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A Literature Review on Cycle Time Reduction in Material Handling System by Value Stream Mapping

R. Arvind[1], Dr.N.Gunasekaran[2]
[1](PG Scholar, Department of Mech. Engineering, SNS College of Engineering, Coimbatore, India)
[2](Professor, Department of Mech. Engineering, SNS College of Engineering, Coimbatore, India)

Abstract: ***Cycle time should be considered as a viable option when an organization is trying to improve efficiency, cost base and customer responsive. Value stream mapping is a paper and pencil tool that helps you to see and understand the flow of material and information as a product or service makes its way through the value stream. This paper proposes how this valuable tool can be implemented effectively in means of loading and unloading of the materials. Forming a current state map for eliminating the non-value added activities, also to derive a future state map for reducing the cycle time and improve the process efficiency.***
Keywords: Cycle time reduction, Value added and non-value added activities, Value stream mapping.

I. INTRODUCTION

M/s Alstom in India has a state-of-the-art manufacturing facility situated at Coimbatore, Tamilnadu, India. This facility is specialized in the design, manufacturing and testing of signaling and Traction control equipments viz. Point Machines, Digital Track circuits (DTC) and Traction equipments. Loading and Unloading of the Traction and Digital track circuit frames is carried out on the regular basis from receiving of raw material to delivery of finished goods. Every process can be refined more efficiently by identifying and eliminating the non value added activities. Value stream mapping has to be implemented for reducing the cycle time, cost and number of steps involved in the material handling process. This is done by understanding the current state and by forming the future state map for the process.

II. LITERATURE SURVEY

A. Planning and Scheduling In the Automotive Industry: A Comparison of Industrial Practice at German and Japanese Makers

Thomas Staeblein, Katsuki Aoki (July 2014) discussed that providing customization of products is an important way of attracting customers, but it can increase the complexity of planning and scheduling processes in the order fulfilment system. In order to improve this understanding, they compared the order fulfilment system of German and Japanese auto makers as a sample of industrial practice. As part of this research they conducted two in-depth case studies at one German and one Japanese auto maker to map planning and scheduling functions along the order fulfilment process. However, contrary to common perception, planning and scheduling processes differ much less between auto makers even in the light of regional differences concerning order fulfilment, different levels of product variety and mixed-model line manufacturing practice. We found less variation between planning and scheduling functions than conventional operations management knowledge would predict in the light of greatly differing levels of product variety, manufacturing conditions, and managerial practice of order fulfilment. The implications on the design and management of planning and scheduling functions vary between makers in our case study, but do not follow the traditional theoretical path. There are two limitations that need to be acknowledged regarding the present paper. The first limitation concerns the cross-disciplinary nature of this research.

B. Value Stream Mapping To Reduce The Lead-Time Of Product Development Process

Satish Tyagi, Alok Choudhary, Xianming Cai, Kai Yang (Nov 2014) have analyzed that product development (PD) is a broad field of endeavor dealing with the planning, design, creation, and marketing of a new product. The main focus of this paper is to exploit lean thinking concepts in order to manage, improve and develop the product faster while improving or at least maintaining the level of performance and quality.

This research discusses the objective and associated problems with product development process for a case study unit of a Gas Turbine manufacturer. All the proposed changes will result in the reduction of lead time for the design stage reducing thus the overall PD lead time by 50%. Investigation of the human element factor in analyzing the performance of future state process is

clearly a topic for future search.

C. Performance Improvement Suggestions For Ground Handling Using Lean Solutions Approach

Ibrahim.A.Nugroho, Ustica.H.Riastuti, Hardianto Iridiastadi (2012) made a study on observations of nearly all of the existing activities in the process of baggage handling, passenger handling, and aircraft interior cleaning activities at PT Garuda Indonesia were executed. Data collection was carried out by direct observation through interviews, as well as measuring time using stopwatch, and various manual distance measurements. After knowing the causes of various activities that did not add value to the process, then proposals for improvements that could be used by PT Garuda Indonesia were made. Based on the analyses that had been made to the existing conditions, suggestions to improve the performance of baggage handling, passenger handling, and aircraft interior cleaning were be made; with the lean principals as the references. Then, future state maps were drawn. There was some differences between the current state maps and the future state maps, considering the alternatives of suggestions that had been made. There were some assumptions used in the future state maps, because it was almost impossible to differences on the airport environment for just some research purposes. Thus, the suggestions made had to be simple but very much applicable.

D. Production Flow Analysis Through Value Stream Mapping: A Lean Manufacturing Process Case Study

Rahani AR, Muhammad al-Ashraf (2012). The team described a case where Lean Production (LP) principles were adapted for the process sector of an automotive part manufacturing plant. Value Stream Mapping (VSM) is one of the key lean tools used to identify the opportunities for various lean techniques. Current State Map is drawn to document how things actually operated on the production floor. Then, a Future State Map is developed to design a lean process flow for LP initiative on a product (Front disc, D45T) through the elimination of the root causes of waste and through process improvements. The use of the VSM improved the approach in LP initiatives as it reveals obvious and hidden waste that affected the productivity of D45T production. The VSM applied to assess the expected impact of a change in the production process resulted in savings (lower rejection rates) and to a certain extent, a positive view was due to the fact that there were substantial gaps between standardized work and real work – this gap meant that workers did not follow strictly assembly standards and improvising the SOP could be a key driver in continuous improvement sustainability on the production floor as operators are fully aware on the long-term commitment to practice Lean.

E. Assessing Lean Systems Using Variability Mapping

A.Deif (2012). A new approach to assess lean manufacturing based on system's variability is proposed. The assessment utilizes a new tool called variability source mapping (VSMII) which focuses on capturing and reducing variability across the production system. The new tool offers a new metric called variability index to measure the overall variability level of the system. Based on the mapping and the new metric, VSMII suggests a variability reduction plan guided by a recommendation list of both lean techniques as well as production control policies. An industrial application is used to demonstrate the new tool. Results show that VSMII managed to reduce the overall variability level of the system as well as non-value added activities. Finally, the new variability index was successfully applied as a leanness assessment metric.This paper presented a new tool (to be added to lean improvement tools) dedicated for variability capturing and reduction. VSMII offered a system variability metric called variability index (VI) based on a weighted average of the overall cycle time and flow variability. VI is used to track improvements achieved due to the implementation of VRP. However, it can also be used as leanness metric to measure the overall leanness of the production system from a variability perspective. n conclusion, it is time for the lean manufacturing paradigm to take the next step by not only recognizing the power of variability reduction but also offering more comprehensive tools to capture and manage that problem.

F. Cycle Time Reduction Of A Truck Body Assembly In An Automobile Industry By Lean Principles

S.Santhosh Kumar, M.Pradeep Kumar (2014). Assembly line balancing is the process of assigning operations to workstations along an assemble line, in such a way that the assignment is optimal in some sense. This paper deals with studying the existing operation time for assembling, line balancing to avoid station delay, and the implementation of lean tools resulting in a shortening of the cycle time in an assembly line.

Based on the studies, the main operations and strategy of the company and the time taken for the assembly line have been calculated. Initially the cycle time of the total assembly was 90min.,After the line balancing the cycle time has been reduced to 37.5min and efficiency has increased up to 30.09%.

III. CONCLUSION

Based on the studies it is concluded that the implementation of Value Stream Mapping has becoming interesting preference for the researchers. This literature survey is observed that researcher are merely applied Value Stream Mapping with the other lean tools. Implementation of other innovative methodologies such as Critical Chain Project Management is clearly a matter of future research. In addition, the extension of VSM implementation on other critical process and finally to whole enterprise will be targeted in the future. Value stream mapping is proven to be the effective tool for reducing the cycle time and the wastes by a proper line balancing which is involved in the current state process.

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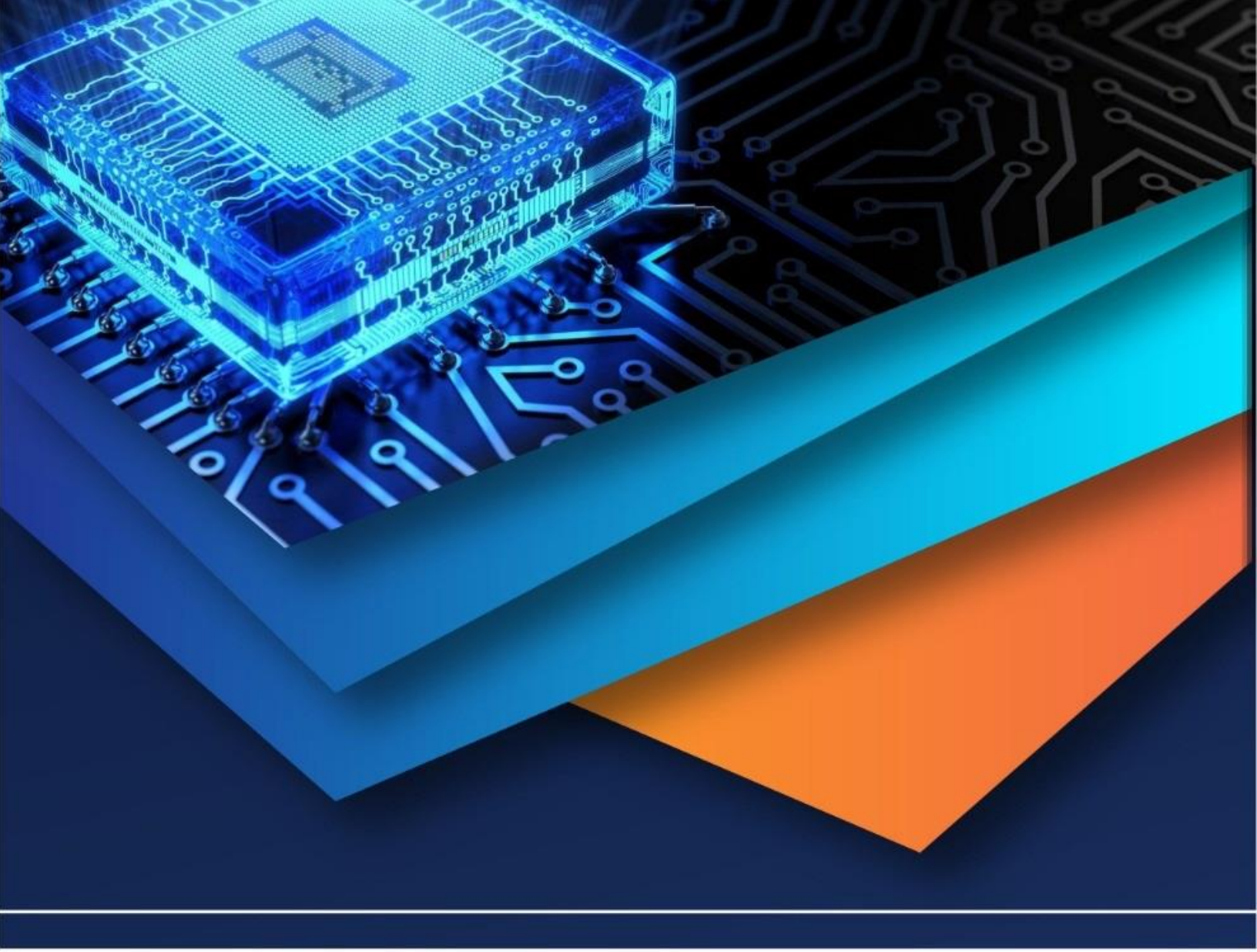

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