MODELLING AND MULTILEVEL OPTIMIZATION OF ASSEMBLY LINES USING QUEUEING NETWORKS

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The assembly line balancing problem is basically assigning a set of tasks with precedence relations to stations. When the task times are stochastic and there are limited buffers between stations, the problem becomes more challenging. A multilevel optimization scheme is proposed for synchronous optimization of task assignment and buffer allocation. The procedure combines the advantages of both queueing theory and constraint programming. A line balance for a given number of work stations is determined using constraint programming. Optimal buffers for in-process inventory is allocated using Powell’s search method. Measures of efficiency are estimated using closed queueing networks. This research introduces an innovative method which integrates queueing theory to stochastic assembly line balancing in assigning tasks, evaluating the line performance and optimizing the line throughput.