

REVIEW

Authored by Prof. Hristo Mihaylov Petrov, PhD, Technical university of Sofia, Faculty and College – Sliven concerning materials submitted for participation in competition for awarding the academic position of “Associate professor” in the area of higher education - 5. Technical Sciences, in professional field 5.1. Machine engineering, scientific major “Technology of textile materials”

In the competition for associate professor, announced in the State Gazette, issue 55/27.06.2023 and on the official website of TU-Gabrovo for the needs of the department of “ Industrial Design and Textile Engineering” at the Faculty of Mechanical and Precision Engineering, is participate Senior Assistant Borislav Tsonev Stoyanov, PhD – Technical University of Gabrovo.

1. Common feature of the candidate

Borislav Stoyanov was born in 1978 in Gabrovo. He completed his higher education in 2001 at the Technical University of Gabrovo, majoring in " Textile Engineering and Equipment" with the professional qualification of mechanical engineer. He worked as a designer and was a project manager in the field of mechatronic products construction at AMK "Drive and Control Technology" Ltd, Gabrovo.

From 2003 to 2006, he was a full-time doctoral student at the Department of "Technical Mechanics" in the scientific specialty "Theory of Mechanisms, Machines and Automatic Lines". He defended a dissertation on the topic "Dynamics of the travelling and lifting mechanism of a chain electrical hoist", for which he received the educational and scientific degree "doctor".

Currently, he is an assistant professor and his teaching activity is in disciplines in the specialty " Textile Design, Equipment and Technologies" and "Computer design".

He speaks excellent English, has a basic level of German and a good level of Russian.

2. General description of the presented materials

The candidate has submitted three lists of works for review, which are grouped as follows.

List 1: Monographic work

A monographic work "Laser marking of textile materials" is presented. In addition to other literary sources, the monograph includes 3 scientific works, 1 of which is independent,

and in two of them the candidate is the first author. The material was reviewed by two reviewers.

List 2: Scientific works other than the monographic work

2.1. Scientific publications in journals that are referenced and indexed in world-renowned databases with scientific information (Web of Science and/or Scopus) [Г.7]. 10 scientific papers are included here, all co-authored, in one of which the candidate is the first author [Г.7.1].

2.2. Scientific publications in non-refereed journals with scientific review or in edited collective volumes [Г.8], a total of 37 issues. Of these, 11 are independent, and in 24 the candidate is the first author.

List 3: Published textbooks

Three independent textbooks are presented: "Testing of textile materials", "Machines and processes in spinning" and "Computer 3D modeling", all of the University Publishing House "Vasil Aprilov", Gabrovo.

I accept the presented works for review, as they are in the thematic area of the announced competition.

3. Reflection of the candidate's scientific publications in the scientific community (citations)

The candidate has submitted an author reference for citations of the works with which he participated in the competition. The characteristics of the citations show the following:

- number of citations in publications referenced in Web of Science and/or Scopus – 7;
- number of citations in non-refereed journals with scientific review – 9.

In addition, two certificates were given for the publication of two articles in journals with an impact factor of 2.351 and 3.236, respectively. The candidate has also submitted a certificate of fulfillment of the minimum national requirements for acquiring an academic position. It is supplemented with the fulfillment of the minimum requirements of TU - Gabrovo for the scientific and teaching activities for the occupation of the academic position of "associate professor"

4. Overview of content and results in the submitted works

4.1. Monographic work

A published and peer-reviewed monographic work "Laser Marking of Textile Materials", University Publishing House "Vasil Aprilov", Gabrovo, 2023, ISBN: 978-954-683-686-1, is presented.

The material is divided into an introduction, four chapters and five appendices and is in a volume of 170 pages. Many figures and tables are used to present input data, processing results and technical information. The monograph solves theoretically and practically, technological tasks in the field of laser marking of textile materials. I was a reviewer for this work and gave it a positive rating.

4.2. Scientific works other than the monographic work

The research results can be grouped into several thematic areas as follows.

4.2.1. Thematic of "Laser marking of textile materials". In this direction, laser engraving technologies were analyzed [Г.8.34], as a tool for creating fashion design, and in the work [Г.8.35] a microscopic analysis of laser-treated cotton fabrics was carried out, examining the effects of bleaching.

4.2.2. Thematic of "Electron-beam processing". Here is presented a summary of studies on structural changes and changes in the mechanical properties of compounds of dissimilar materials by means of electron beam treatment. [Г.7.2], [Г.7.3], [Г.7.4], [Г.7.6], [Г.8.37].

4.2.3. Thematic of "Technology of textile materials". Research has been carried out on the influence of geometric parameters on the dynamics of winding of conical windings of ring spinning machines [Г.8.20], on the conditions of formation of the winding body [Г.8.27], on the influence of preliminary preparation on the properties of fabrics [Г.8.29], on the rate of moisture diffusion in terry fabrics depending on the treatment time with different softeners [Г.8.30] and on other characteristics such as tensile strength, elongation at maximum force, etc.

4.2.4. Thematic of "Machines and equipment for light industry". In a group of publications, [Г.7.1, Г.8.13, Г.8.14, Г.8.15, Г.8.16, Г.8.17, Г.8.22, Г.8.25, Г.8.26], a yarn winding device with intersecting axes was analyzed, the tensile forces in threads during winding were experimentally determined [Г.7.1 and Г.8.15], the physical parameters of the yarns were studied by taking into account the stresses during winding [Г.8.13], it was measured the magnitude of the signals received at the output of strain gauges, when loaded with reference weights [Г.8.16], the vibrational loads were analyzed [Г.8.17], a kinematic analysis of a coil mechanism of a ring spinning machine was carried out [Г.8.21], analyzed are different approaches to building the initial winding of a modernized spinning machine [Г.8.28] under different laws of motion of the mechanism for winding conical coils [Г.8.31].

4.2.5. Thematic of "Theory of mechanisms, machines and automatic lines". On the basis of spatial finite elements, a parametric model of the links of a circular chain was developed, taking into account the contact area between the chain links, the work of the chain links when engaging with a chain wheel was analyzed, taking into account the friction coefficients, in which the mutual work of the gear is improved [Г.8.5], the degree of influence and the dynamic loads that have occurred are considered [Г.8.7 and Г.8.8].

4.2.6. Thematic direction "Electromechanics". In research [Г.8.9], the kinematics of a device for introducing 3D objects into a computing environment is defined, a structural model of a 3D scanning device is selected [Г.8.18], a block diagram for controlling the scanning device is developed [Г.8.19], a PLC software module for controlling electromechanical systems was analyzed for the realization of a cam-like law of motion [Г.8.23], a mathematical model was created to control the processes of winding and unwinding of roll material [Г.8.24].

5. General description of candidate's activity

5.1. Teaching and pedagogical activity (work with students and doctoral students).

The candidate has the necessary teaching experience at TU - Gabrovo, combined with good experience in practice.

He has read and gives lectures on several main specialized disciplines: "Textile materials science", "Testing of Textile Materials", "Machines and processes in spinning", "Modern spinning methods", "Computer 3D modelling", "Modeling and prototyping", "Computer tools for Graphic Design", "Computer-Interior Design", "Office and Retail Design" and "Individual Design Research". His lectures are of the required level of competence and are perceived with interest by the students.

Disciplines in which he led and leads laboratory and seminar exercises: all the disciplines listed above, incl. "Modern Textile Materials and Technologies".

The candidate actively participates in the renovation of the information and material base in the laboratories of the department and the faculty.

5.2. Scientific and scientific-applied activity.

Borislav Stoyanov is the head of three scientific research fund projects:

1. 3НН/2004 - "Identification of the coefficients of elasticity and damping of a mechanism for lifting a chain electric hoist", Scientific research fund "Supporting young researchers, students and postgraduates" at TU - Gabrovo.
2. M-804/2008 - Modernization of ring spinning machines, Scientific and research contract at TU - Gabrovo.
3. M-906/2009 - "Design of a winding mechanism for modernized ring spinning machines", Scientific and research contract at TU - Gabrovo.

The applicant has also submitted a reference from the Patent Office for the registration of utility models with his participation:

1. BG3214-U1 – Laser marking system;
2. BG3503-U1 – Automated system for fastening details;
3. BG3564-U1 – System for laser marking of details with complex surfaces;
4. BG4048-U1 – Technological line for applying laser decorative marking on rotary parts;
5. BG4070-U1 – System for laser cutting and welding of small parts.

It is noteworthy that in all the certificates, Borislav Stoyanov is listed first among the participating inventors.

5.3. Implementation activity. The candidate has submitted official notes on implementations during his participation and direct scientific and technical management in the following companies:

1. "KARDENA - TEX" Ltd., Gabrovo: "Technological line for vector dyeing of yarns - MWB" and "Automatic device for winding of yarn bodies with intersecting axes - AK12". Themes are implemented and developed at the request of customers;

2. "MV YANTRA" JSC, Gabrovo: BG3214-U1 "Laser marking system" and "Automated system for fixing details";
3. "AMK DRIVE AND CONTROL" Ltd, Gabrovo: "Device for scanning three-dimensional objects";
4. "ADTECH" Ltd., Gabrovo: developed useful models BG3214-U1 "Laser marking system" from 2019 and BG3564-U1 "Laser marking system for details with complex surfaces" from 2020, which are in the basis of preparation for application and subsequently basis for development of project BG16RFOP002-1.005-0229 - Increasing the innovation activity in "ADTECH" Ltd, by developing a product innovation (service) - Laser marking system.

6. Contributions (Scientific, Scientific and applied, Applied)

The contributions in the presented monographic work are reflected in my review of the work.

In essence, I accept the stated claims for scientific and applied contributions contained in the publications organized in the relevant thematic areas.

However, I believe that some of the contributions are presented in a disjointed form, which does not provide a sufficient opportunity to fully disclose the scope of the research conducted. Therefore, I allow myself to edit only some of the contributions, which can take the following sample form.

6.1. Scientific and applied contributions

1. The structure and mechanical properties of electron-beam welded joints with a continuous electron beam, made of copper and stainless steel, with and without offset [Г.7.2], [Г.7.3], [Г.7.4] were established;
2. A block diagram for controlling a plotter-type 3D scanning device has been compiled, and the system software consists of two functional and 16 organizational blocks, with three main operating modes included [Г.8.9];

6.2. Applied contributions

1. The kinematics and dynamism coefficients during operation of the lifting mechanism of a chain electric hoist are determined [Г.8.5], [Г.8.7], [Г.8.8];
2. An approach was created for the modernization of ring spinning machines, in which the control parameters for the drive and the working speed of the spindles allow optimization of the technological process [Г.8.10], [Г.8.11], [Г.8.12];
3. An installation for measuring the total force of a thread wound on a device with intersecting axes was designed, and physical and mechanical indicators of the wound yarns were established [Г.8.13], [Г.8.14], [Г.8.15];
4. A vibration analysis of a device for winding yarn bodies with intersecting axes was carried out, and a procedure was introduced for taring strain gauges for measuring the total force in the thread [Г.8.16], [Г.8.17];

5. A kinematic model was designed with the possibility of selecting a kinematic scheme of a device for 3D scanning of objects and a methodology was developed for entering data in a digital environment [Г.8.9], [Г.8.18], [Г.8.19];

6. The rate of moisture diffusion in terry fabrics was experimentally investigated depending on the time of treatment with two types of softeners - silicone and fatty, characterized by different rates of sorption [Г.8.29].

7. Assessment of the personal contribution of the candidate

Contributions are contained both in the individual publications of the candidate and in the collective ones in which his leading role is expressed.

The importance of the candidate's contributions to the field of learning is also undeniable. Educational and methodical contributions are contained in the presented three independent teaching aids.

8. Critical remarks and recommendations

In the peer-reviewed works, in addition to the mentioned contributions, some shortcomings can also be noted:

1. I consider it expedient to redirect the publication activity in the future to foreign publishing houses and international conferences in the field of technologies and testing of textile materials and their application.

2. Paper [Г.8.10], although it deals with issues of achieving some technological advantages in ring spinning, contains elements of an overview nature.

3. In some of the works, the practical benefits of the conducted research could be indicated and directed to potential users [Г.8.29].

4. Some of the works are inappropriately presented only in a foreign language, which creates some difficulties in reviewing them.

5. Technical and other inaccuracies were admitted (e.g. in some of the works the figural apparatus is of degraded quality), which I will not comment on.

I want to point out that the critical comments made to the presented works do not affect the significance of the contributions in them.

9. Personal Impressions

I know the candidate as a doctoral student at TU - Gabrovo, from his participation in scientific conferences and from his teaching activity in the Department of Industrial Design and Textile Engineering at the Faculty of Mechanical and Precision Engineering.

My impressions are that he is a responsible teacher, a scientist with creative thinking and a respected colleague.

I appreciate his activity as a responsible teacher, a consistent researcher and a good pedagogue.

10. Conclusion

Considering the above, I propose assistant professor Borislav Tsonev Stoyanov, PhD, to take the academic position of "associate professor" at TU - Gabrovo - in the area of higher education - 5. Technical Sciences, in professional field 5.1. Machine engineering, scientific major "Technology of textile materials"

Sofia, 30.10.2023

Reviwer: /signature/

/Prof. Hr. Petrov, PhD/