

1. Work Design & Measurement
2. Operations Engineering & Management

MINIMIZING PRODUCTION LATENESS AT PT FIT USING LINE BALANCING APPROACH

A THESIS

**Submitted in Partial Fulfillment of the Requirements for the Degree of
Bachelor of Engineering in Industrial Engineering**



IRENE ANUGRAHATI SOMBOLAYUK

20 14 10595

**INTERNATIONAL INDUSTRIAL ENGINEERING PROGRAM
INDUSTRIAL ENGINEERING DEPARTMENT
FACULTY OF INDUSTRIAL TECHNOLOGY
UNIVERSITAS ATMA JAYA YOGYAKARTA
YOGYAKARTA**

2024

IDENTIFICATION PAGE

A thesis entitled:

MINIMIZING PRODUCTION LATENESS AT PT FIT

submitted by

Irene Anugrahati Sombolayuk

20 14 10595

was examined and approved on

		Approval Status
Thesis Supervisor 1	: Dr. Ir. Baju Bawono, S.T., M.T., IPU	Approved
Board of Examiners		
Chief Examiner	: Dr. Ir. Baju Bawono, S.T., M.T., IPU	Approved
Examiner 1	: Dr. Ir. Yosephine Suharyanti, S.T., M.T., IPU	Approved
Examiner 2	: F. Edwin Wiranata, S.Pd., M.Sc.	Approved

Yogyakarta, 28 June 2024

Universitas Atma Jaya Yogyakarta

Faculty of Industrial Technology,

Dean,

(signed)

Dr. Ir. Parama Kartika Dewa SP., S.T., M.T.

DECLARATION OF ORIGINALITY

I certify that the research entitled "Minimizing Lateness at PT FIT" in this thesis has not already been submitted for any other degree.

I certify that to the best of my knowledge and belief, this thesis which I wrote does not contain the works or parts of the works of other people, except those cited in the quotations and bibliography, as a scientific paper should.

In addition, I certify that I understand and abide the rule stated by the Ministry of Education and Culture the Republic of Indonesia, subject to the provisions of *Peraturan Menteri Pendidikan Nasional Republik Indonesia Nomor 17 Tahun 2010 tentang Pencegahan dan Penanggulangan Plagiat di Perguruan Tinggi*.

Yogyakarta, 28 June 2024



Handwritten signature of Irene Anugrahati Sombolayuk.

Irene Anugrahati Sombolayuk
(20 14 10595)

DEDICATION PAGE

To ALMIGHTY GOD,

*who serves as guidance and the source of strength and knowledge for without
His will this would not be possible.*

To my dearest self.

*I want to thank me for believing in me. I want to thank me for doing all this hard
work. I want to thank me for never quitting.*

To Papa, Mama, Fidel, Iva, and Nenek.

*My most precious treasure,
who have given me invaluable educational opportunities, for their endless love,
prayers, support, and encouragement.*

I am endlessly grateful to be a part of this "home".

Thank you so much.

I love you.

To my beloved friends,

Regina, Owi, Winda, Gaby, Gian, Grace, and Elin.

Thank you for always being there for me through my ups and downs.

Cheer for our bright future.

To my IIEP 20 classmates,

Shani, Hery, and Sandy.

Thank you for participating in IIEP 20 and sharing classes with me.

See you on top, guys.

ACKNOWLEDGEMENT

First and foremost, the author is grateful to God Almighty for His accompaniment and blessings, which allowed her to finish the final thesis on schedule. The completion of this final project is necessary to earn a bachelor's degree in Industrial Engineering from Universitas Atma Jaya Yogyakarta.

Many parties have contributed to this project with encouragement and support, so this project can be finished successfully. Therefore, the author would like to express gratitude to:

1. Mrs. Latifa as the owner of PT FIT, Mr. Bangkit, and all the workers at PT FIT who kindly let and helped the author in this research.
2. Dr. Ir. Baju Bawono, S.T., M.T., IPU as the author's thesis supervisor, who patiently guides and supports the author throughout the final project.
3. Dr. Ir. Parama Kartika Dewa SP., S.T., M.T., as the Dean of Faculty of Industrial Technology at Universitas Atma Jaya Yogyakarta.
4. Dr. Ir. Ign. Luddy Indra Purnama, M.Sc., IPU as the Head of Industrial Engineering Department at Universitas Atma Jaya Yogyakarta.
5. Ir. Twin Yoshua Raharjo D., S.T., M.Sc., Ph.D. as the Head of Industrial Engineering Undergraduate Program at Universitas Atma Jaya Yogyakarta.
6. Dr. Ir. Yosephine Suharyanti, S.T., M.T., IPU and F. Edwin Wiranata, S.Pd., M.Sc. as the Examiners who helped to improve this research.
7. All lecturers in Industrial Engineering Undergraduate Program at Universitas Atma Jaya Yogyakarta, who have given the author insights and support during the author's study at Universitas Atma Jaya Yogyakarta.
8. Other parties who have contributed both directly and indirectly to the author's self-improvement at Universitas Atma Jaya Yogyakarta.

Finally, the author hopes that both society and the readers will benefit from this project. Since there are still potential errors in this report, any helpful critiques and suggestions for future improvements would be greatly welcomed.

Yogyakarta, 28 June 2024

The author,
Irene Anugrahati Sombolayuk

TABLE OF CONTENTS

CHAPTER	TITLE	PAGE
	Cover	i
	Acknowledgement	ii
	Identification Page	iii
	Table of Contents	iv
	List of Tables	v
	List of Figures	vi
	Abstract	vii
1	Introduction	
	1.1. Background	1
	1.2. Problem Exploration	2
	1.3. Problem Statement	7
	1.4. Research Objective	7
	1.5. Research Limitation	8
2	Literature Review	
	2.1. Literature Review	9
	2.2. Theoretical Background	15
3	Identification of Problem and Proposed Alternative Solution	
	3.1. Problem Identification	22
	3.2. Alternative Solution Development	23
	3.3. Solution Selection	24
	3.4. Method Selection	25
	3.5. Research Uniqueness	25
4	Research Methodology	
	4.1. Research Methodology	26
	4.2. Codes of Ethic and Research Standard	30
5	Data and Current Situation	
	5.1. Production Data	32
	5.2. Cycle Time	35
	5.3. Uniformity Test and Adequacy Test	39
	5.4. Adjustment and Allowance, Normal Time, and Standard Time	41

6	Improvement Design and Implementation	
	6.1. Proposed Improvement Design	45
	6.2. Implementation	49
7	Conclusion	
	7.1. Conclusion	51
	7.2. Suggestion	51
	References	xi
	Appendix	xiv

LIST OF TABLES

Table 1.1. Product Categories in PT FIT	3
Table 2.1. Summary of Literature Review	12
Table 3.1. Alternative Solutions Selection	24
Table 3.2. Alternative Methods Selection	25
Table 5.1. Production Data	33
Table 5.2. Current Cycle Time for Each Process	36
Table 5.3. Data Uniformity Test Summary	39
Table 5.4. Data Adequacy Test Summary	40
Table 5.5. Example of Adjustment Rating	41
Table 5.6. Example of Allowance Calculation (Chopping the Wood)	41
Table 5.7. Adjustment, Allowance, Normal Time, and Standard Time	42
Table 5.8. Current LE, BD, and SI	44
Table 6.1. Ranked Positional Weight (RPW) Calculation	45
Table 6.2. LE, BD, and SI After RPW Calculation	46
Table 6.3. Routes of Process with the Standard Times	47
Table 6.4. Proposed Worker	48
Table 6.5. Improvement Result	49

LIST OF FIGURES

Figure 1.1. Aisle Width between Sewing Department and Cover & Finishing Department	5
Figure 1.2. Working Area in the Cover & Finishing Dept. with Narrow Aisle between Tables	5
Figure 1.3. Foam Storage	5
Figure 1.4. Foam that being Stored at Finished Product Section	6
Figure 1.5. Pillows are Stored in Foam Storage	6
Figure 1.6. Shelves for Auxiliary Materials and Archive Documents	7
Figure 2.1. Westinghouse' Adjustment Factor	17
Figure 2.2. Allowances Factor (1)	18
Figure 2.3. Allowances Factor (2)	19
Figure 2.4. Allowances Factor (3)	19
Figure 3.1. Fishbone Diagram of the Problem	22
Figure 3.2. Interrelationship Diagram for Problem Identification	23
Figure 4.1. Flowchart of Empathize Process	26
Figure 4.2. Flowchart of Define Process	27
Figure 4.3. Flowchart of Ideate Process	28
Figure 4.4. Flowchart of Prototype Process	29
Figure 4.5. Flowchart of Testing Process	30
Figure 5.1. Current Precedence Diagram	43
Figure 6.1. Proposed Production Area Layout (First Floor)	48
Figure 6.2. Proposed Production Area Layout (Second Floor)	49

ABSTRACT

PT Furnindo Inovasi Teknologi is a company operating in the furniture industry, which produces several types of sofas. Some of the problems that occur in the company include the production process, which is currently unable to fulfill orders on time, production lateness, a lack of workers, and improper placement of tools and materials. However, the main focus of the research is on the problem of production lateness with the root cause of the bottleneck which causes the production line to be less efficient. Therefore, this research aims to reduce production lateness.

The research uses cycle time data, then calculated the standard time using the working time measurement. Next, the current line efficiency value was calculated and the RPW (Ranked Positional Weight) and CPM (Critical Path Method) methods were used as the alternative solutions for improvement. Then, based on this method, line efficiency calculation and analysis of existing alternative solutions are carried out.

The research results stated that there was an increase in line efficiency of 12.96% from the initial efficiency of 63.22% to 76.18%. Apart from that, this research also succeeded in reducing production lateness by 71.02%, from 20 days to 5.80 days.

Keywords: line balancing, bottleneck, ranked positional weight, sofa production, line efficiency