

## **ADVISORY OPINION**

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

**the field of higher education - 5 "Technical Sciences",  
professional field - 5.1 "Mechanical Engineering",  
doctoral program - "Mechanical engineering technology"**

**Author: Mag. Eng. Nikolay Penkov Kolev**

**Topic: "Optimization of technological processes for part processing on CNC machines with robotic feeding"**

**Member of the scientific jury: Prof. Dr. Eng. Valyo Nikolov Nikolov**

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

In the developed dissertation work on the topic: "**Optimization of technological processes for part processing on CNC machines with robotic feeding**", a study is proposed of the influence of the cutting mode elements on the technological parameters (productivity, durability of cutting tools and roughness of the machined surfaces) of the turning process on CNC turning machines with two types of stations with robotic feeding when processing parts made of 42CrMo4 steel, as a result of which adequate experimental models with high accuracy were obtained.

The present study is relevant, both from a theoretical and practical point of view, since it is necessary to apply a systematic approach in the development and implementation of applications for increasing the technological parameters of the turning process on CNC turning machines with two types of stations with robotic feeding.

### **2. Research methodology**

The research presented in the work has been carried out with modern and adequate methods and technical means for solving the tasks set. Methods for modelling, statistical processing and analysis of experimental results, planning of experiments and optimization with specialized software have been applied.

I believe that the chosen research methodology is in accordance with the set goal of the dissertation work: optimization of the CNC turning process with robotic power supply according to the criteria of productivity, durability of cutting tools and roughness of the machined surfaces and ensuring a continuous work cycle when processing heat-treated (hardened and high-temperature tempered) steel 42CrMo4, in which the main tasks set have been solved and the following results have been obtained:

- A methodology has been developed for research, modelling and optimization of the turning process on CNC machines with robotic power supply.
- The productivity, durability of cutting tools and roughness of machined surfaces when machining heat-treated (hardened and high-temperature annealed) steel 42CrMo4 with different cutting inserts were studied and modelled.
- Multi-objective optimization of the CNC turning process with robotic feed was performed and the optimal cutting modes when machining steel 42CrMo4 were determined.
- A continuous operating cycle of CNC machines with robotic feed was ensured.

### **3. Contributions of the dissertation**

I believe that the contributions are adequately formulated by the dissertation candidate, have a scientifically applied and applied nature and reflect the content of the dissertation work.

They can be accepted as: formulation and substantiation of a new hypothesis, proving with new means significantly new aspects of known scientific theories, creating new methods, constructions, schemes and technologies, and obtaining confirmatory facts. In solving the assigned tasks, the dissertation candidate demonstrates proficiency in applied software products and measurement techniques using modern technologies and systems.

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

The main parts of the dissertation are presented in seven scientific articles, four of which are indexed in Scopus and three are in national specialized collections. One of the publications is independent and six are co-authored, with the doctoral student being the first author in two of them, which reflects his leading role in conducting the research.

I am not aware of any citations of the publications preceding the dissertation.

### **5. Authorship of the results obtained**

I believe that the dissertation candidate shows very good knowledge of the issues and adequately interprets the literary material - he cited 126 sources, 7 of which are in Cyrillic, most of which are contemporary and on the topic of the dissertation, which is an indicator of in-depth knowledge of the problem being solved and has a leading role in conducting research based on the independent publication and the two collective ones, in which he came first.

### **6. Opinions, recommendations and remarks on the dissertation**

I believe that the dissertation work has been developed at a good scientific level and solves current problems related to studying the influence of the elements of the cutting mode on the technological parameters of the turning process on CNC turning machines with two types of stations with robotic feeding when processing parts made of 42CrMo4 steel, as a result of which adequate experimental models with high accuracy were obtained.

I have the following recommendation to the doctoral student: the main results obtained from the dissertation work should be popularized abroad and applied in the training of students and doctoral students.

### **7. Conclusion**

I believe that the presented dissertation meets the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria. The achieved results give me reason **to propose** that the educational and scientific degree "**Doctor**" be acquired by **Mag. Eng. Nikolay Penkov Kolev** in field of higher education - **5 "Technical Sciences"**, professional field - **5.1 "Mechanical Engineering"**, doctoral program - "**Mechanical engineering technology**".

05.06.2026

Signature:

/Prof. Dr. Eng. Valyo Nikolov/