

DESIGN OF KNOWLEDGE-BASED SCHEDULING SOLUTION BASED ON EXPERT'S TECHNICAL KNOWLEDGE IN PRINTING PROCESS AND PROPOSAL OF ITS IMPROVEMENT

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ABSTRACT. *We have reviewed business processes of an automobile parts supplier, and have addressed to improve its production efficiency. The goal of this study is to develop a knowledge-based production scheduling software with expert's technical knowledge. This paper focuses on printing process from the whole of production processes, and describes the result of business process analysis to obtain expert's implicit knowledge. In printing process, finished products are printed by various colors and character plates (operations). When the type of operation is switched, the printing process requires "setup operation" with production idle time. The production lead time can be shortened by collecting the products with same type of operation, so the objective of this problem can be designed by the minimization of setup operations. This paper formulates a scheduling problem by using the result of analysis, and expresses a solution methods based on expert's empirical selection rule. The reason we have concentrated on the expert's technique is that the knowledge based solution method might be easily able to modify the procedures by workers themselves. Usually meta-heuristics including genetic algorithms can obtain more effective solution than the expert's, but most of on-site workers cannot fully understand the solution methods because they are too mathematical to use. Until now, the whole of business processes in the parts supplier have been examined by our previous works, and we have mainly discussed operations in the printing process only by theoretical aspect. However the previous approaches cannot flexibly respond to the changes of production condition such as dispersion of order, interrupt of urgent task, and change of inventory quantity in spite of the actual field can respond these unpredictable and uncertain situations. Many problems in meta-heuristics can be thought to be due to the parameter tuning that experts in actual production field cannot do. Therefore this paper regards that the expert's empirical know-how, tacit knowledge, is the most important factor in response to the changes of production condition, and the present state is modeled by using actual production information, particularly interview in the printing process.*

Keywords: Knowledge-based scheduling software, Business process analysis, Printing process, Expert's technical knowledge, Minimization of setup operations