O P I N I O N

of the materials submitted for participation in the competition for occupying the academic position "Associate Professor" in field of higher education – 5. Technical Sciences, professional direction - 5.1. Mechanical Engineering, specialty - Technology of textile materials

Member of the Scientific Jury: Prof. Galya Velikova Duncheva, DSc, PhD

In the competition for Associate Professor, announced in the State Gazette, no. 55/ 27.06.2023 and on the Technical University of Gabrovo website for the needs of the "Industrial Design and Textile Technology" department at the "Mechanical and Precision Engineering" faculty, as the only candidate participated Chief Assistant Professor Borislav Tsonev Stoyanov, Ph.D. Eng. - Technical University - Gabrovo.

1. Overview of the content and results in the presented scientific works

The candidate is a "doctor" in the scientific specialty "Theory of Mechanisms, Machines and Automatic Lines". Out of 4 pcs. scientific publications on the dissertation (included by the candidate in the general list of publications with numbers G.8.1, G.8.3, G.8.4, G.8.6), Chief Assistant Professor Borislav Tsonev Stoyanov, Ph.D. participated in the competition with a total of 48 scientific publications, distributed in groups of indicators according to ZRASRB/2018, as follows:

► *Group A, indicator 1*: 1 pc. Author's abstract of a dissertation work for the award of the Ph.D. educational and scientific degree on the topic "Dynamics of running and lifting mechanism of a chain electric hoist" (2006);

► *Group B, indicator 3*: 1 pc. published scientific work presented by the candidate as a habilitation thesis - monograph on the topic "Laser marking of textile materials", ISBN: 978-954-683-686-1 (2023) (B.3);

► *Group G*

■ *Indicator 7: A total of 10 scientific publications, distributed by the place of publication as follows::*

● 6 scientific publications in journals with Impact Factor, publications of MDPI, OA, as follows:

- Metals, IF 2.9 (2022) – 3 pcs. articles (7.3, 7.8, 7.10);
- Crystals, IF 2.7 (2022) – 1 article (7.5);
- Coatings, IF 3.4 (2022) – 1 article (7.7);
- Materials, IF 3.4 (2022) – 1 article (7.9).

● 3 scientific publications in journals with SJR indexed by Scopus as follows:

- Journal of Physics: Conference Series, IOP Publishing, SJR 0.21 (2021) – 2 articles (7.2; 7.6);
- Bulgarian Chemical Communications, Journal of the Chemical Institutes of the Bulgarian Academy of Sciences and the Union of Chemists in Bulgaria, SJR 0.17 (2021) – 1 article (7.4);

● 1 article in “Textile and Clothing”, Sofia, Journal referenced in Scopus (7.1).

■ *Indicator 8: A total of 33 scientific publications, of which 16 scientific articles and 17 scientific reports, distributed as follows:*
● 5 articles in the journal "Mechanics of Machines" (8.2, 8.5, 8.7, 8.27, 8.28);
● 4 articles in the journal "Mechanical Engineering and Mechanical Science" (8.16, 8.17. 8.29, 8.30);
● 5 articles in the "Journal of the Technical University of Gabrovo" (8.18, 8.25, 8.31, 8.34, 8.35);
● 1 article in the journal "Automation and Informatics", Sofia, 2011 (8.26);
● 15 reports at International Scientific Conference UNITECH' – Gabrovo (8.6, 8.10 – 8.15, 8.20 – 8.23, 8.33, 8.36, 8.37);
● 1 report at International Scientific Conference MOTSP 2009, Šibenik, Croatia (8.19);
● 1 report at International Scientific Conference Autex2011, Mulhouse, France, 2011 (8.24).

► 3 pcs. issued textbooks, as follows: "Testing of textile materials", 2008, "Machines and processes in treason", 2011, and "Computer 3D Modeling", 2017.

Out of a total of 47 scientific publications (excluding the Abstract of the dissertation), 14 scientific works are published in English. Ch. Associate Professor Borislav Tsonev Stoyanov, Ph.D., is the sole author of 13 scientific works, including the scientific work presented as a monograph (B.3), the three textbooks and the following scientific publications from group G.8: 8.5, 8.10, 8.11, 8.12, 8.20, 8.21, 8.28, 8.31, and 8.32.

► 5 pcs. attests to technology-oriented utility model patents, four of which relate to various applied aspects of laser technology.

► *Group D*
The presented list of citations includes a total of 16 citations, 7 pcs.of which in publications indexed or referenced by Web of Science and Scopus, 5 pcs.at international conferences and 4 pcs. in articles in Bulgarian journals.

2. General characteristics of the candidate's activity
2.1. Educational and pedagogical activity
Chief Assistant Professor Borislav Tsonev Stoyanov, Ph.D., led lectures and laboratory exercises in 10 disciplines in the field of the competition: Textile materials science, Textile testing, Spinning machines and processes, Modern spinning methods, Computer 3D modeling, Modeling and mock-up, Computer tools for graphic design, Computer-interior design, Design of offices and commercial establishments, Individual research work on design, and laboratory exercises in the discipline Modern textile materials and technologies. The candidate has participated in the development of study programs for 8 of the specified study disciplines.

Chief Assistant Professor Borislav Tsonev Stoyanov, Ph.D., participated in the competition with three textbooks, two of which are entirely in the field of the competition.

The above facts confirm the convincing pedagogical and professional expertise of Chief Assistant Professor Borislav Tsonev Stoyanov, Ph.D., in the field of the competition.

2.2. Scientific and scientific-applied activity
In accordance with ZRAS/2018, the scientific work presented for the habilitation work - a monograph on the topic: "Laser marking of textile materials" is of decisive importance. Undoubtedly, this work is in the field of competition. In the context of higher education area 5. Technical Sciences and in accordance with the Regulations for the Acquisition of Scientific Degrees and Holding Academic Positions at the Technical University – Gabrovo, *"The*

scientific monograph must contain an original contribution based on the author(s) own developments of a significant problem for science, practice or society, which has been studied comprehensively and in depth, applying a unified research approach". The original contribution in the presented work consists in the obtained regression models of various physico-mechanical indicators of Denim cotton fabric during the laser marking process, the formulated multi-objective optimization tasks and the compromise optimal values of the process obtained on this basis. *In this context, I believe that in terms of structure, content, experimental studies, research methods and contributions, the scientific work (B.3) meets the required scientific level for a monograph.*

Most scientific publications of group G.8 (8.10 – 8.17, 8.20 – 8.22, 8.24 – 8.36), as well as two of the textbooks, treat various aspects in the field of textile technology in correlation with testing of textile materials. In this group of publications, Ch. Assistant Professor Borislav Tsonev Stoyanov, Ph.D., has a leading role.

The publications from group G.7 (with the exception of scientific paper 7.1) and 1 scientific paper from group G.8 are oriented towards the application of electron-beam techniques in two thematic directions: 1). Electron beam welding of dissimilar metals and alloys (7.2, 7.3, 7.4, 7.8, 7.10, 8.37); 2). Electron beam techniques for modifying surface layers of titanium alloys and composite structures (7.6, 7.7, 7.9). The structure and mechanical properties of the resulting welded joints and modified materials are investigated in these publications. In general, the scientific publications of this group are in the field of material science and engineering materials technology, and in particular, the publications of the second group are in the field of Surface engineering.

A small part of the publications of group G.8 (after excluding the publications on the dissertation for the acquisition the educational and scientific degree "doctor") (8.2, 8.5, 8.7, 8.8) refer to the study of the mechanical behavior of load-lifting equipment, expanding the research in the dissertation.

The remaining posts target various software applications (8.9, 8.18, 8.19, 8.23).

The above systematization of the presented scientific works shows that Ch. Assistant Professor Boroslav Ts. Stoyanov, PhD, has scientific interests and competences in various scientific fields. At the same time, a significant part of the scientific publications have a common technical basis - the use of concentrated energy flows for various engineering applications - with a laser beam and with an electron beam. Such are the monograph and part of the publications in the field of the competition, the publications in journals with Impact Factor and SJR, four of the attest utility model patents, as well as a significant part of the scientific research projects with the participation of Ch. Assistant Professor Borislav Ts. Stoyanov (U1302/2013, M1409/2014, M1514/2015, D1625M/2016, KP-06-H47/6/2021, 2220M/2022, 2310M/2023). Proof of the candidate's expertise in this field is his competence in managing an electron-beam machine Evobeam Cube 400 within the Technological Park in Technical University of Gabrovo. On this basis, I consider that Ch. Assistant Professor Borislav Ts. Stoyanov can confirm and develop his scientific profile in the field of techniques based on concentrated energy flows, including for applications in the textile industry.

Citations in journals with Impact Factor deserve a high rating.

2.3. Implementation activity

Ch. Associate Professor Borislav Ts. Stoyanov actively participates in the implementation of various technical and technological solutions in accordance with the results obtained from research projects and patents for useful models. 6 official notes from companies in the city of Gabrovo are presented - KARDENA-TEX Ltd., AMK Propulsion and Control Equipment Ltd., MV Yantra AD and Adtech Ltd.

3. Contributions and their significance for science and practice
The contributions are in the scientific-applied and applied categories. I offer the following formulation of the main contributions:

3.1. Scientific-applied contributions
● Regression models of the physico-mechanical indicators of Denim-type cotton fabric obtained due to laser marking, depending on the power of the laser radiation and the step of the laser beam;
● Compromise optimal values of the main technological parameters of the laser marking process, providing acceptable values of the physical and mechanical indicators of Denim-type cotton fabric depending on the technological requirements;
● Dynamic characteristics of the mechanical behavior of a chain electric hoist for different operating modes;
● Correlations between the structure and mechanical characteristics of welded joints of dissimilar metals and alloys, and the technological parameters of the electron-beam welding process;
● Correlations between the structure and mechanical properties of titanium alloys and pure titanium-based composites, and the technological parameters of electron beam surface layer modification techniques;
● An approach to the modernization of ring spinning machines;
● Program control of a device for winding yarn bodies with intersecting axes;
● The influence of preliminary preparation and treatment with various softeners on the wetting rate of terry fabrics and the physical characteristics of textile materials has been established;
● Correlation dependence between extensibility and absolute strength of yarns;
● A mathematical model for controlling the winding and unwinding of tape material;

3.2. Applied contributions
● Database for the optimal parameters of the laser marking process depending on the physico-mechanical parameters of denim type Denim-type cotton fabric;
● Device for measuring the effort when winding a thread with winding machines;
● Block diagram for controlling a plotter type 3D scanning device.

4. Evaluation of the candidate's personal contribution
Based on my personal impressions, I believe that Ch. Associate Professor Borislav Tsonev Stoyanov, Ph.D., has made a decisive contribution to the results of scientific works and the implementation of numerous research projects with his participation. Over the years, he has significantly increased his qualifications in the field of competition and in engineering in general. Considering his professional competence and responsibility in work, I firmly believe that Ch. Associate Professor Borislav Tsonev Stoyanov, Ph.D., will achieve a high level in the scientific research and development of the "Mechanical and Precision Engineering" faculty.

5. Critical notes and recommendations
I have no remarks of a principled nature. I recommend that in the future the candidate publishes primarily in journals with Impact Factor that will promote his scientific results in the global scientific community.

6. Conclusion

In view of the above, I propose Ch. Associate Professor Borislav Tsonev Stoyanov, Ph.D., to be elected the academic position of "Associate Professor" in field of higher education - 5. Technical sciences, professional direction – 5.1. Mechanical Engineering, specialty - Technology of textile materials.

07.11.2023 **Member of jury: /signature/**
/Prof. Galya V. Duncheva, DSc/