1. *Work System Design*
2. *Operation Research & Analysis*

REDESIGNING WORKERS ASSIGNMENT SYSTEM TO ACHIEVE PRODUCTION LINE TARGET

FINAL PROJECT

Submitted in partial Fulfilment of the Requirements
for the Degree of Bachelor of Engineering in
Industrial Engineering

Bonifasius Farrel Abhinaya Putra
211411218

INTERNATIONAL UNDERGRADUATE PROGRAM IN INDUSTRIAL ENGINEERING
DEPARTMENT OF INDUSTRIAL ENGINEERING
FACULTY OF INDUSTRIAL TECHNOLOGY
UNIVERSITAS ATMA JAYA YOGYAKARTA
YOGYAKARTA
2026

IDENTIFICATION PAGE

Final Project Title:
Redesigning Workers Assignment System to Achieve Production Line Target.

***IE Body of Knowledge*:**
1. *Work System Design*
2. *Operation Research & Analysis*

Final Project team:

No.	Name and NPM	Study Program	College	Role Description
1	Bonifasius Farrel Abhinaya Putra 211411218	International Undergraduate Program in Industrial Engineering	UAJY	• Final Project Author • Project designer

HALAMAN PENGESAHAN

Tugas Akhir Berjudul

REDESIGNING WORKERS ASSIGNMENT SYSTEM TO ACHIEVE PRODUCTION LINE TARGET

yang disusun oleh

Bonifasius Farrel Abhinaya Putra

211411218

dinyatakan telah memenuhi syarat pada tanggal 29 Juli 2026

		Keterangan
Dosen Pembimbing 1	: Dr. Ir. Deny Ratna Yuniartha, S.T., M.T.	Telah Menyetujui
Tim Penguji		
Penguji 1	: Dr. Ir. Deny Ratna Yuniartha, S.T., M.T.	Telah Menyetujui
Penguji 2	: Ir. Yosef Daryanto, S.T., M.Sc., Ph.D.	Telah Menyetujui
Penguji 3	: Dr. Slamet Setio Wigati, S.T., M.T.	Telah Menyetujui

Yogyakarta, 29 Juli 2026

Universitas Atma Jaya Yogyakarta

Teknologi Industri

Dekan

ttd.

Prof. Dr. Ir. Parama Kartika Dewa SP., S.T., M.T., IPU, ASEAN Eng.

Dokumen ini merupakan dokumen resmi UAJY yang tidak memerlukan tanda tangan karena dihasilkan secara elektronik oleh Sistem Bimbingan UAJY. UAJY bertanggung jawab penuh atas informasi yang tertera di dalam dokumen ini

DECLARATION OF ORIGINALITY

I, the undersigned, hereby declare that:

Name : Bonifasius Farrel Abhinaya Putra

NPM : 211411218

Study program: Industrial Engineering

Hereby declare that my Final Project entitled "**Redesigning Workers Assignment System to Achieve Production Line Target**" is the result of my own research conducted in the Academic Year 2025/2026, is original, and does not contain any form of plagiarism from any party.

Should any inconsistency with this statement be found in the future, I am willing to be held legally accountable and to be processed in accordance with the applicable regulations, including the revocation of the bachelor's degree that has been conferred upon me by Atma Jaya Yogyakarta University.

I hereby make this statement truthfully and to the best of my knowledge.

Yogyakarta, July 25, 2026

Declared by,



Bonifasius Farrel Abhinaya Putra

PREFACE

Praise and gratitude are extended to God Almighty for His blessings and guidance, enabling the author to complete this final project. This piece is prepared as part of the author's endeavour to explore knowledge in the field of industrial engineering, particularly regarding work measurement methods and process optimization, in the hope that it will benefit readers and advance scholarly understanding.

On this occasion, the author would like to express sincere gratitude to several parties who have supported and assisted throughout the completion of this final project, from the internship period to the preparation of the final report. The author would like to extend appreciation to Dr. Ir. Deny Ratna Yuniartha, S.T., M.T. as the academic advisor who provided guidance throughout the completion of the final project. PT X. for providing the author with the opportunity to conduct the final project at their institution. Mister Yoga Pratama as the field supervisor during both the internship period and the preparation of the final project.

The author realizes that this final project is still far from perfect. Therefore, constructive criticism and suggestions are highly appreciated for future improvement. Finally, the author hopes that this final project will be beneficial to readers and contribute to the development of knowledge in the related field

TABLE OF CONTENT

COVER	i
IDENTIFICATION PAGE	ii
APPROVAL SHEET	iii
DECLARATION OF ORIGINALITY	iv
PREFACE	v
TABLE OF CONTENT	vi
LIST OF TABLES	viii
LIST OF FIGURES	ix
LIST OF APPENDICES	x
ABSTRACT	xii
CHAPTER 1 INTRODUCTION	1
1.1 Background	1
1.2 Problem Exploration	4
1.3 Problem Statement	8
1.4 Project Objectives	9
1.5 Project Limitations	9
CHAPTER 2 LITERATURE REVIEW AND THEORETICAL BASIS	10
2.1 Literature Review	10
2.2 Basic Theory	15
2.3 Standards and Codes of Ethics	22
CHAPTER 3 ROOT PROBLEM ANALYSIS AND SOLUTION SELECTION	23
3.1 System Overview	23
3.2 Root Cause Analysis	26
3.3 Development and Selection of Alternative Solution	28
3.4 Tools and Methods Selection	31
CHAPTER 4 METHODOLOGY	34
4.1 Final Project Stages	35
4.2 Empathizing Stage	36
4.3 Defining Stage	37
4.4 Ideating Stage	38
4.5 Prototyping Stage	39
4.6 Testing and Implementation Stage	42
4.7 Project Uniqueness	43
CHAPTER 5 EMPLOYEE CAPABILITY MEASUREMENT SYTEM DESIGN	44
5.1 Output per shift calculation	44
5.2 Aggregate analysis	48
CHAPTER 6 EMPLOYEE ASSIGNMENT	53
6.1 Employee assignment	53

CHAPTER 7 IMPLEMENTATION 65
7.1 Implementation 65
7.2 Critical Success Factor 70
7.3 Economy Analysis 71
7.4 Sustainability 73
CHAPTER 8 SUMMARY AND SUGGESTION 76
8.1 Summary 76
8.2 Suggestions 76
BIBLIOGRAPHY 77
APPENDICES 79

LIST OF TABLES

Table 1.1 Product classification (client T) 1
Table 1.2 Product classification (client H) 2
Table 1.3 Product classification (client AG) 2
Table 1.4 Interview summary 5
Table 1.5 Actual production result dated December 14, 2025 7
Table 2.1 Summary of literature review 11
Table 3.1 Alternative solution 29
Table 3.2 Method selection for manpower category 31
Table 3.3 Method selection for method category 32
Table 5.1 Writer worker rating data 45
Table 5.2 Assessor 2 worker skill data 46
Table 5.3 Assessor 3 worker skill data 47
Table 5.4 Uniformity and adequacy test folding bottom process 49
Table 5.5 Parameter control chart X-bar for folding bottom process 50
Table 5.6 Parameter control chart R-chart for folding bottom 50
Table 5.7 Adequacy test 51
Table 5.8 Output per shift calculation in folding bottom 52
Table 6.1 Output per shift matrix 54
Table 6.2 Cost matrix from output per shift matrix 56
Table 6.3 Row reduction 58
Table 6.4 Column reduction 60
Table 6.5 Hungarian result 62
Table 6.6 Workers assignment based on output per shift 63
Table 6.7 Threshold for each process based on output-per-shift calculation 64
Table 7.1 Worker rating data from PE 1 for the remaining workers 66
Table 7.2 Aggregate analysis for implementation data 68
Table 7.3 Worker Allocation after implementation 69
Table 7.4 Worker Allocation after implementation 69
Table 7.5 Actual production output 70
Table 7.6 One-time cost 71
Table 7.7 Recurring cost 72
Table 7.8 Benefit identification 72

LIST OF FIGURES

Figure 1.1 Illustration of paper bag panda 6
Figure 3.1 Company Business Process 24
Figure 3.2 Fishbone diagram 26
Figure 4.1 Emphathizing step flowchart 35
Figure 4.2 Defining process flowchart 37
Figure 4.3 Ideating process flowchart 38
Figure 4.4 Prototyping process flowchart for worker skill data 40
Figure 4.5 Prototyping process flowchart for assignment 41
Figure 4.6 Testing process flowchart 42
Figure 7.1 Westinghouse worksheet 74
Figure 7.2 Hungarian method worksheet 75

LIST OF APPENDICES

Appendix 1 Company Licensing 79
Appendix 2 Permission from Lecturer 80
Appendix 3. Logbook 81
Appendix 4 Uniformity and adequacy test gluing bottom prototyping 83
Appendix 5 Uniformity and adequacy test Folding Neck prototyping 84
Appendix 6 Uniformity and adequacy test Gluing Handle prototyping 85
Appendix 7 Uniformity and adequacy test Subassy-Handle prototyping 86
Appendix 8 Uniformity and adequacy test Inspection prototyping 87
Appendix 9 Uniformity and adequacy test Gluing-Rear Face prototyping 88
Appendix 10 Uniformity and adequacy test Subassy-Panda Rear prototyping 89
Appendix 11 Uniformity and adequacy test Gluing-Front Face prototyping 90
Appendix 12 Uniformity and adequacy test Subassy-Panda Front prototyping 91
Appendix 13 Uniformity and adequacy test Polimer prototyping 92
Appendix 14 Output calculations folding bottom prototyping 93
Appendix 15 Output calculations gluing-bottom prototyping 93
Appendix 16 Output calculations folding neck prototyping 94
Appendix 17 Output calculations gluing-handle prototyping 94
Appendix 18 Output calculations subassy-handle prototyping 95
Appendix 19 Output calculations inspection prototyping 95
Appendix 20 Output calculations gluing-rear face prototyping 96
Appendix 21 Output calculations subassy-panda rear prototyping 96
Appendix 22 Output calculations gluing-front face rear prototyping 97
Appendix 23 Output calculations subassy-panda front rear prototyping 97
Appendix 24 Output calculations polimer rear prototyping 98
Appendix 25 Uniformity and adequacy test folding bottom implementation 99
Appendix 26 Uniformity and adequacy test gluing bottom implementation 100
Appendix 27 Uniformity and adequacy test folding neck implementation 101
Appendix 28 Uniformity and adequacy test gluing handle implementation 102
Appendix 29 Uniformity and adequacy test subassy-handle implementation 103
Appendix 30 Uniformity and adequacy test inspection implementation 104
Appendix 31 Uniformity and adequacy test gluing rear face implementation 105
Appendix 32 Uniformity and adequacy test gluing rear face implementation 106
Appendix 33 Uniformity and adequacy test gluing-front face implementation 107
Appendix 34 Uniformity and adequacy test subassypanda front implementation 108
Appendix 35 Uniformity and adequacy test polimer implementation 109
Appendix 36 Output calculations folding bottom implementation 110
Appendix 37 Output calculations gluing bottom implementation 110
Appendix 38 Output calculations folding neck implementation 111
Appendix 39 Output calculations gluing-handle implementation 111
Appendix 40 Output calculations subassy-handle implementation 112

Appendix 41 Output calculations inspection implementation 112
Appendix 42 Output calculations gluing-rear face implementation 113
Appendix 43 Output calculations subassy-panda rear implementation 113
Appendix 44 Output calculations gluing front face implementation 114
Appendix 45 Output calculations gluing front face implementation 114
Appendix 46 Output calculations subassy-panda front implementation 115
Appendix 47 Output calculations polimer implementation 115

ABSTRACT

PT. X operates as a manufacturing company specializing in paper-based packaging production, particularly paper bags, for export markets. The company operates in Prambanan District, Klaten Regency, Central Java, and contributes to the growth of the regional manufacturing sector. PT. X belongs to the XYZ Group, which possesses extensive experience in the printing and packaging industry. PT. X encountered challenges in achieving the production target for the Panda paper bag product due to ineffective employee assignment across the assembly line. Inadequate workforce allocation by the PPIC department, Process Engineers (PE), and assembly line leaders contributed to this issue.

Main objective of this final project is to make an assembly line that can meet 90% of the production target. A structured approach addressed the problem encountered by the company. The first stage involved determining the capability of each employee by calculating the output per shift for every process. This stage integrated the Westinghouse method with time study analysis to obtain employee skill data and standard time values. The next stage involved assigning employees to each process through the Hungarian assignment method. This optimization process enabled the selection of the most suitable employee for each process based on the previously calculated output values. Finally, process-specific thresholds were established according to the output-per-shift values of the selected employees.

Implementation proceeded through direct engagement with stakeholders involved in the identified problem. The implementation process achieved successful execution, demonstrated by production performance reaching 112% of the production target. Employees selected through the proposed assignment produced 2,357 units during a single production shift. Therefore, the implementation-based threshold satisfied the company's production performance standard by achieving at least 90% of the production target.

Keywords: Worker assignment problem, Production Target Fulfillment, Westinghouse method, Hungarian Assignment Problem.