

Thesis Title	The Scheduling of Anti-Retroviral Drugs Production Line
Thesis Credits	12
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Program	Master of Engineering
Field of Study	Industrial and Manufacturing Systems Engineering
Department	Production Engineering
Faculty	Engineering
Academic Year	2014

#### Abstract

The Government Pharmaceutical Organization (GPO), a state enterprise under the Ministry of Public Health, is one of the pharmaceutical manufacturers in Thailand. The GPO produces various different dosage forms of medical products such as solid, semi-solid, liquid and injection dosage form. Nowadays solid dosage form which is the main product type confronts with backorder problem. Anti-Retroviral (ARV) drugs also face with this problem. The ARV production line can be divided into 4 stages; mixing, compression, coating and packing. Each process is designed as a flow shop environment. Moreover, instead of setup time in other manufacturing processes, drug production requires a clearance process after each job—which is critical in pharmaceutical industry to reduce the risk of cross-contamination between drugs. The clearance time depends on the type of machine and drug type of job. The production of ARV drug is considered complex and must comply with regulations such as GMP/PICs in order to prevent contamination between drugs and quality of drugs. Thus, sequencing and assigning task is tedious but crucial. This paper aims to develop a mathematical model for a flow shop scheduling problem with sequence dependent setup times. The developed model utilizes a binary linear programming technique whose objective is to minimize a maximum completion time of all the jobs. A numerical example from three actual monthly job is used to illustrate its application and solved by Excel Premium Solver software. The results show that the optimization method can equally reduce the total makespan from current practice and produce all of item following monthly plan.

Keywords : Flow Shop Scheduling / Pharmaceutical industry / Anti-Retroviral Drugs  
Sequence-dependent clearance times / Makespan