

Resource-Constrained Project Scheduling: Past Work and New Directions¹

Bibo Yang • Joseph Geunes

Department of Industrial and Systems Engineering, University of Florida, Gainesville, FL

William J. O'Brien

Department of Civil and Coastal Engineering, University of Florida, Gainesville, FL

April 2001

Abstract

This report summarizes past work in resource-constrained project scheduling problems (RCPSP) and also presents a new RCPSP with a specialized minimum cost objective function. This new RCPSP model focuses on single-resource problems with resource consumption and late delivery costs. This model applies, for example, to a general contractor or sub-contractor in the construction industry facing project deadlines with limited resources and penalties for late completion. We develop a new bin-packing based algorithm to provide good solutions for this problem and describe some computational experience with this algorithm. This paper is separated into two distinct parts. Part 1 (Sections 1 through 5) summarizes the vast literature on RCPSPs and categorizes this literature. Part 2 (Section 6) presents our new RCPSP variant and our heuristic algorithm.

1. Introduction and Classification of RCPSP Problems

Resource constrained project scheduling problems (RCPSPs) involve assigning jobs or tasks to a resource or set of resources with limited capacity in order to meet some predefined objective. As we will see, many different objectives are possible and these depend on the goals of the decision maker, but the most common of these is to find the minimum makespan, i.e., the minimum time to complete the

¹ Research Report 2001-6, Department of Industrial and Systems Engineering, University of Florida. This work was supported by NSF Grant #CMS-0122193.