

Industrial Accidents & Safety Management

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Abstract:

Industrial Safety Management is very crucial to the continued existence of any industry. This is because when accident occurs often in an industry, such industry can fold up. Hence, it is paramount for every industry to have a good industrial safety management program in other to prevent accident. The safety and productivity of people, machines, and processes is a key element of any sustainable business. Industrial safety systems have been used for many years to perform safety functions in the manufacturing industries. In most situations, safety is best achieved by inherently safe process design. Protection layer systems such as sensors, alarms, and personal protection equipment. These may be combined with protective systems to address any residual identified and counter risk. Protective systems can rely on different technologies such as chemical, mechanical, hydraulic, pneumatic, electrical, electronic, and programmable electronic. Companies and the operators who manage their production facilities demand the highest level of safety. This high level of safety helps protect personnel, the environment, and assets while maintaining maximum uptime and minimal operational disruption. Safety guidelines are recommended by the Occupational Safety and Health Administration and other organizations and experts in the era of Covid-19 pandemic.

Keywords — Industrial Safety, Safety precautions, Loss due to accidents, Industrial Safety Management, Industrial Safety Programs

I. INTRODUCTION

The use of machines revolutionized the process of manufacturing which caused different types of risk in the production process due to inexperience in the use of machines. According to Umunadi (2010), the industrial advancement of using motors, conveyors, pumps and appliances had risks that are intrinsic in their use. Near the beginning various type of accidents took place which led to the loss of life and harm to the workers. The casualty rate was quite high. In the United State of America (U.S.A.), industries paid a substantial amount every year for the treatment and cure of workers disabled due to on the job accidents [Golden (1967) in Umunadi (2010)]. Because of the different accidents fatalities, death, loss of production; turn down in company's reputation related with industrialization took place. There was a sharp rise in accident cost that resulted from compensation laws and tighter employer's liability. It initiated the concern with work

safety. Big companies in railroading, mining, manufacturing and others suddenly became concerned in safety. Companies started to guard machines and power sources while machinery makers began to look for hidden danger at work. Firms made workers to wear helmets safety glasses compulsory, and also set up safety departments and safety committees that included both workers and managers. In 1913, companies founded the National Safety Council to pool information. Government agencies such as the Bureau of Mines and National Bureau of Standards provided scientific support while universities also researched safety problems for firms and industries (Aldrich, 1997). Therefore, safety education became critical and significant which direct to the beginning of Industrial Safety Management (ISM).

II. THE OBJECTIVES OF INDUSTRIAL SAFETY

Industrial safety is needed to check all the possible chances of accidents for preventing loss of life and permanent disability of any industrial employee, any damage to machine and material. It is needed to eliminate accidents causing work stoppage and production loss. It is needed to reduce workman's compensation, insurance rate, and all the cost of accidents. It is needed to achieve better morale among industrial employees. It is needed to increase production means to a higher standard of living. It is needed to prevent accidents in the industry by reducing any hazards. Learn More Industrial Safety, Accidents & Prevention Planning of Industrial Safety In industries, the no. of fire hazards, accidents, industrial disasters may be reduced through careful safety planning. All those unfortunate events can be avoided by effective planning for safety. Some important considerations for industrial safety are the following: Proper Plant Layout Proper Fire Prevention system Health & Hygiene Proper Safety Training Proper Alarms And warning systems Appropriate sensors and safety gears for employees Sufficient lighting in the work area as well as the pathways Cleanliness & dryness of shop floor Proper pressure gauges and other safety equipment Electrically insulation Proper signboards for safety instructions

III. ACCIDENT

Accident can be explained as an unplanned, unexpected, unforeseen event that causes injury to human body or no injury and property damage or no loss of property or both. There are reportable and non-reportable accidents. In a Reportable accident is a person after an accident avails first-aid and returns after 48 hours while in non reportable accident a person avails first aid after an accident and return to work immediately.

A. Types of Accident

We have various types accident include;

- 1) Caught in or between object
- 2) Caught in an object

- 3) Caught between moving objects (except flying or falling objects)
- 4) Exposure to or contact with extreme temperature
- 5) Contact with hot substance or object
- 6) Contact with cold substances or objects.
- 7) Exposure to cold (atmosphere/environment)
- 8) Exposure to heat (atmosphere/environment)
- 9) Exposure to or contact with electric current
- 10) Exposure to or contact with harmful substances or radiations
- 11) Contact by inhalation, ingestion or absorption of harmful substances.
- 12) Exposure to ionizing radiations
- 13) Falls of persons
- 14) Falls of persons from heights
- 15) Fall of the person on the same level.
- 16) Fall of person into depth
- 17) Strenuous movements
- 18) Overexertion in lifting objects
- 19) Stepping on objects
- 20) Struck by falling objects

B. Causes of Accident

Moreso, Umunadi (2010) stated that all accidents whether due to human or machine/materials can be roughly categorized under two causes; unsafe act and unsafe condition.

Unsafe Act

This is any illegitimate action taken by employees in an industry that can cause accident. This type of act is usually opposite to the company's safety rules and regulation and acceptable standard safety practice.

Examples of Unsafe Act

- 1) Unauthorized operation or use of equipment
- 2) Use of defective tools and equipment
- 3) Improper use of tools and equipment.
- 4) Operating tools or equipments at unsafe speed
- 5) Poor housekeeping (untidy work environment).
- 6) Removing or by passing safety devices.
- 7) Riding hazardous moving equipment
- 8) Failure to warn or signal as required.

- 9) Standing in an unsafe place or taking an unsafe posture
- 10) Indulging in horseplay
- 11) Failure to wear PPE
- 12) Improper dressing
- 13) Performing unauthorized procedures

Unsafe Condition

This is a harmful physical condition or situation which could directly allow the incidence of an accident. Also, it is an unacceptable physical condition existing in the workplace.

Examples of Unsafe Condition

- 1) Lack of adequate guards or safety devices
- 2) Lack of warning system
- 3) Poor communication of hazard
- 4) Fire and explosion hazard
- 5) Inadequate PPE
- 6) Poor ventilation
- 7) Protruding object hazard
- 8) Close clearance and congestion hazards
- 9) Inadequate illumination
- 10) Intense noise
- 11) Defective tools and equipment
- 12) Presence of dust, fumes, chemicals or toxic materials
- 13) Unsafe floor surfaces
- 14) Unsafe piling, stacking and storing of materials
- 15) Improper disposal of waste
- 16) Lack of first aid

C. Classes of Accidents

Accidents and their types

- 1) Near Accident: Accidents with no damage or injury are called near-accidents. Trivial: An accident with very little damage is called trivial.
- 2) Minor Accident: It is an accident with damage and injury more than trivial.
- 3) Serious Accident: An accident with heavy damage and a lot of injuries is called Serious Accidents.
- 4) Fatal: It is an accident with very heavy damage. There may be a loss of lives also.

D. Effect of Industrial Accident

1) Loss to Industry:

- (i) Expenditure to be made on the medical treatment of the worker.
- (ii) Wages to be paid to the worker for the period when he is not able to join the work due to the injuries caused to him due to the accident.
- (iii) Expenses to be made for the services of machines and tools on which the worker is working.
- (iv) Expenses to be made for inspection and repairs of the machines and the tools.
- (v) Expenses to be incurred on recruitment and training of new worker who has been employed in place of an injured and deceased worker.
- (vi) The cost of the period during which other workers to stop working out of fear or out of sympathy with the worker injured by an accident.
- (vii) More wages than the normal ones are to be paid on overtime, in case the production work is held up, for honoring the orders of customer in time.
- (viii) An accident has also its effect on the other workers. There is a likelihood of occurrence of other accidents out of fear or nervousness.

So these are the effects of accident on industry. But this is not the total list of cost of industrial accidents. This list shows that the real cost of industrial accident is far more than the expenses of compensation.

2. Loss to Workers:

An industry suffers a lot on account of accidents. It affects adversely the worker too. In fact the worker's loss is far more than the loss of others. Beside the economic loss, worker has also to suffer more badly and in case of his death, his family has no one to help. If he is unable to work after the accident, he becomes a burden for his family. Family losses

the source of income and has also to bear increased expenses of his treatment.

3. Loss to Consumer

The expenditure of industrial accident is included in the production cost and therefore, the accidents increases the production cost. This leads to a rise in the prices of commodities and consumer will not be able to buy according to his need which will also affect the standard of living of the consumers.

4. Loss to Society:

If the worker dies or is rendered disabled on account of the accident and the worker's family become helpless and the society has to come to its rescue. The family of such worker has to depend upon the aid of the donation given by the different organizations and it is also a burden on the society.

Accidents not only affect the industry but to the worker, consumer and society. So these accidents should be checked and management should try to reduce these accidents.

E. Accident Investigation

When accident occurs in an industry investigation is done for finding out the causes and impact of the accident to avoid its repetition in future.

Steps in Accident Investigation

- 1) Take care of the accident victim(s)/worker(s).
- 2) Interrogate the accident victim(s) worker(s).
- 3) Interrogate those that witness the accident.
- 4) Record in particulars the work area of the accident
- 5) Take the picture of the scene of the accident with camera or sketch when camera cannot be reached.
- 6) Draw a valid conclusion
- 7) Suggest best practice that will prevent the recurrence of a similar accident.
- 8) Present written report of the accident investigated.

IV. INDUSTRIAL SAFETY MANAGEMENT (IMS)

Safety is the act of stay away from harm and danger. As per Umunadi (2010) it simply means being safe or completely

free from dangerous situation or situations that can cause havoc, disaster, harm, injury and death. Industrial Safety Management (ISM) is all the steps taken by employers, employees, safety officers, supervisors, and government to make sure safe work or production process in firms of which main aim is to promote safety, practice and to lessen and eradicate risk in companies.

V. PEOPLE IN INDUSTRIAL SAFETY MANAGEMENT

In the industries, three main personnel are involved in the production process are employer ,employee and the supervisor:

A. Employer Responsibilities

- 1) *To Provide safe working environment for employees.*
- 2) *To Provide Personal Protective Equipment (PPE) for workers and visitors*
- 3) *To Provide the required facilities and machines for production.*
- 4) *To Provide safety training for workers.*
- 5) *Making sure of proper and regular maintenance of tools and equipments.*
- 6) *To Provide first aid facilities in the company.*
- 7) *To ensure proper guard of moveable and dangerous parts of machines are provided.*
- 8) *Putting into effect strict safety rules and regulations*

B. Workers' Responsibilities

- 1) *Workers must wear PPE (such as safety shoes, hard hat, hand gloves, eye goggles)*
- 2) *Workers ought to keep their work environment clean and arrange tools properly.*
- 3) *Workers ought to always adhere to the safety rules and regulation of the company.*
- 4) *They ought to report to the supervisor when they noticed that the equipment and tools*
 - a. *they are using is not safe for the job.*
- 5) *They should not use equipment and tools for another job for which they are not meant for.*
- 6) *They should not eat while working in the shop-floor.*
- 7) *They ought to report each accident to their supervisor.*

C. Responsibilities of the supervisor

- 1) *He must ensure that before the days job begins every workers have got brief on the days job and all hazard associated with the task are identified and explained.*
- 2) *He must make sure that all the equipment tools for the day's job are in safe condition for use.*
- 3) *He must make sure that workers are doing their job according to recommended procedures.*
- 4) *He should inform the management of the state of workers, equipment and tools.*
- 5) *Supervisor should ensure that workers use the recommended materials and tools during working.*

D. The Safety Officer

He is in-charge having responsibilities of preventing accident.

Responsibilities of the Safety Officer

- 1) *Orientation of all persons on site*
- 2) *Making sure of adequate security on site*
- 3) *Organizing pep talk prior to the days job begins*
- 4) *Organizing site safety meetings*
- 5) *Note site safety statistics in safety statistics board.*

VI. GOALS OF INDUSTRIAL SAFETY MANAGEMENT (ISM)

It helps to lessen and avoid accident.

- 1) *It helps to lessen unprecedented financial cost of compensation and cost of treatment of disabled workers.*
- 2) *It helps to improve the corporate image of the company*
- 3) *It helps to edify workers and employers on the best safety practice across the world.*
- 4) *It helps to decrease burden of insurance on the company.*
- 5) *It helps to lessen injury, sickness and death due to accident and exposure to hazardous processes and substances.*

VII. METHODS OF DEVELOPING INDUSTRIAL SAFETY PROGRAM IN INDUSTRIES

- 1) *Study cases of industrial accident of similar industries producing same services.*
- 2) *Study past accidents in your industry.*
- 3) *Study the various safety programs of other related industries.*
- 4) *Identify the various hazard associated in the production process of your company.*
- 5) *Identify methods of eliminating hazard associated in the production process of your firm.*
- 6) *Invite HSE specialist to come and study the potential hazard associated in the production process of your company*
- 7) *Appraise the safety skills of employees in the company*
- 8) *Present all the information gather before a safety committee to develop a safety*
 - a. *program based on these information.*
- 9) *Organized training workshop for workers base on the safety programme developed by*
 - a. *the safety committee.*
- 10) *Appraise the safety skills of the workers*
- 11) *After some time repeat the entire step again due to technological change.*

VIII. COMMON OBSTACLES IN INDUSTRIAL SAFETY

A. Strategies

Attaining industrial safety is made challenging due to of all the moving parts to EHS. Observe some of the major complication that can potentially create an unsafe work environment.

B. Complex Safety Laws

Safety laws and regulations are frequently developing to make safer workspaces, but it's an continuing challenge to keep alongside each other of these changes. Not only one must know and become accustomed to these changes, one must also communicate them to the workers and make sure they can work on them properly.

C. Ergonomic Hazards

A large amount of industrial production needs repetitive motions that don't permit for much deviation. Workers carry out the identical tasks for hours at a time, which can produce risk for rising injuries related to work. The motions of many jobs are mostly unchangeable. A little you can do to limit twisting, bending, stooping, reaching, or lifting for certain tasks. To fight this, EHS leaders may support workers to get frequent breaks (which can affect productivity) or utilize protective gear or equipment, such as anti-fatigue mats or back braces.

D. Continuing Employee Training

Keeping up with training requirements for whole staff can be a full-time job in itself. EHS leaders must make out that training is a main investment, and should be given priority as much for "seasoned" employees as it is for newcomers.

Training is often challenged with issues. For beginners, many workers may be unable to link the significance of the training with their job and may not take it sincerely. Some observe training as an essential part of the work rather than a value-added task. If you have long-time employees, they may be more inclined to go through the motions of training rather than absorbing and applying what they learn because they're used to doing tasks a certain way.

These are not the only issues plaguing industrial safety. Due to the variety of equipment, machines, vehicles, tools, and people required in a successful operation, there are numerous potential hazards that may appear not possible to plan for. Industrial safety truly is a "be ready for whatever" mentality and should be taken with care.

IX. PRESENT CHALLENGES OF INDUSTRIAL SAFETY

Attaining a greater level of health and safety in an industrial atmosphere is a difficult goal, but it's utterly necessary to a successful workplace. Because of the numerous components of industrial safety, detailed organization is vital. Many manufacturing and industrial facilities rely on EHS software to plan, execute, and monitor their policies.

Everything from updates to safety regulations and procedures to training management can be done within the software so you have cohesive functionality in your EHS department.

Also, one can track and manage workplace observations, incidents, injuries, and other hazards and check them over time. This is a huge aid when it comes to identifying and measuring the impact of ergonomic issues because these are usually marked over time.

Spending a deeper interest in industrial safety is the beginning of a safe, satisfactory workspace. When you take care to eliminate as many obstacles as possible and implant purpose and value in your safety schemes, you create a place where workers will actually want to work and that's an outcome form which everyone can be benefited.

Covid 19 consequence

After COVID-19 lockdowns, production plants and industrial sites are opening up again but the people returning to work will see many changes in their safety protocols. Guidelines are recommended by the Occupational Safety and Health Administration and other organizations.

A. Putting into practice social distancing

People time and again think of social distancing as ways planned to remain at least 6 feet distance between themselves and others. A number of facilities have graphics made on the floor to give an idea about occupants where to stand. Further options consist of staggering shifts and restraining the number of people at the same time as allowed in common spaces, like cafeterias or rest rooms.

Employees at an automotive plant in the United Kingdom recently made the first Range Rover built while adhering to social distancing practices. Shop floor managers also put into practice other measures to sustain worker safety, including offering every employee a face visor. Having warehouse safety procedures to guard people when social distancing becomes difficult is a crucial part of an all-encompassing return-to-work arrangement.

B. Restricting the sharing of tools and supplies

One of the OSHA updates released about COVID-19 practices advises against equipment sharing. Several people as expected want to help out their coworkers, so letting others use their tools and equipments appears natural. Yet, researchers recognized the risk of the coronavirus spreading through surfaces. The U.S. Centers for Disease Control and Prevention (CDC) offers disinfection tips for facilities that managers can follow. One of them recommends using liquids containing at least 70% alcohol for greatest effectiveness. It's also significant to consider items that people may share without others asking to make use of them. For example, a job site process where everyone signs a sheet upon arrival needs revisiting because of the number of people touching and using the common writing pen.

C. Increasing the number of hand-washing stations

The World Health Organization (WHO) issued direction about the setting up of hand-washing facilities in highly crowded areas. It advises keeping them at the entry of every public and private commercial building. Authorities ought to also make hand-washing an compulsory action prior to someone crosses a threshold to go into a building, WHO officials said. Job site rules determined before the pandemic required companies to provide one washing station per 20 employees, but employers may wish to install more. When workers find washing stations readily available, it's easier for them to get in the routine of cleansing their hands before eating. They can also cleanse personal protective equipment (PPE) that may have touched unsafe materials.

D. Putting into practice temperature checks and well-being assessments

Several warehouse safety procedures involve ensuring employees are fit for work. For example, they may have their temperature checked when entering a site or have to fill out a questionnaire at home that confirms they have not experienced any of the most common COVID-19 symptoms within the last 24 hours.

Firms recognized a need in the market and go to develop technologies that help employers screen their workers for symptoms. Despite the rapid adoption of these technological solutions, privacy concerns remain. Some analysts say that

these options may not be as effective as advertised for identifying potentially ill workers. Another issue is that the COVID-19 health apps now on the market and purchased by workplaces may not adequately protect privacy. Yet, businesses are regularly agreeing to these measures. Some low-tech approaches may prove useful, too. For example, OSHA updates recommend firms to stay abreast of public health recommendations about the corona virus and give workers access to those tips. Firms can also plan for sending workers home if they mention feeling sick. If employees see that employers will accommodate them needing to leave early, they'll be less likely to keep quiet about suspected illnesses.

E. Limiting workplace visits

Preparing a workplace for safety in the COVID-19 era, means thinking differently about site visitors. Perhaps a former process required a person to confirm their arrival time at least 24 hours in advance, plus sign in and out of a site visitor log. Many industrial sites hosted tours or open days to attract potential clients. Those activities will likely become less commonplace in the new normal where the corona virus remains a threat. Firms can consider options such as virtual demonstrations or live-streamed glimpses at factory premises. If facilities must admit visitors, they should consider having precautionary procedures in place. Those might consist of giving people disposable masks and having them follow the same sanitation procedures that employees do when entering new sections of a factory or worksite.

X. MAKE SUPPORT AVAILABLE IN THESE CHANGED TIMES

In addition telling workers about warehouse safety procedures, workplace representatives ought to stress how they are there to respond to any feedback and uncertainty employees may have. For example, people may think nervous about returning to work, and some may not know how to use masks and other protective equipment properly.

Firm ought to make specific communication methods for people to use if they have questions about the new rules or want to suggest changes to safety measures. When employers show they take worker input into account, it becomes easier to

get the workforce on board with what's different now versus before the pandemic.

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