument or equipment;

(h) in case of any article or substance found in any premises, being an article or substance which appears to him as having caused or is likely to cause danger to the health or safety of the workers, direct it to the dismantled or subject it to any process or test (but not so as to damage or destroy it unless the same is, in the circumstances necessary, for carrying out the purposes of this Act), and take possession of any such article or substance or a part thereof, and detain it for so long as is necessary for such examination;

(i) exercise such other powers as may be prescribed.
3.7 **Safety equipment that are generally used in the small scale sector:**

**Table 3.7a: Types of Equipments**

<table>
<thead>
<tr>
<th>Body part</th>
<th>Type of equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eyes and face</td>
<td>Goggles, welding shields, face shields, safety</td>
</tr>
<tr>
<td></td>
<td>spectacles.</td>
</tr>
<tr>
<td>Head</td>
<td>Helmets</td>
</tr>
<tr>
<td>Foot and leg</td>
<td>Safety shoes, gumboots, shin guards</td>
</tr>
<tr>
<td>Hand and arm</td>
<td>Rubber gloves, special coated fabric gloves, leather</td>
</tr>
<tr>
<td></td>
<td>gloves</td>
</tr>
<tr>
<td>Body</td>
<td>Special fabric shirts and trousers, jackets, aprons</td>
</tr>
<tr>
<td>Hearing and ears</td>
<td>Earmuffs and earplugs</td>
</tr>
<tr>
<td>Others</td>
<td>Gas mask, inhaling mask filter</td>
</tr>
</tbody>
</table>

The above table shows the different body parts and the type of equipment that is required to make sure that the particular body part is saved from any injury. In the following section every type of safety equipment has been discussed briefly.

A. Eyes and Face : Goggles, welding shields, face shields, safety spectacles.

1. Safety goggles: these goggles are specially designed and the fit tightly around the eyes of the person who may be working in an environment where small particles fly out of a particular process. They are usually colourless and have rubber headband which can easily adjust to fit any size.

2. Welding shields: usually vulcanised fibre or fiberglass is used to construct these welding shields. The importance of fiberglass is that it is very light and thus it can be carried by
the employee while he does welding work to save his eyes from the sparks that come out of the process. To see through, there is a small filtered lens or a coloured glass which is specially designed to protect the eyes from bright light.

3. Face shields: they are transparent shields that are usually sheets of plastic which protect the workers from their eyebrows up to the chin. Some advanced face shields are also polarized so that the gaze will not stop the view of the employee and increase the chance of an accident. Their use in environments where some chemicals may splash or a particular hazardous liquid may be sprayed onto the face and cause injury.

4. Safety spectacles: there are scaled-down version of safety goggles. Where safety goggles are airtight and don't even let air go through, safety spectacles are a very basic protection where air passes through. Such safety spectacles are usually used for supervision by supervisors while actually not working on the machines and they provide a very basic level of protection, unlike the full-scale safety goggles.

Fig 3.7a. Safety goggles.
Figure 3.7b. Safety spectacles.

Figure 3.7c. Face shield.
B. Head: Helmets

Various types of helmets are available in the market. Usually industrial helmets are bright in colour and are tough enough to protect the workers from certain types of impacts that may happen during their work. The headbands are adjustable and usually helmets are universal and fit all.
C. Foot and Legs: Safety shoes, gumboots, shin guards.

1. Safety shoes and gumboots: the basic objective of safety shoes or gumboots is that the workers do not get burns or injured while walking on the floor. The second objective is that they must get a good grip when they walk within the premises and small particles should not poke their feet and cause injuries. Safety shoes are usually not very high as compared to gumboots. Gumboots provide better protection than safety shoes because they are longer.

2. Shin guards: shin guards offer more protection to the shin of the worker who may work with the tool or equipment machine that might hurt orange election. They look like the traditional shin guards that are used in football hockey or cricket sports.
Fig. 3.7f: Gum Boots

Fig 3.7g. Shin Guards
D: Hand and Arms: Rubber gloves, special coated fabric gloves, leather gloves

Different kinds of gloves can be used according to the circumstances of each case. In case of machines that can hurt the workers by electric shock or burn, rubber gloves are usually given to them so that it counters electric current. Sometimes rubber gloves which are even disposable type. Such disposable gloves are used where the workers are expected to handle substances that may cause erosion of the skin of the hands of the workers. In case the workers are expected to hold tools and equipment that makes it during the process of manufacturing, special coated fabric gloves may be used. It is observed in many cases that the palms of the workers crack and even get cut and bleed. In such cases they can use the traditional leather gloves so that there is some protection offered to them.

![Fig 3.7h: Different types of gloves.](image)

From the above figure we can see that there are various kinds of gloves which vary in length and type of fabric that is used some extend up to the arm so that they offer increased protection to the workers.
E. Body Clothing: Special fabric shirts and trousers, jackets, aprons:

A proper body clothing helps the workers to prevent:

- Discomfort which arises due to temperature extremes which may be very high temperature or very low temperature.
- Splashes from molten metal or other hazardous liquids.
- Chemical splashes like acid splashes especially.
- Impacts from tools, machinery, equipment or a particular type of raw material.

Figure 3.7 i: Types of bodysuits
F. Ears: Earmuffs and Earplugs:

Sound pollution is one of the most neglected type of pollution, especially with regards to the small scale sector and observations that were made during the visits. Within the factory premises, sound is not only generated from a single source but multiple sources as there may be one or more machines within the same premises.

Many of the managers did not seem to be bothered about sound pollution and argued that the workers were now immune to loud sounds and that the workers use their mobile phone's "in the ear" headphones while on work. It was also observed in some cases that workers had to move from one place to the other that had a totally different noise level.

A sudden increase in the noise level can also cause damage to the ears and the physical well-being of the employee. Earplugs and earmuffs offer a even better protection against the sound and thus reduce spasms or mental discomfort due to the sound that machines create. If the workers are exposed for a longer duration to this particular noise, certainly there are bound to suffer.

Earplugs may be again of disposable type or the reusable types. Earmuffs require a perfect sealing around the ears of the industrial worker. But if the industrial worker is found to be chewing something, (especially tobacco as commonly observed in case of the observed data for this research), or they have long hair, the benefits of earmuffs are reduced to a great extent.

Fig 3.7 j. Ear Plug Types
G: Gas Masks and other Filter Masks

1. Filter Masks

They offer protection by filtering small dust particles, mists, metallic fumes, spray paint, chemicals and small flying particles of low poisonous levels. There are usually two filters in this mask one is at the outside and the other one is in the inner side. The outside filter is called a "dust filter", and usually consists of filt/paper filter, in a fibre or a plastic case. The outside filter obstructs the dust particles of paint mist which can be dangerous if workers are exposed to such paint mist for a long period of time.

The inside filter is a "gas filter", and made of a coal-based substance, in a metal casing. This filter is responsible to filter out the gas fumes which are not easily noticeable like paint mist but are more dangerous than paint mist.
2. Gas Masks:

Gas masks are available in various qualities having great functionalities. They can be effective for a wide range of elements, from ordinary dust to poisonous gases that act on the central nervous system of human beings (such as sarin and organophosphate pesticides) which may even be fatal in nature if inhaled. They are much more advanced and expensive than common filter masks.
3.8 Safety Climate

Safety climate is regarded as a manifestation of safety culture in the behaviour and expressed attitude of employees (Cox and Flin, 1998), and is a more tangible expression of the safety culture in the form of symbolic and political aspects of the organization (Kennedy and Kirwan, 1998). Safety climate is best considered a subset of organizational climate. Safety climate factors will characterize and influence the deployment and effectiveness of the safety management resources, policies, practices and procedures.

It has been suggested that safety climate surveys are a much better predictor of an organizational safety performance as it overcomes many of the limitations of traditional safety measures such as reporting biases and after-the-fact measurement. Ojanen et al. (1988) suggested that safety performance should be measured on multiple levels, one of them being safety attitudes, in order to determine the real safety level of an organization. They claimed that measuring safety climate can indicate changes in organizational safety behaviour and would therefore be useful for evaluating safety programmes and suggested that safety climate questionnaire is the only way to measure safety climate in an organization.
3.9 Maratha Chamber of Commerce, Industries and Agriculture - MCCIA, Pune - Contribution to Industrial Safety:

MCCIA has been playing a important role in speeding up the industrial and economic development of Pune area for more than 70 years. It is one of the most dynamic Chambers of Commerce in our nation and has been influential in promoting various industrial setups in and around the city. MCCIA has endlessly striven to transform Pune into a worldwide business destination and has been the channel for rapid economic development of the Pune region.

It has more than 2800 Members from a cross section of businesses like engineering, automotive and auto ancillaries, information technology, bio technology, electrical, electronics, agriculture and agri-business, environment technologies, chemicals etc.

MCCIA's Major Services:

- On an average, MCCIA conducts 300 Seminars, Symposiums and Training Programs during a year.
- Entrepreneurship and Management Development Programs in select areas (Agriculture, Excise, International Business, Quality, Taxation, Finance, Corporate Laws).
- Committee Representations to Government Officials, Ministers and Regulatory Authorities.
- Meetings with Diplomats from foreign countries and Business Delegations from abroad.
- Energy Audits.
- Free consultancy on Patents, Trade Marks, Copyrights etc. at IPR-Desk.
- Networking Opportunities with CEOs and functional heads.
Safety Week activities.

- Support to SME sector by conducting Awareness Programs on various topics.
- “Janwani” an NGO supported by MCCIA works on the issues of governance, public policy and enhancing people's participation in governance.
- Organizing Business Delegations to other countries to explore potential business opportunities.

3.10 National Safety Council's contribution to Industrial Safety:

National Safety Council is a leading, non-profit, self-financing and tripartite apex body. It functions at the national level. It is an independent and autonomous body, which was set up by the Indian Government, Ministry of Labour and Employment on 4th March 1966 to create, develop and sustain a voluntary movement on Safety, Health and Environment (SHE). It was registered as a Society under the Societies Registration Act and consequently, as a Public Trust under the Bombay Public Trust Act.

The National Safety Council has been formed with a vision to serve the society by cultivating a preventive environment. It has been using a scientific approach to deal with issues related to SHE. It has treated SHE related issues as one of the basic humanitarian concern. The council has a strong belief that safety issues have an intrinsic relationship with the efficiency, quality and productivity of the manufacturing sector as a whole.

The council conducts several activities which include:

- Conducting specialized training programs
- Organizing conferences, Seminars & Workshops - national and international.
- Conducting consultancy studies like Safety Audits, Hazard Evaluation, Risk Assessment etc.
• Designing promotional materials & publications that spread awareness about safety issues.

• Helping organizations to conduct campaigns like Fire Service Week, Road safety week, Safety Day etc.

The National Safety council depends on a fully computerized Management Information System that collects, retrieves and disseminates vital information to support the task of achieving its objectives.

With a view of fostering safety consciousness among industrial establishments the national safety Council's Maharashtra chapter has been organizing for the past five decades, a safety awards competition for the best performance in accident prevention in the factories situated in the state of Maharashtra.

Table 3.10a: Maharashtra Safety Award Competition Results

**NATIONAL SAFETY COUNCIL – MAHARASHTRA CHAPTER**

**Maharashtra Safety Award Competition – 2012**

**SCHEME – I LOWEST AVERAGE ACCIDENT FREQUENCY RATE**

<table>
<thead>
<tr>
<th>No.</th>
<th>Group</th>
<th>Name &amp; Address of Factory</th>
<th>Freq. Rate</th>
<th>Award</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Chemicals &amp; Fertilizers</td>
<td>Rhodia Specialty Chemicals India Ltd., Dhatav, Roha.</td>
<td>0.00</td>
<td>A Plaque</td>
</tr>
<tr>
<td>2</td>
<td>Light Engineering.</td>
<td>Novateur Electrical and Digital Systems Pvt Ltd, Sinnar, Nashik.</td>
<td>0.00</td>
<td>A Plaque</td>
</tr>
<tr>
<td>3</td>
<td>Paper, Sugar &amp; Pharmaceuticals</td>
<td>Wanbury Ltd., Patalganga.</td>
<td>0.00</td>
<td>A Plaque</td>
</tr>
<tr>
<td>4</td>
<td>Storage, Handling &amp; Distribution of Petroleum Products</td>
<td>Hindustan Petroleum Corporation Ltd., Chakan LPG Bottling Plant, Talegaon, Pune.</td>
<td>0.00</td>
<td>A Plaque</td>
</tr>
<tr>
<td>5</td>
<td>Cement Manufacturing</td>
<td>Ultra Tech Cement Ltd., Patnagiri Works, Zadgaon.</td>
<td>0.00</td>
<td>A Plaque</td>
</tr>
<tr>
<td>6</td>
<td>Miscellaneous</td>
<td>Mumbai Waste Management Ltd., Talegaon.</td>
<td>0.00</td>
<td>A Plaque</td>
</tr>
</tbody>
</table>
DATA ANALYSIS

4.A Data analysis for the responses that were given by the workers.

4.B Data analysis for the responses that were given by the managers.

4.C Interviews of the Inspectors