THE EFFECT OF LOT SIZE AND PRODUCT STRUCTURE ON MAKESPAN MINIMIZATION IN MULTILEVEL PRODUCT SCHEDULING

(Due to 3 Levels of Product Structure with Maximum Parts Are 4 in Each Level)

THESIS

Submitted as Partial Fulfill of the Requirements to Obtain the Bachelor of International Industrial Engineering Degree

Arranged by:

NOVENA CHRISTIE HAPSARI

Student Number: 04 14 04351

INTERNATIONAL INDUSTRIAL ENGINEERING PROGRAM

FACULTY OF INDUSTRIAL TECHNOLOGY

UNIVERSITAS ATMA JAYA YOGYAKARTA

YOGYAKARTA

2008

STATEMENT OF WORK'S ORIGINALITY

I honestly declare that 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.

Yogyakarta, November 2008

The Writer

Novena Christie Hapsari

A BACHELOR OF
INTERNATIONAL INDUSTRIAL ENGINEERING THESIS
On

THE EFFECT OF LOT SIZE AND PRODUCT STRUCTURE ON MAKESPAN MINIMIZATION IN MULTILEVEL PRODUCT SCHEDULING (Due to 3 Levels of Product Structure with Maximum Parts Are 4 in Each Level)

Arranged by:
NOVENA CHRISTIE HAPSARI
Student Number: 04 14 04351

Has been Examined and Approved
On November 27th, 2008

Adviser,	Co-Adviser,
(Y. Suharyanti, S.T., M.T.)	(V. Ariyono, S.T., M.T.)

Board of Examiners,
Chairman,

Yosephine Suharyanti, ST., MT.

Member,	Member,
(Ign. Luddy Indra P, M.Sc)	(Slamet Setio W, S.T., M.T.)

Yogyakarta, November 27th, 2008

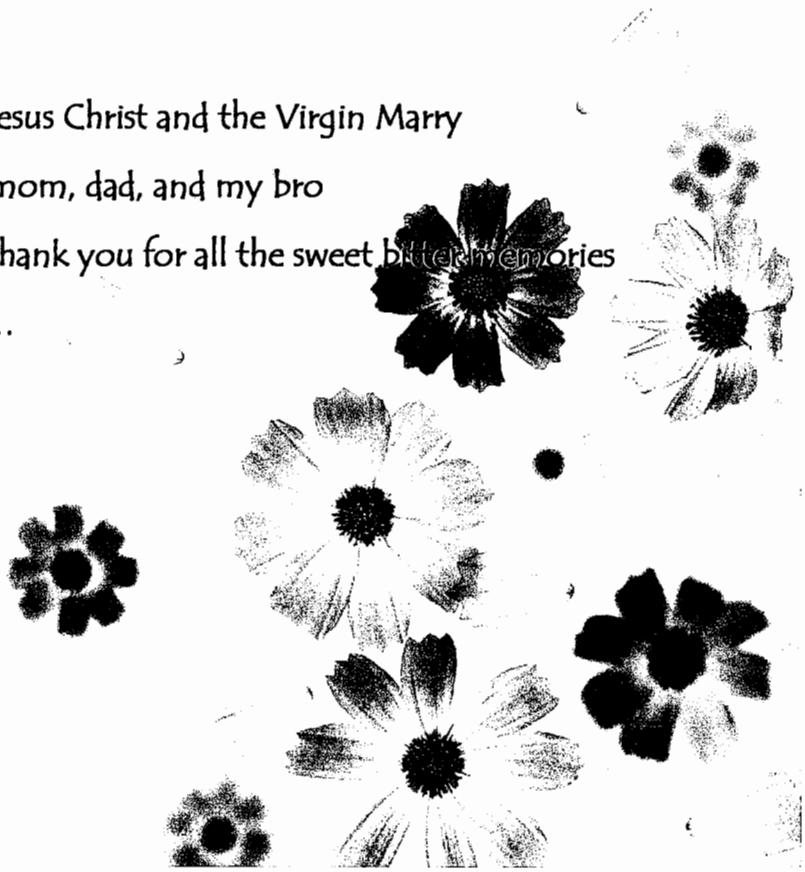
Dean of Faculty of Industrial Technology
Universitas Atma Jaya Yogyakarta

(Paulus Mudjihartono, S.T., M.T.)

ACKNOWLEDGEMENT

Dedicated to:

- My LORD, Jesus Christ and the Virgin Marry
- Mf family : mom, dad, and my bro
- Tiki 2004, thank you for all the sweet bitter memories between us...



FOREWORD

Thank God because of His wonderful bless and gift, the writer is able to finish this final project as one of requirements to obtain the bachelor of International Industrial Engineering Degree in Universitas Atma Jaya Yogyakarta. With His participation, the writer could do the best effort in composing, arranging, and building this final project.

However, writer realizes that this final project could not be completed without helps, supports, and also prayers from all people involved in. In this amazing chance, writer would like to thank:

1. Mr. Paulus Mudjihartono, S.T., M.T., as the Dean of Faculty of Industrial Technology Universitas Atma Jaya Yogyakarta.
2. Mr. Parama Kartika Dewa, S.T., M.T., as the Head of Industrial Engineering Program Universitas Atma Jaya Yogyakarta.
3. Mr. Hadi Santono, S.T., M.T. as the Head of International Program of Industrial Engineering Universitas Atma Jaya Yogyakarta and as my helper, supporter and adviser in my Industrial Internship program.
4. Mrs. Yosephine Suharyanti, S.T., M.T. as the adviser in arranging this final project.
5. Mr. V. Ariyono, S.T., M.T. as the co-adviser in completing the report.
6. All of the lectures and staffs of Universitas Atma Jaya Yogyakarta who has helped writer in doing her duties.

7. My mom and dad for the patience, supports, and loves.
8. My older brother Baskom who becomes my biggest and strongest motivation.
9. TIKI Batch 2004 of course. Thank you for your assistances, supports, cares, and loves, especially for Samuel, Amei, Eko, Ellyn, Dewi, Yeni, Maya, Yansen and Lukas.
10. My friend - Master, who are always being there in my hardest moments.
11. All the people who are involved in behind the scene of this final project, whom the writer could not mention one by one.

The writer also realizes that this final project still has so much limitations and weaknesses. Therefore, all critics or suggestions are accepted in order to make this report better.

May this report is useful not only for the writer but also for the readers.

Thank you.

Yogyakarta, November 2008

Writer

TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

Production scheduling plays important roles in production system. It directly affects the production capacity whether production capacity will inadequate or excessive which both of them can result lost. Generally, production scheduling is aimed to minimize production and labor cost that is affected by function of time which is total production time or makespan. Minimizing makespan becomes the research objective in this research that is included in the long term research project of The Production System Laboratory of Universitas Atma Jaya Yogyakarta.

Some data is used in this research. They are product structures, lot size, setup time, and run time. Product structure used is 3 level of product structure with maximum number of parts are 4 in each level where the combinations of product structure forms are generated to fulfill that consideration. Number of item produced is 30 and lot size evaluated are 5, 6, 10, 15, and 30. Setup time is randomly generated by random number that is varied from 5 to 10 minutes/lot, and run time is varied from 1 to 5 minutes/unit. Gantt chart generation is used to find makespan. Later, hypothesis testing is generated using ANOVA due to the optimum setup time - run time ratio.

Based on the whole process, it results that optimum ratio tends to be among lot size 10, 15, and 30. Another result is that the complexity of product structure (in this research is the number of parts) affects the optimum ratio among product structures. Later, it affects optimum lot size that results minimum makespan.