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*Full Length Research Paper*

# An integral system for automated cutting tool selection

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**The importance of cutting tools in production systems demands modern approach to their selection. Automation of tool selection can significantly enhance the efficiency of process planning. Presented in this paper is a development of a geometry-based and feature-based system for automated selection of cutting tools. The developed system represents an integral solution, since, besides cutting tool selection, it allows selection of cutting parameters and cutting medium. The system is built on a modular principle, comprising a database, knowledge base, dedicated and external software applications. Furthermore, the system features an RFID-based module which gives it vital capability of automated cutting tool inventory management. The proposed system was successfully tested in industrial environment, while in this paper an example featuring a hole boring machining operation is presented.**

**Key words:** Cutting tool, data base, knowledge base, radio-frequency identification technology.

## INTRODUCTION

Constant advancement of computer technology contributes to its ever greater application in engineering, including the process planning. The basic idea behind this process is to enable manufacturing technologies to be highly adjustable to market demands, while providing high product quality, high output volumes and reduced manufacturing costs (Zuperl et al., 2011). There are numerous examples of developed computer-aided everything (CAx) systems which successfully automate the tasks of product design (Zhao et al., 2002), process planning (Simunovic et al., 2010), production management (Abdul-Rahman and Wang, 2010), etc. Within a manufacturing system, there are several factors which most prominently influence the quality of process plans: blanks, sequence and structure of machining processes, concentration of machining operations, machine tools, cutting tools, fixtures, measuring devices, etc. (Smith, 2008). Enhancement of process planning procedure requires optimization of these parameters. In the chain of factors which influence the quality of final product, cutting tools are of exquisite importance (Zuperl and Cus, 2008). Inadequate management of cutting tools contributes to lower efficiency and effectiveness of production systems in general. Therefore, efficient tool management requires constant monitoring of cutting tools flow and use. This necessitates establishment of a comprehensive and well organized cutting tools database which is in the center of all information flows within every cutting tools management system. Cutting tools management requires a number of synchronized activities which demand a large number of information. There are three basic types of activities within such a system and they pertain to: selection of cutting tools, inventory management and management of cutting tools in using. Considering the fact that an average manufacturing system utilizes several thousand cutting tools, that their availability impacts the deadlines for introduction of new products, and modification of existing products, as well as the fact that shop floor, tool flow can also be very complex, therefore it is important to create an automated system for cutting tools selection. Consequently, this problem has been addressed by numerous authors. Giusti et al. (1986) developed an expert module for automatic tool selection of turning

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