

Hazard Identification and Risk Assessment of Installation of Limit switch in machinery

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Abstract: A Classic model of limit switch has been installed in mixer machineries in order to prevent hazardous events in the construction field. The development of the limit switch installation in the guarding mixer machine could prevent the hazardous event. Mixer machines are contained with moving parts, mostly the machineries installed with the adjustable machine guarding. Its have the potential to cause severe workplace injuries such as crushed fingers or hands, amputations. While reviewing the hazard identification and risk assessment, observed that the adjustable machine guards could be misused. Because in the pan mixer machinery's machine guarding is used as a door and for the safety measures. So it can open the machine guarding while operating the machine, so it can cause crushed fingers or hands and major injuries. So Implemented the starter and limit switch installation are the mixer machinery's. Through the limit switch sensors, the adjustable machine guarding can be controlled by the starter with the motor. So the circuit breaker will stop the starter, motor and rotating parts, once the machine guarding door opens. Through this engineering control, safety precautions for the mixer machineries would be increased and can prevent the hazardous events.

Index Terms: Mixer Machineries, Safety Measures, Hazards, Accidents, Industries

I. INTRODUCTION

Industries usually require all kinds of machineries. In the production industries the heavy kind of mixers are installed and fixed machine guarding also installed for the safety measures. But at the time of machine maintenance, some organizations properly maintained the LOTOTO system. In the construction industries the among the many machineries, fixed machine guarding are installed with the machineries but some of machineries are installed the adjustable guarding.

As of 2021 safety accident statistics, India has over 2.5% of major injuries happened by the adjustable machine guarding. Most of the machine guarding has access to remove the guarding, while working at rotating parts.

Even the facts are the some machineries couldn't installed the fixed machine guarding, because some machineries specification are designed through that method. As through the studies, it has performed the hazard identification and risk assessment, it observed that the machineries guarding could by-pass the employees because of some uncompetent person and work pressures.

Industries contain the 6 types of mixer machineries. But through observation, the concrete pan mixer machineries and Brick cutter machineries are the hazardous events. It has adjustable machine guarding, so it can easily by-pass the machine guarding. So in this report contain details report of concrete pan mixer machineries and control measures for the concrete pan mixers.

II. MIXER MACHINE OVERVIEW

Generally the rotating parts required the machine guarding but in some machineries, even machine guarding isn't effective at some points. So we required other engineering controls, so we installed the limit switch system. the following topics are explained the outline of guarding, limit switch and accessories

ROTATING PARTS

The purpose of machine guarding is to protect the machine operator and other employees in the work area from hazards created by nip points, rotating parts, flying chips and sparks.

General requirements are guards must not create potential hazards and must be attached to the machine where possible and if guards cannot be attached to the machine, attach elsewhere.

MACHINE GUARDING

The machine guarding required for the following areas

Points of operation-the area of the machine where work is performed

Power transmission-all components of the mechanical system that transmit energy, such as flywheels, pulleys, belts and gears, situated less than 7feet above the floor

Operational controls-all levers, buttons and other means of controlling machine functions

Pinch points and nip points and stock entry and exit points

In above area can be protected through different types of guards like fixed guards, interlock guards, self adjustable guards and adjustable guards

But in the mixer machineries usually contain with the self adjustable guards, it has been operating by the employees and the human error can be happens, so we required some other engineering control also for the mixer machineries

LIMIT SWITCH

A switch that operates as an automatic control to prevent a mechanism or process from going beyond a prescribed limit. A limit switch is an electromechanical device operated by the physical force applied to it by an object. Limit switches are used to detect the presence or absence of an object.

But it required the starter mechanism to operator and control the limit with the object. so we are using the Star-Delta starter with that the limit switch

Through the installation of limit switch in the machineries, it can control the machine guarding and prevent from the hazard

Figure 1: Limit switch

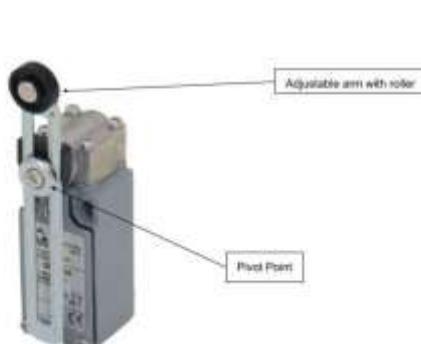
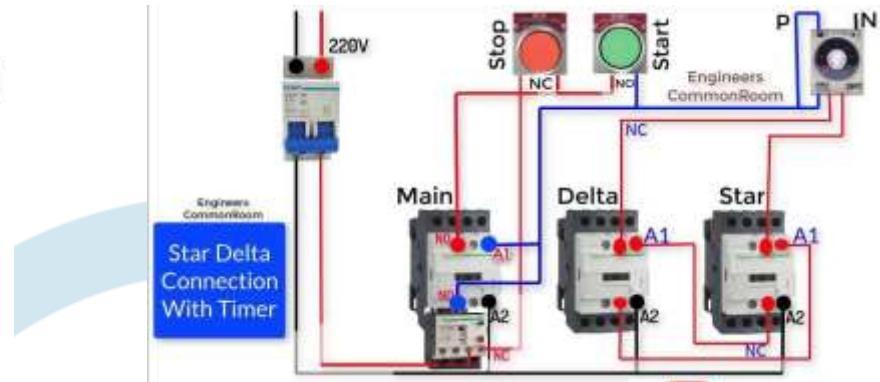


Figure 2 : Star-delta starter connection



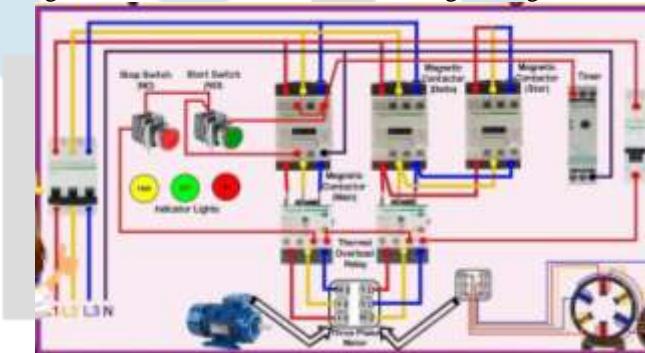
III. RESULT

The blades for rotating the material inside cylindrical drum. At the same time, it was attached to the gearbox. The gear box attached with the motor by help of the bearing. The motor connecting with the star-delta starter and electrical supply would be supplied. At the same times, the starter connected with the starter and the starter placed at the machine guarding by help of attached of cylindrical dru. Once supplied in the starter, the motor will start working and simultaneously, all gearboxes start the work and by the help of the gearbox, the blades are starting to rotate

Before the start of the motor, the starter circuit ensures that the machine guarding is closed. Once the electrical switch in the limit switch normally closed the starter would provide the power supply. In case the machine guarding is opening while supplying the power/middle of running of the motor, the electrical switch in the limit switch would be open. If the limit switch, electrical/mechanical switch normally opened, the starter would be stopped the power automatically and the motor also stopped the running of rotating blades by help of gear box

As a same process would be applicable in the other machineries also like brick cutter machines

Figure 3: Overview of limit switch and guarding connection



IV.HIRA IDENTIFICATION AND RISK ASSESSMENT

As the hira identification and risk assessment can be effectively shown the control measures effective after installation of limit switch and working method.

Table 1: HIRA after installation of limit switch

SL. No	Activity	Hazard	Risk	Probability of Injury	Severity of Potential or Past Injuries	Risk Score	Methods of Controlling Hazard			Probability of Injury	Severity of Potential or Past Injuries	Risk Score
1	USING OF PAN MIXER/Brick cutter	machine hazards	rotating blades lead to hand injury	4	3	12	1.supervisor ensure that the sensor are working conditions 2.proper guard should be close for moving parts 3.Use the sensor int eh machien guarding 4.conducted TBT and awareness to all workers 5.Proper inspection for pan mixer for monthly once			2	2	4
		chemical hazard	respiratory problem	4	3	12	1.use proper PPEs like mask,googles can avoid from the castable powder over pan mixer 2.spillage oil leakage should be clean immediately 3.placed the pan mixer at safe premises 4.dip tray must be placed 5.workers should be wear proper PPE's (mask, gloves, googles) 6.Proper housekeeping near premises 7.Proper supervision			2	2	4
		electrical hazard	electric shock	4	2	8	1.supervisor ensure that the electrical cable of mixer pan mixer shouldn't be placed near electrical hazard premises 2.supervisor ensure that the switch-off of pan mixer, while cleaning the pan mixer 3. Earthling should be provided.			2	2	4

V. CONCLUSION

Over our india and world the use of machine guarding will increase in the coming years.SO these types of innovative ideas are required in this model world.As through this report and studies shows that all employees are provided the different types of control measures

It required that the control measures should be effective. This machine has the machine guarding but it is possible to by-pass the control measures.So through the studies the machine guarding required the limit switches as sensor

While studies about the machine guarding and limit switches, it shows that the different types of starter and limit switches are available at market.It is most important that the adequate material is required for the mixer machine

Through studies the pan-mixer/Brick cutter machine is also getting updated in the model world, so it is possible to increase the capacity.So this report concluded the material like stater and limit switch model are capable to all the machineries

Thanks to Badley who discovered the limit switch.Through the limit switch sensor, the control measures are installed in the machine guarding.This machine guarding may be the control measures for the heavy measures. Hope that all the machine guarding is useful or non-useful it depends upon the work.Through studies,it shows that the hazard identification and risk assessment are most wanted in the control measures.So as the reports shows that the risk assessment,are required at the fixed machine guarding

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