

OPINION

on a dissertation thesis submitted for the acquisition of the educational and scientific degree “Doctor”
(PhD)

Author of the dissertation thesis:

Assist. Stanimir Georgiev Stanchev,
PhD student in the doctoral program “Mining Machinery”,
Professional field 5.8 “Exploration, Extraction and Processing of Mineral Resources”,
Department of Mining Mechanization, Faculty of Mining Electromechanics, University of Mining and
Geology “St. Ivan Rilski”

Title of the dissertation thesis: “Investigation of Mechanical and Technological Parameters of an
Eccentric-Type Rotary Crusher”

Prepared by:

Prof. PhD Eng. Evgeniya Ivanova Aleksandrova,
University of Mining and Geology “St. Ivan Rilski” – Department of Mineral Processing

1. Information about the PhD Student

The PhD student Eng. Stanimir Georgiev Stanchev is a graduate of the University of Mining and Geology “St. Ivan Rilski”, where he successively obtained a Bachelor’s degree in “Mechanization of Mining Production” and a Master’s degree in “Mechanization for Mineral Raw Materials Processing”. Since 2022, he has been a PhD student in the PhD program “Mining Mechanization” in professional field 5.8 “Exploration, Extraction and Processing of Mineral Resources”.

The professional development of the PhD student is focused on the operation, maintenance, design, and improvement of complex mechanical systems and technological equipment. His professional career began as an electrical technician and maintenance mechanic of industrial facilities, after which, for more than fifteen years, he successively held the positions of mechanical technician, senior mechanical technician, and coordinator of the “Specialized Airport Systems” sector at Sofia Airport EAD.

In 2024, he was appointed Head of the “Repair and Maintenance” Department at the Sofia Municipal Waste Treatment Enterprise, where he manages activities related to the operation, modernization, and reconstruction of technological equipment, planning of maintenance activities, and supervision of technical service contracts.

Since September 2024, he has been an Assistant Professor at the University of Mining and Geology “St. Ivan Rilski”, combining teaching activities with research work in the field of mining mechanization and mineral processing machinery.

The PhD student possesses comprehensive engineering knowledge and significant practical experience in the field of machinery and technological systems. He has proficiency in specialized engineering software, including AutoCAD Mechanical, used for technical design and three-dimensional modelling.

2. Description of the Submitted Materials and Compliance with National Requirements

For participation in the procedure, Eng. Stanimir Georgiev Stanchev has submitted the required set of documents, including the dissertation thesis, abstract, curriculum vitae, diplomas for completed higher education, minutes from the Department Council meeting approving the submission for defense, certificates of successfully passed examinations, as well as orders for enrolment and completion of doctoral studies.

In compliance with the minimum national requirements under Article 2b, paragraphs 2 and 3 of the Law on the Development of the Academic Staff in the Republic of Bulgaria, the Regulations for its implementation, and Appendix No. 6 of the Regulations of the University of Mining and Geology “St. Ivan

Rilski”, two scientific publications have been submitted, presenting the main results of the conducted research.

The publications were published in the specialized scientific journal “Mining and Geology” and provide the necessary scientific dissemination of the obtained results among the academic community.

The submitted materials confirm the fulfilment of the minimum national requirements for acquiring the educational and scientific degree “Doctor”.

3. General Characteristics and Structure of the Dissertation Thesis

The dissertation thesis has a total volume of 213 pages and consists of eight main sections, including an introduction, literature review, theoretical framework, presentation of the conducted research, conclusions, scientific-applied and applied contributions, publications, references, and appendices.

The dissertation cites 120 literary sources (33 in Latin script and 87 in Cyrillic script) and contains 178 figures, 60 graphs, and 40 tables.

The formulated aim and objectives correspond to the research topic, while the selected methodology ensures the achievement of the defined research goals.

The thesis is characterized by a logical structure and consistent presentation of the literature analysis, theoretical formulations, numerical simulations, experimental investigations, and statistical processing of the results.

The selected topic is relevant from both scientific and practical perspectives, as it is aimed at increasing the efficiency of crushing processes, reducing energy consumption, and optimizing the operation of crushing machines. The research expands the existing knowledge of this relatively insufficiently studied class of machines and creates prerequisites for their further improvement.

4. Characteristics of the Scientific and Scientific-Applied Contributions of the Dissertation Thesis

The contributions of the research are clearly formulated and logically derived from the conducted theoretical, structural, simulation, and experimental investigations. They can be defined as scientific-applied and applied contributions, while the author correctly states that he does not claim the development of a new general theory of the crushing process, but rather the development and experimental validation of solutions applicable to a specific type of machine.

The following scientific-applied contributions should be highlighted:

- The justified determination of the position of the eccentric-type rotary crusher within the existing classification of crushing machines;
- The development and implementation of a comprehensive research methodology combining theoretical analysis, CAD/FEM modelling, experimental investigations, and statistical processing of the obtained results;
- The experimental determination of the influence of the main structural and technological parameters on productivity, particle size distribution, and specific energy consumption;
- The development of an integrated approach for evaluating process efficiency through the combined use of technological, energy, and dynamic indicators.

The applied contributions include the developed three-dimensional 3D CAD model of the laboratory machine, the performed FEM analyses, the created experimental setup, the obtained database of experimental results, and the formulated practical recommendations for selecting rational operating modes.

I accept the contributions stated by the author as real, well-founded, and proven. They demonstrate a good degree of originality, as they are the result of independently conducted research on a machine that has not yet been sufficiently investigated in the scientific literature.

5. Evaluation of the Scientific Results and Contributions of the Dissertation Thesis

The obtained scientific results and formulated contributions have a scientific-applied character and enrich the knowledge concerning the structural, kinematic, and technological characteristics of the eccentric-type rotary crusher.

The developed models, performed experimental investigations, and obtained generalizations create prerequisites for improving the machine design and optimizing its operating modes, while simultaneously expanding the existing scientific knowledge in the field of crushing machinery.

I consider the contributions presented by the author to be real, substantiated, and proven. They demonstrate a good level of originality, as they result from independent research conducted on a machine that has not been sufficiently studied in the scientific literature to date.

6. Publications and Dissemination of the Results

The main results of the dissertation research have been presented in two scientific papers published in the journal “Mining and Geology”.

The publications address key aspects of the research, including the design and operating principle of the eccentric-type rotary crusher, as well as the static and modal analysis of its eccentric rotor.

The thematic content of the publications corresponds to the subject of the dissertation thesis and confirms the dissemination of the main research results among the specialized scientific community.

7. Critical Remarks

The dissertation thesis has been developed at a good scientific level. Along with its undeniable merits, several recommendations can be made with regard to the further development of the research.

It would be beneficial for part of the experimental results to be compared with data from industrial crushing machines operating on a similar principle. This would enable a more comprehensive assessment of the possibilities for scaling and practical application of the obtained results.

The presentation of mathematical relationships between the main technological parameters and operational performance indicators would facilitate the practical application of the developed methodology.

Future research may also consider additional factors related to the influence of different physical and mechanical properties of the processed materials, as well as the durability and wear of the working elements during long-term operation.

The remarks presented above do not reduce the scientific value of the research and should be considered as recommendations for future scientific work.

8. Conclusion

The presented dissertation thesis represents a completed scientific study with a clearly defined objective, consistently applied methodology, and well-founded scientific-applied and applied results.

The achieved results demonstrate scientific novelty and practical significance and contribute to the advancement of knowledge in the field of crushing machinery and its engineering investigation.

I consider that the dissertation thesis meets the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria and the Regulations for its implementation for the acquisition of the educational and scientific degree “Doctor”.

Based on the above, I give a positive assessment and confidently recommend that the esteemed Scientific Jury award the educational and scientific degree “Doctor” (PhD) to the PhD student Stanimir Georgiev Stanchev.

31.07.2026
Sofia

Member of the Scientific Jury:
Prof. Eng./Aleksandrova/, PhD