ECONOMIC LOT SCHEDULING PROBLEM
IN IMPERFECT PRODUCTION SYSTEM WITH TWO KEY MODULES

A THESIS

Submitted in Partial Fulfillment of the Requirement for the Bachelor Degree of Engineering in Industrial Engineering

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IDENTIFICATION PAGE

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DECLARATION OF ORIGINALITY OF RESEARCH

I certify that the research entitled "Economic Lot Scheduling Problem in Imperfect Production System with Two Key Modules" 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 of 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.

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ABSTRACT

The thesis entitled “Economic Lot Scheduling Problem in Imperfect Production System with Two Key Modules” began with the problem identification based on literature review under the theme Economic Lot Scheduling Problem (ELSP). It was revealed that no paper had been discussing about ELSP in imperfect production system with two key modules. Discussion of ELSP in imperfect production context had only been written under one key module problem. Based on this literature review, the problem in this research was defined as finding the cycle times for ten items of modified Bomberger (1966) stamping problem under ELSP in imperfect production system with two key modules context in order to minimize the total cost covering holding cost, setup cost and quality-related cost of producing non-conforming items.

In pursue of these optimum cycle times, the algorithm of finding the cycle times was developed through a series of modeling from ELSP in perfect production system, ELSP in imperfect production system with one key module and finally the ELSP in imperfect production system with two key modules. Solver function in Microsoft® Excel 2010 was used to obtain the optimum cycle times under Independent Solution (IS) and Common Cycle (CC) approaches. Before applying this model to ELSP in imperfect production system with two key modules, an Economic Production Quantity (EPQ) model with two imperfect modules proposed by Gong *et al*. (2012) must be proved. Only if the formula of expected number of non-conforming items in the EPQ can be proved, this formula can be used in ELSP context with adjustments.

Since the formula to calculate the expected number of non-conforming items could be proven, the model and algorithm development of ELSP in imperfect production system with two key modules could be done. Under the IS approach, the cycle times for modified Bomberger (1966) stamping problem was calculated as T={33.2, 23.6, 22.6, 11.2, 52.5, 85.9, 160, 20.7, 18.6, 38.6} for item 1, 2, …, 10, respectively with total cost in one year of $101,307.9. Under the CC approach, the cycle time for modified Bomberger (1966) stamping problem was calculated as T=31.892 with total cost in one year of $247,592.43. These two costs were higher than those of perfect production system problem since there was involvement of imperfect production system parameters α, β, μ, γ and u.