
**APPLICATION OF LEAN MANUFACTURING IN PRODUCTIVITY
IMPROVEMENT OF 'HEAD LAMP LEVELING SWITCH' IN AN
ASSEMBLY LINE**

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ABSTRACT

This research addresses the application of lean manufacturing concepts in assembly line on Head Lamp Leveling Switch used in car as human interface to adjust light beam spectrum according to road slope and load to vehicle. The goal of this research is to find out the methods which can help in increasing the productivity. This research attempts to identify the measure reasons which promote MUDA (waste) and removing those reasons completely or up to a desired level. The ideas will be tested on a large car automotive switch manufacturing company (Mindarika Pvt. Ltd., Manesar, Gurgaon, Haryana). Methods and procedures of this study include a review of literature relevant to Continuous Improvement, Lean Tools and Techniques, and Root cause Analysis, and Assembly process of a specific automotive product (Head Lamp Leveling Switch). After the reasons of waste were identified, solutions and procedures were recommended to Company Mindarika to eliminate wastes in the assembly processes of Head Lamp Leveling Switch.

Keywords- *Caulking and Clinching process, Head Lamp Leveling Switch, Lean Manufacturing Tools and Skipping of Caulking process*

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1. INTRODUCTION

1.1 Background

Now customer needs continue to evolve in line with the diversification of lifestyles, and high quality and functionality are expected of every product with information technology far developed compared to a decade ago, availing much more product information, customers are demanding more real value in products. World markets being more integrated, consumers now have a wider selection of goods and services with which to satisfy their appetites. In this way International competition and customer demands are forcing radical changes to occur in manufacturing. As a result, companies worldwide that are realizing the importance of being part of the global market are searching for operational methods to increase their productivity and competitive power through the use of innovative production systems. Lean Tools are the production practices that can help organizations to satisfy customer needs and to improve their productivity.

1.2 Project Place Introduction

Mindarika Pvt. Limited, with Rs. 1.30 billion in revenue, is India's largest four wheeler automotive switch manufacturer, has consciously evolved into a complete design and development centre for four wheeler automotive switches. It offers customized solutions to the automotive industry in the realm of product improvisation and new product development and has very strong localization capabilities. The core strengths at Mindarika are skilled manpower, adherence to the highest quality standards and providing cost effective solutions.

2. LITERATURE REVIEW

This chapter will discuss concepts of lean tools and techniques to achieve the maximum productivity with less possible production losses and wastes. By means of various tools and techniques of lean manufacturing and ideas wastages, breakdowns, rejections can be minimized and optimum production rate can be achieved.

3. OBJECTIVE

To improve the productivity of 'Head Lamp Leveling Switch' in assembly line.

4. PURPOSE/NEED OF THE STUDY

The need of this study is to help Mindarika Pvt. Ltd. in the following way-

1. To improve the productivity of a specific product.
2. To minimize the rejection of product at some specific stage.
3. To reduce the cycle time at some specific stages and.
4. To manage the data for a continuous improvement plan.

5. SCOPE OF THE STUDY

This study will help the various assembly line processes-

1. In improving the productivity of a specific product.
 2. In minimizing the rejection of product at some specific stage.
 3. In minimizing the cycle time at some specific stages and.
 4. In managing the data for a continuous improvement plan.
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6. RESEARCH METHODOLOGY

6.1 INTRODUCTION

The purpose of this study is to help Mindarika Pvt. Ltd. to improve the productivity of its product and manage the data for a continuous improvement plan, then provide feedback to the company for the future improvement.

6.2 Define

The problem will be then defined.

6.3 Data Collection

Data related to production of product in assembly line for reducing the wastes, will be collected. It will include the cycle time of machines at different stages, production capacity of machines, standardized work combinations for different associates, total produced quantities and rejected quantities at specific stage.

6.4 Data Analysis

The various Lean tools and techniques will be used to analyze data, identify problems and root causes, and solve problems.

7. RESULTS

The purpose of this study is to help Mindarika Private Limited to improve productivity of their product and manage the data for a continuous improvement plan, then provide feedback to the company for future improvement.

7.1 Identifying and analyzing problems in assembly line of Head Lamp Leveling Switch-

As to meet the increased future demand of its product, the company needed to increase the production of its model S32053 (Head Lamp Leveling Switch) from 450 to 625 pieces per shift. With the limitation of expanding the assembly line and capacity constraint due to different reasons, this assembly line was identified as project to increase the line capacity from 450 to 625 switches per shift with existing 7 associates by using lean manufacturing tool (Kaizen), to reduce the cycle time by reducing process delays, line balancing, innovation and improvements.

Although the plant has facility and ability to produce more than they are producing currently, it is having following limitations:

- Rejection due to poor quality at Caulking and Clinching stage.
- Larger cycle time for some processes.
- Material handling problem.
- Line balancing problem.

Company Mindarika Private Limited has noted a countable rejection of product at Caulking and Clinching stage due to skipping of Caulking process. Rejection at this stage was found 150 pieces per month.

Now the first problem which we had to solve is-

“Rejection of switch due to skipping of caulking process”

7.1.1 Analysis and Solution of the Problem

During caulking and clinching process, there is always possibility that caulking process may skip due to operator's mistake and the component may get rejected. During collection of

initial procedural data of Head Lamp Leveling Switch S32053 in assembly line it was found 150 pieces of switches are getting rejected per month due to skipping of caulking process, which ultimately decreases the productivity of assembly line.

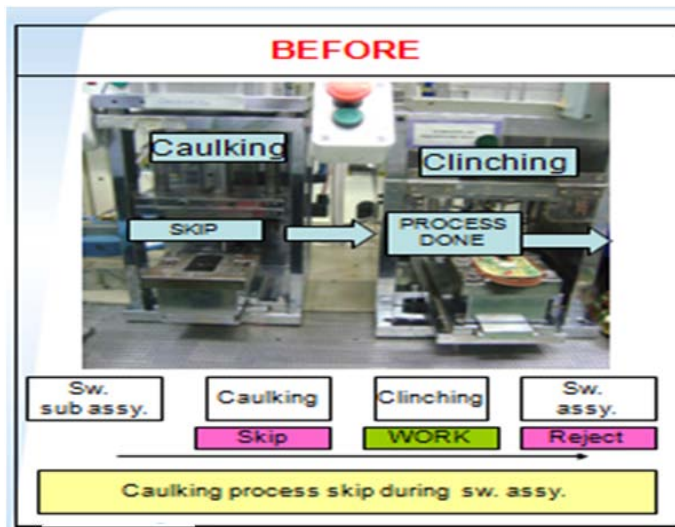


Fig.-1- Caulking process skips during Switch Assembly

Root cause of the problem-

After studying the production procedures and activities performed at this stage of caulking and clinching processes in assembly line it was found that operations are performed in the following sequence-

1-Caulking process

2-Clinching process

Both fixtures work independently. But, if by mistake caulking process skip then there is no facility of catching this problem at next stage automatically and further processes continued and finally the piece gets rejected. Therefore, root cause of the problem may be fatigue of the worker, caused skipping of the process. The same can be prevented if fixtures work dependently.

Developing solution of the problem

To remove the problem of operation skip, we have to remove the operator's mistake by making the system 'mistake proof'. For achieving the above target we will use a lean technique Prevention Poka Yoke. Poka Yoke is one of the tools that use the zero defect principle. Poka Yoke is an autonomous defect control system that is put on a machine that inspects all parts to make sure that there are zero defects. The goal of Poka Yoke is to observe the defective parts at the source, detect the cause of the defect, and to avoid moving the defective parts to the next workstation.

We used PLC programme to make both fixtures synchronized. Now after synchronization, clinching fixture can work in that condition only when caulking operation has completed at caulking fixture.

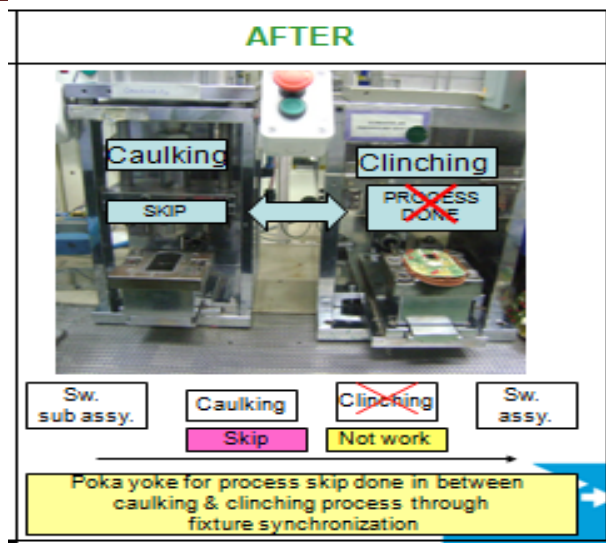


Fig 2-Poka yoke implementation

Now after implementing the poka yoke technique (PLC programme) the problem of skipping the caulking process has been removed. By using PLC programme we have achieved the condition of fixture synchronization, which helped us in achieving our target of prevention of skipping of caulking process.

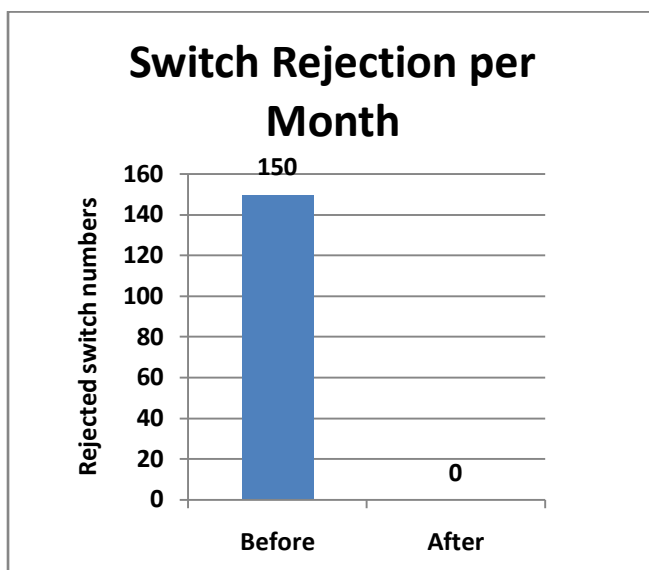


Fig 3- Rejection rate before and after implementing solution

8. CONCLUSION

The interaction of lean tools at different stages in assembly line of Head Lamp Leveling Switch, contributes to the identification, elimination and avoidance of wastes and thus leads in the development of efficient and effective processes. The benefit is in increasing the productivity, from the standardization of processes, from the reduction in lead times and from the accurately determined times.

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