

# OPINION

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***concerning scientific works submitted for participation in competition for awarding the academic position of “Professor” in higher education area 5. “Technical Sciences”; professional field of 5.1 “Mechanical Engineering” and scientific major “Metrology and metrological assurance”.***

In the competition for professor announced in State Gazette, issue 58 from 23 July 2019, and also on the website of Technical University of Gabrovo (TUG) to address the needs of department “Mechanical and precision engineering”, which is a constituent unit of the Faculty of Mechanical and Precision Engineering participated one candidate associate professor Ilia Slavov Zhelezarov, PhD from Department “Mechanical and precision engineering”.

## **1. Overview of the content and results of the submitted works**

To participate in the competition are submitted works that meet the requirements of the "Law on the Development of Academic Staff in the Republic of Bulgaria" and the Rules for its implementation, including: 1 monograph (B.3), 5 scientific publications in refereed editions and indexed in world-renowned databases of scientific information (Г.7), three of which have an “impact factor”, 23 scientific publications in non-refereed journals with peer-reviewed or in edited collective volumes (Г.8), 1 Book (E.23), 1 HandBook (E.24) and 8 other publications.

The publications are categorized into the following four thematic areas:

1. "Methods and instruments for measuring dynamic and static quantities" comprising 6 publications related to systems and instruments for measuring dynamic and static quantities of moving objects. New methods for measuring the parameters of moving objects are presented, which make it possible to create new generation measuring systems; An analysis of the design, requirements and problems of inductive systems for contactless transmission of energy during dynamic charging of electric vehicles has been made; Mathematical models of static and dynamic characteristics for measuring instruments are presented.
2. "Applied Metrology. ISO Standards-Based Quality Management Systems" comprising 9 publications presenting quality management systems based on International Organization for Standardization (ISO) standards, analyzing their applicability in higher education, internal and external evaluation of these systems, opportunities to improve and enhance customer satisfaction. Various methods for measuring, analyzing and evaluating the efficiency and effectiveness of quality management systems and instruments for their implementation are discussed.
3. "Applied metrology. Quality management methods and instruments" comprising 10 publications related to the feasibility analysis of statistical methods and quality management tools, performance indicators, elements for analysis and performance evaluation of a quality management system, and also summarize the standard tools for evaluating performance, the consistency for performing quantitative and alternative measurement the possibilities of application, statistical control of technological processes with control charts on quantitative elements and card precontrol.
4. "Applied metrology. Management and control systems" includes 6 publications related to quality management and control systems and metrological characteristics of systems and measuring instruments. The prerequisites for the normal functioning of the laboratory for calibration of measuring instruments in accordance with the requirements of ISO/IEC 17025 on the territory of the university complexes and their accreditation are considered.

## **2. General characteristics of the applicant's activities**

### **2.1 Teaching and pedagogical activity** (work with students and postgraduate students)

Assoc. prof. Zhelezarov, a candidate in the competition, has considerable teaching and research experience at TU-Gabrovo. Since his admission to the University in 1995, Assoc. prof. Zhelezarov has consistently been an assistant professor and senior assistant professor until 2006, defended his PhD thesis in the specialty "Metrology and metrological assurance", on the topic: "Systems for measuring and managing the quality of training in Higher Technical Schools" in 2006 and holds the position of Chief assistant professor, and in 2007 he holds the academic position "Associate Professor in the scientific specialty "Metrology and Metrological Assurance". Participates in curriculum development and is a lecturer in the disciplines "Quality management systems", "Industrial control systems", "Quality control and management" and "Metrology", "Integrated management systems" included in the curricula of specialties in the Faculty of ME - full-time and part-time education for educational qualification degree "bachelor" and "master".

He is the author of a Book on Quality Management Systems and a Handbook for laboratory exercises on Metrology and Measurement Engineering.

Over the years, he has guided over 50 undergraduate students at the Bachelor's and Master's degrees and one doctoral student, defending a Ph.D. thesis on the subject "Modeling of non-circular small-sized gears with an asymmetric tooth profile" in 2014.

### **2.2 Scientific and applied research activity.**

Applicant's scientific publications submitted for participation in the competition are: 1 monograph; 34 scientific publications, 5 of which are in refereed and indexed publications - 3 in Impact Factor journals and 2 in SCOPUS database. Of these, 12 are individual, 22 are co-authored, with the candidate being the first author in 10 publications. Twenty of the submitted publications are in English, two in Russian and twelve in Bulgarian. 2 handbooks have been developed.

29 citations were submitted for participation in the competition - 8 in scientific publications, referenced and indexed in world-famous scientific information databases (Д.12), 9 in monographs and collective volumes with scientific peer review (Д.13) and 12 in non-refereed journals with scientific review (Д.14).

Assoc. prof. Zhelezarov has participated in 14 research or educational projects. Five of these projects are international, two of which as a leader and in three as a member of the research team; and 9 national - 6 as a leader and 3 as a team member.

### **2.3 Implementation activity**

Assoc. prof. Zhelezarov has extensive experience in implementing application projects. The documents presented show the large number of projects that the applicant has managed in the period 1999 - up to now in a large number of organizations (over 200). Projects include the development, implementation and improvement of ISO 9001 quality management systems, ISO 14001 environmental management systems, ISO 45001 and OHSAS 18001 health and safety management systems, ISO 50001 energy management systems, systems for the management of ISO 17025 testing laboratories, etc., which are relevant to the competition. The total value of the attracted funds is significant - 1 451 460 BGN.

## **3. Contributions** (scientific and related to applied research and application). **The importance of contributions to science and practice**

The submitted author's reference for the contributions includes 3 scientific contributions, 9 applied-scientific and 4 applied ones.

Scientific contributions relate to:

- the creation of a new method for measuring the parameters of moving objects;

- development of a mathematical apparatus, allowing the determination of the dynamic error of the measuring instruments of the angular deviations of moving objects and the creation of models that provide opportunity for the development of the analysis and synthesis of measuring systems whose dynamic accuracy is ensured by the correction of the dynamic real time error;

- analysis of models for the presentation of management systems based on standards of the International Organization for Standardization (ISO).

Applied Scientific contributions include:

- developed system for measuring the parameters of moving objects with high dynamic accuracy based on differentially coupled MEMS gyroscopes and adaptive algorithm;

- a system for measuring onboard and pitching, roll and ship trim;

- model and system for internal and external measurement and evaluation of the quality management system;

- comparative analysis of models of quality management systems, as well as methods for recording, measuring, systemizing, analyzing and evaluating information and their applicability to a particular presentation model;

- risk management model and uncertainty of measurement results in a quality management system;

- algorithm for the analysis of measuring instruments and measurement systems for quantitative and alternative control;

- method for the control of involute cylindrical gears with asymmetrical tooth profile by means of measuring rolls;

- mathematical models of static and dynamic characteristics for measuring instruments;

- model of integrated management system in accordance with the requirements of the standards for quality management systems ISO 9001, environmental management systems ISO 14001 and occupational health and safety management systems OHSAS 18001 / ISO 45001, as well as methods are proposed to improve the integrated management system.

Applied contributions include:

- developed, implemented and certified model of quality management system for training and research of TU - Gabrovo;

- developed model of a university laboratory management system for calibration of measuring instruments in accordance with the requirements of ISO / IEC 17025 standard. Prerequisites for accreditation and improvement of the laboratory management system;

- systematizing statistical methods for optimizing management and production, which improve the flexibility, efficiency and effectiveness of processes and improve the performance of the quality management system;

- developed model for evaluating the quality management system of higher education institutions, by applying statistical methods and techniques for measuring and managing the quality of the educational product during its life cycle.

#### **4. Evaluation of candidate's personal contribution.**

The assessment of the personal contribution of the candidate assoc. prof. Zhelezarov with respect to the achieved results from the educational, pedagogical, scientific and scientific-applied activity is completely positive. The large number of co-authors from and outside the country is evidence of teamwork skills. The scientific results obtained, specific applications and citations are largely due to professional correctness, objectivity and benevolence; ability to find common ground, integrate and bring together different (by age, preparation, claim, etc.) specialists.

## **5. Critical notes and recommendations**

I have no critical notes or recommendations for the applicant.

## **6. Personal impressions**

I know assoc. prof. Iliya Slavov Zhelezarov, both in personal and professional terms, and I am in the course of his scientific and teaching development. He is a highly qualified and erudite specialist, a well-established lecturer who enjoys prestige among his colleagues in the department, faculty, university. Assoc. prof. Zhelezarov has made an outstanding contribution to the cooperation between the departments of Mechanical Engineering of TU-Gabrovo and the Precision Engineering of TU-Sofia, and in particular between the two universities.

I believe that the information presented on the applicant's scientific and teaching work fulfills the requirements for occupying the academic position of "professor" and meets the requirements of the Law on the Development of Academic Staff in the Republic of Bulgaria, the Regulations for the implementation of the law for the development of academic staff and The Rules for Acquisition of Academic Degrees and Occupation of Academic Positions at the Technical University of Gabrovo.

## **7. Conclusion:**

***In view of the above, I propose that assoc. prof. Iliya Slavov Zhelezarov, PhD, to be elected "Professor" in the field of higher education - 5. Technical Sciences, Professional field - 5.1 Mechanical Engineering, specialty - "Metrology and Metrology Assurance".***

11.11.2019 г.

Member of ST:        /signature/  
                              /assoc. prof. D. Diakov/