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Bi objective optimization for scheduling two-stage assembly flow shop problem in a just in time environment

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Abstract— **In this paper, we proposed a new bi-objective mathematical model for two stage assembly flow shop problem (TAFSP) in just in time environment. Assembly flow shop problem (AFSP) is a special type of flexible job shop problem that has two stages. Parallel and independent machines are exists in the first stage and only one machine (assembly machine) assembled jobs in the second stage. Each job consisted of m+1 operations that process on m+1 machines in the two stage respectively. We applied ε – constraint method as exact approach to validate the proposed model and obtain fronts of the solutions in the solution space.**

Keywords-Assembly flow shop problem; Just in time envirnoment; ε – constraint method.

I. INTRODUCTION

In an assembly flowshop scheduling problem there are n jobs where each job has m + 1 operations and there are m + 1 different machines to perform each of these operations. Each machine can process only one job at a time. For each job, the first m operations are conducted at the first stage in parallel and a final operation in the second stage. Each of m operations at the first stage is performed by a different machine and the last operation at the second stage may start only after all m operations at the first stage are completed. The two-stage assembly scheduling problem has many applications in industry. Potts et al. [1] described an application in personal computer manufacturing where central processing units, hard disks, monitors, keyboards, etc. are manufactured at the first stage, and all the required components are assembled to customer specification at a packaging station (the second stage). Lee et al. [2] described another application in a fire engine assembly plant. The body and chassis of fire engines are produced in parallel in two different departments. When the body and chassis are completed and the engine has been delivered (purchased from outside), they are fed to an assembly line where the fire engine is assembled. There are many other problems that can be modeled as an assembly flowshop scheduling problem, including queries scheduling on distributed database systems. In recent years, there has been a rapid trend toward the distribution of computer systems over multiple sites that are interconnected via a communication network [3]. This new architecture has raised many new challenges and problems in the field of database systems. For example, it is common with current technology to develop forms or reports that require tens of embedded queries that retrieve information from different sites on the networks [4].

The remainder of this study is organized as follows: Section2 gives the literature review of scheduling assembly flow shop problem. Section3 describes the problem and introduces notation and proposed mathematical model. Section 4 consists of the proposed algorithm for finding the pareto front .Section 5 presents