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MODELING OF ADVANCED CELLULAR FLEXIBLE MANUFACTURING SYSTEMS WITH PRODUCTIVITY CONSIDERATION DURING ALTERNATE PROCESS PLANS: A MATHEMATICAL APPROACH

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Abstract

For the design of manufacturing cells, numerous mathematical models and various algorithms have been extensively investigated in the literature. However, most of the proposed models and algorithms have more or fewer drawbacks on the issue with real life situations. In the past decade, substantial research was focused on the development of new cell formation procedures. Group formation of machines and parts in cellular exible manufacturing systems (CFMS) is often achieved by using the similarity of part operations. However during exible manufacturing cell formation, factors that relate to manufacturing attributes are often ignored. The implementation of CFMS leads to increased output, decreased setup time, reduced work-in-process, and reduced material handling cost as well as improved system productivity. One problem in the design of CFMS is ce1ls formation (CF). Solving the CF problem in CFMS may lead to the organization or re-organization of manufacturing systems into exible manufacturing cells and to the determination of the type and number of machines required in each manufacturing cell. In the present work, a cellular manufacturing (CM) system design model that uses a direct measure \productivity index" is presented. A 0-1 integer-programming model that maximizes productivity is proposed. In this paper, the proposed mathematical

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Key Words: Productivity, Alternate Process Planning (APP), Flexible Manufacturing System (FMS), Cellular Flexible Manufacturing System (CFMS).