

“Enhancement of Productivity at Sai Nath Fastners Through Lean Tool”: PDCA-Demings Cycle

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Abstract — Lean Concept has a good reputation of uncovering waste in manufacturing, survey production and business process by identifying, calculating and removing non value adding steps. Over all Lean is an easy method of recovering a product's production path from door to door and to various machining operations. In a process survey is done where all non value added actions are searched and identified in each step and between each step there is estimations of its wastage time and resources are identified. Manufacturers face challenges in efficiencies in their manufacturing operations.

Keywords — Demming Cycle, VSM, PDCA.

1. INTRODUCTION

Lean Manufacturing means "A systematic approach to identifying and eliminating waste through continuous improvement by flowing the product at the demand of the customer "Lean Manufacturing is an approach which is all about looking at the time line right from the moment the customer gives an order till the point when we collect the cash. And we always approach to reduce that time line by eliminating the non – value added wastes [1]

Lean is all about doing more with less: less time, space, inventory, money and labor,. "Lean manufacturing", a shorthand for the commitment to eliminate the waste, give simple procedures and speeding up production. Lean Manufacturing which is also known as the Toyota Production System is, in its most basic form, for the systematic elimination of waste. Five areas which drive lean manufacturing/production [2] are -Cost, Delivery, Quality, Safety, and Moral

2. LITERATURE REVIEW

Michael H. Mc Givern, Alex Stiber, studied and proposed the Lean Manufacturing System and implemented it firmly in an Organization and analyzes the results[3].

It is a very fine tool of lean manufacturing which helps to understand very well the flow of material and information as products that makes their way through the value stream [4].

The value stream includes the value adding and non-value adding activities that are required to bring out a product from raw material through the delivery to the customer [5]. In other words, value stream mapping (VSM) is an outline of a product's manufacturing life cycle that identifies each and every step throughout the production process. It is a visual representation of the material and information flow of a particular product family [6].

The thought of the Plan-Do-Check-Act (PDCA) cycle was initially conceived by Walter Shewhart and W. Edwards Deming was the one who first coined the term PDCA and he encouraged the Japanese in the 1950s to adopt the PDCA method. The PDCA cycle, also called the Deming wheel [7], or by Deming himself the Shewhart cycle [8],



Figure1: Plan-Do-Check-Act (PDCA) Deming cycle Part of lean manufacturing is assessing operations and processes or products that add cost rather than value. This is known as value stream which is a set of processes required to transform raw materials into finished goods that customers value. Bo & Mingyao used the value stream mapping tool for the Chinese enterprise in order to reduce costs, increasing efficiency and improve product quality. BO & Mingyao have suggested the combined kaizen plan to go for implementing the lean manufacturing and manage the each opportunity to plan as a project

Lean Approach

Lean organizations are highly customer focused, providing the lowest cost products, highest quality, in the shortest lead time possible. According to a book "Lean Thinking" by James P. Womack and

Daniel Jones, the Lean approach can be summarized in five principles (Womack and Jones, 2003):

- a) Specify what creates value from the customer’s perspective
- b) Identify all the steps along the process chain
- c) Make those processes flow
- d) Make only what is pulled by the customer
- e) Strive for perfection

3. METHODOLOGY

A new strategy for better implementation of lean system and continuous improvement of work flow Demming cycle can be used. In this Plan –Do – Check– Act is followed

- PLAN-Planning to analyses the system which need improvement
- DO- Make necessary changes where ever required for flow betterment
- CHECK- Check that implementation is actually working in positive way.
- ACT-Now the proposed system is finalized to carry out practically.

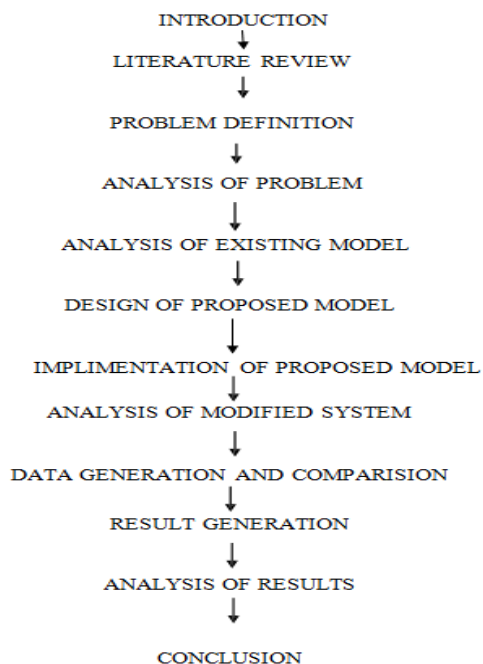


Figure2: Methodology Chart

4. MODIFIED PROPOSED SYSTEM AND COMPARISON WITH EXISTING SYSTEM

After viewing the current status of Sai Nath Fasteners, Acc to PDCA there was a planning in planning section of this paper also termed as PLAN of PDCA. Now that plan has to be implemented and done in accordance of achieving efficient system.As three components of the studied items are found to be typical and needs change. There are the following

changes which can be done and checked further. Following are the modification calculated after changing layout and working pattern.

5.1.Modified Proposed System Process Flow Table Of Each Job With Time

(A)Two Wheeler Side Stand (Existing system)

Process	No. Job	Total Time
(a) Rod Tube		
(i) Cutting	2000	9 hrs.
(ii) Punching	2000	5 hrs.
(iii) Drilling	2000	28 hrs.
		42hrs.
(b) Piece Pivot		
(i) Shearing	2000	2 hrs.
(ii) Blanking	2000	5 hrs.
(iii) Punching	2000	5 hrs.
(iv) U Bend	2000	6 hrs.
(v) 2 nd Punching	2000	7 hrs.
(vi) Threading	2000	28 hrs.
		53 hrs.
(c) Stoooper		
(i) Shearing	2000	1 hrs.
(ii) Blanking	2000	2 hrs.
(iii) U bend & Forming	2000	2 hrs.
		5 hrs.
(d) Thread Plate		
(i) Shearing	2000	1 hrs.
(i) Blank & Punch	2000	4 hrs.
(ii) Channel	2000	5 hrs.
		Total : 10 hrs.
(e) Welding	2000	49hrs

Total 149 hrs per 2000pcs

(C) Two Wheeler Side Stand (Modified)

Process	No. Job	Total Time
(a)Rod Tube		
(vii)Cutting	2000	6 hrs.
(viii) Punching	2000	4 hrs.
(ix) Drilling	2000	14 hrs.
		24hrs.
(b)Piece Pivot		
(iv) Shearing	2000	2 hrs.
(v) Blanking	2000	4 hrs.
(vi) Punching	2000	4 hrs.
(x) U Bend	2000	4 hrs.
(xi) 2 nd Punching	2000	4 hrs.
(xii)Threading	2000	15 hrs.

		33 hrs.
(c)Stooper		
(iv) Shearing	2000	1 hrs.
(v) Blanking	2000	2 hrs.
(vi) U bend & Forming	2000	2 hrs.
		5 hrs.
(d) Thread Plate		
(iii) Shearing	2000	1 hrs.
(iv) Blank & Punch	2000	4 hrs.
(v) Channel	2000	4 hrs.
		09 hrs.
(e)Welding		
	2000	20hrs

Total 91hrs per 2000pcs; Reduction of 58 hrs
(B)Axil Plate (existing)

Process	No. of Job	Total Time
1. Shearing	2000	2 hrs.
2. Blanking	2000	8 hrs.
3. Slotting	2000	6 hrs.
4. Punching	2000	6 hrs.
5. Threading	2000	21 hrs.
6. Small Drill	2000	21 hrs.
7. U Bend	2000	3 hrs.
8. Slotting	2000	3 hrs.

Total 70 hrs. per. 2000 Pcs.

(B)Axil Plate (Modified)

Process	No.of Job	Total Time
1. Shearing	2000	1hrs30m.
2. Blanking	2000	6 hrs.
3. Slotting	2000	6 hrs.
4. Punching	2000	6 hrs.
5. Threading	2000	15 hrs.
6. Small Drill	2000	15 hrs.
7. U Bend	2000	3 hrs.
8. Slotting	2000	3 hrs.

Total 55 hrs30min. per. 2000 Pc, Reduction of 14hrs 30mnt

Process	No. of Job	Total Time
(I) Shearing (10 sheet)	2000	1hr
(ii) Blanking	2000	7 hrs.
(iii) Forming	2000	8 hrs.
(iv) Punching	2000	7 hrs.
(v) Embossing	2000	7 hrs.
(vi) Second Forming	2000	9 hrs.
(vii) Welding	2000	21 hrs.

(C) Mud Guard (existing system)

Process	No. of Job	Total Time
(J) Shearing (10 sheet)	2000	1hr
(ii) Blanking	2001	5 hrs.
(iii) Forming	2000	5 hrs.
(iv) Punching	2000	5hrs.
(v) Embossing	2000	5 hrs.
(vi) Second Forming	2000	7 hrs.
(vii) Welding	2000	14 hrs.

Total – 59 hrs. per 2000 pieces

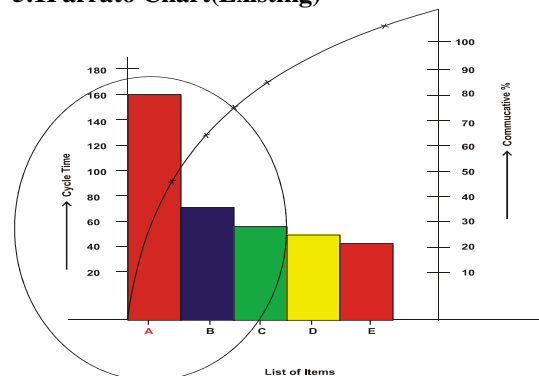
(C) Mud Guard(Modified System)

Total – 42 hrs. per 2000 pieces, Reduction of 17hrs

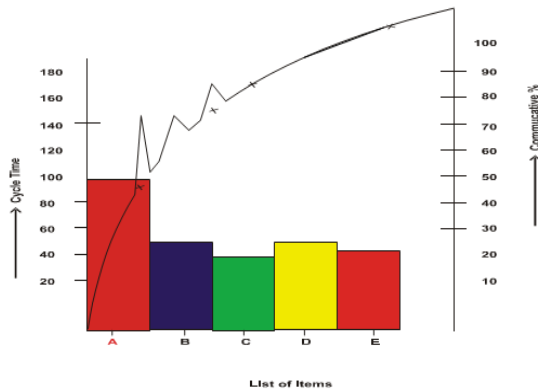
5. RESULT

By converting long assembly line into work cells, the assumed worker multi- skilling seems effective as well as communication between operators is fast and accurate.The problem of low flexibility is eliminated by cellular manufacturing,

5.1Parrato Chart(Existing)



ParratoChart(Modified)



Parrato Chart is a graphical representation of work flow time with commulative time for specified job in order to cross check the problematic element.

5.2. Combind Time Chart For Process Flow Per 2000 Piece

Product	Total Time(existin g)	Total Time(Modifi ed)	Time difference after modificatio n
A	149 hrs.	91hrs	58hrs
B	70 hrs.	55hrs 30mnts	14hr30 m
C	59 hrs.	42hrs	17hrs

CONCLUSION

In this work at spare parts, the Lean Manufacturing tools and techniques especially PDCA were studied and used in case company. The other benefits observed are the flexibility of requirement changeover and rework reduction. Thus the initial assumptions were solved by this study in the case company. The problem of low flexibility is eliminated by cellular manufacturing, because there is very low WIP inside the process, so the line can be changed immediately if needed.

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