Study of Lean Manufacturing for Manufacturing of Auto Components

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Abstract

Lean manufacturing is the manufacturing philosophy and the system that was given by the Toyota, Japan and now the many of the manufacturers are using these techniques in industries. “Lean is simply a systematic technique or approach to identify and eliminating the waste through the continuous improvement by flowing the product at the pull of the customer in pursuit of the perfections. The main aim is to eliminate the wastages in every area of the production including the customer relations and the product design and suppliers”. Lean tools and approach are very much popular in the automobile component manufacturing which is improving the growth initiatives in the automobile industry in last two decades. In automobile these lean tools like JIST, 5S, Six Sigma, FIFO, LIFO, Continuous Improvement, JIS, Kanban processes also helps in the rapid development and growth in assembly line and overall production and growth specially in automobile sector. Nowadays almost 70% to 80% improvement in most of industrial growth is due to the approach of lean manufacturing.

Keywords- JIST, 5S, Six Sigma, FIFO, LIFO, Continuous Improvement, JIS

I. INTRODUCTION

Lean manufacturing often simply “lean”, is a systematic method for the waste minimization with a manufacturing system without sacrificing productivity. This philosophy is derived from the Toyota production system (TPM) identified lean in 1990’s. its basically also deals with the wastage produce due to over production, transportation and waiting etc.

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The basic purpose of this study to know about the practical analysis and improvement process of lean tool.
II. Research Methodology

The research methodology used in this is a study of lean manufacturing tools practical analysis and the improvement in the industry carrier wheel pvt ltd. This study allows the researchers to know about the principles, processes and the application of these tools in a auto component (wheel) manufacturing industry. The industry uses the following tools like Jit, Jis, 5S and continuous improvement in the production line or assembly line and in the quality inspection department. In this we have seen the practical applicable process of these tools which helps in improvement of the productivity, efficiency and the overall growth of the industry by reducing the wastages. It also helps in maintain the wastage of over-production, waiting, inventory waste. It also shows how actually the implementation of the lean manufacturing in the industry has undergone and shows the improvement of the industry. The following lean manufacturing method is as follows.

A. Continuous Improvement System

It is one of the Improvement Process that helps us to improve efficiency on the production line i.e. Up to 2%. It also helps us to improve the work flow in an organization. This approach is mainly used in the development of the process. The methods are:-
- Define
- Measure
- Analyze
- Improve
- Control

The process of the continuous improvement is done in the automobile industry in rim assembly line, improvement in the sheet metal sheet and improvement in the pickling process to remove the corrosion. Implementation of this was started in 2013 in the industry and has overcome the four methods:-
- Apply a personalize approach to workforce management.
- Integrate your tool
- Overcome with the score carding and the sound governance.
- Communicate your success.
B. 5S

It is one of the lean approach developed by the Japan so, as to maintain the proper standard and enables the just in time manufacturing. It is the system which is used to reduce the wastages and optimum productivity so, as to maintain the order sequential. It is the methodical way to organize your workplace and your working areas as being on overall philosophy and the way of working it splits into the parts like (seiri, sieton, seiso, seiketsu, shitsuke).

Sort – it makes the work easier by eliminating the wastages on the rim production line.

Set in order- the operations and the operations is arranged in proper order so, as to get the finished product.

Shine- workplace should be clean and free from dust material so as to improve the quality.

Standard- machine, worker standard should be properly maintained to manufacture a product.

Sustain-it is the goal oriented process.

1) Implementation
   - Transmit the proper information
   - Transmit the standards
   - Build standards on the workplace.
   - Warning when abnormalities occur.
   - Stop the abnormalities
   - Defect prevention (error proof)

Finally, 5s also helps us to improve the quality and maintains the proper sequence for the overall growth of the industry.

![5S Organization of the workplace](image)

Fig. 3: Implementation of the lean system 5s

C. FIFO (First in First Out)

It is the lean technique which means first in first out. The part the goes in will be the first that goes out. This technique helps to maintain the proper order and systematically sequence. In this there is also a limit to the no of parts in the Fifo lane. This also refers to ensure that the older stock should be used first and thus maintains the absolute inventory. Nowadays this system is almost used in all the industry which helps in maintaining the proper level and thus, improves the quality of the product by reducing wastage and leads to increase the production rate in this the several system and several inventory models like the economic order quantity, multiple order inventory level is being used.

The principle and practice of maintaining precise production and conveyance sequence by ensuring the first part enter a process or storage location is also the first part to exist. It is generally necessary for the pull system implementation.

The following points are to be considered as the part of the FIFO system:-

- Materials used are drawn from the cost record in logical and in the systematic manner.
- Movement of the material is continuous, orderly manner that represent the condition that is necessary and consistent with the efficient material control.
- This technique was started in the year 2013 in the wheel manufacturing industry (carrier wheel pvt ltd.).
- This tool is mainly follows in the mass production when the quantity of the product is not very large also when there is a variation in the cost. There is also an visual management, it is usually easy to see if afifo lane is full or empty giving a lot of clues on the status of the system.
D. **Just in Sequence**

Jis is also one of the lean techniques that are mainly used to maintain the sequence in operations, machining and production parts. Jis also helps to improve the quality of the product and sequential level. Jis has a major role in him reducing the wastages and also helps to reduce the mismatch in the assembly line. Jis in sequence approach is to be maintained with the just in time technology. The product to be manufacture must be pass from stage to stage to stage so that is become helpful for the operation and as well as for the system to be maintained. Finally from the industry base point the focus of the lean manufacturing helps in reducing the work in process inventory. By this the following wastages are going to be reduce.

- Wastage of over-production
- Wastage of waiting
- Wastage of unnecessary transportation
- Wastage of defective inventory
- Wastage of unnecessary motions
- Wastage of defected product

Therefore, it is necessary to maintain the proper quality and sequence to set-up the lean manufacturing techniques.

E. **Just in Time**

Just in time is also a technology that is actually means for mass production which means the right material at right time at right place and in right order. Just in time manufacturing also helps us to improve the productivity and overall growth of the industry. By using this technique wastages are reduced in the industry and quality of the product (rim) gets improved. It means where there is order of the discs and rims on the production line the material needs to there. This technology has given the good quality by reducing the cost and proper quantity of the raw material to be supplied. By using this technology the standards is properly maintained in systematic manner.

### III. ADVANTAGES

1) Improved quality of the product
2) Increased efficiency and maintain proper standards.
3) Easier to manage the work area.
4) Reduce the space by reducing the wastages.
5) Safer work environment
6) Improve the employee morale
7) Problem elimination
8) Increased the productivity

### IV. DISADVANTAGES

1) Time factor which reduces the productivity
2) The human factor
3) Lack of proper IT systems
4) Unbalanced economies
5) Negative perceptions by the staff
6) Cost of implementation
7) Cost of changing the existing structure
8) More tools/equipment’s/workbenches

V. APPLICATIONS

1) Education
2) Health care
3) Agriculture
4) Financial services
5) Military and government services
6) Software and IT services
7) Law

VI. CONCLUSION

The purpose of this study was to investigate how the implementation and practical analysis of lean manufacturing techniques and their tools work in the automobile industry. In the project lean manufacturing for manufacturing of the auto components leads to reduce the wastages an inventory level to be maintained which is the mother of the waste. After reducing the inventory level wastage is automatically reduced. By this way the optimum performance on the assembly line and on the inspection and testing line. There is also a tangible benefits in reducing the cost saving, space saving and process improvements etc. therefore. Lean is a continuous improvement process if we carry in a right way it may also results achieve simply fantastic. The major outcome after it has got perfectly implemented in the automobile industry is that it mainly requires the team work also and to reduce the lead time from start of manufacture of the product to the dispatch time and flexibility of the product is also get improved. At last, we conclude that the project of lean manufacturing for manufacturing of the auto components gives us the knowledge of to maintain our product level which helps to the overall development.

VII. FUTURE WORK

Future work of lean manufacturing is further going on which leads to increase the percentage of the improvement and the quantity of manufacturing of the components by reducing their lead time. In future the further research is also going on to make this approach stable both in large as well as in small scale industries. This also leads to give more output by giving the lesser input that leads to the growth of the productivity.

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