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ALA MOANA HOTEL, HONOLULU, HAWAII

IMPROVING PRODUCTIVITY OF SMALL-TO-MEDIUM ENTERPRISES BY ADOPTING CELLULAR PROCESSING

WENG, WEI & ET AL

WASEDA UNIVERSITY, JAPAN

GRADUATE SCHOOL OF INFORMATION, PRODUCTION AND SYSTEMS

Dr. Wei Weng
Mr. Atsushi Fukui
Mr. Shigeru Fujimura
Graduate School of Information, Production and Systems
Waseda University, Japan

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Synopsis:

The job shop system has been widely accepted by small-to-medium enterprises as the common way of doing business. However, cellular processing is likely to bring higher performance than a job shop if an enterprise deals with only a small variety of products. This paper demonstrates why and gives an industrial case as an example. We share the experience to help more enterprises improve productivity and overall performance.

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Wei Weng, Atsushi Fukui, Shigeru Fujimura

Graduate School of Information, Production and Systems, Waseda University

2-7 Hibikino, Wakamatsu-ku, Kitakyushu, Fukuoka 808-0135, Japan

Abstract

In product making and processing industries, the job shop system has been widely accepted as the common way of doing business. However, for small-to-medium enterprises that deals with only a few types of products, a cellular processing system might be better than a job shop for achieving lower costs and higher performance. This study compares the cellular processing system against the job shop system, and gives an example of a factory that converted from a job shop to cellular processing system and achieved great improvements. We share the experience to enable more enterprises to improve productivity and performance in costs, lead time, and quality.

Globalization is increasing competition among products making and processing enterprises around the world. Especially for small-to-medium enterprises, it is difficult to survive and grow in such a competitive market. Therefore, achieving lower costs, shorter lead times, and higher quality become critically important for them.

One factor that affects the performance of an enterprise is the system it uses for product processing or making. Most small-to-medium enterprises use the job shop system, which is the most widely accepted way of doing business (Bhat, 2008). However, this has burdened many enterprises with inefficiency, because job shop systems are likely to produce large inventories, thereby bringing problems such as high costs and long lead times (Bhat, 2008). The only advantage of a job shop is that machines can be fully utilized, since they are not dedicated to processing a single product. Therefore, a job shop is most suitable for high variability production, i.e. processing a large variety of products, each in a small volume. For enterprises that deal with only a small variety of products, cellular processing is likely to be better, because its equipment layout greatly simplifies material flow, thus removing many problems of a job shop (Matsui, 2007). According to some studies, adopting cellular processing would bring similar benefits and advantages of applying lean production (Fullerton and McWatters, 2001; Wemmerlov and Johnson, 1997; Mackelprang and Nair, 2010).

In this respect, we investigated a number of small-to-medium factories in Asia, and found that all of them achieved clear improvements after converting from a job shop to cellular processing.

One of them is located in Taiwan and makes air-conditioning parts. Before adopting

cellular processing, product making was on the first floor, and assembly and packaging were on the second floor. Cranes were moving between processes. Large warehouses were supplying material under instructions of the production manager. Large volumes of material and semifinished were piling on both sides of walking paths. Production plans and instructions were made by a production management office. Lead times of products varied from 14 to 28 days. After knowing the advantages of cellular processing, the factory spent three years to convert to it. Fig. 1 shows the progress they went through. They first produced a single product in a pilot cell for trial. Delighted by the results of the trial, they then extended cellular processing to the remaining products.

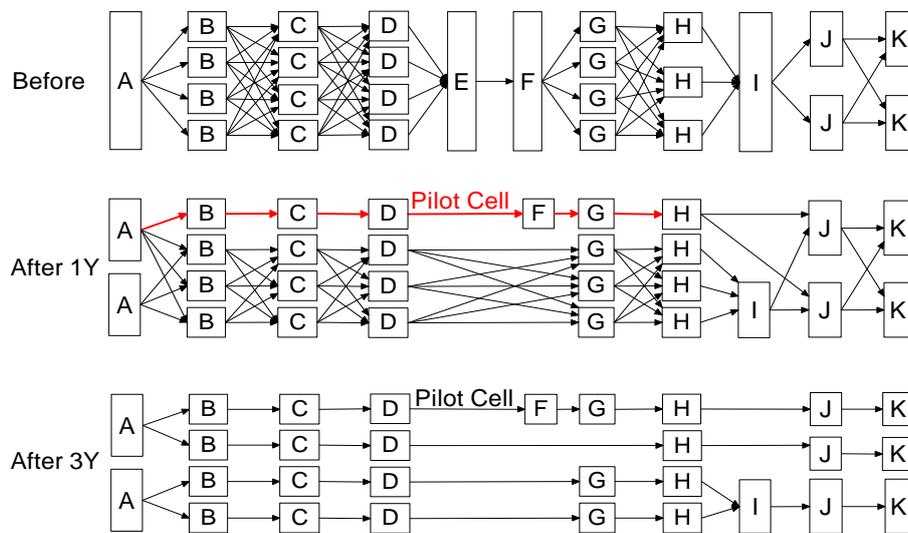


Figure 1: Progress of implementing cellular processing in a real factory.

After adopting cellular processing, all the cranes and warehouses in the factory were discarded, inventories reduced to almost zero, and average lead times of all products reduced to 7 days.

In spite of all the advantages, cellular processing has the disadvantage of machine duplication, which might lead to high costs if machine utilization rate is low (Bortolini et al., 2011). Therefore, it is most suitable for low variability high volume production. The degree of improvement from adopting it depends on the unique characteristics of each individual factory.

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