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PRODUCTIVITY IMPROVEMENT IN LIGHT & MEDIUM DUTY CHASSIS ASSEMBLY LINE AT VE COMMERCIAL VEHICLE

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ABSTRACT

The research was done in sub-assembly area and the main assembly line in Volvo Eicher Commercial Vehicle plant, plant deals with continuous production & supply of Low, Medium & Heavy commercial vehicles to its customers. Research given the work content & variability reduction of MCV model (11.10 E-WB) in Main assembly line. Present line has very less automation & most of the operations are done manually. That causes the work content & variability are more in each station of Main assembly line. Present line has a problem of line balancing and also the problem of tools & fixtures at various stations.

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KEYWORDS:.

INTRODUCTION

The research was done in sub-assembly area and the main assembly line in Volvo Eicher Commercial Vehicle plant, plant deals with continuous production & supply of Low, Medium & Heavy commercial vehicles to its customers. Plant have separate Sub-assembly area which supply the sub assembly to the Main assembly line, Engine assembly area and Engine testing department, two Main assembly line one for LCV & MCV & another for HCV, these departments are very important very important in whole plant. MCV & LCV are large profit earning and selling models of VECV. Research given to me was the work content & variability reduction of MCV model (11.10 E-WB) in Main assembly line. Present line has very less automation & most of the operations are done manually. That causes the work content & variability are more in each station of Main assembly line. Present line has a problem of line balancing and also the problem of tools & fixtures at various stations.

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OBJECTIVES

The main objectives of the paper are:

- Identify & reduce Non Value Added Activities percentage & Variability percentage in assembly stations.
- To increase the utilization of resources, manpower & facilities available in stations.
- To develop a new fixtures & tackles to reduce operation time.
- To develop more Ergonomic method of doing operation.
- Line balancing is not proper at MCV chassis assembly area.
- Preparation of Operation Sheet.
- Preparation of sustenance plan.

METHODOLOGY

PROBLEM IN EXISTING SYSTEM

Study of the MCV chassis assembly line stations they found out certain problem in existing system

- **Excess work content:** The biggest disadvantage of the present method is the more work content of MCV chassis assembly line due to various non-valuable activities. Thus increase the cost associated with it.
- **Low production rate of MCV per shift:** Present assembly line production rate is less as compare to the future predicted demand of MCV.
- **Old method of operation:** The present method of doing operation is not ergonomically design due to which operation time & operator time increases.
- **Present method & equipment have more ineffective time & activity:** As mentioned earlier, the present method has many non-valuable activities in it, as this was designed many year before. Which increase ineffective time of MCV assembly line.
- **Less utilization of available manpower:** In present method of MCV production is less due to more work content, ineffective time & non-valuable activity, which final have effect on manpower utilization. More operators are needed to achieve the production target with in available time. Thus the cost of production increases.
- **More operator's efforts:** Present method s of operations are old has many non-valuable activities, which increases the operator efforts & fatigue.
- **Line balancing efficiency less and waiting time is more:** Present MCV assembly line balancing efficiency is very less due to improper line balancing between different stations of assembly line.
- **Required facilities provided i.e. tools & fixtures:** If sufficient tools are not provided to workers, and then this becomes the reason of delay.
- **Training:** Training is an important part to avoid the excess work content, variability and also rework but in present there is absence of facility for casual training.

METHODOLOGY TO SOLVE THE EXISTING PROBLEMS

The methodology adopted to achieve the objective of the research was 'SREDIM' is the most common methodology used in a method study project & 'select, record, examine, develop and define, install, and maintain (SREDIM)'.

- **Selecting the task to study-** The first step consist of selecting task on the basis of it being an identified problem area.
- **Recording the facts about it**- The record stage of method study was to provide a sufficient data (in term of bath quality & quantity) to act as the basis of evaluation & examination.
- **Examination of recorded data**- This was the most important stage in the project. The step deals with examining the recorded process by seeking answer to the recommended questions. The more closely the job is examined and consider the easier it is to identify the possible alternative, more effective methods.
- **Developing new methods**- This step deals with developing new methods of executing the task, by taking into the account, the result of critical examination. The new method was developed by combination of entirely eliminating some activities, combining same parts, changing the sequence of some activities and by simplifying the content of others.
- The technique like brainstorming, literature survey & visit to other organization help in this regards. The new methods required to compare with the existing method. Here also, process flow charts & flow diagrams were used for the purpose of comparing with it with the old or existing method.
- **Implementing the new methods-** This step of project involves managing the chances and ensuring that everybody involved understands the changes. If a new method is installed immediately over an old method- then there is complete certainty that it is going to work.
- **Maintaining the new method**- Every method of the operation team needs to be committed to the new method.

PROCEDURE USED TO ANALYZE & REDUCE 3M'S

3M's

Muda

Muda is a traditional Japanese term for an activity that is wasteful and doesn't add value or is unproductive. It is also a key concept in the Toyota Production System (TPS) and is one of the three types of waste (Muda, Mura, and Muri) that it identifies. Waste reduction is an effective way to increase profitability. Muda has been given much greater

attention as waste than the other two which means that whilst many Lean practitioners have learned to see muda they fail to see in the same prominence the wastes of mura (unevenness) and muri (overburden). Thus whilst they are focused on getting their process under control they do not give enough time to process improvement by redesign.

Muri

Muri is a Japanese term for overburden, unreasonableness or absurdity, which has become popularized in the West by its use as a key concept in the Toyota Production System. Muri can be avoided through standardized work. To achieve this a standard condition or output must be defined to assure effective judgment of quality. Then every process and function must be reduced to its simplest elements for examination and later recombination. The process must then be standardized to achieve the standard condition. This is done by taking simple work elements and combining them, one-by-one into standardized work sequences.

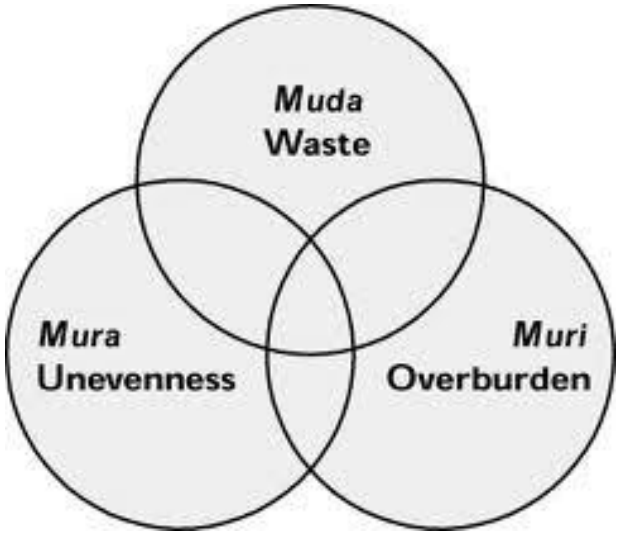

Figure 1: 3M's

Mura

Mura is traditional general Japanese term for unevenness, inconsistency in physical matter or human spiritual condition. Mura is avoided through Just In Time systems which are based on little or no inventory, by supplying the production process with the right part, at the right time, in the right amount, and first-in, first out component flow. Just in Time systems create a "pull system" in which each sub-process withdraws its needs from the preceding sub-processes, and ultimately from an outside supplier. When a preceding process does not receive a request or withdrawal it does not make more parts. This type of system is designed to maximize productivity by minimizing storage overhead.

PROCEDURE

1. First decide base model of assembly line
2. Capture current situation of a station by doing video shoot.
3. Take video of a station 3 times deploying the same operator.
4. Break the different operations into activity/sub activity by doing video analysis
5. Mention time against each activity/ sub activity of different operations.
6. Analyze the data & do variability study.
7. Mention cause of variability against operations where it is applicable
8. Identification of VA/NVA activities & reason. Calculation of VA/NVA in %
9. Perform 3M (Muri/Mura/Muda) analysis & Prepare 3M sheet
10. Classify 3M sheet into different category (Engineering/Line side storage/ store supply/Part quality/Manufacturing issue)
11. Prepare standard operation sheet in UDM format
12. Take actions/countermeasure against each improvement as categorized 3M.
13. Execution of actions

14. Modified existing operation standard & incorporate improvements
15. Give training to operator as per new modified operation standard
16. Again take video shoot of same station after doing improvement.
17. Repeat same activity from 3 to 8)
18. Measure Variability & compare it with earlier data of variability

RESULTS AND DISCUSSIONS

TANGIBLE BENEFITS

1. **Reduction in variability**:
   The biggest advantage of these study is the reduction in variabilty of work of LMD assembly line stations.
2. **Reduction in total work content:**
   Tha second biggest advantage of proposed method os the reduction in tataol work content of LMD assembly line. Thus, reduce the cost associatrd with it.
3. **Ergonomic method of operation:**
   The new method of doing operation is more ergonomically design than the old methods. New fixture, tackel and tools are simple in handaling and operation for the line operator.
4. **Better utilization of available time:**
   With the proposed method of assembly increse the utilization of total available production time per shift.
5. **Re-design of the process & equipments to eradicate ineffective time and activity**:
   As mentioned earlier, the present operation methods have many invaluable activities in it, which will be elimineted in proposed methods. Thus, eradicate ineffective time from the assembly line stations.
6. **Reduce worker's efforts:**
   As suggested in proposed method, workers efforts for performing operation activity is reduce, as it eliminated many in valuable activity from the process.
7. **Increase line balancing efficiency and reduce free time:**
   The propose method reduce the free time between groups in assembly line stations, as by proper line balancing.

INTENGIBLE BENEFITS:

1. Productivity boost for management & operator.
2. Motivation to the operator.
3. Market competence with reduction in cycle time.
4. Improve working condition & reduce absentees.
5. Timely customer requirement fulfillment.

CONCLUSION

After applying Industrial Engineering tools and Kaizen improvements the productivity of MD chassis assembly line will increases and also the variability of stations will reduces. The standard time for the MCV is the 7.5 min. per vehicle. The last year MCV production was approx 10000 and the current year production is approx 13000.

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