International Conference
on Industrial Engineering and Systems Management
IESM 2009
May 13-15
MONTRÉAL - CANADA

Formulation for Less Master Production Schedule Instability under Rolling Horizon

Carlos HERRERA [a], André THOMAS [a],

[a] *Centre de Recherche en Automatique de Nancy (CRAN), CNRS UMR 7039/Nancy Université Campus Sciences - BP 70239 - 54506 - Vandœuvre-lès-Nancy Cedex, France.*

Abstract

In Manufacturing Planning and Control Systems, the Master Production Schedule (MPS) makes a link between tactical and operational levels, taking into account information provided by end items, demand forecast as well as Sales and Operations Planning (S&OP) suggestions. Therefore, MPS plays an important role to maintain an adequate customers service level and an efficient production system. In a rolling planning horizon, MPS is periodically computed over whole operational horizon. The differences between scheduled quantities obtained by this process are related to MPS instability. This feature of MPS has negative effects, both, at tactical level and also at operational one. In this paper, a Mixed Integer Programming model is proposed for MPS instability. The proposed model considers instability minimization in addition to inventory costs and set up. Simulation is used to take into account stochastic demand. Computation experiments are presented in order to show the efficiency of this approach by finding stable MPS without a considerably increase in the total cost.

Key words: Production, Manufacturing, Integer Programming, Instability, Nervousness.

1 Introduction

In Manufacturing Planning and Control Systems, the *Master Production Schedule* (MPS) is the link between tactical and operational levels taking into account information provided by demand forecast as well as Sales and Operations Planning (S&OP) suggestions [3,14]. Moreover, the MPS considers availabilities of critical resources, management policies and goals. The main objective of the MPS is to obtain production quantities in each period, minimizing the cost and maximizing bottleneck utilization. Therefore, the MPS is important to maintain an adequate customers service level and an efficient production system through well managed constraints.

The most common way to compute a MPS is to consider a rolling planning horizon. This means, MPS is constantly computed with a specific periodicity Δt (cycles), over whole operational horizon. Hence, this methodology regularly reschedules the production quantities by periods.

The differences in the planned quantities obtained by this rescheduling process, are related to MPS stability. If these differences are not significant, MPS is said to be stable, on the contrary, whenever these differences are more significant, the MPS becomes more unstable. This results of MPS instability,

⋆ This paper was not presented at any other revue. Corresponding author C. Herrera. Tel. +33-03-83684450. Fax +33-03-83684459.

Email addresses: carlos.herrera@cran.uhp-nancy.fr (Carlos HERRERA), andre.thomas@cran.uhp-nancy.fr (André THOMAS).