

# **OPINION**

**on dissertation work  
for the acquisition of educational and scientific degree "doctor" in**

**Field of higher education - 5. Technical sciences  
Professional direction - 5.1 Mechanical engineering  
Doctoral program "Technology of mechanical engineering"**

**Author: MSc Eng. Ali Abdulkarim Gitan**

**Topic: "Optimization of the basing and fixing of blanks during mechanical processing in the conditions of CAD environment"**

**Member of the scientific jury: Prof. Galya Velikova Duncheva, DSc, PhD**

## **1. Topic and relevance of the dissertation**

The processes of design, production and implementation of technological equipment require a significant resource of time and money in the preparation of new products in mechanical engineering, and therefore, they directly affect the price/quality ratio. In essence, mechanical engineering design implies a variability of solutions. Therefore, the choice of an optimal option from several alternatives requires the formulation and solution of an optimization problem based on multiple criteria (engineering and technical and economic). The present dissertation is aimed at developing a system for selecting an optimal scheme for basing and fixing blanks during mechanical processing, integrated with CAD environment. In terms of the above justification, the topic is relevant and useful.

## **2. Research methodology**

A theoretical and an analytical approach were used in the dissertation based on basic assumptions for dimensional analysis, as well as assessments of the reliability, linear wear and contact area of various supporting base elements. To automate the selection of the optimal installation scheme and its constructive implementation, the systematic approach to analysis and synthesis of technical objects was used. For the program implementation of the automated system, a database of 3D models of basing elements in the SolidWorks environment and tables for automated selection of their parameters in the MS Excel software have been developed.

### 3. Contributions of the dissertation work

The main contributions of the dissertation work can be classified as follows:

#### ■ *Scientific and applied contributions*

This group of contributions is entirely in the category:

*Creation of new classifications, methods, constructions, models, methodologies, algorithms:*

- *Systematization of possible schemes for basing of blanks in mechanical processing;*
- *Defined criteria for: geometric compatibility of the shape of the blank, allowing the choice of a basing scheme; selection of the construction of a basing element when using different technological bases;*
- *Models, methodology, algorithms and diagrams of classes and states, which can be used to develop a software system for choosing an optimal scheme of basing and fixing blanks;*

#### ■ *Applied contributions*

- *Structural diagram of a software package for selecting the optimal scheme for basing and fixing the blanks;*
- *Database of developed 3D models of base elements in the SolidWorks software;*
- *Tables for: automated selection of base element models; preliminary assessment of the economic efficiency of the designed devices.*

### 4. Publications and citations of publications on the dissertation work

A total of five scientific works have been published on the dissertation work, distributed according to the place of publication, as follows:

- 1). One scientific report at a conference abroad (Rezekne, Latvia);
- 2). Two reports at scientific conferences in Bulgaria;
- 3). Two articles in the Bulgarian journal "Mechanical Engineering and Machine Science".

MSc Eng. Ali Gitan is an independent author of one article.

No citations of the mentioned publications are known.

### 5. Authorship of the results obtained

I believe that the author has significantly improved his qualifications in the researched problem and in the field of mechanical engineering technology in general.

### 6. Remarks and recommendations

The dissertation and the abstract are well structured and clearly written. The following technical inaccuracies and omissions are noted: 1). Some of the abbreviations in the text are not included in the list of abbreviations used (e.g.

SU, ZU); 2). Merger of words in the text; 3). There are no captions for tables 3.1, 3.2 and 3.3 and information about the dimensions of the values included in them.

## **7. Conclusion**

I believe that the presented dissertation meets the requirements of the Act on the Development of the Academic Staff in the Republic of Bulgaria. The achieved results give me grounds to **propose** that the educational and scientific degree "Doctor" be acquired

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**Член на научно жури                      /п/  
/Prof. Galya V. Duncheva, DSc, PhD/**