इंडोशन्यूज़
INDOSHNEWS

कार्यस्थल पर सुरक्षा, स्वास्थ्य और पर्यावरण पर त्रिमासिक समाचार-पत्र
QUARTERLY NEWSLETTER ON SAFETY, HEALTH AND ENVIRONMENT AT WORKPLACE

We Nurture Safety Culture

DGFASLI

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Ministry of Labour & Employment, Government of India
सायन, मुंबई 400 022, महाराष्ट्र , भारत
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Alok Mishra, IIS
Joint Secretary, MoLE& Director General
Directorate General Factory Advice Service & Labour Institutes
Ministry of Labour and Employment, Govt. of India

MESSAGE

It is with great pleasure that we present the latest issue of DGFASLI's quarterly newsletter, **INDOSHNEWS**, focusing on Occupational Safety, Health, and the Environment at the Workplace.

Aligned with the **Viksit Bharat 2047** vision—India's goal to become a developed nation by its 100th year of independence—DGFASLI remains dedicated to fostering economic growth, social progress, and environmental sustainability. Through various initiatives, we actively promote a safer and healthier workforce, contributing to this national objective in both spirit and practice.

This issue of **INDOSHNEWS** offers an in-depth exploration of critical topics in occupational safety and health. The first article, *Safeguarding of Machines – The Conceptual Framework*, highlights the fundamental principle that machine guards should not be seen as separate entities but as integral components of machinery itself. The second article, *Training for Occupational Safety & Health (OSH) at the Workplace*, underscores the significance of structured OSH training programs and their benefits. Additionally, this issue presents a comprehensive statistical analysis of OSH data through a case study on factory injuries in Rajasthan over the last decade, providing valuable insights into emerging risks and trends.

As workplaces evolve, hazard and risk assessment remain at the forefront of occupational safety. DGFASLI continues to play a pivotal role in setting standards, fostering a culture of safety, and sustaining best practices. We hope this issue of **INDOSHNEWS** serves as an invaluable resource for all stakeholders committed to enhancing workplace safety and well-being.

Place: Mumbai

Alok Mishra

SAFEGUARDING OF MACHINES - THE CONCEPTUAL FRAMEWORK

Sumit Roy

Abstract

Machine guarding for protection from physical hazards are fundamental and first requirements of a complete safety program. Believers of the theory that accidents are caused due to unsafe acts of persons are predominant will also agree that safety should commence from safe machines, safe tools, safe operating procedures, and safe working environment. The fundamental concept of machine guarding is imbibed upon the fact that machine guards should not be treated as a separate entity on the machine but should form an integral part of the machine. Workers may tend to remove or by-pass machine guards if it causes discomfort or is a hindrance to smooth operation of the machine. This attitude is consistent with the importance of worker failure as a causative factor for corrective action. In the same spirit it can be said that though unsafe acts causes the most accidents, mechanical guarding and engineering revision are the important factors in preventing machine accidents. Man invented the machine, built it, and put it to work. It moves when and where we direct, at the speed we desire, and stops when we stop it or when the energy we give it expires. People devise mechanical processes and procedures together with such safeguards, rules, regulations, and instructions as they alone decide are necessary. Accordingly, it is fair to conclude that even injuries resulting wholly from mechanical fault, with no personal unsafe action, are basically chargeable to humans (machine designers) and not machines. Hence safeguarding of machines, including ergonomic consideration, need to be taken care of at the design stage itself.

IMPORTANCE OF GUARDING

All mechanical action or motions are hazardous, however in varying degrees. Motions of rotation, reciprocation, moving belts, meshing gears, and machine parts causing impact or shearing are some examples of moving parts which call attention for safeguarding by way of prevention of material or person coming in contact. However, the aforesaid different types of motion are not specific to any one machine or industry, but in fact they are basic to the mechanical devices. Machines that are used in industrial establishments and particularly dangerous machines by way of their potential to cause serious injuries, including disability and fatality should have active protection through guards. Machine guarding is one particular area that needs to be focused upon for ensuring safety of persons while working at workplace and also as an aid to improve the productivity. The dependence of productivity on safe and healthful working environment is very much established because of the fact that 'every accident brings with it a cost that the products has to bear.

The conceptual framework of machine guarding in general revolves around the fact that one needs to provide effective guarding to prevent contact with dangerous moving parts which may otherwise cause injury. Any machine part, function, or process which may cause injury must be safeguarded. In principle any machine part which has a potential to cause harm should be safeguarded.

Machine guarding reduces the likelihood of an accident that may occur due to mechanical failure, human error, electrical failure, or poor design, though a poorly designed machine cannot be expected to provide effective guarding. Apart from other concerns, there lies a psychological concern in the minds of the workers. The concern that the machinery they are using may fail or cause harm to them. On the contrary, workers who feel confident of their safe working with machinery will be more productive and can contribute in a big way to the prosperity of the organization. With no or fewer injuries production targets can be met profitably.

PROTECTION ACHIEVED THROUGH EFFECTIVE MACHINE GUARDING

Effective machine guarding can prevent the following:

1. Direct contact of persons and material with exposed moving parts of machines at the point of operation and power transmitting parts of mechanisms.

2. Prevent exposure to any unsafe condition that may result due to faulty machine operation or design failure.

3.Prevent exposure to flying particles given off from the machine during working, eg., metal chips, pieces of wood that kick back from a power saw, or particles from abrasive wheels.

4. Machine failure, resulting from lack of preventive maintenance, overloading, metal fatigue, or abuse.

5. Electrical shock or burn resulting from malfunctioning of the machine.

6. Prevent operator from injury that may inflict in case of deviation from SOP as a result of operator error or human fatigue caused by overload, worry, ignorance, horseplay, etc.

SAFEGUARDING OF MACHINES THROUGH SAFE MACHINE DESIGN

The basic idea of machine guarding is to address the hazards at the design stage itself. By this the purpose of machine guarding can be effectively achieved. The general principles of effective machine guarding that can be followed at the design stage itself is, but not limited to, as summarized below:

1. Machine guarding should form an integral part of the machine itself and should not be a separate entity.

2. The guard should effectively prevent contact with the moving parts at the point of operation and other moving parts of the machine that could cause injury.

3. The parts with high potential risk should be so designed such that it is not possible to manipulate or tamper with the part by the worker.

4. Passive protection against splatter or falling debris while using the machine during normal operation or during maintenance.

5. While designing machine guards, it should always be borne in mind that the machine guard should not be an additional source of hazard, like sharp edges, pinch points, etc.

6. Often operators refuse to use machine guards or remove them before using the machines since the guards cause discomfort or obstruction during operation. Machines guards should be so designed that they allow ease of operation.

7. The machine guards should be so designed that it is not possible to run the machine without the guards.

8. The guarding should not pose inconvenience in changing jobs or attaching accessories.

9. Wherever feasible, point of operation guards should be installed by the manufacturer of the machine.

ERGONOMIC CONSIDERATIONS AT DESIGN STAGE

Workplace ergonomics is the science of designing the workplace, as per the capabilities and limitations of the worker. Ergonomically poorly designed machine guards or machines leads to fatigued, frustrated and injured workers. More likely, apart from injury it leads to lower productivity and poor product quality. To be ergonomically acceptable, a safe guard should:

1. Be considered a permanent part of the machine.

2. Afford maximum positive protection, not only for the operator, but also for his co-workers and passer-by.

3. Be convenient- It must not interfere with efficient operation of the machine, cause discomfort to the operator, or complicate the job of cleaning the area around the machine.

4. Be designed for the specific job and specific machine.

5. Provisions must be made for oiling, inspection, adjusting, and repairing of the machine parts. Be easy to repair.

FIVE APPROACHES TO MACHINE GUARDING

1. Guarding by using physical guards: One of the most preferred methods used for machine guarding is by placing of physical barriers that enclose dangerous machine parts to prevent employee and their body parts to come in contact with them. Such guards must be of substantial construction sound strength and fastened securely to the machine in order to prevent the guard from being inadvertently removed.

2. Safe Guarding Devices: Safeguarding devices are controls that usually prevent inadvertent access by workers to hazardous parts of the machine, when properly designed and installed. Examples include: presence sensing device, pullback device, restraint, safety controls, and gates. These devices are capable of stopping the machine in case of violation of any protocol, like inadvertent placing of hand or any part of the body in the danger area. These devices can also restrain or withdraw the operator's hands from the danger area during operation or may require the operator to use both hands on machine controls, thus keeping both hands of the operator busy and thereby facilitating in keeping the body out of danger. Further such devices may provide a barrier which is synchronized with the operating cycle of the machine in order to prevent entry to the danger area during the hazardous part of the cycle.

3. Secondary Safeguards: These methods are acceptable only when guards or safeguarding devices cannot be installed due to reasons of infeasibility. These methods are used when the physical guards cannot provide complete protection to the workers from exposure to moving machine parts because of operational limitations and hence to cover-up the residual danger such a method is used. These include administrative controls for preventing access to the hazardous areas by the workers. These methods provide a lesser degree of protection than the primary safeguarding methods as they do

not prevent employees from placing or having any part of their bodies in the hazardous machine areas. Training, warning messages, etc. are some examples of secondary safeguards. Secondary safeguarding methods should not be substituted with primary safeguarding methods.

4. Location/ Distance: The concept is to keep the operator away from the dangerous parts by keeping them at distance from the point of operation. To consider a part of a machine to be safeguarded by location, the dangerous moving part of a machine is positioned so that those areas are not accessible or do not present a hazard to a worker during the normal operation of the machine. One example of such guarding is to place the controls far from the moving parts so that the operator has to move away from the moving parts to operate the machine. A thorough hazard analysis of each machine and particular situation is absolutely essential before attempting this safeguarding technique.

5. Awareness Barriers (Warnings): Awareness barriers do not give complete protection from machine hazards; they may provide the operator with an extra margin of safety. An awareness barrier does not provide physical protection, but serves only to remind a person that he or she is approaching the danger area. This is in fact an administrative control for the machine hazards. Generally, awareness barriers are not considered adequate when continual exposure to the hazard exists.

STATUTORY PROVISIONS FOR MACHINE GUARDING

Plant workers, managers, and even casual passersby must adhere to very strict safety regulations in order to keep everyone as safe as possible. The Factories Act, 1948 under section 21 prescribes for fencing of machinery. The section specifically provides that “every dangerous part of any other machinery; shall be securely fenced by safeguards of a substantial construction which shall be constantly maintained and kept in position while the parts of machinery they are fencing, are in motion or in use”. Further, guidelines for safety while working on machines are available in the form of the Model Rules of DGFASLI framed under the Factories Act, 1948 under section 21. Schedules prescribed under the Model Rules for certain categories of dangerous machines provide specific guidelines on safety. Section 22 on work on or near machinery in motion provides guidelines for working near machinery while they are in motion prescribing standards of safety to be complied with. The Act along with the Rules framed there under provides comprehensive guidelines for ensuring the safety of workers while working on machines.

Conclusion

In view of the varied hazards posed by the machines, it is fair to conclude that even injuries resulting wholly from mechanical fault, with no personal unsafe action, are basically chargeable to humans (machine designers) and not machines and hence safeguarding of machines need to be taken care of at the design stage itself.

REFERENCES:

1. The Factories Act, 1948 and the Model Rules framed there under.
2. Industrial Accident Prevention by H. W. Heinrich, Dan Petersen and Nestor Roos
3. Ora, Appil& Kumar, K. &Dewan, Rishi. (2018). Recent Development in Machine Safeguarding for Protecting Humans from Complicated Machines.
4. Parker, David & Brosseau, Lisa &Samant, Yogindra & Xi, Min & Pan, Wei &Haugan, David. (2007). A Randomized, Controlled Intervention of Machine Guarding and Related Safety Programs in Small Metal-Fabrication Businesses. Public health reports (Washington, D.C.: 1974).
5. Safeguarding Equipment and Protecting Employees from Amputations Occupational Safety and Health Administration.U.S. Department of Labour OSHA 3170-02R2007.
6. Concepts and Techniques of Machine Safeguarding, Banks G. Mitchum, United States. Occupational Safety and Health Administration, U.S. Department of Labour, Occupational Safety and Health Administration, 1989 – Factories.
7. Machine safeguarding at the point of operation- A guide for finding solutions to machine hazards, Consumer and Business Services, Oregon,OSHA.

Sumit Roy
Director (Safety),DGFASLI, Mumbai.

TRAINING FOR OCCUPATIONAL SAFETY AND HEALTH (OSH) AT WORKPLACE

Upendra Singh

Abstract

Occupational Safety & Health (OSH) training has been always been one of the lowest things on the priority list of most industries. Changes in work organization practices because of rapid technological progress (implementation of new technologies and automation, biotechnologies, new production methods and materials) at the workplace, shifting patterns of employment, etc., the employment set up can generate new types and patterns of hazards, exposures and risks. In order to extend protection to workers and environment, the workforce needs to be equipped with proper skill sets, thorough knowledge and adequate technical competence. Training being one of the integral components of human resource development, it is to be imparted from time to time considering its benefit, and also in compliance with national and international requirements as per the industry, operation methodology and end product. Investing in effective employee training will increase skills, knowledge, productivity and morale as well as reduce workplace incidents and injuries.

1.0 INTRODUCTION

The scope of occupational safety and health has evolved gradually and continuously in response to social, technological and economic changes. Occupational Health & Safety (OHS), Occupational Safety (OS) or Occupational Health (OH) or Occupational Safety & Health (OSH) or are related to each other. The Occupational Safety and Health (OSH) is generally defined as the science of the anticipation, recognition, evaluation and control of hazards arising in or from the workplace that could impair the health and well-being of workers, taking into account the possible impact on the surrounding communities and the general environment. This domain is necessarily vast, encompassing a large number of disciplines and numerous workplace and environmental hazards. A wide range of skills, knowledge and analytical capacities are needed to extend protection to both workers and the environment. The world is living in the age of globalization and India is no exception

The world has seen various paradigms and shifts thereon. Workplaces have become more labour dependent along with the machines. The larger production size and voluminous operations are the new normal of the industries to cater and fulfil the need of the world. Rapid technological progress has also brought in new types and patterns of hazards, exposures and risks. Demographic changes and population movements can also affect safety and health in the world of work.

The employed workforce needs to be equipped with proper skill sets, thorough knowledge and adequate technical competence. Training being one of the integral components of human resource development, it is imperative to mention that training pertaining to specific profession should be imparted from time to time which are varied in nature and changes as per the industry, operation methodology and end product.

2.0 THE NEED OF OHS TRAINING

The worker is the most valuable asset of the production process at workplace and need to be extended all kind of protection from the adverse work environment. In fact, adverse work environment needs to be controlled and monitored and made safer for the workforce.. In this prevailing situation, OSH training does play its indispensible role. The following facts further emphasise the need of OSH training:

(a) It has been seen that those who are new on the job have a higher rate of injuries and illnesses than more experienced workers.

(b) Imparting OSH training to workers to do their jobs safely is an investment that will pay back in future over and over again in fewer injuries and illnesses, better morale, lower insurance premiums and many more indirect benefits.

(c) Changes in production processes further consolidate that OSH training is a key

support for continuous improvement. Resources invested in the training of workers are likely to produce significant benefits in terms the economic costs associated therewith.

Creating a safe work environment is critical to the success of business, and one of the best ways to retain staff and maximise productivity. To ensure you get the best out of your employees, it is essential that they are all provided with appropriate training on all aspects of their work including health and safety. Although it costs to implement safe practices and install safety equipment, the consequences of not taking action can be extremely severe. In other words, "Training is expensive but without training, it is more expensive." The following aspects further emphasise the need of Occupational Safety and Health training to workers at workplace:

(d) Community expectations that organisations have a responsibility for those that works for them.
(e) Legal obligations.
(f) Insurable costs such as worker's compensation premium that is linked to OSH performance.
(g) Uninsurable costs such as lost time injury and reduced productivity, staff replacement, retraining costs as well as loss of business reputation.
(h) Costs to the community, such as health services, rehabilitation and loss of skilled labour.
(i) Costs to employees through reduced quality of life as a result of workplace injury and disease, reduced income for the injured and their family and grief by everyone involved.

3.0 BENEFITS OF OSH TRAINING

A healthy, productive and well-motivated workforce is the key agent for overall socio-economic development for the workplace and for the country as a whole. Occupational Safety and health is at the centre of sustainable development in the following ways:

a) The prevention of occupational injuries and diseases and the protection of workers against physical and psychological overload by imparting OSH training for safe work at workplace imply a frugal use of resources, minimizing the unnecessary loss of human and material resources.
b) The OSH training can provide and empower the workers with adequate knowledge and skills regarding work environment which consists of factors like physical, chemical, ergonomic or psychological stresses and physical workload.
c) OSH Training empowers the worker to use and operate the machinery optimally for higher productivity.
d) The OSH training facilitates the undisturbed production that increases the quality of products, productivity and process management and thus helps to avoid unnecessary loss of energy and materials and to prevent unwanted impact on the environment.
e) Through OSH training, workers may be apprised about the state of the general environment and the ecosystem which has an impact on the health of workers either indirectly or directly in the process of manufacturing.
f) The health and productivity of the worker directly impacts his/her dependent's health and well-being, thus making several members of the community dependent on the health of the worker. In a situation where organized social protection is lacking, the loss of health, life or working capacity of such a key member of the family often means a severe crisis also for the rest of the family, affecting indirectly the well-being, health and economy of communities at large and of future generations. This can be tackled by imparting OSH training to the workers and make them follow safe work practices and preclude the occurrence of injury or accident
g) OSH training not only empowers workers but also instils confidence in them for doing the works safely and aspires for higher responsibility.
h) OSH training plays a crucial role in making workforce aware

4.0 ISSUES IN HAND

(a) **Migrant Workers**: Workers in the informal economy are much more likely than formal workers to be exposed to poor working environments, low safety and health standards, and environmental hazards, and to suffer poor health or injury as a result. Most informal workers have little or no knowledge of the risks they face and how to avoid them. It is a herculean task for

the governments to collect the vital statistics needed to take appropriate remedial action, and, since much informal work takes place in homes, Labour Departments/inspectorates cannot investigate working conditions or get information and advice to the people who need it. The process of improving the working conditions and environment of informal workers through training, raising awareness and other means are need of hour.

(b) The inadequate dissemination of knowledge and information hampers action, especially in developing countries, like India. In the scramble for capital, the pressures of globalization and increasingly stiff competition tend to deflect attention from the long-term economic benefits of a safe and healthy working environment .Workers continue to face serious risks. To reduce the human suffering, financial loss and environmental degradation associated with these risks, there is a need for increased and sustained action to protect occupational safety and health.

(c) Technology transfer, concerns and controls: Technology transfer is one of the major factors behind the economic development in any country. Such transfer may occur in several different forms; in production carried out by multinational enterprises, as a national activity carried out by foreign investors or as an import of foreign technology. There are numerous examples of the transfer of hazardous and obsolete technologies from industrialized countries to developing countries. Numerous international guidelines and conventions have been prepared by international organizations to prevent such hazardous transfer, but they are not yet effectively implemented everywhere. In particular, the transfer of unshielded dangerous machinery and hazardous chemicals and substances to have caused an increase in occupational diseases and accidents among workers in the recipient countries.

*"*The principle of the ILO Recommendations on Multinational Enterprises and UNEP's Basel Convention on Prevention of Transboundary Transportation of Hazardous Waste stipulate that nothing that is unacceptable in the exporting country should be transferred to the importer, no matter what the legislation of the recipient country states about such a practice."

(d) New technologies, substances and processes are being introduced to monitor workplaces without previous experience of their potential health impact. Advance testing and assessment of hazards and risks is generally needed. Continuous monitoring of the possible occupational safety and health effects of such new technologies should be taken care of and effort should be made to introduce scientific criteria for planning of healthy and safe technologies and work environments. The capacity of occupational health and safety experts to participate in the assessment of new technologies and in the provision of health criteria should be strengthened. For this, apart from active research efforts, occupational safety and health services and training thereof, is also needed.

(e) The right to health and safety at work has been stipulated in the Constitution of WHO and ILO and is supported by a number of other United Nations documents. No country has so far been fully successful in achieving this objective for all workers. Thus, occupational safety and health infrastructures, programmes and training should be further developed and strengthened.

5.0 THE WAY FORWARD

The employer shall ensure that each worker receives adequate safety and health training, in particular in the form of information and instructions specific to his workstation or job:

(a) At the time of recruitment before assignment to job,
(b) When transferred or a change of job,
(c) When introduction of new work equipment or a change in equipment,
(d) When introduction of any new technology.
(e) Before any assignment to hazardous process related activities

Safety and Health of the workforce is important as it has direct and sometimes indirect effect on the business operations and its goals, reputation, outputs and contribution towards the national building. In order to formulate the right policy in the field of "occupational safety and health training" for the workers/employees and subsequently implement it countrywide, it is very important to know the existing scenario and practices in extant and hence, the National level study and survey is required to be undertaken to understand the present profile of OSH training and what needs to be done further.

6.0 OSH TRAINING REQUIREMENT/STATUTE-INTERNATIONAL PERSPECTIVE

6.1 International Labour Organisation (ILO):

The human, social and economic costs of occupational accidents, injuries and diseases and major industrial disasters have long been cause of concern at all levels from the individual workplace to the national and international. Measures and strategies designed to prevent, control, reduce or eliminate occupational hazards and risks have been developed and applied continuously over the years to keep pace with technological and economic changes. Occupational and industrial accidents are all caused by preventable factors which could be eliminated by implementing already known and available measures and methods.

Major OSH instruments used by ILO

The means used by the ILO to promote occupational safety and health include:

- International Labour Standards (Conventions and Recommendations)
- Codes of practice,
- The provision of technical advice and the dissemination of information

The ILO Conventions and Recommendations on occupational safety and health embody principles which define the rights of workers in this field as well as allocating duties and responsibilities to the competent authorities, to employers and to workers. The ILO policy on occupational safety and health is essentially contained in three international labour Conventions and their accompanying Recommendations.

a) The Promotional Framework for Occupational Safety and Health Convention (No. 187), and its accompanying Recommendation (No. 197), 2006, provide for the establishment of a permanent process of continuous improvement of occupational safety and health and the building of a preventive safety and health culture.

b) The ILO Occupational Safety and Health Convention, 1981 (No. 155), and its accompanying Recommendation (No. 164), provide for the adoption of a national occupational safety and health policy, as well as describing the actions to be taken by governments and within enterprises to promote occupational safety and health and improve the working environment.

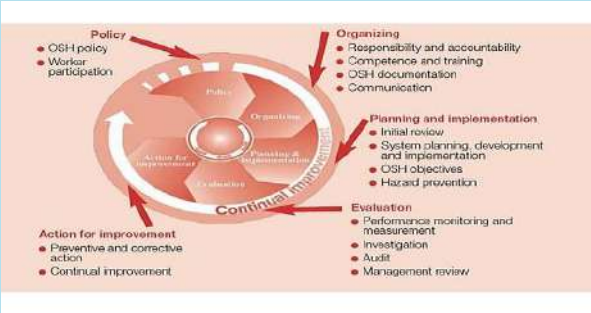
c) The ILO Occupational Health Services Convention (No. 161) and Recommendation (No. 171), 1985, provide for the establishment of occupational health services at the enterprise level, designed to ensure the implementation of health surveillance systems and to contribute towards implementing the OSH policy.

The ILO's codes of practice are highly technical and scientifically detailed to be used as guidance on implementing the labour standards or on addressing a particular issue. Examples of recent ILO codes of practice on occupational safety and health:

- ✓ Prevention of major industrial accidents, 1991
- ✓ Safety and health in construction, 1992
- ✓ Safety in the use of chemicals at work, 1993
- ✓ Recording and notification of occupational accidents and diseases, 1995
- ✓ Guidelines on occupational safety and health management systems, 2001
- ✓ Ambient factors in the workplace, 2001
- ✓ HIV/AIDS and the world of work, 2001
- ✓ Safety and health in the non-ferrous metals industries, 2003
- ✓ Safety and health in underground coalmines, 2008

Guidelines on occupational safety and health management systems, 2001

These guidelines were designed as a practical tool for assisting organizations (a company, operation, firm, undertaking, establishment, enterprise, institution or association, or part of it, whether incorporated or not, public or private, that has its own functions and administration) and competent institutions as a means of achieving continual improvement in occupational safety and health (OSH) performance. The system should contain the main elements of policy, organizing, planning and implementation, evaluation and action for improvement, as shown below:
Main elements of the OSH management system



From the Figure above, 'Organising' being one of the main elements of the OSH management system includes 'Competence and Training' as its sub element.

Competence and training

The necessary OSH competence (includes education, work experience and training, or a combination of these) requirements should be defined by the employer, and arrangements established and maintained to ensure that all persons, in particular new and young workers have been trained and are competent to carry out the safety and health aspects of their duties and responsibilities. The employer should have, or should have access to, sufficient OSH competence to identify and eliminate or control work-related hazards and risks, and to implement the OSH management system.

6.2 OSHA (Occupational Safety and Health Administration)

Training Requirements in OSHA (Occupational Safety and Health Administration) Standards: Under the Occupational Safety and Health Act of 1970, employers are responsible for providing a safe and healthful workplace. No person should ever have to be injured, become ill, or die for a pay check.

OSHA's mission is to ensure the protection of workers and prevent work-related injuries, illnesses, and deaths by setting and enforcing standards, and by providing training, outreach, education and assistance. OSHA provides that training is an essential part of every employer's safety and health program for protecting workers from injuries and illnesses. The training requirements contained in OSHA's standards are organized into five categories of OSHA standards: General Industry, Maritime, Construction, Agriculture, and Federal Employee Programs.

Injury and Illness Prevention Programs

Training and education are elements of a strong injury and illness prevention program that can help employers find and fix workplace hazards before workers get hurt. Injury and illness prevention programs are systems that can substantially reduce the number and severity of workplace injuries and illnesses while reducing costs to employers. Most successful injury and illness prevention programs are based on a common set of key elements. These include management leadership, worker participation, hazard identification, hazard prevention and control, education and training, and program evaluation and improvement.

Safety starts with training

Before engaging in any potentially hazardous activities, workers must receive appropriate safety training from their employer, as defined in OSHA standards. OSHA requires employers to provide training to workers who face hazards on the job. Training Requirements for Workplace Safety under the Occupational Safety and Health Act of 1970, employers are responsible for providing a safe and healthful workplace. Title 29, Code of Federal Regulations Part 1910-GENERAL INDUSTRY provides for OSH training at workplaces.

6.3 Health and Safety Executive-UK

'Health and Safety Executive' provides information and training-Everyone who works for you needs to know how to work safely and without risk to their health. This includes contractors and self-employed people. Health and safety training should take place during working hours and must be free for employees. There are external trainers who could help, but you can often do effective training in-house. Staff will need extra training if you get new equipment or your working practices change. When employing a young person under the age of 18, whether for work, work experience, or as an apprentice, employers have the same responsibilities for their health, safety and welfare as they do for other employees.

'Health and Safety Executive' states that workers must be given clear instructions and information, as well as adequate training and employees with particular training needs must be included, for

example new recruits, people changing jobs or taking on extra responsibilities, young employees and health and safety representatives.

7.0 OCCUPATIONAL SAFETY AND HEALTH TRAINING (REQUIREMENT/STATUTE) - NATIONAL PERSPECTIVE

7.1 The Factories Act, 1948

A comprehensive Act which provides for safety, health and welfare to workers working in factories registered under the Factories Act, 1948. Through section 7A, the Act has made the occupier of the factory responsible for the health, safety and welfare of all workers while they are at work in the factory.

General duties of the occupier under Section7A

It is the duty of the occupier to ensure safety, health and welfare of all workers while they are at work in the factory. Besides, the occupier is also responsible for training and supervision as are necessary to ensure the health and safety of all workers at work. The training shall be adapted to take account of new or changed risks, and repeated periodically if necessary.

Specific responsibility of the occupier in relation to hazardous processes under Section 41 C

Post Bhopal tragedy, the Factories Act, 1948 was amended and a specific chapter on 'Provisions Relating to Hazardous Processes' was added, and section 41C (b) sets specific responsibility for occupier of the hazardous factories to appoint persons who possess qualifications and experience in handling hazardous substances and are competent to supervise such handling within the factory. From this provision, it may be derived that the persons appointed for handling hazardous substances/processes need to have prescribed qualification and experience, and suitably trained to manage the hazardous processes at the workplace in the hazardous factory.

Right of workers under Section 111A

Every worker shall have the right to get trained within the factory wherever possible, or, to get himself sponsored by the occupier for getting trained at a training centre or institute where training is imparted for workers' health and safety at work.

8.0 SYSTEMS IN WORKPLACES- OCCUPATIONAL SAFETY & HEALTH TRAINING

The Government of India has strengthened its national OSH system through various legislations i.e. the Factories Act, 1948, the Mines Act, 1952, the Dock Worker (Safety, Health &Welfare) Act, 1986 and the Building & Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 which are enforced by the government through Ministry of Labour and Employment & State/UT governments, and DGFASLI, a Nodal agency to ensure safer and healthier work environment.

8.1 National Policy on Safety, Health & Environment at Workplace

The Government of India has declared its National Policy on Safety, Health & Environment at Workplace in 2009, and is applicable to all sectors of economy whether formal or informal. Government firmly believes that without safe, clean environment as well as healthy working conditions, social justice and economic growth cannot be achieved and that safe and healthy working environment is recognized as a fundamental human right. Education, training, consultation and exchange of information and good practices are essential for prevention and promotion of such measures. Clause 4.6 under the 'Action Programme' of the National Policy on Safety, Health & Environment at Workplace provides for Occupational Safety and Health skills development where OSH training has been emphasized to increase the number and competence of personnel engaged in the field of occupational safety, health and environment at workplace.

Clause 4.6: *Occupational safety and health skills development*

4.6.2 by providing for training programmes to increase the number and competence of personnel engaged in the field of occupational safety, health and environment at workplace.

4.6.5 by integrating health and safety into vocational, professional and labour related training programmes as also management training including small business practices.

4.6.6 by adopting Occupational Safety and Health training curricula in workplace and industry programmes.

Clause 5.2: Government stands committed to review the National Policy on Safety, Health and Environment at Workplace and legislations through tripartite consultation, improve enforcement, compilation and analysis of statistics; develop special programmes for hazardous operations and other focus sectors, set up training mechanisms, create nation-wide awareness, arrange for the mobilisation of available resources and expertise.

8.2 National OSH Profile and Programme

The National OSH Profile is a document which summarises the existing OSH situation of a country and is used as a diagnostic document to assess gaps in the national OSH system and identify priority areas for national action in OSH. It is a valuable source of information for policy makers, government officials, workers, employers and OSH practitioners to follow and monitor OSH developments, and is used as a basis for formulating the National OSH Programme. Development and application of National OSH Profile and Programme will facilitate to understand the present situation, identify gaps in OSH management system, ways to measure progress and effectively implement its National OSH system by further planning to ensure safety and health for all workers. Chapter 7 of the National OSH Profile provides for "Provision of OSH Training". Provision of OSH Training in the National Occupational Safety and Health Profiles is stated commitment towards the need and importance of OSH training workers and hence to contemplate of a workplace with Zero-accident.

9.0 Strategies for Enhancement of Occupational Safety & Health Training:

(a) Worker Participation in Developing Training Programs: Training programs help ensure that safe jobs mean no accident. Safe jobs exist because employers make a conscious decision, each and every day of the year, to make protecting workers a priority in the workplace. When this effort includes participation from workers, workplace injury and illness prevention programs are improved because workers can identify missing safety procedures, make recommendations for changes and help ensure a safe workplace. When workers have a voice in the workplace and input about how training is developed, training programs are more accurately focused on specific workplace hazards.

(b) Work organization and worker participation has a positive impact on safety and health: The way that work is organized, the management style, and the extent to which the worker can determine or regulate his or her work and participate in decisions about it.

(c) Development of Human Resources for Occupational Health

- Training and education are elements of a strong injury and illness prevention program that can help employers find and fix workplace hazards before workers get hurt.
- Injury and illness prevention programs are systems that can substantially reduce the number and severity of workplace injuries and illnesses while reducing costs to employers.
- Most successful injury and illness prevention programs are based on Worker participation and education and training, apart management leadership, hazard identification, hazard prevention and control and program evaluation improvement.

(d) The right to health and safety at work - a part of basic human rights:

References

1. https://www.ilo.org/global/topics/labour-administration-inspection/resources library/publications/guide-for-labour-inspectors/how-can-osh-be-managed/lang--en/index.htm.
2. https://www.osha.gov/training.
3. https://www.osha.gov/sites/default/files/publications/osha2254.pdf.
4. https://www.nfpa.org/Training-and-Events.
5. https://www.hse.gov.uk/simple-health-safety/training/index.htm.
6. https://oshwiki.eu/wiki/OSH_training.
7. https://www.researchgate.net/publication/335961173_Training_Manual_on_Occup

ational_Safety_and_Health/link/5d85d6f4299bf1996f8323d3/download.
8. https://www.ilo.org/wcmsp5/groups/public/@dgreports/@dcomm/@publ/documents/publication/wcms_093550.pdf.

Upendra Singh
Deputy Director (ST/P),
Central Labour Institute, Mumbai

Workshop on 'Safety in Dock Work & Handling of Hazardous Chemicals' held on 19.09.2024 at New Mangalore Port Authority

The One-Day Workshop on Dock Safety & Handling of Hazardous Chemicals was conducted on 19th September 2024 at the Business Development Centre, NMPA, Mangalore. This workshop brought together a wide range of experts, regulatory authorities, and industry leaders to discuss the challenges and best practices in handling hazardous chemicals in port environments. The event was organized by DGFASLI, in collaboration with New Mangalore Port Authority (NMPA), Mangalore Refinery and Petrochemicals Limited (MRPL), and NIT Karnataka.
The Keynote Address delivered via video conferencing by Shri Alok Mishra, Joint Secretary & Director General, DGFASLI. He articulated the necessity for continuous innovation in safety practices, highlighting that the rapidly evolving nature of industrial operations demands adaptive and forward-thinking strategies. He encouraged all stakeholders to leverage this collaboration to foster academic research that addresses real-world challenges in dock safety.

In his Presidential Address, Dr.Venkata Ramana Akkaraju, Chairman of the New Mangalore Port Authority (NMPA), delivered a compelling message, reaffirming the port's deep commitment to fostering a culture of safety and operational excellence. He highlighted that NMPA is at the forefront of ensuring the highest safety standards, particularly in dock operations where workers are exposed to hazardous chemicals and high-risk activities.

The workshop witnessed active participation from 118 participants representing 30 organizations spanning technical industries, administrative bodies, and academic institutions. The workshop brought together a diverse range of stakeholders, including representatives from M/ s JSW Mangalore Container Terminal Pvt. Ltd., M/s Aegis Vopak Terminals Ltd., M/s Mangalore Refinery & Petrochemicals Ltd. (MRPL), M/ sAdani Power Ltd., IMC Ltd., M/ sAspinwall& Co., and M/ sDelta Infralogistics (Worldwide). Government bodies such as KIOCL, Karnataka State Fire and Emergency Services, DISH Karnataka, CISF, and Port Health Organisations (DGHS, MOHFW, GOI) also took part, along with academic partners like NITK-SurathkalandMIT-Manipal.

Lighting of the lamp

Director General, DGFASLI addressing the audience

The workshop provided an excellent platform for technical organizations, administrative authorities, and academic partners to engage in critical discussions on improving safety protocols for hazardous chemical handling in dock work environments. Topics covered included best practices for handling and storing hazardous chemicals, emergency response strategies, competence and supervision standards, and international safety guidelines. Academic institutions played a crucial role in facilitating research-driven insights, while industry leaders shared practical experiences and challenges related to safety in port and industrial operations.

Participants Group Photograph

CIDS addressing the audience

Session	Speaker	Topic	Key Points Delivered	Pictures
Session 1: **Regulatory Framework**	Shri Sumit Roy, Chief Inspector of Dock Safety, DGFASLI	Overview of National and International Regulations on Dangerous Substances	Compliance with national safety standards to minimize accidents. Understanding international best practices for hazardous substance management. Need for continuous regulatory updates to address emerging risks.	
Session 2: **Safe Handling of Dangerous Substances**	Dr.Kunal Sharma, DGFASLI	Competence and Supervision in Handling Explosives and Flammable Liquids	Ensuring only certified personnel handle hazardous materials. Supervisors must maintain constant oversight to enforce safety protocols. Periodic training and re-certification of workers and supervisors.	
	Prof.Rajmohan,NIT Karnataka	Best Practices for Loading, Unloading, and Storage of Hazardous Chemicals	Adhering to established procedures for loading and unloading dangerous goods. Ensuring storage facilities meet international safety standards. Use of specialized equipment and tools to handle hazardous chemicals safely.	

Session 3: **Hazardous Environments and Emergency Response**	Shri M.S. Sudarshan, CGM/HSE, MRPL	Identifying and Managing Risks in Hazardous Environments	Conduct regular risk assessments to identify potential hazards. Implement preventive measures to mitigate identified risks. Use of protective gear and safety equipment in hazardous environments.	
	Shri Atul Bhongle, GM/Fire & Safety, MRPL	Emergency Response Procedures	Develop and rehearse emergency response plans regularly. Equip personnel with the necessary knowledge and tools for emergencies. Effective inter-agency coordination during crises.	
	Shri Vipul Mishra, Director (S), DGFASLI	Case Study Presentation: Real-life Incident Analysis and Lessons Learned	Identifying gaps in safety protocols and emergency preparedness. Importance of real-time monitoring systems for hazardous materials. Improving communication and coordination during emergency responses.	
Session 4: **Technological Solutions and Innovations in Dock Safety**	Shri Pramod Kumar Dash, Sr.Dy. Traffic Manager, NMPA	Use of Advanced Technologies/ Automation in Cargo Handling in Ports to Ensure Safety	Integration of automation to reduce risks in manual handling. Real-time monitoring for early detection of potential hazards. Investment in innovative technologies to improve safety standards. GPS-enabled traffic management for safer routing of hazardous materials.	
	Ms. Sushma H, Safety Officer, NMPA	Implementation of Safety in Port Operations	Maintaining a safety-first culture in all port operations. Continuous training and safety audits to improve protocols. Collaborative efforts among stakeholders to uphold safety standards.	

This event resulted in significant knowledge-sharing and cross-sector collaboration, equipping participants with essential tools and strategies to mitigate risks, enhance operational safety, and foster a safety-centric culture across their respective organizations. The workshop's comprehensive approach—bridging industrial expertise, regulatory compliance, and academic research—will drive sustained improvements in dock safety and hazardous chemical management.

Safety Audit at Chennai Port Authority in Tamilnadu (Tanoj Chandan, Sunil Dadi and Nag Mani Mishra. Regional Labour Institute, Chennai)

The safety audit at Chennai Port Authority in Tamilnadu was carried out in accordance with IS 14489:2018. The Audit was conducted to identify and evaluate work practices and procedures which are hazardous in nature to cause human injuries & sickness &cause damage to the machinery.

The scope of the safety audit was to assess the safety, Health & Welfare of Dock workers employed in the Storage, handling & transportation of cargo. The audit was also aimed in relation to the safety of the equipment used in the process in relation to the existing standard and statutes along with Dock Workers (Safety, Health & Welfare) Regulations 1990.

The various elements of audit covered were existing practices and procedures in cargo handling, upkeep and maintenance of lifting appliances & gears, procedures of accident reporting and investigation fire prevention plan, and welfare facilities available at the Port.

The report covered the safety department, education and training, Port inspections, hazard Identification and control system, transport safety within the Port premises, testing and examination of the lifting appliances used in cargo handling, fire safety adequacy & emergency action plan, medical examination of the dock workers.

Based on findings & observations recommendations were given that Safety & Health Policy shall be reviewed periodically and commitment of management shall also be the part of the policy. Hazard identification and communication shall be made more effective. Separate guidelines and cargo wise SOP shall be in place. Usage of PPEs at the cargo handling areas shall be made more stringent. The stringent policy on vehicular movements at the cargo handling sites should be formulated. The transport drivers (having valid license) employed for transportation of cargo shall be medically examined and trained in transport and material safety.

Risk assessment study at detergent cake manufacturing unit in Madhya Pradesh. (Varadharajan, N. and Srivastava, Karunesh. Regional Labour Institute, Kanpur)

The risk assessment study was *carried out at* detergent powder manufacturing unit in Madhya Pradesh. The scope of this risk assessment study was to assess the identification and description of potential hazards that could cause harm to workers working in the factory and assessment of the likelihood and impact of these hazards by observations and documentation.

A comparison of estimated risks against existing criteria to determine its significance & whether they are acceptable or require further action was given in a Risk Matrix form.

A comprehensive report that includes all findings, analyses, and recommendations to be used for decision-making purposes was given to the management. It was also suggested to monitor and review processes to ensure the effectiveness of implemented controls and to update the risk assessment as required.

Safety Audit at detergent cake and detergent powder manufacturing unit in Uttar Pradesh (Saxena, D. K. and Varadharajan, N., Regional Labour Institute, Kanpur)

The safety audit was conducted *at detergent* cake & detergent powder manufacturing unit in Uttar Pradesh. The scope of this safety audit was to assess the safety and health of workers. The safety audit was also for evaluating the effectiveness of health and safety programs, verifying the availability and implementation of elements of occupational health and safety systems and the system's ability to achieve defined safety objectives as per the guidelines given in the IS 14489:2018.

Based on the observations and discussions, suggestions were given to the management of the factory for improvement in the system's specified requirements like proper earthing of the electrical units, proper safety for storage of chemicals used as perfumes, safety signage, housekeeping by way of following 5S (sort, set in order, shine, standardize, and

sustain) and for further more effective implementation of the specified requirements like training of employees in use of appropriate PPEs, fire fighting etc.

Safety Audit at air bag inflator manufacturing industry in Tamil Nadu. (Tanoj Chandan, Dadi Sunil and Das, A.K.), Regional Labour Institute, Chennai.

The safety audit was carried out at *air bag inflator manufacturing industry in Tamil Nadu* in accordance with IS 14489:2018. The scope of this safety audit was to assess the Safety, Health& Welfare of workers employed in the process area, storage, canteen, material handling& transportation. The audit was also aimed in relation to the safety of the process in relation to the existing standard and statutes along with Factory Act 1948 and T.N Factory Rule 1950 made there under.

The various audit elements covered were safety management system in the Plant, existing practices and procedures of accident reporting and investigation, fire prevention plan, emergency response plan, safety culture & motivation and other welfare measures.

The report covered the detailed methodology, safety department, education and training, hazard Identification and control system, emergency control measures within the plant premises. Testing and examination of the lifting appliances and pressure vessels. Safety Inspections and compliance of safety observation during safety committee meeting, medical examination of the workers.

Based on findings & observations recommendations were given such as Safety & Health Policy shall be reviewed periodically and commitment of management shall also be the part of the policy, Hazard identification and communication shall be made more effective. Periodical medical examination and eye test of driver has to be ensure.Wearing of PPE'S to be ensured. SOP has to display for hazardous substances etc.

Industrial Hygiene/ Work Environment Air Monitoring Study at Noise/Thermal Insulation solutions cum sound proofing and acoustic materials manufacturing and assembling Industry in Maharashtra. (Dr.Paine, S.K),Central Labour Institute, Mumbai)

The work environment air monitoring study was conducted for the assessment of different types of air borne health hazards and to suggest effective remedial strategies on workers engaged in different locations of materials handling units and processes. The aim of the study was for evaluation of the level of airborne contaminants in the workplace environment in the factory.

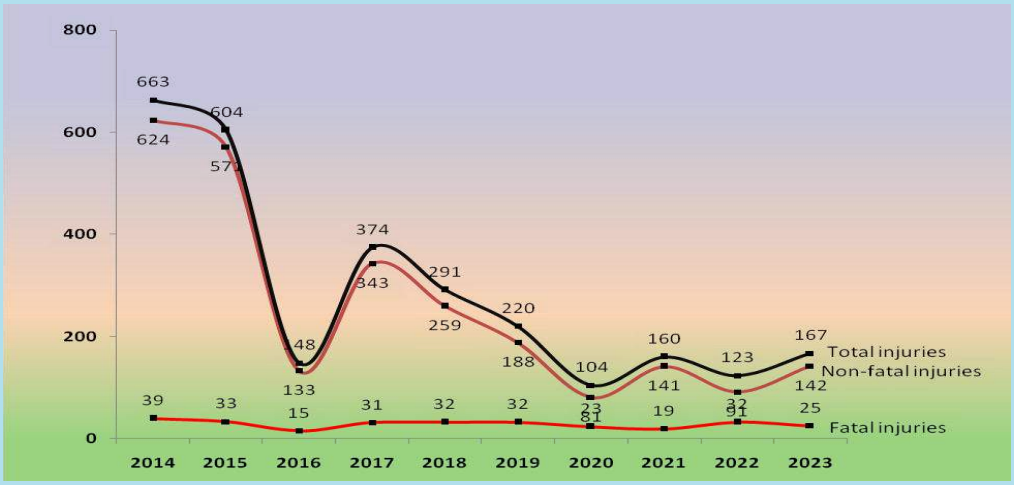
The acute and chronic health effects of hazards exposure like nuisance dust (respirable/ total dust), silica dust, air borne gas/vapours, glass wool/rock wools, exposures of adhesives and VOCs, Chlorines and Alkaline vapours exposure etc. were documented.

The observed concentrations of air borne dust containing silica, graphite other airborne chemical like Acid vapours, Chlorine, Ammonia was above the TLV i.e. threshold limit values & PEL i.e. Permissible Exposure Levels as per OSHA recommendations but below the permissible level of exposure as per the Factory Act, 1948 and amended 1987 (Second Schedule) at few locations of the work places.

Based on the observation and findings several recommendations were given such as protections and preventions of air borne chemical exposures at the work places, engineering controls by increasing ventilation systems like local exhaust ventilation (LEV), general ventilation and fume hoods to be installed. Dust collection systems like bag-house filters and cyclone for suppression of air borne dust chemicals to be installed for reducing exposure to airborne contaminants. Safe work practices, training and awareness, personal protective equipment (PPE), respiratory protection, skin protection shall be implemented. Environmental controls and exposure monitoring like air monitoring systems, alarm systems, and maintenance of equipment shall be done on regular interval as per statute.

Trend Analysis: Fatalities (fatal injuries) and Non-fatal injuries reported in the factories registered under the Factories Act, 1948 in Rajasthan (2014-2023)

Year	Fatal injuries	Non-fatal injuries	Total injuries
2014	39	624	663
2015	33	571	604
2016	15	133	148
2017	31	343	374
2018	32	259	291
2019	32	188	220
2020	23	81	104
2021	19	141	160
2022	32	91	123
2023	25	142	167



Observation and Analysis

The above table shows fatal injuries (fatalities) and non fatal injuries reported during the last ten years i.e. from 2014 to 2023 in the factories registered under the Factories Act, 1948 in the state of Rajasthan.

Over the past decade, workplace injuries have shown a significant decline, reflecting improvements in safety protocols and possibly the effects of external factors like the COVID-19 pandemic. The data, spanning from 2014 to 2023, reveals noteworthy trends in both fatal and non-fatal injuries, shedding light on progress and areas for further focus on occupational safety.

Fatal injuries have generally trended downward, with the highest number recorded in 2014 (39 deaths) and the lowest in 2016 (15 deaths). While there was some fluctuation, such as the increase in fatalities in 2017 (31 deaths) and 2018 & 2019 (32 deaths), the overall trend is downward. The years 2020 and 2021 show the low figures of fatal injuries, possibly due to the COVID-19 pandemic. The slight resurgence of fatal injuries in 2022 (32 deaths) reflects the need for continued vigilance. Non-fatal injuries have seen a steepest decline from 624 in 2014 to a low of 81 in 2020. This steep drop may partially be attributed to workplace disruptions during the pandemic, as the number of incidents rebounded slightly in 2021 and 2023 to 141 and 142 cases, respectively. The total injuries have consistently fallen over the 10 years period, between 2014 (663 total injuries) and 2023 (167 total injuries).

The year 2020 remains an outlier, with record low injury numbers. This could be attributed to reduced industrial activity due to COVID-19.

A standard deviation of 7.36 indicates relatively moderate variability in the number of fatal injuries from year to year. This suggests that fatal injuries have remained within a somewhat consistent range, with less fluctuation. The higher standard deviation of 196.08 indicates significant variability in the number of non-fatal injuries over the years. This implies that non-fatal injuries have experienced more dramatic year-to-year changes.

A moderate positive correlation coefficient (around 0.68) between fatal and non-fatal injuries, indicate that they tend to move in the same direction. The coefficient of variation for fatal injuries stands at 26.18%, showing that fatal injuries have remained relatively consistent, with only moderate year-to-year fluctuations. On the other hand, non-fatal injuries exhibit a much higher coefficient of variation at 76.21%, indicating significant variability. This suggests that non-fatal injuries are more influenced by external factors or changing workplace conditions.

This data underscores the importance of sustained safety improvements while highlighting the influence of external factors on workplace injury statistics. The consistent decline in both fatal and non-fatal injuries over the decade indicates positive progress in workplace safety practices. The sharp reduction in non-fatal injuries, especially pre-pandemic, highlights potential advancements in safety protocols and their successful enforcement. However, the volatility seen in non-fatal injury rates, particularly in 2014 and 2016, suggests that certain periods may have experienced lapses in safety practices or external factors affecting injury rates. The dramatic drop in injuries during 2020 can be attributed to the COVID-19 pandemic, which significantly reduced industrial operations, and may also reflect underreporting during this period. Moving forward, continued emphasis on preventive measures, worker training, and hazard mitigation will be essential to maintaining the downward trajectory in injury rates.

OSH Data of registered factories (2013-2022)

Year	No. of Registered Factories	TotalEmployment	Dangerous Occurrences	Fatal Injuries	Non-fatal injuries	Total Injuries
2013	340226	14042410	1343	1312	26852	28164
2014	361994 (6.4%)	20034859 (42.67%)	1534 (14.22%)	1266 (-3.51%)	25500 (-5.04%)	26766 (-4.96%)
2015	348429 (-3.75%)	16374546 (-18.27%)	1091 (-28.88%)	1107 (-12.56%)	20257 (-20.56%)	21364 (-20.18%)
2016	360949 (3.59%)	17376854 (6.12%)	700 (-35.84%)	1189 (7.41%)	5367 (-73.51%)	6556 (-69.31%)
2017	339931 (-5.82%)	16409493 (-5.57%)	1382 (97.43%)	1084 (-8.83%)	4866 (-9.33%)	5950 (-9.24%)
2018	364268 (7.16%)	18724733 (14.11%)	1124 (-18.67%)	1154 (6.46%)	4528 (-6.95%)	5682 (-4.50%)
2019	355478 (-2.41%)	18552909 (-0.92%)	1371 (21.98%)	1127 (-2.34%)	3927 (-13.27%)	5054 (-11.05%)
2020	363442 (2.24%)	20298387 (9.41%)	634 (-53.76%)	1050 (-6.83)	2832 (-27.88%)	3882 (-23.19%)
2021	321578 (-11.52%)	17414912 (-14.21%)	1058 (66.88%)	988 (-5.90%)	2803 (-1.02%)	3791 (-2.34%)
2022	329317 (2.41%)	17767088 (2.02%)	1014 (-4.16%)	1053 (6.58%)	2983 (6.42%)	4036 (6.46%)

Data Source: Data collected by DGFASLI through correspondence with Chief Inspector of Factories (CIF) of States/UTs as on Sep, 2024.

Year	Fatal injuries per lakh workers	Non-fatal injuries per lakh workers	Total injuries per lakh workers	Fatal injuries per thousand registered factories	Non-fatal injuries per thousand registered factories	Total injuries per thousand registered factories
2013	9.34	191.22	200.56	3.86	78.92	82.78
2014	6.32 (-32.33%)	127.28 (-33.44%)	133.60 (-33.39%)	3.50 (-9.33%)	70.44 (-10.75%)	73.94 (-10.68%)
2015	6.76 (6.96%)	123.71 (-2.8%)	130.47 (-2.34%)	3.18 (-9.14%)	58.14 (-17.47%)	61.32 (-17.07%)

2016	*6.84* *(1.18%)*	*30.89* *(-75.03%)*	*37.73* *(-71.08%)*	*3.29* *(3.46%)*	*14.87* *(-74.42%)*	*18.16* *(-70.38%)*
2017	*6.61* *(-3.36%)*	*29.65* *(-4.01%)*	*36.26* *(-3.90%)*	*3.19* *(-3.04%)*	*14.31* *(-3.76%)*	*17.50* *(-3.63%)*
2018	*6.16* *(-6.81%)*	*24.18* *(-18.45%)*	*30.34* *(-16.33%)*	*3.17* *(-0.63%)*	*12.43* *(-13.13%)*	*15.60* *(-10.86%)*
2019	*6.07* *(-1.46%)*	*21.17* *(-12.44%)*	*27.24* *(-10.22%)*	*3.17* *(0.00%)*	*11.05* *(-11.10%)*	*14.22* *(-8.85%)*
2020	*5.17* *(-14.83%)*	*13.95* *(-34.10%)*	*19.12* *(-29.81%)*	*2.89* *(-8.83%)*	*7.79* *(-29.50)*	*10.68* *(-24.89%)*
2021	*5.67* *(9.73%)*	*16.09* *(15.38%)*	*21.76* *(13.85%)*	*3.07* *(6.31%)*	*8.71* *(11.89%)*	*11.78* *(10.38%)*
2022	*5.93* *(4.59%)*	*16.79* *(4.35%)*	*22.72* *(4.41%)*	*3.20* *(4.23%)*	*9.06* *(4.02%)*	*12.26* *(4.07%)*

Data Source: Data collected by DGFASLI through correspondence with Chief Inspector of Factories (CIF) of States/UTs as on Sep, 2024.

N.B.: (i) Figures in the bracket indicate percentage change as compared to the previous year.
(ii) The data pertaining to the following years do not include data from the States/UTs mentioned against them as these States/UT did not provide data to DGFASLI during those year: 2022- Daman and Diu & Dadra and Nagar Haveli, Himachal Pradesh, Mizoram, Punjab, Uttar Pradesh and West Bengal, 2021 - Daman and Diu & Dadra and Nagar Haveli, Punjab, Uttar Pradesh and West Bengal, 2020 West Bengal, 2019 - West Bengal, 2017 - West Bengal, 2013 - Jammu & Kashmir and Uttar Pradesh.

The above table shows Occupational Safety and Health data of last 10 years (2013-2022) of factories registered under Factories Act, 1948.The following observations can be made from the data:

- The number of registered factories saw fluctuations over the years, with a peak in 2018 (3,64,268) and a noticeable decline in 2021 (3,21,578). There is an overall decline of 3.21% between 2013 and 2022. The percentage changes show notable increases in 2014 (6.40%) and 2018 (7.16%), while 2021 saw a significant decline (-11.52%).
- Total employment witnessed significant growth (44%) from 2013 to 2020. It peaked in 2020 (2,02,98,387) and generally increased from 2013 to 2022 with a few fluctuations. The largest increase was in year 2014 (42.67%) and significant drop in year 2015 and 2021 i.e.18% and 14% respectively.

- Dangerous occurrences varied significantly, with a sharp decline in 2016 (700) i.e. about 36% and in 2020 (634) i.e. about 54%, and a steep rise in 2017 (1,382) i.e. about 97%.The percentage changes indicate large fluctuations, especially a significant decrease in 2016 (35.84%) and 2020 (53.76%) while increase in year 2021 (1058) about 66.88%.

- Though the fatal injuries show a general downward trend, there are fluctuations. The most significant increase occurred in 2016 (7.41%) and decrease in 2015 (12.56%). Fatal injuries show a declining trend from 2018 (1154) to 2021 (988), with a slight increase in 2022 (1,053).
- Non-fatal injuries show consistent decline every year till 2022. There is a sharp decline from 2013 (26,852) to 2021 (2,803), with the most significant decline in 2016 i.e. about 73.51%. The percentage changes indicate substantial improvements, particularly the sharp decline in 2016 (73.51%). It is worth noting here that the state of West Bengal reported a large decline in the no. of non-fatal injuries in the year 2016 as compared to the previous years.
- Total injuries followed the trend of non-fatal injuries i.e. declining each year till the year 2022. Total injuries decreased from 28,164 in 2013 to 4,036 in 2022. This is a significant decrease (85%) between 2013 and 2022.
- The rate of fatal injuries per lakh workers was notably high at 9.34 in 2013, which then decreased significantly by 32.33% to 6.32 in 2014. This decline continued with some fluctuations, reaching its lowest in 2020 at 5.17, a decrease of 14.83% from the previous year. However, the rate rose again in subsequent years, peaking at 5.93 in 2022, marking a 4.59% increase from 2021.
- Non-fatal injuries per lakh workers displayed a marked decrease over the years. Starting at 191.22 in 2013, it plummeted by 33.44% to 127.28 in 2014. The figure for the year is 16.79 seeing an increase of 4.35% over the last year. The total injuries per lakh workers followed a similar pattern, decreasing from 200.56 in 2013 to 22.72 in 2022, illustrating a steady reduction in workplace injuries.
- Examining the fatal injuries data per thousand registered factories reveals a similar trajectory. Fatal injuries per thousand registered factories dropped from 3.86 in 2013 to 3.20 in 2022, despite some fluctuations. Non-fatal injuries per thousand registered factories significantly decreased from 78.92 in 2013 to 9.06 in 2022. This consistent decline highlights improvements in workplace safety and regulations. Consequently, total injuries per thousand registered factories also saw a substantial reduction from 82.78 in 2013 to 12.2 in 2022. The year 2021 represents a special case. Despite a consistent decline in the rate of fatal and non-fatal injuries from 2013, an increasing trend is observed starting from 2021.
- The analysis of the data reveals significant trends in workplace safety and injuries in the registered factories in India in the last 10 years. There has been a general decline in both fatal and non-fatal injuries over the years. However, fluctuations in factory registrations, employment, and dangerous occurrences suggest areas that need further attention. The recent increase in injuries after 2021 suggests that further efforts are needed to address emerging challenges and sustain these improvements. Despite these inconsistencies, there is overall reduction in injury rates and there is steady progress in reducing workplace injuries.

OSH Statistics in Docks

The Dock Workers (Safety, Health and Welfare) Act, 1986 and the Regulations 1990 framed there-under cover safety, health and welfare aspects of all the workers engaged in dock work within the port premises. These statutes are in line with the ILO Convention No. 152 on Occupational Safety and Health (Dock Work).

The DGFASLI through the Inspectorates of Dock Safety set up in all the major ports in India, enforces the Dock Workers (Safety, Health and Welfare) Act, 1986 and the Regulations, 1990 and strives to ensure Safety, Health and Welfare of dock workers. The chief Inspector of Dock Safety is also an authority for enforcement of the Manufacture, Storage and Import of Hazardous chemicals Rules, 1989 framed under the Environment (Protection) Act, 1986 in the major ports.

The above statutes are enforced by the Inspectors posted at Inspectorate Dock Safety at all the major ports viz. Mumbai, Kolkata, Chennai, Kandla, Mormugao, New Manglore, Cochin, Tuticorin, Visakahapatnam, Paradip and Jawaharlal Nehru Port except Ennore where the Inspectorate is being set up. Presently, the enforcement in this Port is carried out by the Inspectors posted in Inspectorate Dock Safety, Chennai.

The main function of Inspectorates is to ensure the compliance with the provisions under the statutes. The statutory responsibilities of Inspectors include inspection of ships, tankers, loose-gears, container-handling equipment, docks container-yard and terminal, prosecution of employers, attending to complaints, providing advisory services. The Inspectorate also prosecutes the agency responsible for serious violation of provision of the Act and Regulations framed there-under.

Activities carried out from July, 2024 to September, 2024

Activity	Total
Total number of Ship Inspected	109
Total number of Gear Inspected	149
Total number of Dock/Shed/Yard/ Warehouse/Go-down/storage yard, etc. Inspected	148
Total number of other visits carried out	167
Total number of Hazardous Installations Inspected	09
Total number of reportable Fatal Accidents as per dock safety statutes	04
Total number of reportable Non-Fatal Accidents as per dock safety statutes	02
Total number of reportable Accidents as per dock safety statutes	06

Central Labour Institute, Mumbai			
JANUARY 2025			
1	Management of workplace health hazards in industries	15-17 January, 2025	IH Division, Email: sm@dgfasli.nic.in
2	Emergency Preparedness in Factories	20–22 January, 2025	MAHCA Division Email: sm@dgfasli.nic.in
3	Testing of Pressure Plants for aspiring or approved Competent Persons	22-24 January, 2025	FAS Division Email: fas@dgfasli.nic.in
4	Behaviour Based Safety – A proactive approach to injury Prevention	27-29 January, 2025	ST&P Division Email: cli-training@dgfasli.nic.in
FEBRUARY 2025			
5	Safety in MAH factories.	17-19 February, 2025	IH Division Email: sm@dgfasli.nic.in
6	Integration of Occupational Health and Safety and Productivity at workplace	19-21 February, 2025	ST&P Division Email: cli-training@dgfasli.nic.in
MARCH 2025			
7	Artificial Intelligence integrated OSH initiatives for enhanced Productivity at workplace	12-14 March, 2025	ST&PDivision Email: cli-training@dgfasli.nic.in
8	Application of ILO International Classification of Radiographs in diagnosis of Pneumoconiosis	17-19 March, 2025	IM Division Email: ss@dgfasli.nic.in
9	Safety in MAH factories	19-2 March, 2025	MAHCA Division Email: sm@dgfasli.nic.in

Regional Labour Institute, Chennai			
Sl.	**Title of the Programme**	**Period**	**Course Coordinator**
JANUARY 2025			
10	Role, Responsibility and functioning and structure of Safety Committee.	8-10 January, 2025	Safety Division Email: rlichennai@dgfasli.nic.in
11	Management of Chemical Hazards at Workplaces	18-20 January, 2025	IH Division Email :rlichennai@dgfasli.nic.in

FEBRUARY 2025			
12	Emergency Preparedness and First Aid in Industries	5-7 February, 2025	IM Division Email :rlichennai@dgfasli.nic.in
13	Emergency Action Plans and their Preparedness	12-14 February, 2025	Safety Division Email rlichennai@dgfasli.nic.in
MARCH 2025			
14	Role and Responsibility of Safety Officer	5-7 March, 2025	Safety Division Email: rlichennai@dgfasli.nic.in
15	Occupational Diseases and their Notification	11-13 March, 2025	IM Division Email: rlichennai@dgfasli.nic.in

Regional Labour Institute, Faridabad			
Sl. No.	**Title of the Programme**	**Period**	**Course Coordinator**
JANUARY 2025			
16	Workshop for HAZOP	8-10 January, 2025	Safety Division Email: rlifaridabad@dgfasli.nic.in
FEBRUARY 2025			
17	Role, Responsibility and functioning and structure of Safety Committee at the workplace	5-7 February, 2025	Safety Division. Email: rlifaridabad@dgfasli.nic.in
MARCH 2025			
18	Improving Occupational Safety and Health in MSMEs sectors	4-6 March, 2025	Safety Division Email: rlifaridabad@dgfasli.nic.in

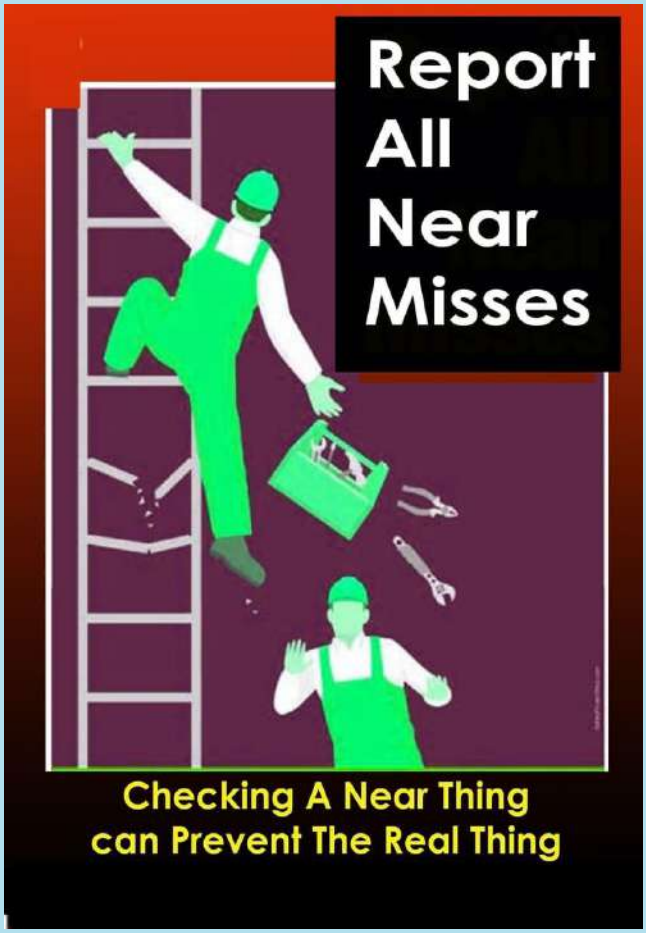
Regional Labour Institute, Kanpur			
Sl. No.	**Title of the Programme**	**Period**	**Course Coordinator**
JANUARY 2025			
19	Introduction to BOCW (RE&CS) Act, 1996 for	29- 31 January, 2025	Safety Division E-Mail: dks@dgfasli.nic.in

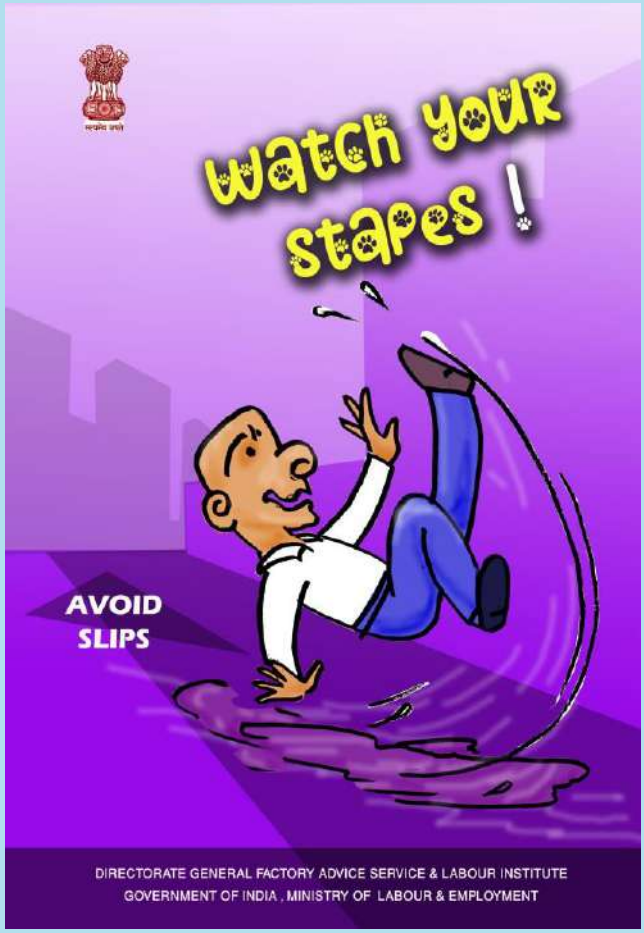
	Construction Supervisors”		
FEBRUARY 2025			
20	Safe use of Lifting Appliance and Lifting Gear in Industries, Ports and Construction sites.	5 -7 February, 2025	Safety Division E-Mail: dks@dgfasli.nic.in
MARCH 2025			
21	Safety in MAH factories.	18- 20 March, 2025	IH Division E-Mail: d.acharekar@dgfasli.nic.in
22	Associate Fellow of Industrial Health (AFIH) .Three month duration.	24 March - 23 June,2025	IM Division E-Mail: arkasau@dgfasli.nic.in

Regional Labour Institute Kolkata			
Sl.No.	**Title of the Programme**	**Period**	**Course Coordinator**
JANUARY 2025			
23	Associate Fellow of Industrial Health (AFIH) .Three month duration.	1January- 31 March, 2025	IM Division, Email: rli.kolkata@dgfasli.nic.in
24	Identifications, Evaluations & control of Occupational Hazards Monitoring &Control in Industries, Ports, Docks &Construction Industries.	8-10 January, 2025	IH Division Email: rli.kolkata@dgfasli.nic.in
25	Safety in Handling and storage of material	21-23 January, 2025	Safety Division Email :rli.kolkata@dgfasli.nic.in
FEBRUARY 2025			
26	Accident Causation, Prevention and Investigation	25-27 February, 2025	Safety Division Email: rli.kolkata@dgfasli.nic.in
MARCH, 2025			
27	OSH management at construction sites	11-13 March, 2025	Safety Division Email: rli.kolkata@dgfasli.nic.in
28	Occupational health and safety audit	25- 27 March, 2025	Safety Division Email: rli.kolkata@dgfasli.nic.in

Regional Labour Institute Shillong			
Sl.No	**Title of the Programme**	**Period**	**Course Coordinator**
JANUARY, 2025			
29	One Month Certificate course for Supervisors under Section 41C (b) of the Factories Act, 1948.	1-30 January, 2025	RLI Shillong Email :rli-hillong@dgfasli.nic.in
MARCH, 2025			
30.	Associate Fellow of Industrial Health (AFIH) .Three month duration.	March- May,2025	RLI Shillong Email: rli-hillong@dgfasli.nic.in

For the above mentioned programmes contact the respective Institute.





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REGIONAL LABOUR INSTITUTE, LAKE TOWN, KOLKATA-700089

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