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Automation of Enamel Removal Process

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ABSTRACT

The main objective of the project is to improve the saftey of Enamel removal process Machine in Industry. The aim of our project is to reduce major defects in Enamel removal process such as severe burns to the eyes, skin, digestive system or lungs, and also The Experimental work is mainly concentrate on to reduce the manual effort the employee by automatic material handling equipment of product.This reduces the time of removing enamel coating over stator end wire and also improves the production rate. As we analyzed that the operators facing the spillage of sodium hydroxide and got injured once in 4 month. As the result of the safety issues the safety percentage was about 30 – 40 %. We gave suitable solution as result of which the safety percentage was increased about 80-90%¬¬¬¬. These report clearly explained methodology followed, solution given and reference obtained.

Keyword: Pneumatic cylinder, Polycarbanate sheet, automation, material handling system.

I. INTRODUCTION

1.1 OVERVIEW

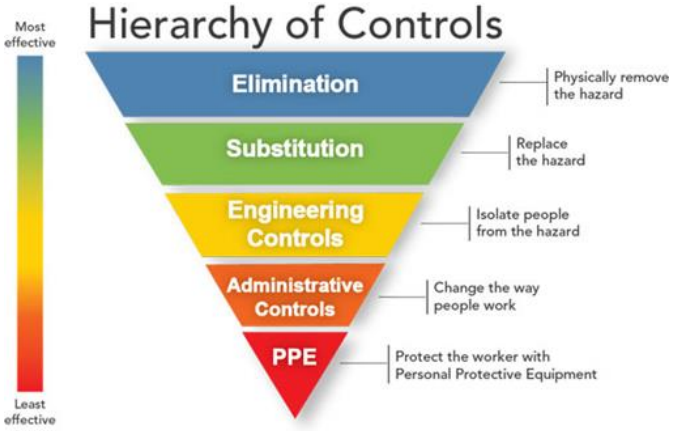
In today's scenario, everything is moving towards automation in order to increase the production rate and to reduce the manpower fatigueis a leading provider of mechatronic solution for automotive, consumer and industrial goods companies, manufacturing and supply of products.

1.2 INTRODUCTION

The methodology is simple approach in the analysis of low safety in enamel removing machine . The production line consists a sequence of operation to make a final product. Safety lagging occurred because the machine did not covered properly This project aim to analyze and increase the safety of the machine operator. reduce the defects occurring in the stator and using quality tools like cause and pareto chart ,end count measure, which are been used int the company for getting cheap and high effectiveness

measure for controlling the rejection rate. The main aim is to give optimum solution with optimum cost and high effectiveness of measure.

1.3 One representation of this hierarchy is as follows:



II. OBSERVATION OF PROBLEM

Manually operated enamel removal process

2.1. Low safety of operator

- Contact with very high concentrations of sodium hydroxide can cause severe burns to eye, skin, digestive system or lungs.
- Repeated skin contact may cause dermatitis
- Repeated inhalation of sodium hydroxide vapor can lead to permanent lungs damage

2.2. Low Accuracy

- Improper removal of enamel by not giving a required time for the work piece to get fully corroded
- Improper cooling of the work piece after the enamel removing process

2.3. Low Productivity

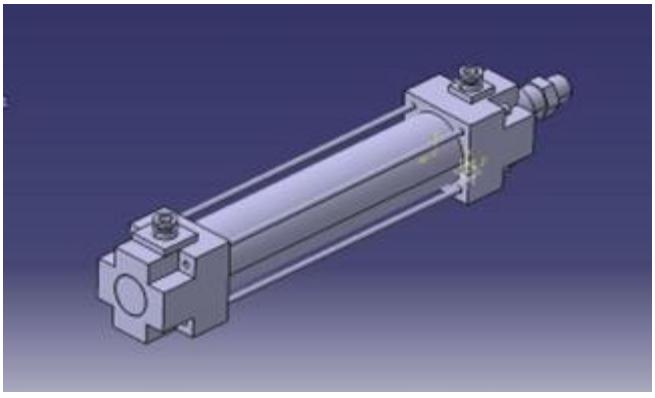
- In manual enamel removing process only one work pieces can be finished for a single cycle
- The entire process is affected because of high requirement of time

III. OBJECTIVE OF THE PROBLEM

- Toreducethetimetakenfortheproducttogoingtothe nextprocess.
- Toeliminatethelabourforthematerialhandlingwor k.
- To improve the overall safety of the operator during the enamel removal process

PARTS ASSEMBLY

3.1 Pneumatic cylinder:



Pneumatic cylinder is a mechanical device which is used to power of compressed gas to produce a force in a reciprocating linear motion. Like hydraulic cylinders, something forces a piston to move in the desired direction

3.2 Rod less cylinder:

A rodless cylinder is a pneumatic component capable of moving a load in a linear path with compressed air Whereas a traditional pneumatic cylinder uses a rod to push or pull the load from the piston, a rodless cylinder moves the load alongside the piston Vertical LM Slide with flange LM Bearing (25 mm) dia
Horizontal slide with LM Bearing Block (12 mm) dia

3.3 Polycarbanate Sheet

Extremely high break resistance: Polycarbonate is virtually unbreakable. This unique property have resulted in applications such as machine guards Polycarbonate is a thermoplastic that comes in a transparent sheet. It is incredibly tough and absorbs minimal moisture, making it resistant to impact damage as well as water damage. It's also flame-retardant and chemical resistant

3.4 Temperature Meter

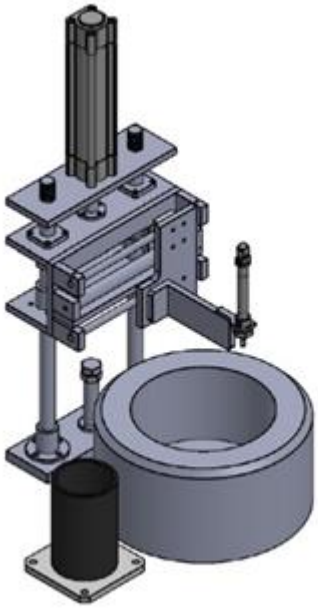
The purpose of a temperature control system is to maintain a device at a constant temperature. Two types of actuators are commonly used to precisely control the temperature of optics, lasers, biological samples, or other temperature sensitive devices

3.5 Fumes collector:

Fume and smoke collectors are used to remove sub-micrometer-size particulates from the air. They effectively reduce or eliminate particulate matter and gas streams from many industrial processes

IV. ASSEMBLY

Designed of automation enamel removal



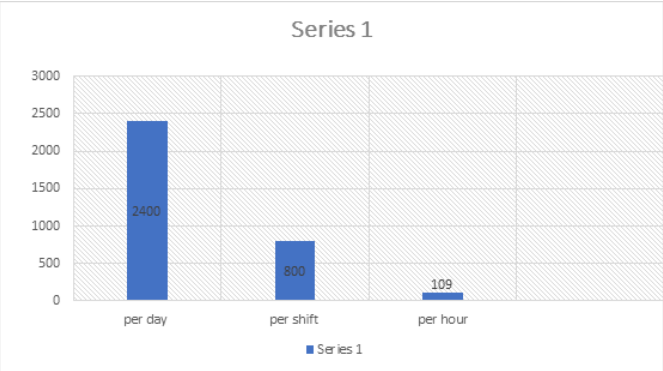
3D view of automated enamel removal

V. COMPARISION CHART

Manual process	Automated process
Low safety for the operator during the process	High safety for the operator during the process
Work fatigue for the operator is high	Work fatigue for the operator is low
Only one work piece can loaded in a single cycle	4 work piece can be loaded in a single cycle
Accuracy of a work piece is low	Accuracy of a work piece is high

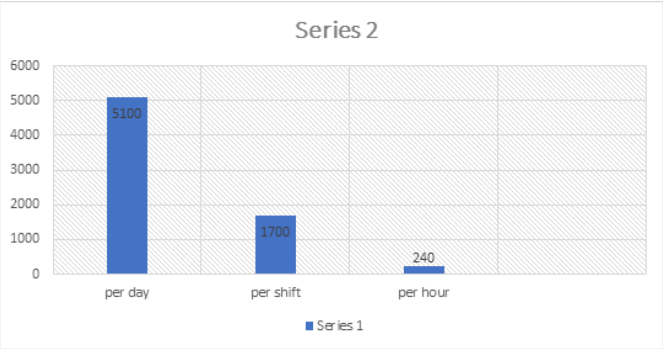
4.1. Manually operation

Per Day 3 Shift
Per shift 8 hrs
Tea time 10 min
Lunch time 15 min
Total working time - 7.35 hrs
Per shift product out – 800 pieces
Per hour product out – 109



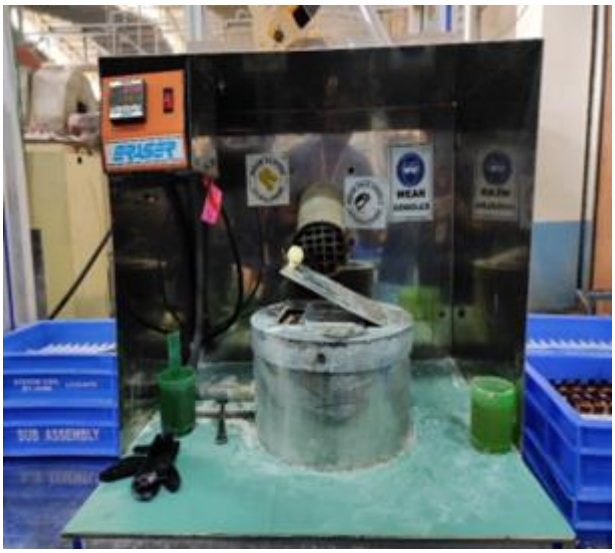
4.2. Automated operation

Per Day - 3 Shift
Per shift - 8 hrs
Tea time -10 min
Lunch time - 15 min
Total working time -7.35 hrs
Per shift product out – 1700
Per hour product out – 240



4.3. FABRICATION

Fabricated Automated enamel remover process



Before Automation (Manual)

After Automation

VI. CONCLUSION

Manpower is the basement of industry, so we care for them. We are able to sparkle in this society. Material handling technique reduces the strain of the employee to remove the enamel of stator end wire. By this method, we are able to eliminate the employee work stress, and improve the safety This method does not affect the production time of component and also automation helps to improve work environment. Production can be improved because of the automation. Finally, this process of

making a manual operation into a automatic operation has been done considering the safety issues. In addition, to implement the automation in other machines and further more to improve the production rate.

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