Job Safety Analysis before Work at Manufacturing Industry

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Abstract— The objective of this thesis is to implement the health and safety practices at the workplace. What the workers need for their safety; especially in small scale industries were discussed. Here in this study, the problem of ergonomics has created a need for implementation of workplace health and safety practices in the industries. Accident prevention tools like, incident investigation and pre job safety analysis can significantly reduce work place incident. The implementations were made for the task which may cause injuries to the person who performing the particular task as well as for the protection of the equipment, tools or any machine part. In this study the cause of accident and how could prevent their occurrences and after that, there supervision whether the workers are following there the instructions or not were discussed. In this study the implementation towards the productivity were also discussed by implementing new strategies which were made by us after the analysis. Two machines were analysed or monitored for comparing the new implemented strategies with the old or running one, for product safety during manufacturing process.

Keywords: Job Safety Analysis (JSA), Manufacturing Industry

I. INTRODUCTION

A job safety analysis (JSA) is a procedure which helps integrate accepted safety and health principles and practices into a particular task or job operation. In a JSA, potential hazards are identified for each step of the task and controls recommended for the safest way to do the job.

A JSA risk assessment must be developed when:

- The work activity involves a number of different tasks and hazards for which risk controls need to be planned, communicated and implemented
- Changes at the workplace occur that may impact on the effectiveness of control measures
- A Permit to Work is required
- Developing SOPs

A take 5 risk assessment can be used instead of a JSA when the work activity involves a simple task with a limited number of low risk hazards and there is good understanding about how the hazards should be controlled to ensure the task is completed safely. For example doing a visual inspection of a worksite, or closing off a valve, or investigating a tripped switch. Features of job safety analysis (JSA)

A. Developing a JSA,

The person leading the work is responsible for developing the JSA. This is typically the:

- Person doing the work for single person tasks
- Person supervising the work for team tasks
- Person in charge of designing new work or equipment.

One method of doing a JSA is to have a group of experienced workers complete the analysis through discussion. An advantage of this method is that more people are involved in a wider base of experience and promoting a readier acceptance of the resulting work procedure. This method is most suitable for infrequently performed or new jobs; or situations where observation may not be practical.

When leading JSA discussions ask:

1) What are we doing?
2) What could go wrong?
3) What do we need to do to make it safe?

These three prompt questions will provide you with the basic information needed to build your JSA. Once you have your JSA framework built, use available guidance to ensure the risk control measured selected are sufficient to reduce the risk so far as reasonably practicable i.e. standards, best practice guidelines, WSL Key Requirements and risks assessments. Include diagrams and photos where needed.

Benefits of doing a JSA The JSA process helps identify hazards and increase the job knowledge of those participating. Safety and health awareness is raised, communication between workers and supervisors is improved, and acceptance of safe work procedures is promoted.

II. LITERATURE REVIEW

Morrish Colin et.al [1] Discussed about the accident and investigation of the incident and pre-job safety analyses which helps to reduce workplace incidents. He states that working parties must work together to make these safety tools effective, in which staff units are work together in a co-ordinate manner and they must be shown the value of their work in preventing accidents with the help of examples of actual accidents investigated in the factory during his work experience. He discussed that how he causes of the accidents are explored with close reference to how pre-job safety analyses could have prevented their occurrence.

Anju Singh et.al [2] give details about small and medium enterprises which are also the main pillar of an economy for any country. The author also discussed about major minor accidents about old machineries, lack of awareness in worker towards the safety point of view, ergonomics problem etc, and also the implementation of working procedure with which the working condition creates positive impact on economic development.

Michael Appiah Adu et.al [5] is discussed that the study drawn only from hospitals and this are the limitation which are generalization of the result across varied specialization or organizations the authors has discussed about the safety and healthy working environment which has received numerous research attentions over the years. This research seems to have been conducted in the construction industry, with little attention in the health sector. There are many couple of studies conducted that suggest pressure in hospitals. The aim of his study was to examine how pressure influence safety behavior in the hospitals. General safety

climate significantly correlated positively with safety behavior and negatively with work pressure.

Hasse Nordlof et.al [6] analyze that this study will not applicable for the industries other than manufacturing, and also to other countries or a cross-national research project, preferably with a larger sample size and this study could not able to focus on how companies' OHSM practices can be measured in a successful manner. In this study the author discussed about the companies which need to ensure a functioning occupational health and safety management (OHSM) system to protect human health and safety during work, but generally there are differences in how successful they are in these practices. The main aim of this study was to investigate whether these factors are associated with OHSM practices in companies or not.

III. REDUCING THE PROBLEM OF ERGONOMICS

There are two broader objectives:

1) To improve effectiveness and to enhance the efficiency with which the activities or work is carried out so as to increase the convenience of use, reduced errors and increase in productivity.
2) To enhance certain desirable human values including safety, reduced stress and fatigue and improved the quality of life. The figure 4.1 shows about the implementation of the trolley used by the workers at the workplace for the different tasks.

IV. WORKING & METHODOLOGY

Hazards identification, their assessment, evaluation and measurement both qualitative as well as quantitative rectification, technological and operational control measures, management safety system, administration and organization in safety are very remarkable tools.

Among the many methods the most remarkable are:

- Hazards and operability studies
- Hazards analysis- also called as Risk analysis, Risk assessment, Probability risk assessment and also quantitative risk assessment.

Regular safety audits at workplace.

A. Planning

By adopting the systematic planning procedure it is possible to identify the significant hazards and the control of risks associated with the activities of the organization as well as any related legal requirements.

The following points are as follows:

1) In the planning schedule overwork and stress should avoided and must be taken into consideration.
2) The supervision at the greater level during the work pressure or stress must be taken into an account. Shut-down, starts up, emergency planning must be monitored and met by the management.
3) Special attention should be paid to the physical fitness of the employees with respect to their job.
4) Employees and their representative should participate in decision making from where they exist for concerning their activities for the organization

V. INCIDENT INVESTIGATION

After the causes of incident occurrence are found, controls must be taken to prevent recurrence. This would include considering what are the actions which would prevent these causes from occurring again. This would involve implementing one or more of a multitude of actions within the physical environment including how workers interact with the physical environment, procedures, and training.

The following steps have to follow by the investigators:

1) Investigation scope.
2) Selecting the investigate person.
3) Providing the details of the accidents, operating procedure, location, list of witness etc.
4) For taking information one responsible person should visit for site.
5) Inspection of the site, taking picture, keep accurate record etc.
6) Take interview of the witness.
7) Now determination of the accidents by the questionnaires like;
   a) What was not normal before the incident?
   b) Where the abnormality occurred?
   c) When it was noticed?
   d) How it is occurred?
8) Analyse the above data.
9) Determine the cause of the particular incident.
10) Recommend the suggestion to prevent the reoccurrence of the incident.

Case 1: Heavy load plate falls on the supervisor's foot. (Worker safety)

At the workshop or also can say tool room the supervisor doing the mould maintenance, as we know that the moulds are very heavy in weight, if it falls, than one can got serious injuries, may be get fractured to the body part. Inside the mould there are many parts which are assemble one of them is the ejector plate. The ejector plate ejects the product when it completes the cycle. The plate is also contains much load. The helper holds the plate vertically by his hands and the supervisor is cleaning the plate. As the balance of the plate is depends on the helper. By mistake the plate slips by the operator's hands and fall on the legs of the supervisor. As the plate was very heavy it damaged the leg (i.e. fracture) of the supervisor. As well as the plate also got damaged as it is made of the stainless steel, a minor crack has came on the top of the plate, which will also cost more for repairing if it possible.

Case 2: Eyes get injured when grinding machine's gate opened by the operator at the running time.(Worker safety)

The rejected material from the production area shifted to grinding area. In which the bottle is cut into small pieces by grinding machine, which having sharp blades (as shown in figure). The sharp blades wheel is rotating by 40 hp motor which is connected to the shaft and v-belt. The speed of wheel rotation is very high.

The operator is new joining in factory he opens the door of the machine at the running time, due to this the small pieces of bottle move upwards direction as the rotation of the wheel is very high, which cause injury to the operator eyes. After investigation the report is prepared by following the steps which is discussed in the above section then precautions were made,

Case 3: Fire extinguisher fails at workplace and not able to control the fire. (Fire safety)

The operator is cleaning the mould by the alcohol, which is flammable liquid. The operator wears the gloves for the protection. The gloves get full contaminated from the alcohol as he cleaning the mould. After cleaning the mould nozzle needed heating from external source, for this the LPG cylinder is used. The operator did not remove the gloves and burns the cylinder; due to this the fire occurs in the gloves which are contaminated by alcohol.

VI. Advantages of Job Safety Analysis

1) A job safety analysis (JSA) is a procedure which helps to integrate accepted safety and health principles and practices into a particular task or job operation. In a JSA, each basic step of the job is to identify potential hazards and to recommend the safest way to do the job. There is also the other terms used to describe this procedure, they are; job hazard analysis (JHA) and job hazard breakdown.
2) Some individuals prefer to expand the analysis into all aspects of the job, not to just safety. This approach is known as total job analysis. Methodology is based on the idea that safety is an integral part of every job and not a separate entity. In this document, only health and safety aspects will be considered.
3) The terms "job" and "task" are commonly used interchangeably to mean a specific work assignment, such as "operating a grinder," "using a pressurized water extinguisher," or "changing a flat tire." JSAs are not suitable for jobs defined too broadly, for example, "overhauling an engine"; or too narrowly, for example, "positioning car jack."

VII. Result

Risk decrease by the installation of the limit switch, which stops the grinding machine when the gate will open at the running time.

1) Risk decrease due to the use of overhead cranes at the time of mould maintenance.
2) Increase in productivity by implementing new strategies.
3) Risk decreased after providing the proper training, after following SOPs (standard operating procedure), updates the types of fire extinguishers in the production zones.
4) Problem of the ergonomics decreases after the implementation.

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