

Design of Virtual Manufacturing Cells: An Integrated Approach

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Abstract

Cellular Manufacturing (CM) is being used as a philosophy with broad applicability in manufacturing sector. But existing approaches to cell formation forces each part of a part family to belong to only one machine cell. In order to attain mutual separability in machine part cluster, machines of a particular manufacturing cell operate upon parts of only the corresponding class. However, forcing parts into families or duplicating machines without any economic considerations might be counter productive to the essence of group technology and might even result in more cost than intercellular material movement or subcontracting. These approaches fail to merge part families with overlapping machine requirements. This paper presents a four- phase approach for cell formation, which integrates machine grouping and layout design, neglecting part family formation. The proposed approach uses hybrid layout that seek to preserve the part family and cellular focus of the original set of cells designed to replace existing functional layout in a job shop. The approach is illustrated with an example.

Keywords: Cellular manufacturing, cell formation, hybrid layout, virtual manufacturing cells