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

THESIS

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

Arranged by:

MAYA CAROLINA
Student Number: 04 14 04236

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, June , 2008

The writer,

Maya Carolina

A BACHELOR OF
INTERNATIONAL INDUSTRIAL ENGINEERING THESIS
On

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

Has been Examined and Approved
on June 16th, 2008

Adviser,

Yosephine Suharyanti, ST., MT.

Co-Adviser,

V. Ariyono, ST., MT.

Board of Examiners,
Chairman,

Yosephine Suharyanti, ST., MT.

Member,

Ign.Luddy Indra Purnama,M.Sc

Member,

Ir.B.Kristyanto,M.Eng,Ph.D

Yogyakarta, June 16th, 2008
Dean of Faculty of Industrial Technology
Universitas Atma Jaya Yogyakarta

FAKULTAS TEKNOLOGI INDUSTRI

Paulus Mudjihartono, ST., MT.

ACKNOWLEDGEMENT

TIKI BATCH 2004

Thank you for everything.....

Dedicated to:

My parents, mom and dad

My brother & sisters

My niece & nephew

FOREWORD

First of all, I want to thank God of his everlasting bless which have accompanied the writer through her research of Final Project and of His blessing in the writer's work of this Final Project report.

The writer realized his limitations of the knowledge and experience, and without the help and supports from all the people involved, the writer wouldn't be able to complete this Final Project report. And in this chance, the writer sincerely thanks:

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 Indusrial Engineering Universitas Atma Jaya Yogyakarta.
4. Mrs. Yosephine Suharyanti, S.T., M.T. as the first adviser in research and completing the report.
5. Mr. V. Ariyono, S.T., M.T. as the second adviser in research and completing the report.
6. Mr. Ign. Luddy Indra Purnama, M.Sc. as my examiner.
7. Mr. Ir. B. Kristyanto, M.Eng., Ph.D. as my examiner.
8. My Mom and Dad, who always support the writer with the everlasting love.
9. My sisters and brother, Olivia, Monica, and Sonny, who always cheer me up.

10. My best friend, Martadi, who always support me whatever happen into my life.
11. International Industrial Engineering Batch 2004, Samuel, Geo, Amei, Eko, Ellyn, Desta, Dewi, Ivana, Abie, Yeni, Sugeng, Gieta, Liza, Dahana, Awiek, Yansen, Lukas, Vena, William, Bram, and Yuri.
12. My lovely niece and nephew, Michelle and Andre, who gave me a lot of fun.
13. My Friends, Melisa, Anne, Tedi, Fen2, Tika, and Monika, who always be around when the writer is down.
14. All the people involved helping this paper out whom the writer was unable to mention one by one.

The writer also realized that this paper includes many errors and weaknesses technically and materially, therefore the writer sincerely apologizes and will gladly accepts for critics and suggestions from the reader for future improvements.

The writer hopes that the Final Project report will be useful for either the writer or all who needs and reads the report.

Yogyakarta, June 2008

Writer

TABLE OF CONTENTS

TABLE LIST

FIGURE LIST

ABSTRACT

Scheduling is one of the important parts of manufacturing and engineering. There are a lot of factors should be considered before taking the best scheduling approaches. The Production System Laboratory of UAJY has a long-term research project about the effect of product structure complexity, process routing complexity, and setup time-run time ratio on makespan minimization in multilevel product scheduling. The writer takes a part of this long-term research project. The writer concerns to product structure which is limited on 3 levels and maximum 3 parts in one level. The objective of this research is to define the optimum lot size by evaluating the effect of product structure complexity.

There are 6 possible combinations of product structure which have been generated. The routing file is generated to shows step-by-step set of instructions describing how the product is made. The routing files generated to create 5 replications for each product structure, all routing files have the same operations and work centers, the difference is on setup time and run time according to the random number generation. Makespan is found by Gantt chart simulation using Microsoft Excel program. There are several lot size examined, they are 4, 8, 16, and 32. Setup-run time ratio is the function of lot setup time divided by lot size times unit run time. Setup-run time ratio represents optimum lot size in ANOVA test.

Based on Gantt chart simulation, every case has its own optimum lot size; number of optimum lot size is randomly distributed. Most of optimum lot size is defined when lot size = 8 or lot size = 16. Based on ANOVA Single Factor result, writer concludes that there is no significant difference between variation of product structure and optimum lot size.