Piromya Puttong 2006: Development of Artificial Neural Network for Manufacturing System Performance Prediction: Case Study of Pull Control System. Master of Engineering (Industrial Engineering), Major Field: Industrial Engineering, Department of Industrial Engineering. Thesis Advisor: Mr. Pormthep Anussornnitisarn, Ph.D. 197 pages.
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The main objective of this research is to develop an artificial neural network (ANN) to predict the outcomes of simulation model, in this case, pull production control system. This research also investigate the factors that may have impact on the prediction performance of the proposed ANN. The investigated factors are: 1) size of training set for ANN; 2) degree of variation for each stochastic input variable and 3) the number of input variables for ANN. The pull production system simulation model of is developed and used to generate training and verifying data set for the proposed ANN. The proposed ANN is design to predict four performance measures of the pull production system. The four performance measures are: the average work-in-process, the average number of fulfilled customer orders, the average number of unfulfilled customer orders and the average cycle time.

The experiment results show that the ANN is able to predict the performance of the pull production control system with slight difference from original simulation solution. The factors that have impact on the performance prediction are: 1) the more the number of training sets, the better the prediction performance; 2) the prediction performance drops when the variation of input variables increase; and 3) the more the input variables of ANN, the bigger the prediction error.

This research also applies the proposed ANN as a performance function approximation of the pull production system. Working with simple heuristic procedure, the optimal kanban size can be found with less time comparing to searching via simulation model.

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