

5 Construction Quality and Safety management....^{7hrs}

Quality assurance & control:

- ◆ key aspects , Quality Assurance Policy, use of manuals and checklists for quality control(Typical checklist for concreting, formwork and reinforcement activity), role of inspection,
- ◆ Introduction to TQM, quality audit, cost of quality, ISO standards

Safety and health on project sites:

- ◆ accidents causes and effects, costs of accidents, occupational health problems in construction,
- ◆ Safety and health management system
- ◆ Health and safety act regulations

WHY SAFETY COMES FIRST?

- ◆ Construction involves risky operations in dangerous areas,
 - ◆ working at heights,
 - ◆ working on slippery surfaces
 - ◆ working under material handling equipment.
 - ◆ Constantly changing sites, nature of work, construction methodology and technology

Unsafe working leads to accidents

- ◆ “An accident is an unplanned, unwanted, undesirable, sudden mishap which interrupts an activity or a function; and causes sufferings and/or damages. ”
- ◆ *Accidents do not just happen, they are caused.*
 - loss of life, limb, time and money.
 - A worker who meets with an accident suffers from financial, physical and mental loss,
 - No amount of money can compensate for the lost life, lost limb or lost time of the family breadwinner.

Employers do face serious economic consequences.....

- ◆ reduced output,
- ◆ wasted wages,
- ◆ lost time,
- ◆ lowered morale,
- ◆ damaged property,
- ◆ lost experienced hand replacement,
- ◆ insurance cost and
- ◆ incidental expenses such as statutory reporting, investigations, medical aids, additional office expenses and work breakdown till restarting of the activity.

Importance

◆ Importance : Worker

- death, temporary or permanent injury, loss to family.....

Organisation

- Cost of compensation, bills
 - Lost time, production, faith
 - Panic in coworkers
- Construction Industry scenario
 - Casual labour/ no industry status

An effective accident prevention programme

..... *is the best guarantee against the accidents.*

- ◆ Time, money and efforts spent on safety always pays dividends.
- ◆ Safety and efficiency go hand in hand.
- ◆ Safe practices yield high productivity, boost workers morale, project corporate image, cut accident costs and ensure compliance with law.
- ◆ The studies highlight that it is economical to enforce safety measures at construction sites rather than face the consequences of unsafe project environments.

STATUTORY SAFETY MEASURES IN INDIA

◆ 'Building and Other Construction Workers (Regulation of Employment and Conditions of service) Act, 1996' and

◆ 'Central Rules, 1998';

- ◆ the employer has the sole responsibility for ensuring safety of construction workers.

responsibilities and duties of employers, architects, project engineers and designers, building workers, etc. The employers have detailed responsibilities including

◆ In case of an accident causing death or any body injury by reasons of which the person injured

- is prevented from working for a period of **48 hours** or more,
- the employer has to give notice thereof to appropriate authorities who may make such investigations or enquiry

◆ However, in case of accident causing death of five or more persons,

- the appropriate Government authorities are also required to make an enquiry into such accidents within one month of the receipt of the notice.
 - *clause 40(2) Chapter VII on 'Safety and Health Measures' in the Building and Other Construction Workers (Regulation of Employment and Conditions of service) Act, 1996.*

Statutory safety provisions for 'Safety and Health Measures' included in the Act cover:-

- (a) Safe means of access and safety of working place.
- (b) Demolition work to be undertaken
- (c) Safe handling and use of explosives under competent persons.
- (d) Safe erection, installation, use and maintenance of transporting equipment.
- (e) Safe erection, installation, use and maintenance of lifting equipment.
- (f) Adequate and suitable lighting of workplace and approaches.
- (g) Prevention inhalation of dust, fumes, gases or vapours.
- (h) Safe stocking and handling of materials or goods.
- (i) Safeguarding of machinery.
- (j) Safe handling and operation of plant and equipment.
- (k) Precautions against fire.

- _(l) Limits on weights to be lifted and moved by workers.
- (m) Safe transportation of workers over water.
- (n) Prevention from electricity danger.
- (o) Use of personal safety equipment, including safety nets, safety sheets and safety belts.
- (p) Compliance of safety standards regarding scaffolding, ladders and stairs, lifting appliances, ropes, chains and accessories, earth moving equipments and floating operational equipments.
- (q) Safety in pile driving, concrete work, work with hot asphalt, tar or other similar things, insulation work, demolition operations, excavation, underground construction and handling materials.
- (r) Safety policy to ensure the safety and health of the building workers.
- (s) The information to be furnished to the Bureau of Indian Standards (BIS) regarding the use of any article or process covered under the BIS Act 1986, in a construction work.
- (t) The provision and maintenance of medical facilities.

Hazards in construction


- falling of person / material
- ◆ Exposure to heat, cold, radiation, dust, noise, high humidity, electric current
- ◆ Over work :- exertion/ fatigue, muscle strain
- ◆ Striking against objects
- ◆ Loose scaffolding, ladders..
- ◆ Diseases
- ◆ Welding machine injuries, cranes

Construction Accidents

Breakdown of fatalities according to type of accident in construction industry

- ❖ 56% falls from height
- ❖ 21% trapped by something collapsing or overturning
- ❖ 10% struck by a moving vehicle
- ❖ 5% contact with electricity or electrical discharge
- ❖ 4% struck by a flying/falling object during machine lifting of materials
- ❖ 3% contact with moving machinery or material being machined
- ❖ 1% exposure to a hot or harmful substance



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- ◆ In industrialized countries, the average number of fatalities per 1,00,000 workers are around 12, with some countries reporting 35 deaths per 1,00,000 workers.
 - ◆ In India, one of the reputed company has recorded the death rate of around 100 per 1,00,000 workers.
 - ◆ The accident rate in construction is 4 to 5 times higher than that of the manufacturing sector on the global scale .

Project Safety Programme

- ◆ purpose of the project safety programme
 - ◆ is to state who is responsible for safety,
 - ◆ explain how the project safety policy will be implemented,
 - ◆ state specific arrangements for maintaining the safe working conditions, and
 - ◆ provide a management tool for monitoring project safety programme.

- ◆ It includes:
 - ◆ Safety organization with well-defined responsibilities.
 - ◆ Safety training on construction methods and equipment operation practices.
 - ◆ Management tool to monitor project safety
 - ◆ Safety related reporting system.

Safety Officer/Dept. Functions

1. To **establish the norms** and guidelines for the provision of
2. To prepare check lists, manuals, and other **documents for use** by the line management in carrying out the function No. 1
3. To **supervise** safety at site and within the organization.
4. To give **advice** on all safety matters in accordance with the safety policy.
5. To maintain all **safety records**, prepare reports and **monitor**
6. To conduct **safety training** in the organization.
7. To carry out **safety audit** periodically.
8. To discharge all **statutory obligations** regarding safety, and maintain liaison with the government safety machinery and other industry associations.
9. To **organize competitions, posters, melas** and other such activities that promote safety consciousness amongst employees.

Safety Programme : objectives

1. Secure the full support of top management
2. Organize for safety part:

Safety director- Engineer- Supervisors

Functions of safety director:

- Design of safety programme,
- Plant inspection
- Safety training, promotion, communication to all
- Investigation of an accident and consequences
- Records
- Should see that company complies with contract and regulatory safety requirements.

Safety Programme....

3. Publicize safety programme :- posters, document circulation..
4. Develop Safety Programme for each job
5. Competitive basis implementations
6. Medical test for new employees
7. Safety training/ meetings for all frequently

Safety Programme....

8. Promote housekeeping:- clean, neat, scrap free, well ventilated working environment
9. Medical facilities :-
 - First aid & training
 - Telephone for communication
 - Ambulance
 - Doctor/ medical staff
10. keep stock of safety equipments
11. Insurance help