# SAFETY IN WEIGHTLIFTING OF EOT CRANE

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***Abstract* —** Material handling is a vital component of any manufacturing industry. EOT cranes are associated with a large number of hazards in their operation. So that is necessary to check the effectiveness of the present safety and health program from time to time to mitigate the risk associated in the manufacturing industry with the help of questionnaire study and checklist method in questionnaire study the three levels are assigned to take response of them and a survey with the relieve of checklist method is carry out to identify the hazardous condition on three cranes installed in an industry and their control measures are specified. It helps to mitigate the hazards and risky state, with the help of a graph which shows the effectiveness of the present established safety and healthprogram.

**Keyword:** EOT crane, Crane Safety, Hazard Identification, Checklist method, Questionnairemethod

## I.INTRODUCTION

Several injuries are occurring inside the industries. The manufacturer faces many problems like loss of the trained worker, loss of production, loss of materials. There are various challenges in the heavy industry. The manufacturing industry involves complex and dynamic work environments that present.

As a result of the complicated and constantly changing nature of lifting operations, the manufacturing industry has a very high injury and fatality rates compared to other trades. According to the Bureau of Labor Statistics (BLS) the data for 2006, in that year, there was 72 bridge crane-related fatal work-related injuries, down from an average of 78 fatalities per year from 2003 to 2005. These comprise all death where the source of the injury was a crane, the secondary sourceof theinjurywasacrane,orwheretheworkeractivitywasoperating acrane.

## II. METHODOLOGY

Identification of hazards
⇩
Questionnaire method
⇩
Calculation of risk factor
⇩
Control measures
⇩
Suggestion and implementation

The EOT cranes are mainly used in manufacturing industries on the shop floor to transfer the goods from one place to another place; it is a repetitive type of work for operators. EOT crane having their horizontal travel and up and down motion which is control by pendent control when needed around the shop floor there are one to three numbers of cranes are moving in around one shop floor installed by different types of manufactures and only 2 or 3 operators are available to operate these crane so there is a chance of mistake is available which further converted into a hazard and also lack of operators training, experience and qualification is the main reason of accidents and also various conditions associated with risk such as physical, operational and maintenance working conditions in which several risks are undergoing in this researchwork.

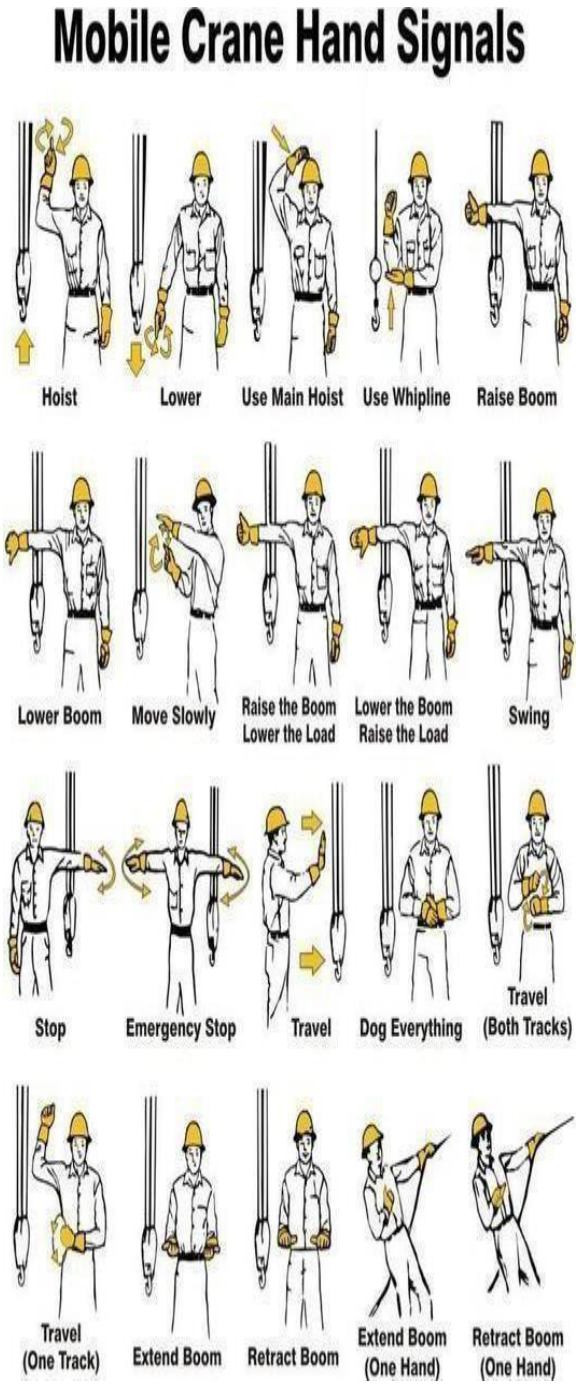

**Fig: Hand Signal**

## III. THE ROLE OF A SIGNAL PERSON

As the eyes and the ears of a dedicated area or crane, a signal person carries many responsibilities. Before a person can direct the working of a block and stuff they must first undergo formal training and complete a qualification in crane signaling. The trainee signal person is required to grasp an understanding of the great library of signals without any memory prompts and show competence in recalling these during an examination by a third-party provider.

- Sufficient light shall be hung from the joist of the crane so that the working area under the crane is original light.
- An audible warning device shall be provided in the operator's cabin to warn people working below while operating thecrane.
- There shall be at least two plug points of voltage 220 AC and 24 volts ac respectively fitted in the crane girder to facilitate during maintenancework.

## IV. EMPLOYER RESPONSIBILITIES

- Make sure compliance with requirements of the currentvolume.
- Ensuring the crane is working according to the manufacturer's requirements and the worksiteregulations.

Utilize only qualified supervisors andoperators.

- Ensuring the crane is in proper operating condition by verifying original documentation for believed by the crane owner and frequent inspections.
- Verifying the crane has sufficient capacity to perform thework.

Notify the crane owner if any rope has been orshortened. Identity of the contract employee, the date of training, and the means used to verify that the employee understood the teaching.

## V.TRANSMISSION OFCRANE

Trolley traveling system: the driving force of the crane trolley is from the motor. It transmits power to the high-speed shaft end of the reducer by brake-wheel coupling, compensation shaft, and half gear coupling. Then through reducer to reduce the high revolution of the motor to the required insurgence and output by a low-speed shaft of reducer. And then by half gear coupling, compensation shaft, the half gear coupling joint with trolley driving wheels, to drive the trolley driving wheels rotating so finish trolley transport heavy objects by lateral movement.

## VI. TRANSMISSION OF CRANE TRAVELINGSYSTEM

The driving force of the crane trolley is from the motor. It transmits power to the high-speed shaft end of the reducer by brake-wheel coupling, compensation shaft, and half gear coupling. Then through reducer to reduce the high revolution of the motor to the required insurgence and output by a low-speed shaft of reducer. And then by full gear coupling joint with crane driving wheel shaft, to operate the crane driving wheels rotating, finish bridge transport heavy objects by lateral movement.

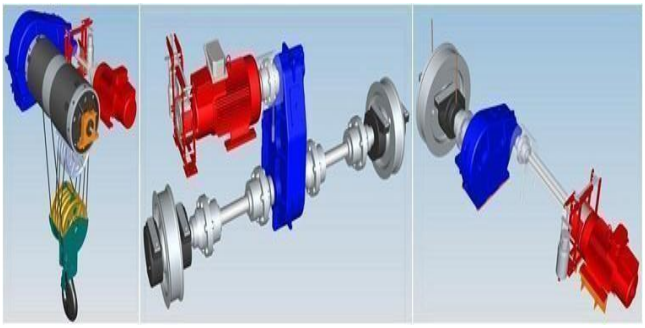

**Fig: Transmission of Crane Traveling System**

## VII. SAFETY IN WEIGHTLIFTING OFCRANES

In lifting heavy loads, always make a special effort to ensure that the bottoms of the sling legs are do up securely to the load in a manner that will prevent damage to the fill. Many pieces of equipment have eyes do up securely to them during manufacture to aid in lifting. With some fill up, speed up a hook to the attention.

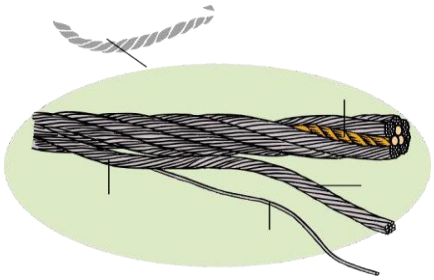

**Fig: Climate impact damages**

## VIII. PROPER SELECTION OF HOISTING TOOLS OR LIFTING POINTS

It theoretical calculation to set up hoisting tools or to use pipeline and structure as lifting point of cranes, bearing capacity estimated by experience is not enough, or partial bearing capacity is not enough, unstable causes the wholecollapse.

**a) Pulley and Rope Are Selected Unreasonably**

When the hoisting tools is not enough knowledge about the stress changes of the ropes caused by the angle

change of the fast cable, the tonnage of the guide pulley is too small,

The chosen ropes for the pulley are too thin, after the overload, the rope wheel.

**b) Accidental Hanging of Rigging WithoutLoading**

When the lifting work has, the hook is working with empty rope rigging. Then the holder accidentally lifts an object from the sling. If the crane operator or the conductor did not respond promptly, the accident happens instantly. This kind of accident has the worst consequences for crane operators and crane lifting appliances.

| Checklist | | Satisfactory | Not satisficed -tory | Provided |
|---|---|---|---|---|
| A | HOOK BLOCK | | | |
| 1 | Identification Mark | 3 | | |
| 2 | The capacity of Hook (Marked) | 3 | | |
| 3 | Condition of Hook | 2 | 1 | |
| 4 | Condition of Swivel | 2 | 1 | |
| 5 | Throat Opening | 2 | 1 | |
| 6 | Shank Dia. (Marked) | 2 | 1 | |
| 7 | Condition of Hook Block | 1 | 2 | |
| 8 | Condition of Centre Pin | 1 | 2 | |
| 9 | Safety Latches | | | 1 |
| 10 | Oil greasing | 3 | | |
| B | HOIST | | | |
| 1 | Wire Rope Diameter | 3 | | |
| 2 | Construction of Wire Rope | 3 | | |
| 3 | Original Test Certificate | | 3 | |
| 4 | Nut and bolt condition | 3 | | |
| 5 | Condition of Wire Rope | 2 | 1 | |
| 6 | Wire Rope Drum Condition | 2 | 1 | |
| 7 | Groove Condition | 3 | | |
| 8 | Wire Rope End Fitting | 3 | | |
| 9 | Riving of wire ropes | 3 | | |
| 10 | Pulley Condition | 2 | 1 | |
| 11 | Outer Pulley Cover | 1 | 2 | |

**Table: Checklist**

| S. no. | HAZARDOUS CONDITION | POTENTIAL HAZARD | CONTROL MEASURES |
|---|---|---|---|
| 1 | Lack of ID. Plate with SWL. | Overloading may occurleads to the fall ofmaterial tall machine failure may occur. | ID plate to filled with the following details Safe working load, identification number, date of inspection. |
| 2 | Wear, tear and throat opening more than the permissible limit of hook. | The hook can break raise gear may come out from the jaw and load. | Periodically inspection of hook and proper maintenance to accomplish. |
| 3 | Lack of safety latch/ Safety latch is not working | Lifting gear can come out from the hook jaw, the considerable effort essential to attach or remove lifting gears, so riggers helpers liable to back injury, holding, pushing, and frustration. | Safety latch to afford in working condition, periodic inspection to achieve, instruction collect to personal manual lifting. |
| 4 | Reduction in wire rope diameter/ crushing/kink/ corrosions/ Elongation in length/broken wires. | Deduction in wire rope diameter, kinking, crushing, from which hook block and load can fall from a height for results to a fatal accident, body part injury. | Preventive maintenance of wire rope. Periodically inspection of wire rope. Wear all work-related PPE's. |
| 5 | End fitting of wire rope | Wire rope end fittings are not proper or loose for can result in the drop of hook block. | End fitting should be according to standard and at a proper distance should be periodically inspected, |

**Table: Hazards and control measures**

## XI. CONCLUSION

The questionnaire study is the best way to take the response of personals in any organization regarding any rather condition by which it is easy to assess the present influence of the program. Lifting activity because of the very nature of the operation, the complexity of the systems, procedures, and methods always involves some number of hazards. Hazard identification accomplished with the help of checklist methodology it is the point to point throughout survey of task which is a design first and then performed without difficulty by any non-experienced person the for identification of undesirable events that can lead to a hazard, the analysis of hazard mechanism by which this unpleasant event could occur and usually the estimation of extent, magnitude, and the likelihood of harmful effects. It is widely accepted within the industry in general that the various techniques of Hazard Identification contribute basely toward improvements in the safety of complex operations and EOT cranes in Phase I. Recommendation & implementations were in progress.

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