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# PRODUCTIVITY IMPROVEMENT THROUGH LEAN ANALYSIS FOR OPTIMIZING ASSEMBLY LINE IN COMPRESSOR INDUSTRY

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**Abstract -** *In present scenario, Industries need to perform efficiently with high rate of production for which they need continuous improvements and which can be made by applying various management tools. Lean tool applied in Compressor manufacturing Industry to minimize the worker movement and fatigue resulting in increase in production. This paper discusses as by applying lean tool how the performing efficiency is increased with high rate of production*.

***Key Words***: **Lean, Performing Efficiency.**

## 1.INTRODUCTION

Companies work on continuous improvement strategy which give them the advantages to improve quality, reliability and service to customers. Lean basically focuses on elimination of waste by observing Non-value added activities in assembly line.

This case study is done in Compressor assembly section where number of operations were performed sequentially at different work stations. The purpose of this study was to improve safety, quality, performance, flexibility and minimize space, scarp, waiting.

In this paper, improved material management implemented in company and other modifications done with lean tool are discussed.

Lean in simple terms is eliminating non value added activities by observing the process flow of product and implementing Kaizens, pokayoka, safety measures etc.

### 1.1 METHODOLOGY

I. The process flow of compressor assembly was studied.
II. The literature survey on assembly line implemented using Lean Technique was studied.
III. Small Improvements done for better product flow, better quality.

### 1.2 PROBLEM STATEMENT

The major time for assembling compressors was wasted due to material unavailability at workstations and also during model changeover time. The total 18 workstations were dependent on each other resulting in line stoppage due to material unavailability.

The small improvements on workstations were needed to improve the throughput.

## 2. IMPLEMENTATION

**Fig-1:** Material Store

**Fig-2:** Material Store

The above Fig.1 and Fig.2 shows the earlier material store from where material need to be reached to assembly workstations.

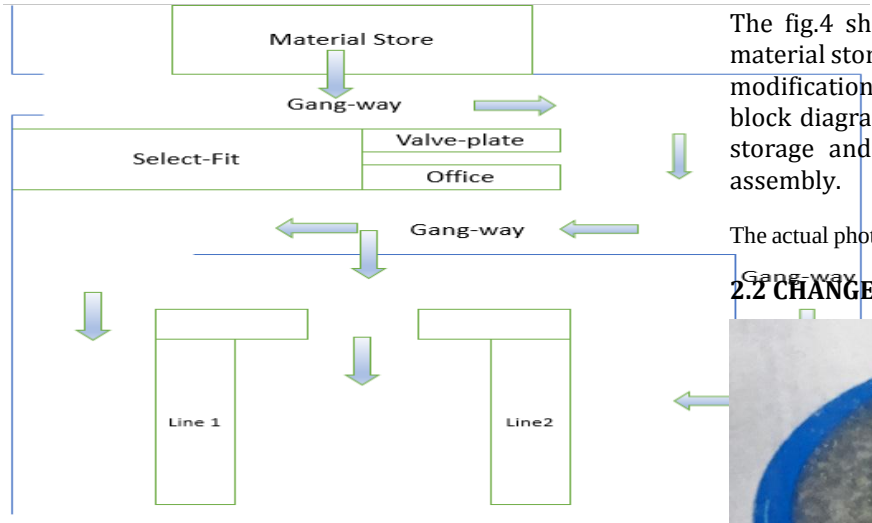


**Fig-3:** Block diagram of material flow

The Fig.3 shows the block diagram in which arrows indicates the material flow path by trolley, stacker etc. for old assembly layout.


**Fig-4:** New material storage area

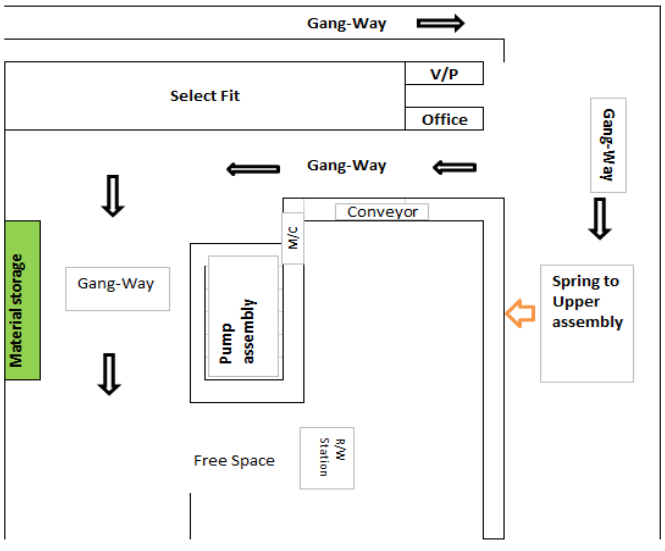


**Fig-5:** New layout of assembly line and material store

The fig.4 shows the best utilization of area by bringing material storage next to work stations during assembly line modification. The fig.5 shows the new material storage area block diagram in which green color is shown for material storage and accordingly the material handling path in assembly.

The actual photograph of implemented material store is shown in fig.4.

## 2.2 CHANGE IN PISTON OILING PROCESS

**Fig-6:** Old oil process

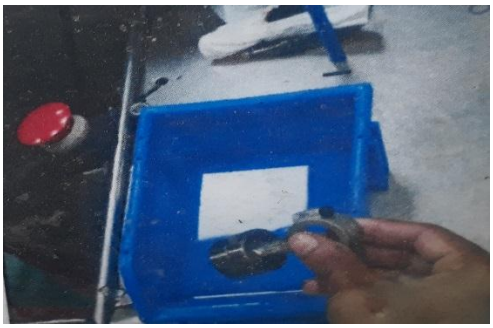

**Fig-7** New oil process

For oiling process as shown in fig-6 using foam in oil tray and dipping piston in it causes some small particles stick to it, resulting in piston assembly tight/lock problem.

The problem was sorted by changing oiling process shown in fig-7 in which removed foam sheet from tray and kept only oil for dipping piston in it for lubrication. Instruction given to worker to change oil during shift start.

## 2.3 GASKET SELECTION STORAGE

Before After

For gasket selection marking the rack with compartments is prepared with label of gasket size on it with the purpose that operator could find it easily shown in after condition.

### 2.4 CHANGE IN ASSEMBLY PRODUCT FLOW

Before

After

The process flow assembly from one station to other was discrete and after it was made on pallets with rollers i.e single piece flow. This modification helped to move assembly faster than previous flow.

The 5'S technique used for marking on assembly material in order to find things quickly.(fig-8)

**Fig-8:** Marking for material as per 5'S concept

### 2.5 VALUE ADDED ACTIVITIES IMPLEMENTATION

The pneumatic guns replaced by DC torque machines for three stations that are bearing assembly, cylinder head torque and shock loop assembly.

Before


After

Operations of these stations performed by air rench was requiring manual torque which by DC torque machines is neglected. Due to this it saved the few seconds of the operation and quality of the work improved.

## 3. CONCLUSIONS

Lean techniques applied helped the process of assembly to increase the throughput by small modifications. The main aim of lean technique is to identify non-value added activities and eliminate them with alternative.

The improved material management reduced half the time to reach material at workstations. The various improvements made helped to increase productivity, improve quality of product.

## ACKNOWLEDGEMENT

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