A Review on Optimization in Total Operation Time Through Maynard Operation Sequence Technique

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Abstract

This paper seeks to analyse the internal work flow in an Assembly line of the manufacturing unit. An objective of the study is to carry out MOST for the product, to reduce or eliminate the idle and / or down time of operations in addition to improvements of the current working methods. The main objective of this study is to reduce the operation time against the existing operation time. Maynard Operation Sequence Technique (MOST) study through capture the workflow activities using systematic and descriptive workflow data block for the value adding, value engineering and methods engineering analysis. Thus through the process redesign and process flow analysis, material handling and work flow are improved. Consequently, it has been possible to reduce the production cycle time to cater the higher level of demand with shorter takt time maintaining the current level of manpower. This review shows significant benefit associated with the implementation of lean programme because this review paper shows a real case study of manufacturing Assembly line.

Keywords: Operation time, Idle time, Most, Productivity

I. INTRODUCTION

Maynard Operation Sequence Technique (MOST) is a predetermined motion time system that is used primarily in industrial settings to set the standard time in which a worker should perform a task. To calculate this, a task is broken down into individual motion elements, and each is assigned a numerical time value in units known as time measurement units, or TMUs, where 100,000 TMUs is equivalent to 1 hour. All the motion element times are then added together and any allowances are added, and the result is the standard time.

Dr H B Maynard was the leader of the team that developed MTM (Methods Time Measurement), the base system on which almost all synthetic work measurement systems have been developed. Kjell B Zandin later developed an accurate system that is both easy to apply and can quickly produce consistent results using this proven MTM data.

MOST stands for Maynard operation Sequence technique. It is one of the important work measurement technique used for management decisions. Work measurement is a tool used as a basis for planning, scheduling, estimation of costs and evaluation of performance. MOST is the activity based work measurement system that enables us to calculate the length of time required to perform a task i.e. a system to measure work.

Work means exerting energy to accomplish some task or to perform some useful activity. Physics defines work as the product of force times distance (W = f x d), or simply work is the displacement of a mass or object. This definition applies quite well to the largest portion of the work accomplished every day. For the overwhelming majority of work, however, there is a common denominator from which work can be studied, the displacement of objects. All basic units of work are organized for the purpose of accomplishing some useful result by simply moving objects. It was noticed that the movement of objects follows certain consistently repeating patterns, such as reach, grasp, move, and position the object. These patterns were identified and arranged as a sequence of events (or sub activities) followed in moving an object. A model of this sequence is made and acts as a standard guide in analyzing the movement of an object.

The use of tool is analyzed through a separate activity sequence model that allows the analyst the opportunity to follow the movement of a hand tool through a standard sequence event which is a combination of two basic sequence models. It eliminates the subjective performance rating and has a much better acceptance of workmen because it is totally transparent and easy to demonstrate.

This concept provides the basis for MOST sequence models. The primary work units are no longer basic motions as in MTM, but fundamental activities dealing with moving objects. These activities are described in terms of sub activities fixed in sequence. Therefore, it is a powerful analytical tool that helps to increase productivity, improve methods, facilitate planning, establish workloads, estimate labor costs, improve safety and maximize resources.

Thus a MOST work measurement technique is a complete study of an operation or a sub operation consisting of one or several method steps and corresponding sequence model, parameter time values and normal time values for the operation or sub
operation. It also includes the Basic, Mini, and Maxi versions; it makes the measurement of work a practical, efficient, and inexpensive task for manufacturing industry.

MOST is a powerful tool because:
1) Latest Benchmarking tool for all type of operations in various industries
2) Streamlines operations and quickly identifies inefficient methods
3) Provides consistent standards and accuracy to within ± 5% with a 95% confidence level.
4) Timings can be obtained in advance before actual start of production
5) Universal Application to all types of industries
6) Reduces the time required for data development and standard setting
7) Easy to learn and use
8) Universal Approach, Fast to Apply, Adequate Accuracy
9) Minimum of Paperwork
10) Encourages Method Development and Improvement
11) No Rating System as required in Time Study
12) Can be applied to any method-defined manual work.
13) Can be applied largely from memory.

II. LITERATURE REVIEW

Mehvish Jamil, Manisha Gupta, Abhishek Saxena and Vivek Agnihotri (1) reported highlights a methodology developed for standardization in the process activities by using Maynard’s Operation Sequence Technique and minimization of fatigue among the workers in manufacturing line by using Ergonomics. Thus, this research use they like Ergonomics as the work study and Maynard Operation Sequence Technique (MOST) as the time study method. They main objective is to achieved Optimization of the system with integration of M.O.S.T. and Ergonomics.

Taran Kumar Yadav (2) use methodology starts from a suitable assembly system selection and there after decides suitable cycle times, parallel workstation requirements, and parallel line implementation for the type of assembly system being selected. They suggested Work measurement is a systematic procedure for the analysis of work and determination of time required performing key tasks in processes, it is typically based on time standards for manual tasks.

A. N. M. Karim, H. M. Emrul Kays, A. K. M. N. Amin and M. H. Hasan (3) show sustain in business under the current global situation of fierce competition a needs to reduce or eliminate the idle and/or down time of operations in addition to improvement of the current working methods. They studied was conducted through application of Maynard Operation Sequence Technique (MOST) in the rear window assembly section to capture the workflow activities using systematic and descriptive workflow data block for the value adding, value engineering and methods engineering analysis. Subsequently, new methods and work standards are developed in advance for capacity planning, workplace layout design and manning analysis. Thus through they done process redesign and process flow analysis, material handling and workflow are improved. Consequently, they has been possible to reduce the production cycle time to cater the higher level of demand with shorter takt time maintaining the current level of manpower.

Patil S.S., Shinde B.M., Katikar R.S. and Kavade M. V. (4) suggested the intention to provide awareness of particular work measurement technique called Maynard Operation Sequence Technique essential for planning and controlling operation. They main objective of any work measurement technique is to reduce the work content and thereby improve the productivity of the process. They has almost eliminated the online worker uncomfortability. A MOST analysis is a complete study of an operation or a sub operation consisting of one or several methods step, and corresponding sequence models, as well as appropriate parameter time and total normal time for the operation or suboperation. They use help of MOST method, its possible to achieve major times reduction in the manufacturing of the products. MOST nearly gives non-machining time reduction of 60 to 65 % With the help of this method its possible to get the production time of the products before its actual manufacturing starts..

Ulf K. Tschirgräber and Maximilian de Bucourt (5) show eliminate non-value adding (NVA) waste for the procurement of endovascular stents in interventional radiology services by applying value stream mapping (VSM). They suggested Lean manufacturing technique was used to analyze the process of material and information flow currently required to direct endovascular stents from external suppliers to patients. They identified the VSM is a visualization tool for the supply chain and value stream, based on the Toyota Production System and greatly assists in successfully implementing a Lean system.

Satish Tyagi, Alok Choudhary, Xianming Cai and Kai Yang (6) reported the Product development (PD) is a broad field of endeavor dealing with the planning, design, creation, and marketing of a new product. They 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. They constructed future state map is also developed with removing all the wastes/inefficiencies. It is expected that the VSM framework will help the development teams to reduce the PD lead-time by 50%. They research discussed the objective and associated problems with product development process for a case study unit of a Gas Turbine manufacturer, they proposed changes will result in the reduction of lead time for the design stage reducing thus the overall PD lead time by 50%.

A. P. Puvanasvaran, C.Z. Mei, V.A. Alagendran (7) reported highlights improvement of the Overall Equipment Efficiency (OEE) of the autoclave process through the implementation of time studies. They identify Maynard’s Operation Sequencing
Technique (MOST) is then adopted to conduct the secondary time study. They suggested MOST is used to evaluate the percentage of improvement contributed to the OEE. It is reliable as it provides consistent standards and accuracy to within ± 5% with a 95 % confidence level. Furthermore, they are confirmed about time required for data development and standard setting is also significantly reduced.

Yoshihiro Mizutania, Takayuki Sakai b and Hiroyuki Hamadaa (8) show they delineate the method that conducts production in one-twentieth (1/20) of usual lead time, which is revolutionary short, is able to respond to the needs of the users concerning delivery, among QCD (quality, cost and delivery). They aims for development of corrugated cardboard makers and optimum efficiency of management. They employing the proposed methods, not only it will improve the sales, but it will also create extra time and space, producing additional value to the products that will serve the customers better. They aim to popularize this Jpacks Production System and benefits.

Peter Stelth (MSc) and Professor Guy Le Roy (PhD) (12) reported CPM, a technique for analyzing projects by determining the longest sequence of tasks through a project network. Organizations today are also increasingly using virtual project management teams. Therefore, CPM and CCM process are even more complicated than in the past. They need to increase profits and revenues has forced many establishments to try to optimize their resources. They suggested CPM and the CCPM are both valuable tools that any organization can use successfully to manage their projects. “Scope management, cost management, and time management” are important variables for projects.

### III. Methodology

MOST can be applied to any type of work for which a method can be defined and described. It was designed to be much faster than other work quantification techniques because of its simpler structure. It groups together into predefined sequences the basic motions that frequently occur. MOST uses a structured approach, it develops structured data, it is a progressive technique. The technique is thoroughly proven, highly respected and used around the world. MOST is a powerful analytical tool to measure every minute spent on a task.

Generally, 9 steps are used for applying basic MOST methods such as:

1. Selection of Job
2. Select the Operator for study
3. Record details of activity and conditions of Work
4. Observation of each parameter Phases
5. Parameter Indexing
6. Addition of all the parameter Index values of activity
7. Convert the total of Index values into TMU
8. Convert the TMU value in corresponding time (Hours)
9. Convert the time from hour into Minutes

Thus, brief description of why MOST is important for an organization includes: accurate work standard, capacity analysis and manpower planning, workplace design and job activity analysis for re-organization and allocation for work balancing, cost estimating for existing and new processes.

Implementation of MOST technique for production and assembling in automation sector

The main Process Steps of Carrying Out Work Measurement are as follows:

1. Obtain and record all available information about the job, the worker and the surrounding conditions likely to affect the execution of the work.
2. Record the complete description of the method, break it down into elements.
3. Measure with a stopwatch and record the time taken by the worker to perform each element of the operation.
4. Assess the rating of the worker.
5. Extend the observed time to "basic time" by factorizing the actual time (observed time) by the assessed rating.
6. Determine the allowances (e.g. personal allowances, relaxation allowances, allowances for the working conditions etc.) to be made over and above the "basic time" for the operation.
7. Apply those allowances on the "basic time".
8. Thus, determine the "standard time" for the operation.

### A. Outcomes from Maynard Opretion Sequence Technique:

As compare to other techniques, the benefits of MOST are:-

- reduce costs
- reduces paperwork
- improve productivity
- streamline operations
- easy to learn and use
- quickly identifies inefficient methods
- provides consistent results/standards
– gives accuracy to within ± 5% with a 95% confidence level
– can be applied to any method-defined manual task
– reduces the time required for data development
– can be applied largely from memory
– applicable for every type of industry
– dedicated range of software products
– encourages method development and improvement

IV. CONCLUSION

MOST through a lot of manpower, time and effort was saved and productivity was increased. Thus with the help of MOST method it is possible to achieve major times reduction in the manufacturing of the products. MOST nearly gives non-machining time reduction of 60 to 65 %. With the help of this method it is also possible to get the production time of the products before its actual manufacturing starts. This helps in the production planning. The MOST technique, its systems family and the powerful suite of software are products that have been developed with essential elements of good management in mind: to improve competitiveness, profitability, productivity - in short, to help you save time, money and effort.

REFERENCES

Papers that have been accepted for publication should be cited as “in press” or “in print” in the list of references. References to the website address are discouraged.