OPINION

by DSc Eng. Nikolay Dimitrov Menkov

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Department of Process Engineering

on a dissertation for an educational and scientific degree "doctor"

in: field of higher education 5. Technical Sciences

Professional field 5.1. Mechanical Engineering

Doctoral program "Methods for controlling and testing materials, products and equipment"

Author: Miroslav Slavchev Simov

Title of the dissertation: Increasing the service life of plastic injection molding tools.

Scientific supervisor: Assoc. Prof. Dr. Velko Slavchev Rupetsov

1. General presentation of the procedure and the doctoral student

I have been appointed as a member of the scientific jury for the defense procedure of a doctoral dissertation for the acquisition of the educational and scientific degree "Doctor" on the topic "Methods for Control and Testing of Materials, Products, and Equipment", by Order No. RD-22-1993/20.10.2025 of the Rector of Paisii Hilendarski University of Plovdiv (PU). The author of the dissertation is MSc Eng. Miroslav Dimitrov Simov, a full-time PhD student at the Department of Mechanical Engineering and Transport of PU. The procedure is in the field of higher education 5. Technical Sciences, professional field 5.1. Mechanical Engineering, doctoral program “Methods for Control and Testing of Materials, Products, and Equipment.” The scientific supervisor is Assoc. Prof. Dr. Velko Slavchev Rupetsov from PU.

The set of materials submitted to me in electronic form by Eng. Simov (including the dissertation, abstracts in Bulgarian and English, list of publications, copies of the publications, a reference for compliance with the minimum requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria, and declarations of originality and authenticity) complies with the requirements of Article 36 (1) and (3) of the Regulations for the Development of the Academic Staff of Paisii Hilendarski University of Plovdiv. The submitted documents and materials have been prepared precisely and accurately. The dissertation of Eng. Simov consists of 139 pages and includes an Introduction, six separate chapters, a Conclusion, Contributions, and a List of publications. It is structured logically and appropriately.

I am not personally acquainted with Eng. Simov, but his curriculum vitae demonstrates competence corresponding to the topic of the dissertation.

2. Relevance of the Topic

Injection molding tools are critical components in the mass production of polymer parts. Extending the service life of these tools is essential for improving cost efficiency, reducing downtime, enhancing product quality, and minimizing environmental impact. In this context, I find the topic of the dissertation to be particularly relevant, and the stated objective fully corresponds to modern re-

quirements for the practical improvement of tool quality and durability. As evidence of the topicality of this research problem in contemporary science, I can refer to three review papers related to the subject, published in reputable scientific journals in 2025: https://doi.org/10.1007/978-3-031-95211-1_7; DOI: 10.22441/ijimeam.v7i1.31721; .https://doi.org/10.1108/RPJ-10-2024-0444.

3. Familiarity with the Problem

Chapter 1 presents a critical analysis of the current state of plastic molding tools. The literature review shows that the use of modified polymers poses a significant challenge to the service life of the tools. The main factors limiting the usability of injection molds are examined, and various practices aimed at extending tool life are discussed. A total of 137 literature sources have been used (all published after the year 2000), more than 30 of which are internet sources. The presented review demonstrates the author's high level of competence on the topic, his ability to delve deeply into the current state of the field, and his skill in identifying and classifying key problems. The literature study is summarized in conclusions that enable Eng. Simov to correctly formulate the aim and objectives of his research. To some extent, the review continues in Chapter 2, where defects in injection molds and methods for improving their durability are analyzed.

4. Research Methodology

Chapter 3 presents the materials under investigation, the applied methodologies, and the measuring equipment. Based on well-defined criteria, the author has selected appropriate steel and coating types as objects of study. The methodologies for the experimental determination of wear intensity and coating characteristics are described in detail, allowing their replication. This provides sufficient grounds to consider the obtained experimental results as reliable and credible.

5. Characteristics and Evaluation of the Dissertation and Its Contributions

The dissertation is written in a very good academic style, and I highly appreciate the quality of the included tables, figures, and graphical materials, including their color design. In each of Chapters 4 and 5, a specific objective is formulated, the obtained results are presented, and relevant conclusions are drawn. Chapter 6 presents practical methods for the restoration of defective injection molds and measures for extending their operational life.

I fully acknowledge the scientific and applied contributions formulated by Eng. Simov, through which he proposes original solutions to specific problems and achieves results that are valid for the issue of wear resistance of injection molds. I also recognize the applied contributions, which provide concrete solutions with direct practical applicability.

6. Evaluation of the Publications and the Doctoral Candidate's Personal Contribution

There are three publications related to the dissertation. In one of them, Eng. Simov is the sole author, while in the other two, co-authored with his scientific supervisor, he is listed as the first author. This provides grounds to conclude that the doctoral candidate is both the initiator and an active participant

in the published research. All three publications are written in English and have been published in journals indexed in Scopus. No citations have been identified so far, which indicates that the research has not yet gained recognition within the scientific community.

7. Abstract

The abstract is presented in 32 pages and corresponds fully to the dissertation. It includes all its main sections and complies with the requirements of Article 36 (1) of the Regulations for the Development of the Academic Staff of Paisii Hilendarski University of Plovdiv.

8. Recommendations for the Future Use of the Dissertation's Contributions and Results

The entire dissertation has a direct practical orientation, which would allow the author to further expand his research in multiple directions in the future. I recommend that the author continue striving to publish in reputable scientific journals. The dissertation itself is well-structured and excellently formatted. I would note a few methodological weaknesses: 1. In Chapter 1, there are entire pages of text containing statements (apparently from other authors) without proper citation, which may give the impression that these are the author's own conclusions; 2. The third research task is formulated unclearly, including grammatical ambiguity; 3. There is inconsistency in the style of the bibliography — such as publication years, author names, abbreviations, and other details. These remarks in no way diminish the scientific and practical value of the dissertation.

CONCLUSION

I consider that Eng. Miroslav Simov has carried out a substantial amount of analytical and experimental work, both in terms of scope and quality. The dissertation contains sufficient scientific-applied and applied contributions and complies with the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria, its Implementing Regulations, and the Regulations for the Development of the Academic Staff of Paisii Hilendarski University of Plovdiv.

Based on the conducted analysis, I give a categorically positive evaluation of the presented dissertation and consider it fully justified that MSc Eng. Miroslav Dimitrov Simov be awarded the educational and scientific degree "Doctor" in the field of higher education 5. Technical Sciences, professional field 5.1. Mechanical Engineering, doctoral program "Methods for Control and Testing of Materials, Products, and Equipment."

07.11.2025 г. Prepared by: .....

Prof. DSc Nikolay Menkov