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# To Improve Quality and Reduce Rejection Level through Quality Control

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**Abstract**— Organization now a days need to improve their product/process/services continuously and progressively for that lean six sigma is the holistic approach that address multiple aspect of organization competitiveness it is only tool to achieve overall operational excellence.CNC Cutting involves various processes which include machine setting, blade speed, machine parameter, clamping, cooling, etc. It is very difficult to produce defect free cutting. Occurrence of the defect may involve single or multiple causes. These causes can be minimized through systematic procedure of applying various tools and technique .This paper represents analyses and investigation of cutting defects and identification of remedial measures carried out at specific industry. Diagnostic study carried out on overall process of cutting. Cutting products revealed that the contribution of the five prominent defects in cutting rejections were found and they are taper cutting, over size, under size, rough surface and burr. It was noticed that these defects were frequently occurring at different locations. Systematic analyses were carried out to understand the reasons for defects occurrence and suitable remedial measures were identified and implementation of process.

***Keywords***-*cutting defect, formatting, feedback,and statistical quality control*

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## I. INTRODUCTION

For global competitiveness, Indian industry need over operation excellence and improvement in both productivity and profitability. For achieving this we are trying many improvement measures from the domain of quality engineering and management, such as, statistical quality control tools, total quality management, ISO certification etc. A boom of experimentation on lean manufacturing and a tool to change prospective of quality 'six sigma' are also on same page playing an accelerating and encouraging results too. Statistical quality control tools are capable of producing desire result. Then question? Is why this all (six sigma and lean manufacturing). The problem is with its implementation and time span it will sustain to get its benefits. Six sigma and lean manufacturing are one of the most modern and effective tools having direct impact on bottom line. Now a days it is often seen feedback system between customer and vendor but feedback system between two industries is very less seen due to communication chain internally and externally of industry is very long. If there is any problem other department is easily blamed due to feedback system root cause can be identify and each and every department can know the thought process of customer industry and it also help in brain storming process.

For use of 7 Quality control tools is stepwise procedure with staring of product development to final product delivery to the customer. So it is very useful in every stage of production and service.

Seven Quality Control Tools

There are 7 basic quality control tools as following:

1. Check sheet
2. Histogram
3. Pareto chart
4. Cause and effect diagram
5. Control chart
6. Flow chart
7. Scatter / Dot diagram Check sheet:

It is one of the starting tool for implementation of these quality tools. It is data collection type tools which will collect all data related to number of rejection or number of defects etc. Histogram: It is second stage after collecting data by check sheet. It is graphical representation of collected data so it is data presentation type tool. Pareto chart: After defining data in graphical form it is easy to focus on particular defect which is occurred with high frequency. So as per Pareto chart it will provide major problem which will reduce 80% of quality related problem so it is called as data analysis type tool. Cause and effect diagram: After detecting major problem finding main causes which will create this major problem by considering factors like man, machine, material, environment and process etc. it is also known as Ishikawa diagram or fish bone diagram and it is data interpretation type tool. Control chart: After finding root causes of that problem or defect particular solution is taken. After providing solution if rejection rate is controlled or not is measured by control charts. So this tools is used for controlling data for any process or rejection of any product. Flow chart: It is data presentation type tool for providing graphical presentation of overall

structure of any process or organization hierarchy. Scatter / Dot diagram: To find relation between two variable, this tools is very useful as to find positive or negative relation.

## II. Problem Identification

As discussion with production manager and production team implement in seat manufacturing company the rejection of Aluminum sliding insert bolt is very high due to variation of size and tapper cutting due to tapper cutting and variation of size aluminium insert not fitted in mould properly and also damaging the mould. aluminum sliding insert bolt used in Eco-40 sliding seat in passengers vehicle. Over the last several years the company has continuously invested in and expanded its technology partnerships, manufacturing systems, product range and clientele to emerge as India's largest commercial vehicle, bus seating and Interiors Company. Supplier and manufacturer of automotive bus seat, driver seats, car seats, sleeper berths. The company Service Provider of automotive interiors, seating systems & automotive components in Indore.Manufacturer, Importers and Exporters of Automotive Seats, Aluminium sliding insert bolt, Door Trims, Roof Linings, Vacuum Formed parts, Seat Cushions, Bus Seats, Multiplex Seats, ect.

PROBLEM:

The rejection of aluminium sliding insert bolt is very high due to variation of size and tapper cutting..due to tapper cutting and variation of size aluminium insert not fitted in mould properly and also damaging the mould. The rejection level of Al sliding bolt insert is very high (40-50% Approx)

-Major challenge is to improve quality of aluminum sliding insert bolt and reduce rejection level through quality control. and also increase the productivity of aluminum sliding insert without losses.

Required size- 42.50mm as per mould fitment.(variation +/- 1mm acceptable)

Problem- Tapper cutting and variation in cutting length 2-4mm

## 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 produc.
- To provide better solution for process improvement.

## IV. Research Methodology

We have Brainstormed to reduce the rejection level by correction in aluminum insert cutting process & to finalized Standard operating procedure for aluminium insert cutting. we have given our innovative ideas to improve the quality and reduce the rejection level of Aluminum insert for Eco-40 seat.

Research methodology adopted to achieve the objectives of the project comprises of basically some points are as follows:

1. To change the cutting procedure.
2. To set proper machine parameter.
3. To set blade feed speed Set at scale of 1 to 1.1 for speed :12-15 mm/min
4. To set proper cutting blade speed, set the knob for medium speed and set the machine parameter for 55-60%
5. no. of aluminium section load on machine 14nos.
6. check 150nos of aluminium insert.

## V.Analysis and Data Collection

The rejection level of Al sliding bolt insert was very high(40-50% Approx) due to variation of size, & taper cutting. Due to this taper cutting & variation of size, Al insert was not fitted in mould properly & was damaging the mould also.

Final assembly production line was also affected due to less productivity of Al insert.

We observe following points during aluminium cutting:-

1.Cutting speed was very high.

2.Machine parameters not set properly.

3.Clamping not proper.

4.Incorrect tolerance.

5. Aluminum section load on machine not proper.

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

To reduce the rejection level by correction in aluminum insert cutting process & to finalized Standard operating procedure for aluminium insert cutting.

Standard operating procedure for aluminum sliding insert-

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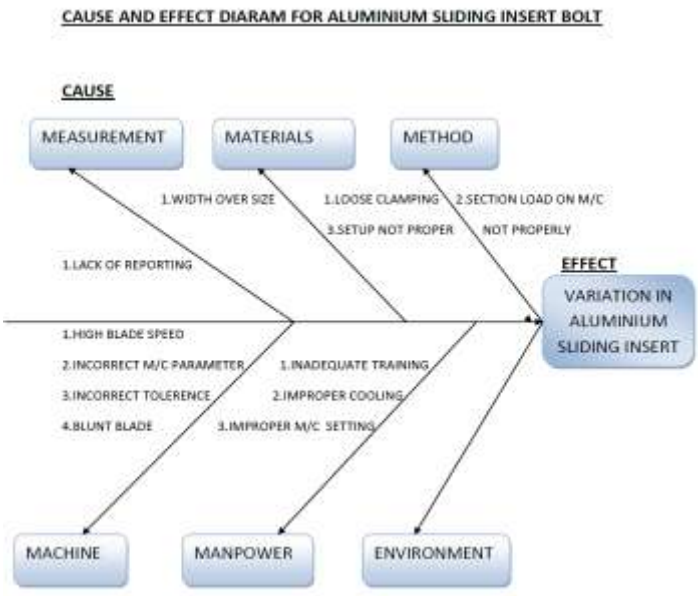
1. First turn ON the main switch of CNC cutting machine.
2. Switch ON the hydraulic and lubricant.
3. Load the aluminum section on machine (2 layer of 14 section)in the same manner as shown in figure


4. Clamp the section by press the F-3 (For main Vice) & F-4 (For Shuttle Vice)
5. Set the machine in auto mode
6. Clamp the section by press the F-3 (For main Vice) & F-4 (For Shuttle Vice).
7. Set the blade speed at medium range (with setting parameter of 55-65 %)
8. Now start the cutting & check the length for 1st piece



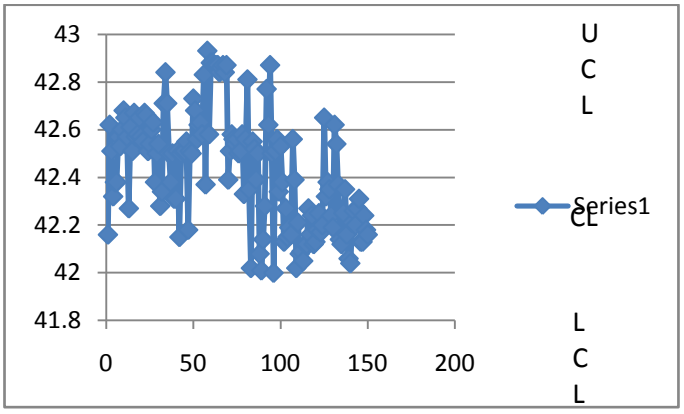

<u>After measure 150 pieces of aluminium insert we observe following data</u>

Required dim.-42.50mm (cutting length set at 42.5mm)
maximum reading- 42.91mm
minimum reading- 42.00mm

<u>variation in dimensions:-</u>

43.50-42.50 = +0.56
42.00-42.50 = -0.50

x-bar chart for 150pieces of aluminium insert

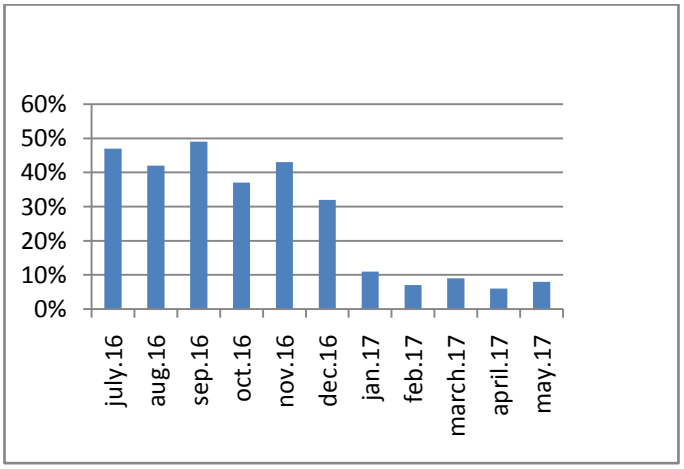



<u>No. of parts</u>

Aluminum insert data for upper control limit and lower control limit

CL-UCL = 79 Pieces
CL-LCC = 71 Pieces

<u>MONTH WISE REJECTION GRAPH</u>




<u>MONTH</u>


<u>BEFORE</u> <u>AFTER</u>

| | | BEFORE | AFTER |
|---|---|---|---|
| 1 | REJECTION LEVEL PRODUCTION | 40-50% | UP TO 5% |
| 2 | EFFICIANCY COST | 60% | 85% |
| 3 | MATERIAL+LABOUR | 2.27L/yr | 1.19L/yr |

**Cost saving :**

Material cost:

Per piece weight of AL insert = 23 gms.
Average rejection per month = 2000 pieces
Material saved per month =
2000Peices*23gms
= 46000gms= 46kg

Aluminum rate / kg = Rs. 190 /-
= 190x46
= Rs. 8740 Rs
/Month.
Per Year Cost saved = 8740x12
= 104880 Rs/year

Labour cost:

Total time save per day = 1 hour
Total labour cost per day (8 hours) = 315 Rs/day
Total labour cost per hour = 39.37Rs/hour
Total cost saved per hour = 39.37 Rs/hour
Total cost saved per month = 39.37x30
=
1181Rs/month
Total cost saved per year = 1181x12
= 14172Rs/year

Total cost saved per year = material cost +labour cost

= 104880 + 14172
= 119052Rs/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 of aluminum sliding insert.
6. Saving is done around Rs 11,9052/ year after solving the problem related to aluminum sliding insert bolt.

## 6. CONCLUSION

The purpose of this research is to maximize productivity of the previous aluminum sliding insert, and to improve its work process. Proposed and possibility of enhancing productivity was confirmed through comparing it with the previous system. In addition, by deducting concepts for residue processing module, an additional function, and quality checking system to improve detailed processing of the aluminium sliding insert bolt. In the future, a research is to be performed to supplement and improve problems which may additionally occur through constructing and demonstrating a system in which these system functions are combined.

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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