
A hierarchical cellular manufacturing system

**Seyed Hojat Pakzad-Moghaddam and
Farhad Salehian**

Department of Industrial and Systems Engineering,
University of Tehran, Iran
Email: hojatpakzad@gmail.com
Email: farhad.salehian@ut.ac.ir

Seyed Esa Hosseini

Department of Social Science,
Islamic Azad University, Iran
Email: hosseini.s.e.123@gmail.com

Hassan Mina*

Department of Industrial and Systems Engineering,
University of Tehran, Iran
Email: hassan.mina@ut.ac.ir
*Corresponding author

Abstract: Cellular manufacturing is one of the most common and popular methods in order to take advantage of group technology. Of particular interest, applying cellular manufacturing systems (CMSs) increases the efficiency of the applied transportation system by designing an efficient working floor. Controlling the amount of material handling, results in lower cost and energy required to transport materials/products. Hence, CMS are under consideration in the study at hand. Regarding a hybrid CMS, proper manufacturing systems such as single machines, flow shops, job-shops and open shops are applied between and within cells to harmonise the whole manufacturing procedure. A special case of hybrid CMS, referred to as hierarchical CMS is investigated in this paper. In a HCMS not only machines are placed in several interior cells, but also interior cells themselves must be located in exterior ones. Finally a mixed integer nonlinear programming mathematical model is presented and validated through numerical results.

Keywords: cellular manufacturing; CM; energy saving policy; shop floor; mathematical modelling.

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