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Throughput Improvement by Application of Lean Manufacturing Technique 5S

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ABSTRACT: Lean manufacturing by applying 5S in manufacturing industries gives a upper hand for the organization to reduce cost due to scrap & non value adding activities. 5S is a disciplined, data-driven approach and methodology for eliminating defects in any process – from manufacturing to transactional and from product to service. The fundamental objective of the 5S methodology is the implementation of a measurement-based strategy that focuses on process improvement. It can also be employed if a current process requires more than just incremental improvement. This paper includes implementation of 5S approach in auto parts production line.

KEYWORDS: 5S, Production line, Production process, production line layout, workplace.

I. INTRODUCTION

There are five 5S phases: They can be translated from the Japanese as "sort", "set in order", "shine", "standardize", and "sustain". 5S is the name of a workplace organization method that uses a list of five Japanese words: seiri, Seiton, Seiso, Seiketsu, and Shitsuke. 5S was developed in Japan and was identified as one of the techniques that enabled "Just in Time" manufacturing.

5S implementation ensures continuous improvement in housekeeping and results in better environment and safety standards. Organising 5S team will result in maintaining a quality environment in the firm. Quality environment includes both order and cleanliness. 5S becomes more effective when it is integrated to management system. The 5S process is a very simple methodical team based approach to organizing your work space to ensure that it is tidy, arranged ergonomically, efficient and capable of repeatable, quality output. It does this through a simple five stage process, each step starting with the letter "S" hence the name 5S.

The 5S process is not one that can be forced onto an area by an outsider, it a process of improvement that is conducted by the people that work within the area itself. They become responsible for and have ownership of all of the improvements and changes that they implement. The benefits of 5S for Lean are significant, it is suggested that efficiency gains of the order of 10% to 30% can be achieved, and certainly within my experience of handling many 5S program implementations these levels of success have always been achieved, even in companies that already claim to have implemented 5S.

II. EXISTING LAYOUT OF COMPANY

The company manufacturers variety of automobile product on production line shown in fig no.1

The production line consists of CNC machine, Lathe machine, Drilling machine, Grinding machine, Balancing machine, Hydraulic machine. On these machines several products are manufactured as per demand placed by customers. Components produced on production line such as impellers, housings, cover plates, front wheel hubs and rear wheel hubs, engine heads, engine blocks. All operator measuring quality parameters checked by operators on production line and critical measuring parameters measure in standard quality control lab.

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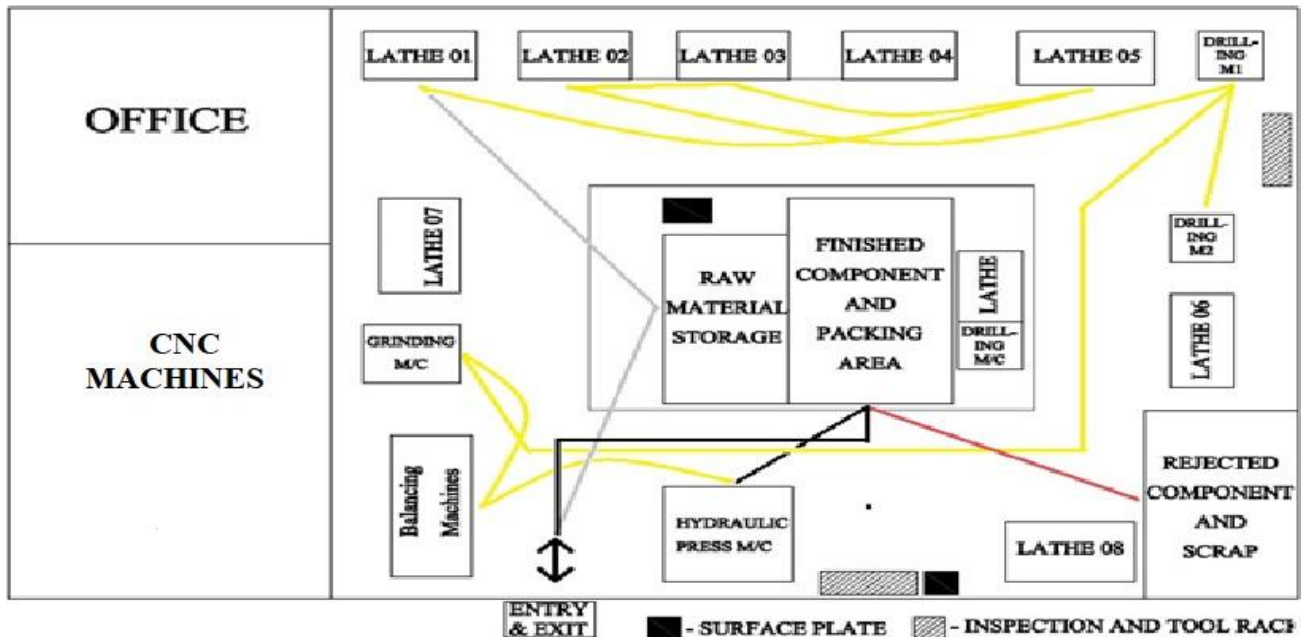


Fig.1 Layout of production line

III. PROBLEM WITH EXISTING TECHNIQUE

Here the flow is approximately 400 feet and this is done manually which makes this process more complicated. Machine arrangement is not appropriate here the new machines added are so placed according to the space available. This has made the length of the travel more. The time required just travel a single component is approximate 14 to 22 minutes and if the components are heavy it need 3 workers and it would take more time on availability of the worker. In present condition in process inspection and final inspection is difficult to carry out because no proper space is available due to improper machine shop layout and the inspection device are not maintained properly.

A. IMPROPER MATERIAL HANDING

There is no any technique used for material handling. All the material or the raw material is transported by hand. In order to transport 2 to 3 workers are involved. The time for transporting in more as only one heavy of 2 components are transported at one time. This results in more time for transportation of the material. This may stop some machine ideal due to no delivery of the components, or the worker working on the machine would transport the material. This process is more time consuming which has its effects on the rate of the production. Workers involved in this process suffer during transporting large components. Thus, this technique used in material handling are not appropriate in order to meet the acceptance as the flow get uncorrupted which leads in increase in the production time and maximum it hampers the workers as more stress in produced on these people in order to complete the production in time.

B. LOW PRODUCTION RATE

The working of the company has the fixed hours that are 7.00 to 5.00. it doesn't have any shift. Thus, in order to complete production the workers are stressed which hampers the workers' health as well as the physiology. There is no any technique to allot the work to the machine.

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Following are the factor that affects the productivity

1. The material handling technique is also manual.
2. Improper flow of the material.
3. The instrument used is not placed on the appropriate place and there is no any good method to store them, hence misplacing of them affects on the production.

C. ELECTRICAL POWER PROBLEM

The power supply to the company is taken from local commercial line; there was no any special transformer for the company which resulted in to frequently breakdown of the electrical problem.

IV. PERCENTAGE OF ON TIME DELIVERS (OTD) BEFORE 5S TECHNIQUE

Percentage of on time delivers for selected housing product from the month August and September is shown in table 1.
Table.1 Percentage of On Time Delivers before Lean Manufacturing

Month	Week 1 st	Week 2 nd	Week 3 rd	Week 4 th
Aug-18 Housing	73.00 %	88.87 %	89.53 %	81.20 %
Sep-18 Housing	90.00 %	92.77 %	80.67 %	85.33 %
Aug-18 Hub	84.44 %	92.34 %	90.22 %	99.86 %
Sep-18 Hub	92.55 %	90.65 %	85.78 %	97.63 %
Aug-18 Break Drum	86.50 %	84.59 %	82.18 %	83.65 %
Aug-18 Break Drum	85.67 %	83.77 %	45.50 %	90.83 %

V. 5S IMPLEMENTATION

A. SET IN ORDER

The second S reflects a very popular saying: “A place for everything and everything in its place”. It emphasises safety, efficiency and effective storage and consequently improves the appearance of the workplace. Once the first S has been successfully implemented, what is left should be arranged so that there is ease of use and storage. The process shown in Figure eliminates waste in production or in clerical activities and ensures all materials, tools and equipment’s have designated locations which are easy to find. activities such as:

- Mark reference materials with an oblique line to detect disorder from a distance.
- Put names and numbers on all jigs and tools.
- Store tools beside the machine with which they will be used according to sequence of work operations.
- Store similar items together.
- Store different items in separate rows.
- Do not stack items together, use rack or shelf.
- Use small bins to organise small items.
- Use colour for quick identification of items.
- Label clearly each item and its storage area (Visual Control)
- Use see-through cover for better visibility.
- Use specially designed carts to organise tools, jigs and measuring devices that are needed for each particular machine.

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Fig.2 Tool Storage Set in Order



Fig.3 Jobs Store in Racks



Fig.4 Jobs Placed as per order

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B.SHINE

The third S stresses on cleanliness because it ensures a more comfortable and safer workplace, as well as better visibility, which reduces retrieval time and ensures higher quality work, product or service. All equipment malfunction or defects must be fixed or reconditioned. The key word in this description is keeping the workplace and everything in it clean and in good functional condition. This is achieved through the combination of the cleaning function and defect detection.



Fig.5 location of Lathe in lighting clean area



Fig.6 location of CNC in lighting clean area

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VI. RESULT AND DISCUSSION

1. Items easily returned to its designated location after use.
2. Required items easily located, stored and retrieved.
3. First-In First-Out (FIFO) is practised.
4. Retrieval time is reduced.
5. Right Item, Right Place, Right Quantity and Right Method (4R) are in place.

VII. ANALYSIS OF PRODUCTION RATE BEFORE AND AFTER 5S TECHNIQUES

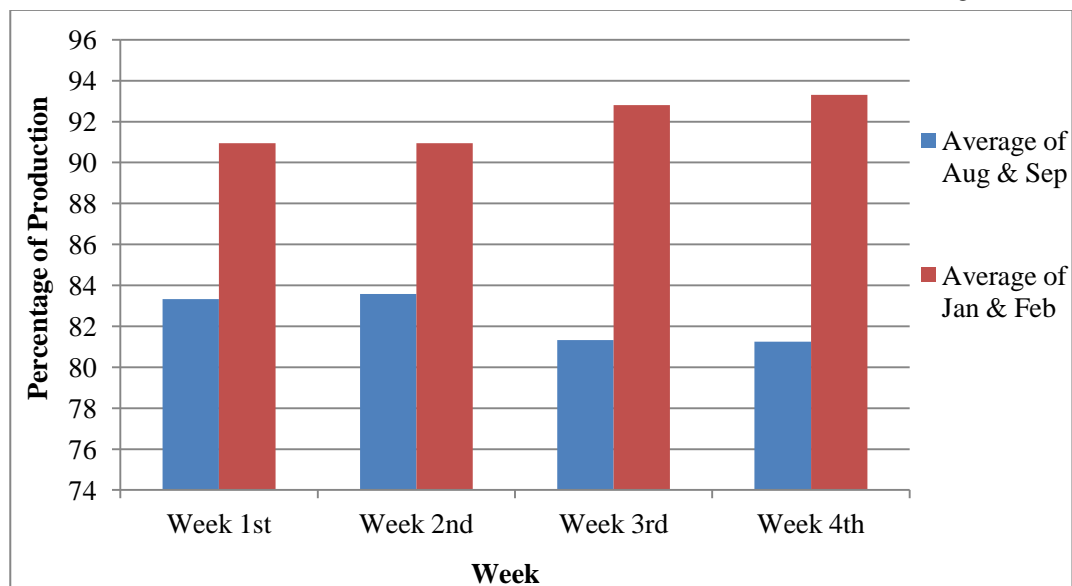


Fig 7: Analysis of Production Rate Before and After 5S Techniques

VIII. CONCLUSION

The Project aims for demonstrating the detailed implementation of '5S' in the organization which resulted in:

1. Proper workplace management for better use of working area.
2. Time saving in searching for tools and materials due to proper location and identification.
3. Huge cost saving from waste and unwanted materials.
4. Increased morale of the workers due to enhancement of working environment.

5S brings a new dimension to management philosophy and provides an interesting challenge to the traditional ways of looking at an organization's profitability. Adopted within a wide variety of organizations and settings, it appears that organizations using 5S have determined that it can help them achieve a number of management objectives, including continuous improvement. It is relatively a simple technique which can be easily applied in any organization and the results of it are rapidly visible.

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