

REVIEW

for participation in a competition for an academic position “Associate professor”
in scientific field 5 Technical sciences
professional field 5.1 Mechanical Engineering
scientific specialty Manufacturing technology
posted at DV issue 67/28.07.2020

applicant: assist. Professor Eng. Tanya Georgieva Avramova, PhD

Reviewer: prof. Vasil Stefanov Kostadinov, DScTech
According to Rector’s Order 438/08.10.2020

1. Background and biography data

The competition was announced by the proposal of the Department “Technology of Machine Tools and Manufacturing”. On the announced competition, documents were submitted by only one applicant – Assist. Professor Eng. Tanya Georgieva Avramova, PhD.

Assist. Professor Eng. Tanya Georgieva Avramova, PhD was born in Varna in 1985. She graduated from the Technical University of Varna in the specialty "Manufacturing Engineering and Technology". In 2014 she defended her doctoral thesis on the topic "Management of quality parameters of treated surfaces through the application of combined technological impacts". The teaching activity of the applicant began in 2009, when she was appointed as an assistant professor at the Dept. “Technology of Machine Tools and Manufacturing”.

2. General description of the materials presented

The applicant has submitted the following works for participation in the competition for associate professor:

2.1. Independent monograph entitled "Finishing operations by sliding friction at machining of holes" - (A1).

The monograph is 108 pages long and was published by Publishing House “Color Print” - Varna in 2019, with ISBN 978-954-760-490-2 and was reviewed by Assoc. Prof. Dimitar Nedelchev, PhD.

2.2. Presented in the competition scientific publications can be presented as follows:

- Scientific publications in journals which are referenced and indexed in world-famous databases of scientific information – (B3), (B4), (B13) and (B14) (4 pcs);
- Scientific publications in unrefereed journals with scientific peer review or in edited collective papers – (B1), (B2), from (B5) to (B12), from (B15) to (B24) (20 pcs);
- Published university textbook or a textbook used in the school network – (B2) (1 pc);
- Published university teaching tutorial or teaching tutorial used in the school network – (B1) и (B3) (2 pcs);
- Recognized request for utility model, patent or copyright certificate - (Г1) и (Г2) (2 pcs).

Total number of works – 30 pcs.

I do not accept 14 papers for review for the following reasons:

- Publications on the dissertation for educational and scientific degree "Associate professor" – papers from (Д1) to (Д8) (8 pcs);
- I report the monograph (A1), but do not review it (1 pc);
- University textbook (B2) and university teaching tutorials (B1) и (B3) I report, but do not review (3 pcs);
- Registered utility models (Г1) and (Г2) I report but do not review (2 pcs).

I accept 24 papers for review. The applicant's participation in the peer-reviewed papers is as follows:

- Independent author in 10 works [(Б8); (Б9); (Б10); (Б14); (Б15); (Б16); (Б18); (Б19); (Б20); (Б21)];
- First author in 6 works [(Б3); (Б4); (Б7); (Б11); (Б15); (Б17)];
- First author in 6 works [(Б1); (Б2); (Б5); (Б6); (Б13); (Б24)];
- Third author in 1 work [(Б22)];
- Fourth author in 1 work[(Б23)].

All publications are on the topic of the competition as in Bulgarian are 8 pcs and 16 in English.

The information on the implementation of the scientometric indicators for the participant in the competition Assist. Professor Eng. Tanya Georgieva Avramova, PhD can be summarized as follows:

<i>Group of indicators</i>	<i>Content</i>	<i>Minimum requirements for acquisition of academic position "Associate Professor"</i>	<i>Number of points of the applicant</i>
<i>A</i>	<i>Indicator 1</i>	<i>50</i>	<i>50</i>
<i>B</i>	<i>Indicator 2</i>	<i>—</i>	<i>-</i>
<i>B</i>	<i>Indicator 3 or 4</i>	<i>100</i>	<i>100</i>
<i>Г</i>	<i>Sum of indicators from 5 to 11,</i>	<i>200</i>	<i>378,34</i>
<i>Д</i>	<i>Sum of indicators from 12 to 15</i>	<i>50</i>	<i>66</i>
<i>E</i>	<i>Sum of indicators from 16 to 28,</i>	<i>—</i>	<i>130</i>
<i>Ж</i>	<i>Indicator 29</i>	<i>30</i>	<i>307</i>

In conclusion, after comparing with the requirements: the applicant Assist. Prof. Eng. Tanya Georgieva Avramova PhD covers the minimum national requirements for all groups of indicators for academic position "Associate Professor".

3. General characteristics of the research and scientific applications activity of the applicant.

All publications of Assistant Professor Eng. Tanya Georgieva Avramova, PhD can be classified in the following areas:

- Designing of combined tools for machining holes -11 pcs [(Б3), (Б4), (Б6), (Б8), (Б9), (Б10), (Б16), (Б17), (Б18), (Б19), (Б24)];

- Methods, mathematical and simulation models for studying the behavior of milling tools in shaping the machined surfaces – 4 pcs [(B1), (B2), (B13), (B14)];
- Application of software products for design, research and analysis of processes, parts and equipment – 5 pcs [(B11), (B12), (B20), (B21), (B23)];
- Methodology for determining the characteristics of regular microrelief – 4 pcs [(B5), (B7), (B15), (B22)].

The applicant also shows significant research and development activity. As can be seen from the attached list, the applicant in the period 2012 – 2019 has participated in 5 research projects (from 11.7.2 to 11.7.7) and 2 educational projects funded by two EU operational programs (11.7. 8 and 11.7.9). She is the leader of 2 scientific projects (11.7.5 and 11.7.7) for the period 2018 – 2019, as one of the managed projects has been awarded a diploma for a project of the Faculty of Manufacturing Engineering and Technologies.

The scientific-applied activity is realized in the company "Si Pro" EOOD – Varna. Two SPD tools have been implemented (for which two utility models (Г1) and (Г2)) have been registered). With them have been machined holes of hydraulic cylinders in production conditions (11.11).

There is no data on the realized economic effect.

4. Assessment of the pedagogical preparation and activity of the applicant.

I evaluate the pedagogical qualification of the applicant and her work as a lecturer at the level of the required scientific title "Associate Professor", as she lectures on the following subjects for the bachelor's and master's degrees:

- Manufacturing Technologies – part I;
- Production Technologies;
- Technological equipment. Designing;
- Information technology and systems;
- Finishing processes;
- Technological preparation of production;
- Assembly technology;
- Computer aided design of metal cutting tools;
- Manufacturing Technologies – lectures for foreign students under the Erasmus + program.

Under her leadership, have defended 44 graduates in the Bachelor's and Master's degrees and has been reviewed 47 diploma theses (11.6).

There are 4 mobilities under the Erasmus + program for the period 2017-2019. One is for teaching purposes (11.9.2) and three for training (11.9.3 to 11.9.5).

Numerous curricula have been developed (14 pieces) for specialty KTM, spec. MTT, spec. PI, spec. TTT and spec. MTT for Bachelor's degree, Master's degree and Professional Bachelor's degree. They are detailed in Annexes 11.2.1 to 11.2.3.

Documents are presented (11.4.1 to 11.4.8) confirming the main contribution of the applicant in providing practical activities for students in a practical environment outside TU-Varna.

She has ensured the purchase of 20 process management software licenses through real-time data collection and statistical processing. Two digital measuring instruments with the respective transmitters, a connecting module, a receiver and software for processing the obtained results were donated to them. With them are equipped a computer lab available to students, PhD

students and lecturers (11.5.1). With her assistance, a metal-cutting lathe ST 201-251 from the company INHOM 98 OOD was donated to the Department TMTM for student training and research (11.5.2).

5. Major scientific and applied science contributions

The contributions contained in the applicant's works can be referred to the following groups:

5.1. Scientific contributions (Creation of new classifications, research methods, new constructions and technologies)

- Analytical dependencies for determining the forces acting on the guide-smoothing elements of a smoothing tool, which allow to determine their location in space and the design of such tools (B4);
- It has been proven that when machining holes by cutting with applied vibrations with variable frequency transmitted to the tool, a surface with a certain relief suitable for PPD is obtained (B18).

5.2. Applied research contributions (Obtaining and proving new facts and creating classifications, constructions, technologies and schemes)

- Derived equations describing the trajectory of the relative working motion of a point from the cutting edge of the tool during milling, using which a computer simulation model was created to study the change of the tool orthogonal clearance for different diameters of available points when machining concave and convex rotary surfaces (B1, B2);
- The approach developed in determining the safety factors and strength conditions of combined sequential impact tools, which takes into account stress concentrators (B3);
- Construction of an adjustable tool for smoothing the surfaces of cylindrical holes with three deforming elements operating in sliding friction conditions (B4, B5);
- The developed method for selection of tools for machining parts with complex configuration, according to their functional capabilities under specific cutting conditions and with forecasting the accuracy of surfaces (B8, B9);
- The proposed methodology for calculating the working angles of cutting tools with replaceable cutting inserts, which is adapted to the creation of programs for automated design of non-monolithic tools with replaceable cutting part (B8, B10);
- Methodologies for theoretical determination of the chip length compression ratio and the plastic deformation coefficient for single-edge drills (B11, B12);
- The methodology for designing of an annular drill, based on the scheme of operation of the tool, the scheme of cutting the allowance for machining, the method of obtaining the annular profile, the material, balancing the cutting forces and determining the locations of the guide rollers (B19);
- Mathematical dependences for determining the system of forces acting on the construction of an annular drill working with support rollers (B19).

5.3. Applied contributions (Classifications, constructions, technologies, obtaining new facts)

- The dynamometric tool for experimental research, the results of which serve to find the optimal design of a boring tool with guide-smoothing elements (B6);

- The combined tool for boring and surface plastic deformation with radial feed (B7);
- The experimental setup for determining the chip breaking element and for studying the change of the chip length compression ratio (B11);
- The tool for processing blind conical holes by surface plastic deformation (B15);
- The strength analysis of the individual monolithic elements of the construction of cutting tools, which takes into account the change of the physical and mechanical properties of the materials used for their manufacture depending on the operating temperatures (B16);
 - The created hydraulic vibrator, built on the basis of thin-walled steel pipes, with adjustable vibration amplitude (B18);
 - The proven need for a new standard in determining the roughness parameters of regular microrelief (RMR), which takes into account all the features of the shape, size and location of the RMR cells while ensuring the reliability of the measurement results (B20, B22);
 - The methodology for designing a portable CNC router machine, based on the selection of basic components and design in the environment of the software product Solid Works of basic elements (B21);
 - The strength analysis of the individual monolithic elements of the construction of cutting tools, which takes into account the change of the physical and mechanical properties of the materials used for their manufacture depending on the operating temperatures (B16);
 - The methodology for studying the technological possibilities of the air-plasma cutting method (B23);
 - The created experimental setup, which allows to check in real conditions different design variants of drills (with guiding elements) (B24);
 - Developed a new approach for calculating the coefficient of unevenness in face milling, based on modeling of the tool and machining conditions (B14);
 - The developed methodology for strength calculations of drills with replaceable carbide inserts, which is based on the determination of the coordinates of the mass center, static moments and the position of the main inertial axes and moments (B17);
 - Kinematic scheme of cutting when machining holes with a tool with applied vibrations (B18).

5.4. Methodical contributions

I consider that the presented one textbook (B2) and two teaching tutorials (B1) and (B3) are essential for the quality of the teaching process.

The textbook and teaching tutorials are on the topic of the competition, are reviewed and have positive reviews.

The publications listed above [(B6), (B8), (B10), (B21), (B24)] developed by the applicant also refer to the methodological contributions.

5.5 Citations

29 citations of papers are presented, distributed as follows:

- In Scopus - (B13);
- In peer-reviewed scientific journals [(B1), (B2), (B3), (B4), (B5) – cited 2 times, (B6) – cited 2 times, (B7) – cited 4 times, (B8) – cited 2 times, (B9) – cited 2 times, (B10) – cited 2 times, (B13) – cited 2 times, (B15) – cited 2 times, (B16) – cited 3 times, (B17), (B24) – cited 2 times, (D6)].

6. Significance of contributions to science and practice.

There are significant scientific, scientific and applied contributions, significantly enriching the theory, teaching material and practice in the field of the announced competition in "Manufacturing technology".

A significant amount of the methodological and analytical part of her scientific activity is implemented in the educational process.

The information given in paragraphs 2 and 3 talks about the applicant's recognition and gives grounds to claim that the predominant part of the contributions is her personal work or have been received with her decisive participation.

Citations in point 5.5 talk about recognition of the applicant by the scientific community at home and abroad.

The quantitative indicators of the criteria for holding the academic position "Associate Professor" are met. All indicators are met, especially those of groups Γ and \mathcal{X} , which are overfulfilled.

7. Critical remarks and recommendations

In the works of the candidate I did not find omissions of a principled or debatable nature - such as literary ignorance, wrong statements, incorrect methodology, incomplete analysis or incorrect summary of the results. When the candidate publishing future works, I note that the conclusions and contributions to them must be specific and precise. There are notes of a secondary nature, which should be accepted as recommendations for the work of the applicant and the future team of assistants and doctoral students led by her. They were handed over to her in advance

8. Personal impressions and opinion of the reviewer

I know Assistant Professor Eng. Tanya Avramova, PhD personally as a participant in the scientific jury for the defense of her doctoral dissertation, as well as from our joint participation in conferences and seminars. It is noteworthy that in addition to teaching and research work, the applicant has performed a variety of administrative and organizational activities in the Depart. TMTM and the University, as follows (11.13.1 to 11.13.8):

- Responsible for the candidate student campaign of the Faculty of Mechanical Engineering;
- Responsible for the academic work in the Master's degree of dept. TMTM;
- Responsible for the specialty Computerized technologies in mechanical engineering;
- Responsible for the agreements for joint cooperation between the department and business representatives.

The applicant is a member of the company "Mechanical Engineering and Technology" at the Territorial Organization of NTS-Varna and the Professional Association in Modern Manufacturing Technologies, ModTech, Iasi, Romania (11.8.2 and 11.8.3).

She has been awarded the following diplomas:

- Diploma of excellence and active public work in order to increase the prestige of the Technical University - Varna for the academic year 2017/2018;
- Diploma for a scientific project of the Faculty of Mechanical Engineering for 2018, of which she is the head;

- Diplomas awarded by the Student Council at the Technical University - Varna, some of which are: Strict but fair lecturer, Most organized lecturer and others.

Certificates for advanced training related to the level of foreign language use and the study of software related to engineering design are also presented.

I consider that she is shaped as a highly qualified specialist and can be characterized as a recognized researcher and educator in the field of mechanical engineering technology.

CONCLUSION

Based on my acquaintance with the presented scientific works, their significance and the scientific, scientific-applied and applied contributions contained in them, I find it reasonable **to propose Assistant Professor Tanya Georgieva Avramova, PhD to take the academic position "Associate Professor"**

in professional field 5.1 Mechanical Engineering,
scientific specialty Manufacturing technology

26.10.2020
Ruse

REVIEWER:
/Prof. Eng. V. Kostadinov, DScTech/