ABSTRACT

Cellular manufacturing system is a layout system which utilizes the advantages of functional layout as well as line layout and minimizes the disadvantages of both type of layouts. Usually handling cost will be more in functional layout where as excess capacity cost of the facilities will be more in line layout if sufficient production volume does not exist.

The main objective of this research was to develop a computerized algorithm to find desirable number of groups and corresponding solution in each group as an aid to cellular manufacturing for a given set of components. The criteria used was the minimization of total cost comprising of handling cost and excess capacity cost.

The algorithm mainly consists of three steps:
1. Identification of additional potential main line sequences using Rank order clustering algorithm and Mean demand position method.
2. Development of similarity index matrix
3. Finding the desirable number of groups using covering technique with modifications so that the total cost will be minimum.

The algorithm was experimented with several problems, by varying the production volume of the components.
The algorithm was compared with Production Flow Analysis (PFA) and found that the application of the algorithm is simpler than the PFA technique.

The following are the major contributions of this research.

1. The literature review indicated that no suitable algorithm is available to form groups for a given set of components, considering the cost of handling and cost of excess capacity of the facilities simultaneously. This is taken care by the algorithm discussed in this research.

2. In the past, all the authors defined the similarity index as a function of operational similarity only. But in this research, the similarity index defined, is a function of operational similarity and the production volume of the components. This type of similarity index is more realistic.

3. A heuristic procedure for covering technique with suitable modifications was developed to identify desirable number of groups of components with minimum total cost.

4. The algorithm was applied to case problem and satisfactory solution was obtained.