

Single Machine Product Scheduling with Outsourcing Allowed

C. S. Sung^a, Ik Sun Lee^a, S.H. Yoon^b and J.H. Juhn^c

^a Dept of Industrial Engineering, KAIST, Yuseong-gu, Daejeon 305-701, Korea

^b School of IT and Engineering, Jeonju University, Korea

^c Dept of Comp Public Admin, Chongju National College of Science & Technology, Korea

Abstract

This paper considers various single-machine product scheduling problems with outsourcing allowed, where each product can be either produced by the machine or outsourced at market. Outsourcing has been becoming increasingly popular as a way to improve productivity in various companies, especially, including electronics industries and motor industries. The objective is to find the optimal product sequencing (scheduling) with outsourcing (if needed) allowed, which minimizes sum of the associated outsourcing cost and scheduling cost. The scheduling cost is represented by each of the scheduling measures including makespan, (weighted) sum of completion times, maximum lateness, and sum of lateness.

In the analysis, the proposed problem of minimizing sum of the associated scheduling cost and the outsourcing cost, called *unconstrained problem*, and that of minimizing the scheduling cost subject to outsourcing budget, called *constrained problems*, are analyzed for their complexities. Then, some associated solution properties are characterized to derive DP algorithms.