

# Waste Elimination by Lean Manufacturing

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## Abstract

To stand up in today’s Globalization world, Manufacturers need to find ways to reduce Production time and cost in order to improve operating performance and Product quality. Lean manufacturing is the systematic elimination of waste. Lean is focused at cutting non-value-added activities from production. This Paper details the use of lean manufacturing Techniques in reducing waste in Nut Bolt Manufacturing Company. This Study Shows the reduction in Through-Put Time is achieved to increases the productivity.

**Keywords:** Lean Manufacturing, Waste, Muda, Mura, Muri, Process.

## 1. Introduction

Lean manufacturing is an overall methodology that seeks to minimize the resources required for production by eliminating waste (non-value added activities) that inflate costs, lead times and inventory requirements, and emphasizing the use of preventive maintenance, quality improvement programs, pull systems and flexible work forces and production facilities. Principles of lean include zero waiting time, zero inventory, scheduling (internal customer pull instead of push system), batch to flow, line balancing and cutting actual process times. To find out the Muda, Mura, Muri in process we go for detail time study of all activities. Time studies consist measuring the time taken in series of operations in such a way that the ineffective time is shown up and can be separated out. In practice, proving existence of the ineffective time is the most difficult task. Breaking the job into elements to ensure that productive work (or effective time) is separated from unproductive activity (or ineffective time). Then, distinct part of a specified job selected for convenience of observation, measurement and analysis. We carried out time study for all activities of Nut Bolt.

## 2. Problem Statement

Our aim is to increase the number of Nut Bolts to be dispatch. It could be done by reducing the cycle time of process. Reduction of process cycle time could be done by, Eliminating the non-value added works in each individual process stage. As concentrated to reduce the cycle time of material flow. As per physical observation, there are some non-value added works. To eliminate those non-values

added works Time Study & Activity sequence need to be modified & need to use lean manufacturing techniques. In Nut Bolts, major processes like Rod cutting, Head making, Head trimming, Thread rolling, Machining and Polishing. The Production rate for Nut Bolt is 3440/month. The throughput time want to be reduced by Lean Manufacturing Techniques and improve the production rate.

## 3. Methodology

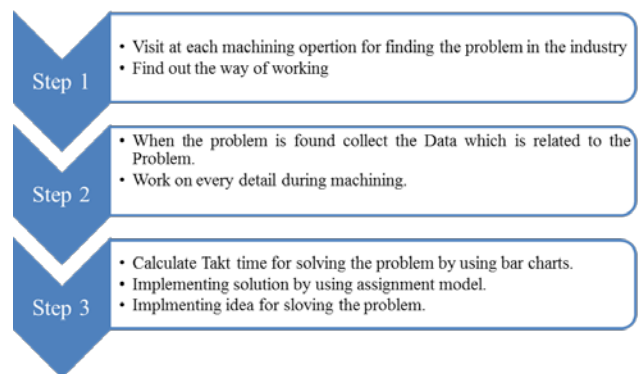


Fig. 1 Methodology

To reduce cycle time the following process for manufacturing change.

### 3.1 Observation of process to identify 3M’s

Lean manufacturing is a Japanese method focused on 3M’s. “Muda” for waste in process. “Mura” for inconsistency in product, processes and systems. “Muri” for unreasonableness physical strain of operators. “Muda” means waste. Muda specifically focuses on activities to be eliminated. Waste is broadly defined as anything that adds cost to the product without adding value to it.

Breaking the job into steps to ensure that productive work (or effective time) is separated from unproductive activity (or ineffective time). Then, distinct part of a specified process selected for convenience of observation, measurement and analysis. We recorded time for all activities of Nut Bolt.

Table 1: Time study

Sr. No.	Processes	Time Required (Sec)
1	Rod cutting	90
2	Head making	250
3	Head trimming	300
4	Thread rolling	150
5	Machining	100
6	Polishing	40
Total		930

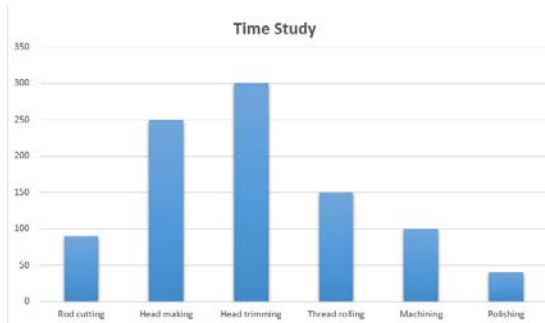


Fig. 2 Time Study

After analysis from Pareto Diagram we find out major activities to be focused so as to reduce through put time to credit the component. So, focused on above major activities with lean techniques, we reduced total through put time of credit the Nut Bolt by following process improvements.

Table 2: Process Improvement

Sr. No.	Processes	Time Required (Sec)	Muda Identify	Action Taken
1	Rod cutting	90	Muda of Handling	Propose to change the layout of storage location near work center.
2	Head making	250	Muda of processing	Find root cause of problem. Activity shifted to Foundry.
3	Head trimming	300	Muda of processing	Find root cause of problem. Activity shifted to Foundry.

4	Thread rolling	150	Process Improvements.	One more skill worker given.
5	Machining	100	-	-
6	Polishing	40	"Muda of Handling	Do this activity while machining.

#### 4. Result

The cycle time of Nut Bolt reduced by eliminate some non-value added works as per Lean Manufacturing System. Ultimately due to cycle reduction the number of Nut Bolts dispatch per month has been increased. It shows increase in the total monthly production of Nut Bolts in last four month as we improved the processes one by one by eliminating the Muda.

Table 3: Monthly Improvement

Sr. No.	Month	Quantity
1	November	8415
2	December	8440
3	January	8465
4	February	8470

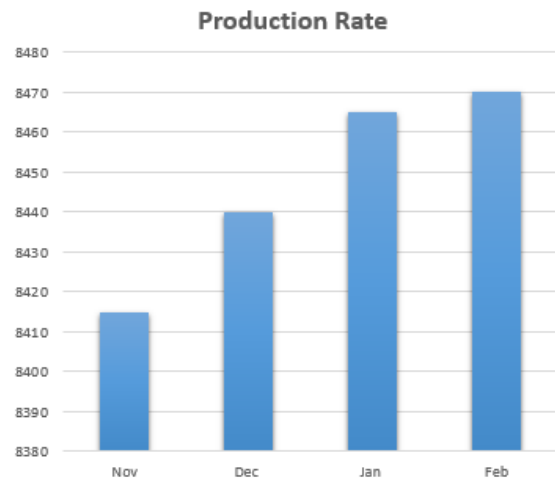


Fig. 2 Monthly Improvement

#### 5. Conclusion

Lean manufacturing appears to hold considerable promise for addressing a range of simultaneous, competitive demands including high levels of process and product quality, low cost and reductions in lead times. This Case Study addresses the application of lean manufacturing concepts to the continuous production sector with a focus on the Pump manufacturing industry.

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