

7th IQC

**QUALITY
RESEARCH**

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7th International Quality Conference

23.05.2013. Center for Quality, Faculty of Engineering, University of Kragujevac



Culture of Quality

**Quality and Social
Responsibility**

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to quality**

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globalization**

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to quality and
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**Management of
sustainable
development**

**ICT challenges
for future society**

**Excellence of
society organization**



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7. International Quality Conference



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Editors: *Dr Slavko Arsovski*, full professor
Faculty of Engineering, Kragujevac
Dr Miodrag Lazic, full professor
Faculty of Engineering, Kragujevac
Dr Miladin Stefanovic, associate professor
Faculty of Engineering, Kragujevac

Technical Editor: *Snezana Nestic*
Faculty of Engineering, Kragujevac

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Prof. dr Slavko Arsovski

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Aleksandar Djordjevic¹⁾
Milan Eric¹⁾
Aleksandar Aleksic¹⁾
Snezana Nestic¹⁾
Svetlana Stojanovic¹⁾

1) Faculty of Engineering,
University of Kragujevac,
Serbia
{cqm, ericm, aaleksic,
s.nestic}@kg.ac.rs

OPTIMIZATION OF MACHINING PROCESSES USING THE ABC METHOD AND GENETIC ALGORITHM

Abstract: Optimization of machining processes is one of the most important elements in the planning of metal parts production. In this paper, we have applied ABC methods to determine the cost of all processes that are used in production of homocinetic sleeve joint. After that we have used multi-criterion optimization technique based on genetic algorithms, in order to optimize the basic parameters of all the processes: the speed and feed. The objective function is given in a form of specific cost for each process, for which minimization it is need to consider the appropriate mechanical and manufacturing constraints. The proposed model uses a genetic algorithm, so that after a certain number of iterations optimal result is reached that will satisfy the objective function and all anticipated limitations. Obtained results shows that GA solves the optimization problem in an efficient and effective manner, so that the results can be integrated into an intelligent manufacturing system for solving complex optimization problems in machine production processes.

Keywords: Genetic algorithm, machine production processes, cost functions minimization

1. INTRODUCTION

Optimization is the process of adjusting the input device characteristics, mathematical processes and experiments in order to find the minimum or maximum output or result [1]. In recent years, new optimization methods are developed that are conceptually different from the classical methods of mathematical programming. These methods are called modern or metaheuristics optimization methods. Under metaheuristics optimization methods are considered direct search methods that converge to global optimum in a particular direction based on ideas of probability heuristics. Most of these methods are based on certain

characteristics or behaviors of biological, molecular and neurobiological systems. These methods have become popular in recent years for the solution of complex engineering problems. One of the methods of optimization, which has experienced significant development, is the method of genetic algorithms (GA).

Genetic algorithms have been proposed by John H. Holland in the early seventies. Holland developed them, along with his students at the University of Michigan in the seventies and eighties. The book published by the Holland in 1975. "Adaptation of the neural and artificial systems" represents a genetic algorithm as an abstraction of biological evolution and provides a theoretical

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