OPINION

regarding a dissertation thesis for the acquisition of the educational and scientific degree "Doctor" (PhD) in

Higher Education Area: 5. Technical Sciences Professional Field: 5.1. Mechanical Engineering Doctoral Program: "Mechanical Engineering Technology"

Author: M.Eng. Nikolay Penkov Kolev
Topic: "Optimization of technological processes for part processing on CNC machines with robotic feeding"
Member of the Scientific Jury: Assoc. Prof. Vladimir Petrov Dunchev, PhD

1. Topic and Relevance of the Dissertation Thesis

The dissertation thesis is dedicated to a relevant and significant scientific-applied problem related to increasing the efficiency of technological processes during the machining of parts on CNC machines through the implementation of robotic handling systems. The subject matter is in line with modern trends in industrial production development, characterized by increasing automation, digitalization, and the integration of intelligent systems in mechanical engineering. The need to optimize production processes, reduce auxiliary operation times, and improve product quality determines the high relevance of the research. The topic is timely, significant, and has a clearly defined scientific-applied focus.

2. Research Methodology

To achieve the set objectives, a methodological approach has been applied, based on an analysis of scientific literature and the conduct of experimental studies in a real-world environment. The process includes the development of mathematical models and the application of statistical methods for data processing. The results have been experimentally verified and serve as the basis for creating engineering methodologies with direct practical application.

3. Contributions of the Dissertation Thesis

Based on the submitted dissertation thesis, the contributions can be formulated in the following synthesized manner:

Scientific-Applied Contributions:

- Theoretical-experimental models have been created for productivity, tool life, and surface roughness during turning on CNC machines with two types of robotic loading (Fanuc and Mitsubishi);
- A methodology has been developed for determining optimal cutting conditions using two methods – identifying a compromise optimal region and employing a generalized utility function;
- A methodology and an algorithm have been defined for calculating the required number of cutting tools to ensure a continuous process during the machining of serial parts in an environment involving robotic loading.

Applied Contributions:

- A detailed analysis of technological parameters was conducted when using tools from various manufacturers (SECO, PALBIT, ISCAR) under robotic production conditions;
- Specific optimal cutting conditions were determined, balancing high productivity and surface finish quality for the investigated robotic stations.

4. Publications and Citations on the Dissertation Thesis

The main theoretical propositions and experimental results of the dissertation thesis are reflected in 7 scientific publications. Their distribution includes 2 papers presented at international peer-reviewed scientific forums and 5 publications in specialized national scientific conferences in the field of mechanical engineering. The volume and scientific quality of the publications fully comply with the national requirements and the regulations of the Technical University of Gabrovo for the acquisition of the educational and scientific degree "PhD".

5. Authorship of the Achieved Results

The authorship of the achieved results is substantiated through publications in specialized scientific editions. The doctoral candidate is the sole author of one paper and the lead (first) author of two of the remaining publications. These facts confirm the candidate's personal contribution to the development of the dissertation thesis.

6. Opinions, Recommendations, and Remarks on the Dissertation Thesis

The dissertation thesis is well-structured and professionally written. The conducted experimental studies are thorough and well-substantiated. I have no fundamental remarks.

7. Conclusion

I consider that the presented dissertation thesis meets the requirements of the Act on the Development of the Academic Staff in the Republic of Bulgaria. The achieved results provide sufficient grounds for me to propose that the educational and scientific degree **"Doctor" (PhD)** be awarded to **M.Eng. Nikolay Penkov Kolev** in the Higher Education Area: 5. Technical Sciences, Professional Field:
5.1. Mechanical Engineering,
Doctoral Program: "Mechanical Engineering Technology".

Date: June 3, 2026

Signature: .....

/Assoc. Prof. Vladimir Dunchev, PhD/