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INVISTIGATION AND IMPLEMENT OF SIX SIGMA AND REDUCE LABOUR COST AND DOWN TIME IN PLASTIC MANUFACTRING

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ABSTRACT -Now days one of the fastest growing industries is injection moulding field. High plastic parts in injection moulding industry are widely used in India. This project is about present an approach of implementation of six sigma method to reduce the rejection rate in a plastic injection moulding process for high plastic parts. Six sigma is a set of techniques and tool for process improvement six-sigma strategies seek to improvement and quality of output of process by identifying and removing the causes of defects, and minimizing variability in manufacturing and business processes.

(**Keywords**: plastic industry, investigation, six sigma, implementation, minimizing, method.)

I. INTRODUCTION

Injection molding is an important industrial method. It is little bit similar to die casting but the difference is in raw material used. In die casting we use metals which require extremely high temperature for melting but injection molding is mainly done on glasses, elastomers and most commonly thermoplastic and thermosetting polymers but this technique is widely used for fabrication of thermoplastic materials. This process is done by heating of raw material and injecting them into the mold cavity by applying pressure at a specific temperature without any change in their chemical composition. Since 1980, there has been a profound growth in the use of statistical methods for quality and overall business improvement. The term “Six Sigma” was coined by Bill Smith, an engineer with Motorola under the leadership of Robert W. Galvin. Motorola had always been a pioneer in the areas of productivity and quality.1987 Motorola officially launched its Six Sigma program. Motorola saved more than $ 15 billion in the first years of its Six Sigma effort. Later it was adopted by General Electric, where it was initiated by Jack Welch

Manufacturing is the action of making things. It is the process of transforming materials into items with greater value. Most materials used in manufacturing are classified into four categories: metals, ceramics, polymers and composites. Polymers are divided into two categories: plastics and rubbers. Thermoplastics and thermosets are two types of plastics. Unlike thermosets, thermoplastics can be subjected to heating and cooling cycles repeatedly without degrading. This property allows thermoplastics to be used in plastic injection moulding, which is the primary focus of this study

(Valles, Sanchez, Noriega, & Nunez, 2009). “Injection moulding is a process in which a polymer is heated to a highly plastic state and forced to flow under high pressure into a mold cavity,

II. PROBLEM IDENTIFICATION

Company SSF plastic Indian private limited is a manufacturing organization that produces body of mobile charger parts and different sub-assemblies related to mobile charger. For the few months company is receiving high rejection rate.

In automation insert loading machine, this results in high rework rate and due to which higher production time is spent and also credibility of the company and profits are may affecting. Approximately 10% of rejection are produced while running machine. (Rework and rejection are both considered as defects)

1 The process to complete cycle have 28sec. For the example a cycle 4 cavities. Whenever while missing insert in automation. There will the more rejections. For assuming 2mins have 5 cycle .it produce 20 cavities.

2 For machine a single man power is enough to handle. By Implementation of automation 2:1 is reducing into 1:1

3 Major problem is down time in the production.

In the pre heating process some time the material are not refilling. There is no indication to the process. And the cause of overheated material.it will lumps on the dryer it cause down time to production.

PROBLEM ANALYSED IN INSERT PIN AUTOMATION MACHINE

- Whenever there was an oversize in insert there is insert missing issues.
- Some piece or material stuck on bowler there is insert missing issues.
- Operator mistake (forget to load insert in bowler there is insert missing issues)

- While there was an air pressure low there is insert missing issues.
- Whenever sensor is absent there is insert missing issues.
- When the vibrator frequency is varied there is an insert missing issues.

By missing the insert in automation the process is running. it causes the material injected to insert area.

PROBLEM:

Fig Dummy part rejection

1. And the part is direct rejection.
2. It causes work time waste
3. Material reworked process.
4. It causes the pin bulging in process.
5. Single pin issues.
6. Flash issues
7. Tool damages

III. OBJECTIVES

- To identify the causes of defects
- To minimize the rejection level through quality control
- To identify the losses and remove incorrect use of method.
- To improve the method for quality as well as productivity.
- To increase productivity and profitability in an organization.
- To reduce rework and scrap of produce.
- To provide better solution for process improvement.

MAIN OBJECTIVE OF THE IMPLEMENTATION TO THIS PROCESS

- To avoid the major rejection in this process so we need to avoid the possibilities to run machine with the rejection.
- When the insert is missing it will indicate to stop the process
- Add 15sec to timer through PLC programme to avoid the insert missing.
- If the timer excess the set value, buzzer will alarm.
- Buzzer to indicate the process

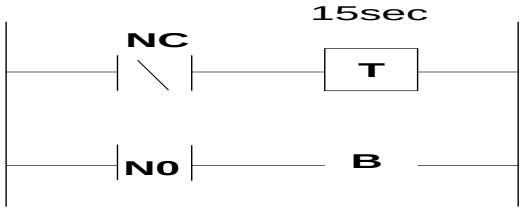
  Red, Green, Yellow

- Hence the rejection reduced by implementation the program in PLC.

IV. RESEARCH METHODOLOGY

OUR IMPLEMENTATION ON AUTOMATIC INSERT LOADING MACHINE

Timer in ladder logic is the on delay timer. Its name comes from the fact, that the on delay timer delays its output from the on signal As soon as the on delay timer gets a signal at the input, the timer starts to count down. When the preset time is up, the output of the on delay timer will turn on. If the input is turned off before the countdown finish, the time will reset On delay timers in ladder logic can look different depending on the PLC programming software. But common for all of the are the following.



Input

Enable Output (EN)

Done Output (DN)

Pre-set Time Value

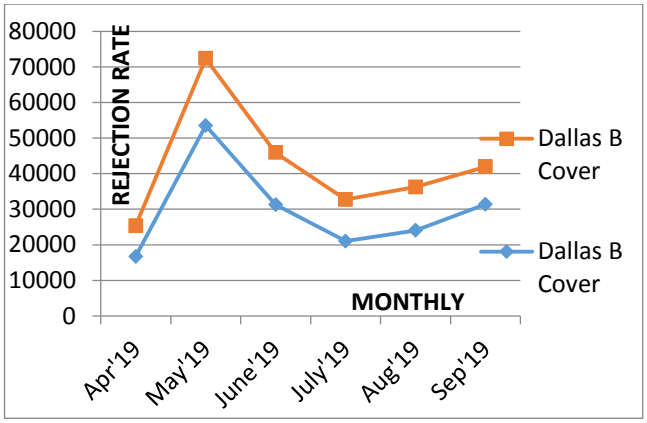
The enable output (EN) is the first output and it is on when the timer is energized. So, as long as the input is true or on, the enable output will be true. Second output is the done output (DN). This output in an on delay timer is only on, when the timer has counted down the preset time.

TIMED CONTACT SYMBOLS ON-DELAY SYMBOLS

- Normally open, timed closed contact (NOTC)
- Contact is open when relay coil is de-energized
- When relay is energized, there is a time delay in closing
- Normally closed, timed open contact (NCTO)
- Contact is closed when relay coil is de-energized
- When relay is energized, there is a time delay in opening

V. ANALYSIS AND DATA COLLECTION

Project linkage to company business:- Company objective for current year- quality enhancement, reduction of scrap, increase the Mould life & to save scrap cost.



REJECTION LEVEL BETWEEN DUMMY PART AND OTHER ISSUES

AFTER IMPLEMENTATION THE PROCESS RESULT

		BEFORE	AFTER
		BEFORE	AFTER
1	REJECTION LEVEL	40-50%	UP TO 5%
2	PRODUCTION EFFICIANCY	60%	85%
3	COST MATERIAL+LABOUR	2.27L/yr	1.12L/yr

WAY TO REDUCE LABOUR COST

Labour cost is the second important element of cost of production. Wages, salaries and other forms of remunerations represent a major portion of the total cost of a product or services. The growth and profitability of the concern depends upon proper utilization of human resources or labour force which in turn needs proper accounting and control of cost. Thus, control of labour cost is a very significant issue from the view point of management

CONVEYOR IMPLEMENTATION

ESTIMATION FOR SAVING LABOUR COST

1 MAN POWER SAVED PER SHIFT

Total time save per shift = 8 hour

Total labour cost per day (8 hours = 480Rs/day

Total labour cost per hour = 60Rs/hour

Total cost saved per day = 480Rs/hour

Total cost saved per month = 480□30

= 14,400Rs/month

Total cost saved per year = 14,400□12

= 172800Rs/year

Total cost saved per year for labour cost

= 172800Rs/year

VI. RESULT AND DISCUSSION

After studying all problems related to each research papers individual solutions are provided as below. Based on solution on that problem effect on production is changed as increase in productivity or reduction of rejection rates which is provided as below-

1 .After Implementation and Correction in Process we observed reduced parts Rejection Level.

2. Reduced rejection percentage from 40% up to 5-10%

3. Reduced losses and Process time.

4. Improved Quality of Product.

5 .Improved productivity

6. Saving is done around Rs 172800/ year after solving the problem related to labour cost issues.

6. CONCLUSION

Six Sigma looks at all work as a series of processes with inherent variations, which can cause waste or inefficiency. Focusing on those processes with greatest impact on business performance, as defined by leadership teams, the methodology involves statistical analysis to quantify repeated common cause variations - which can then be reduced by the Six Sigma team. Six Sigma becomes a continuous process for quality improvement and cost reduction flowing throughout the company. As an improvement and cost reduction process, Six Sigma is equally valid for marketing and product development as well as manufacturing and customer services. Six Sigma improvement projects and techniques are now the cornerstone of Cummins continued success in cost reduction and quality improvement.

It was stated in the introduction that companies which want to improve their product and process quality need to concentrate their efforts on the proper exploration of (internal and external) data available in their records. That way, they can become more flexible in responding to customer needs and reacting to competitors' attempts to undermine their market position. To achieve this flexibility, companies should improve the quantitative literacy of their employees .Special attention should be given to the service sector, which embraced the basic quality improvement ideas simultaneously with the manufacturing sector, but has been neglecting the use of statistical quality control and improvement tools even more than its manufacturing counterpart.

From the review of above mentioned research articles, following conclusions are derived.

1. 7 Quality control tools are very simple and easy to use for all majority industries.

2. Quality improvement can be made by reducing rework and rejection rate using 7 Quality control tools.

3. Reduction in rejection is indirectly improving productivity and profitability of the organization.

4. 7 Quality control tools have shown better results in quality improvement as referred many case studies.

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