FLEXIBLE MANUFACTURING SYSTEM LAYOUT FOR FURNITURE INDUSTRY

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ABSTRACT

This thesis is written to understand flexible manufacturing system (FMS) and then to develop FMS layout for the furniture industry. We have chosen Tawei (M) Sdn Bhd as our case study company as they have given us the opportunity to further explores the potential to implement FMS in their plant. Our thesis starts with the understanding of FMS components. In general, FMS is defined as a fully automated operation yet flexible production for a family of parts. In studying FMS, the components consist of workstation, material handling, computer control system, and human resources. Besides that, types of layout is one of the characteristics involve in the designing of FMS layout. The FMS layout can be divided into five categories, such as in-line layout, loop layout, ladder layout, open-field layout, and robot centered layout.

The technical definition of FMS is a production system consists of a set of identical or complementary numerically controlled machines that are connected through automated transportation systems. Each process in an FMS is controlled by a dedicated computer (FMS cell computer). This is often imbedded in a large hierarchical network of computers. An FMS is a capable of processing workpieces of a certain workpiece-spectrum in an arbitrary sequence with negligible setup delays between operations. This is possible since in an FMS a set of preadjusted tools is available through a centralized tool magazine with short access time or through local tool magazines at the machine with direct access. Furthermore workpieces are clamped on pallets at separate setup tables thus allowing them to be quickly positioned at the machines (T Horst and K Heinsrich, 1993).

FMS is not new to the manufacturing industry. Although Malaysian industry have used the concept of FMS especially in the automotive and electronics industry but in its limited application for a certain process. In Malaysia, FMS has yet to be

applied in the furniture industry. Therefore in view of this, it is a great opportunity for us to explore the benefits of FMS for the furniture industry. Furthermore, most of the wood base furniture industry in Malaysia is still manually operated and labor intensive that uses large foreign labour workforce. Foreign labour is being used for this furniture industry in view of its inconducive environment to the locals especially exposure to dust, fumes, highly hazardous machinery, and exposure to chemicals such as varnish, thinner and petroleum-based solutions.

Proposed implementation of FMS to this sector will helps to increase the production volume rate, reduce labor intensive from foreigners, and provide safety-working area. FMS combines with computer integrated manufacturing that comprises of automation and robotics system will certainly provide a better quality product as compared to the traditional method of production.

From our visits and analysis of Tawei plant, we have identified that they adopted a process type layout for their chair production plant. We found that such type of layout is inefficient in terms of flow as shown from Figure 4.3 in this thesis. A new FMS layout was drawn showing new equipment and machinery as well as its new layout to provide a more efficient product flow and output. From our study on the new FMS setup, we found that Tawei could increase their chair production plant rate to meet the overseas market requirement. Most importantly they could also be improved the quality of their products.

Finally, we hope this thesis will be extended to other project students who are interested to explore further in the physical machine design and computer systems integration for such FMS layout. This project can also be extended to other manufacturing sectors that need to excel and be competitive in the era of global competition.

TABLE OF CONTENTS