# PROCESS CONTROL IMPROVEMENT USING TIME STUDY IN MUHLBAUER TECHNOLOGIES SDN.BHD

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**TAJUK: PROCESS CONTROL IMPROVEMENT USING TIME STUDY IN MUHLBAUER TECHNOLOGIES SDN.BHD**

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I hereby, declared this Bachelor's Project entitled "Process Control Improvement Using Time Study in Muhlbauer Technologies Sdn.Bhd" is the result of my own study except as cited in references.

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# APPROVAL

This report is submitted to the Faculty of Manufacturing Engineering of UTeM as a partial fulfilment of the requirements for the degree of Bachelor of Manufacturing Engineering (Manufacturing Management). The member of the supervisory committee is as follow:

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Supervisor

# ABSTRAK

Aplikasi operasi lean dalam dunia industri ini membawa peningkatan yang tertinggi kepada organisasi yang aplikasikan strategi pembuatan ini. Operasi pengeluaran di Muhlbauer Technologies Sdn.Bhd terbahagi kepada Pre-Assembly dan Final Assembly dimana kedua-dua bahagian pengeluaran berlainan dari segi aturan kerja tetapi menghasilkan produk yang sama berkaitan. Kedua-dua operasi pengeluaran dikendalikan sepenuhnya oleh kemampuan dan kemahiran manusia. Tambahan pula, kerja atau kendalian yang dilakukan tanpa mempunyai kendalian mesin. Pengendalian kerja dan seimbangan kerja di Final Assembly tidak diaplikasikan secara sistematik. Keadaan ini yang berlaku sebagai penghalang meningkatkan mesin tergendala, pemprosesan masa dan tidak keseimbangan kerja. Oleh itu, aplikasi Time Study dikaji untuk mengenalpasti dan menyelesaikan penghalang ini. Selain daripada itu, aplikasi Time Study dalam organisasi ini dapat meningkatkan keseluruhan proses dalam pengeluaran dengan menggunakan teknik dan kaedah yang sesuai. Di akhir keseluruhan aplikasi ini, masa pemprosesan tidak bernilai dan peningkatan kendalian proses pada Die Sorting mesin dapat direalisasikan.

# ABSTRACT

Applications of Lean Operations in global industries have results great improvements to the organization those implemented these powerful manufacturing tools. The production in Muhlbauer Technologies Sdn.Bhd divided into Pre-Assembly and Final Assembly which both productions are different in term of work order but the product they produced related to each other. The both production assembly are operated by full application of human abilities and skills. In addition, there is no machine programmed to perform work or task assigned. The operation scheduling and work standardization in Final Assembly was still not systematically approached. These scenarios are occurred as the barriers which increased the production work in progress (WIP), lead time and unbalanced process. Thus, the Time Study application was carried to identified and overcome these barriers. Moreover, the implementation of Time Study in this company to improve the overall process control in the production by using appropriate techniques and methods. At the end of the study, the expected findings are discovered on Die Sorting machine in term of lead time reduction and process improvements.

# DEDICATION

My sincere thanks to my father, mother and family members who gave me a full support during developing my Final Year Project. I also be thankful to Supervisor and my friends those help me in completing this project.

# ACKNOWLEDGEMENT

First of all, I would like to take this valuable opportunity to thank my Supervisor, Ir.Dr.Puvanasvaran Perumal for being as guidance and supporting to carry out my final year project. As I was under his supervision, I learned and gained much knowledge on manufacturing tools and techniques which very useful in my project. I am also would thank Mr.Sekar Ramasamay the Production Manager in Muhlbauer Technologies Sdn.Bhd for accepting me to undergone my project in this company.

I taught a lot of barriers in the production and the solutions which valuable knowledge for a future Engineer in the manufacturing system. In addition, I am thankful to Final Assembly supervisor and workers who helped me to understand how the actual assembly processes. Special thanks for other universities friends who undergone the project in the same company with me. It was a great chance to identify and analysis the manufacturing problems.

Finally, I would like to thank UTEM for offering this final year project which provides an opportunity to experience a real working problems and how to overcome it. By completing this project, it is able to apply the knowledge that we have gained in the project to the future working field.

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| | | |
|---|---|---|
| PSM | – | Projek Sarjana Muda |
| WIP | – | Work in progress |
| MTM | – | Methods Time Measurement |
| TMU | – | Time Measurement Unit |
| MOST | – | Maynard Operation Sequence Techniques |
| DS | – | Die Sorting |
| VA | - | Value Added |
| NVA | – | Non-Value Added |
| JIT | - | Just In Time |

# CHAPTER 1
# INTRODUCTION

## 1.1 Background

A general study of an industrial organization for productivity improvement and cost reduction can be described in term of the Time Study application. A sense of employee involvement in work system is considered as the major affects in done the job with easier and faster. Basically the measurement of work can be using Time Study which divided into few techniques. The way how does the measurement can be applied is based on stop watch, computer software and video recording. In term of applying Time Study in a production system, there are some task to be studied before proceed to time observation. The tasks that need to determined are such as the process of work elements, job order or work standard and part of jobs. In another word, Time Study determined the time systems, standard data and work sampling that used for measuring work in organization. Time Study used to require the time of a qualified and well trained employee who work at a normal pace to do a specific task. Developments in Time Study are taking place with rapid changes to concern with design of work systems and methods.

## 1.2 Problem Statement

The production systems in Muhlbauer Technologies Sdn.Bhd are separated into two division which run under Pre-Assembly and Final Assembly. The operation in Pre-Assembly and Final Assembly are different in term of work order but the product the interrelated each other. As this company is well known in assemble machine and the parts, the processes in both production assembly are mostly under supervision of human abilities and skills. Since this company begins with newly established production, they are facing some difficulty in time management. Hence, the production working scheduling was still not systematically approached. This situation leads the production operation to get delayed and most of machines being in WIP. Moreover, there is no proper work standardization within the operators. The organization is also facing a problem of Supply Chain Management whereby some of component and part doesn't supply or reached on the requested time. By the occurrences of this obstacles, the production lead time are also highly recorded which created the bottleneck activity. Therefore the improvements on process need to be determined and studied.

## 1.3 Objectives

The objectives of this research at Muelbauer Final Assembly are to develop a fundamental approached for overcome the problem occurred. Hence the objectives are listed as below:

a) To analyze and identify the waste and bottleneck process at Final Assembly Production.

b) To propose a work standardization and improve productivity by reducing the lead times.

## 1.4 Scope

The research of this Time Study application at Muhlbauer Technologies Sdn.Bhd is focused and limited to certain area of study. Therefore the research was carried out to achieve in the limitation of scope to reduce lead times, eliminate unnecessary time and processes. This research is overall focus on Die Sorting machine process improvement at Final Assembly production by work standardization and scheduling.

## 1.5 Overall Findings

At the end of this research, the expected results from overall studies would be advantages for future implementation and development. The expected findings on this Time Study research at this company are expected to reduce current production lead times and standardized the processes. Hence, the implementation of this project should be able to fully understand the Time Study application as well as improving the production process.

# CHAPTER 2
## LITERATURE REVIEW

### 2.1 Background

Time Study as one of the best tools in Manufacturing is recruiting everyone in the industry operation to measure and reduce the costs and benefits of a new improvement. Analysis of the time spent in going through the different motions of a job or series of jobs in the evaluation of industrial performance. The first effort for Time Study was made by Frederick Winslow Taylor in the 1880s. As Time Study was originated by Frederick Winslow Taylor, this study of literature revealed that he was named as the father of Time Study.

A general movement can be described to study work with the objective of finding better and simpler methods of getting the job done. According to Motion and Time Study earliest history, Frederick Winslow Taylor used a stopwatch and a clipboard to record the time and findings of his study. He started with his family, recording how long it took them to finish doing things around the house. With his wife, he would time how long it took her to wash the dishes. He also looked at the setup, where was the soapy water, the clean water, and where was she placing the clean dishes (www.scribd.com).

In the general definition of Time Study, the terms of Time Study was originated by Frederick Winslow Taylor who used this tool for determining time standard. Time Study is a systematic study of work systems with multi purposes of work measurement. Referred to Clara M.Novoa & Francis Mendez (2009), that the purposes of Time Study can be described in developing the preferred system and method, standardizing the system and method, determining the required time by a qualified or trained person who work in a standard pace to perform an operation. However, the term Time Study was used eventually with Motion Study and Work Measurement that were applied together in industries. This combination of methods in Time Study did approach into a wider use with a broad meaning in industries operation. In the past decades, Time Study application was made and rapidly developed in a systematic ways that continues at the present trend until today.

The Time Study application was originally limited into industry work systems. However, with the rapid development in the tool as many people learned and adopted the methods, principles and techniques, the problem solving process was established as a systematic approach. Nature of Time Study has proved being useful in increased the effectiveness and greater productivity. In addition, the Time Study application was also resulted in better utilization, quality and cost reduction. The ways of Time Study application should be applied in other various activities and areas.

According to Ralph M.Barnes (1980), he stated that application of Time Study was very firstly beginning started in a machine shop by Frederick Winslow Taylor. The machine that he began his work measurement was operated in Midvale Steel Company in 1881. A study of literature in how Taylor began his use of Time Study is stated in the investigation that he determined through Midvale Steel Company. Taylor entered the company laborer as a machinist. All the work he has to manage the operation up as a time keeper and foreman of the machine shop. Thus Taylor identified that the system under this management of employment left much improvement to be desired. Thus the desire of Taylor lead interest in term scientific study of time required to do various kind of work.

**Figure 2.1** Frederick Winslow Taylor

(Google image)

The innovation of Taylor began with his general area of experiment in studying endurance of workers and physical work measurement in term of horsepower. In this experiment, Taylor aimed and determined the relationship between man workload with time. The investigation carefully carried out in the company with two assistant of workers for several years.

From the experiment findings, Taylor discovered that for heavy work the control factors in how much work a man could do in one day was:

a) percentage of the day that workman was under load
b) percentage of the day a man resting
c) length and frequency of rest periods

The importance of Taylor's contribution to the company can be described in machining processes, organization functional development and originating a system or philosophy for the company referred as scientific management. These contributions of Taylor's really did affecting the problems occurred in the company by inventing result of a systematic study. With his development and contribution to the company, Taylor statement of stop watch time study was real important in scientific management beyond all others making possible the transfer of skill from management to labor. Frederick Winslow Taylor achievements in applying the systematic approach to the industry did intimately affect the human efforts which contributed to the effective utilization. The development of Taylor in scientific management are illustrated in term of finding the proper method of doing a given piece of work, teaching the worker to how accomplished their task could do properly, setting a definite time standard for accomplishing the work and paying the worker a premium of wages for doing the task as specified.

According to Fred E. Meyes and James R.Stewart (2002), Taylor was able explained what the objectives accomplished through his Principles of Scientific Management. The four principles consist as:

a) Develop a science for each element of a person's work, thereby replacing the old rule of thumb methods.
b) Select the best worker of each task and train in the prescribed method developed in Principle above.

c) Develop a spirit of cooperation between management and labor in carrying out the prescribed methods.
d) Divide the work into almost equal shares between management and labor, each doing what they do best.

In another achievement done by Frederick Winslow Taylor in conducting experiment on methods of work, his used of this scientific approach carried out at Bethlehem Steel Works. A discussion by Ralph M.Barnes (1980) that Taylor's experiment carried out to determine the best way to do work and obtain specific data for standardizing tasks. The experiment of Taylor began in 1898 investigated of shoveling. In the shovel's yard, there were 400 to 600 workers employed to moved and lifted loads of coal, coke and iron ore. The yard approximately about two miles long and a quarter mile wide with Taylor's expected the gang moving materials over a large area. Each worker founded had their own shovel and Taylor immediately noticed the different sizes of shovels and wondered which shovel was the most efficient. Taylor assigned two good laborers who set into different large shovel and small shovel. These two laborers were measured and recorded the work with stop watch study. This procedure of work continued from heavy shovel to small shovel. Taylor then identified the shovel size, duration, number of breaks and work hours.

As the result obtained by Taylor, a small amount of shovel provided for handling ore and a large amount for light material such as ashes. As the result of Taylor's experiment done, Bethlehem Steel Works was running with 140 workers as before study was 400 to 600 workers. Taylor's experiment also reduced the cost of handling shovel in 7 to 8 cents reduced to 3 to 4 cents per ton. After 3 years of Bethlehem operation, Taylor application of Scientific Management together Time Study has produced a saving of $78,000 per year. According to Billy Ng (1997), another experiment did by Taylor was on the pig iron experiment at Bethlehem Steel Company. Taylor's work increased output dramatically by redesigning the way pig iron was handled. The pig iron experiment was expanded by filming bricklayers at work and redesigning their work process based on the principles of scientific management.

The result of this systematic study of scientific management, the historical achievements by Frederick Winslow Taylor is known as the father of scientific management and industrial engineering. Taylor's contribution in originating time study has been given credit for the first person to use a stopwatch to study work content. This contribution was really meant to known Taylor as the father of time study.

**Figure 2.2** Bethlehem Steel Works
(Google image)

According to Ray Gehani (1995), Taylor proposed piece-rate compensation incentives for the faster workers in America during 20$^{th}$ century. Taylor studied the operations of an organization and developed one best way for each task. Taylor also specified, standardized and simplified tasks that assigned to the workers. From his study findings, time was an important element for scheduling, organizing, planning and controlling of all operations. The Taylor's proposed did benefit on time-based efficiency which effectively utilized limited labor contributed impressive industrial in the America.