



OPINION

on the materials submitted for participation in a competition for **PROFESSOR** in the Field of Higher Education: 6. Agricultural Sciences and Veterinary Medicine; Professional Field: 6.5 Forestry; Scientific Specialty: Technology, Mechanization and Automation of the Woodworking and Furniture Industry; Discipline of Furniture Technology for the competition for professor published in the State Gazette issue 102/07 Dec 2021 and on the website of the University of Forestry with the code WWI-P-1121-74 for the needs of the Department of Furniture Production at the Faculty of Forest Industry of **the candidate Assoc. Prof. Dimitar Hristov Angelski, Ph.D.** from Department of Furniture Production at the Faculty of Forest Industry.

Opinion written by: Pavlin Biserov Vitchev, Ph.D., Assoc. Professor in Professional Field 6.5 Forestry; Scientific Specialty of Technology, Mechanization and Automation of the Woodworking and Furniture Industry from the University of Forestry.

1. Brief biographical data for the candidate

Assoc. Prof. Dimitar Hristov Angelski was born in Sofia in 1975. In 1999 he graduated from the University of Forestry with a master's degree in Mechanical Technology of Wood. In 2000 he began his teaching career as a part-time assistant professor at the Department of Furniture Production at the University of Forestry. In 2001 he was elected Assistant Professor, in 2005 Senior Assistant Professor, and in 2008 Chief Assistant Professor at the same department. In 2010 he successfully defended his dissertation entitled *Researches over the processes of plastisization and bending of furniture wood details* with supervisor Prof. Dr. Andrey Kavalov, and he was awarded the educational and scientific degree of Doctor in Technology, Mechanization and Automation of the Woodworking and Furniture Industry. In 2015, after his participation in a competition, he acquired the academic position of Associate Professor. Since 2016 he has been the Deputy Dean for Academic Affairs of the Faculty of Forest Industry at the University of Forestry.

Assoc. Prof. Dr. Dimitar Hristov Angelski is entered as an associate professor in the list of habilitated persons in the Register of Academic Staff of the National Centre for Information and Documentation (NACID).

He is fluent in English and Russian and has good digital skills.

2. Compliance of the submitted documents and materials of the candidate to the Regulation for the Development of Academic Staff of the University of Forestry

The documents and materials submitted by the candidate Assoc. Prof. Dimitar Angelski for participation in the announced competition for the academic position of professor comply with the Regulation for the Development of Academic Staff of the University of Forestry and the Higher Education Act, namely:

- curriculum vitae using the European CV format;

- copies certified by a notary of the Diploma for Higher Education, the Diploma for Acquiring a Doctoral Degree, the Diploma for the Academic Position of Associate Professor;
- self-assessment report for fulfillment of the minimum national requirements under art. 2a, para. 2, 3 and 4 for the academic position of *Professor*, the academic position of *Associate Professor*, the educational and academic degree of *Doctor*;
- list of publications; scientific and applied results; list of known citations, etc. All submitted documents are available in electronic format;
- Official Note for the current academic position and years of work experience in the required scientific field issued by the University of Forestry;
- documents and written materials certifying other professional and creative activities and performances under art. 67, para. 2;
- medical certificate and criminal record certificate.

3. Assessment of the candidate's educational and pedagogical activities involving teaching and supervising students and PhD students

Since 2000 Assoc. Prof. Dimitar Angelski has been working at the Department of Furniture Production at the University of Forestry, holding the following positions: part-time assistant professor (2000); assistant professor (2001 - 2005); senior assistant professor (2005 - 2008); chief assistant professor (2008 - 2015) and associate professor (since 2015 to present). He delivers lectures in the following course: Furniture Technology, Furniture Production, Technologies for Decorative Design of Furniture and Technological Planning of Furniture Enterprises and conducts laboratory exercises in the following courses: Materials and Processes for Protective and Decorative Coating, Practical Training in Furniture Production, Design of Park and Forest Recreation Constructions Made of Wood.

To facilitate the educational process of students at the Faculty of Forest Industry, the following books were published: a Textbook on Furniture Technology and a monograph entitled Non-traditional Methods for Smoothing Wood Surfaces with authors Prof. Andrey Kavalov and Assoc. Prof. Dimitar Angelski.

Assoc. Prof. Dimitar Angelski was the research supervisor of 1 doctoral student who successfully defended a PhD thesis, 1 doctoral student who completed the doctoral studies and has the right to defend a thesis, 53 undergraduate and graduate students including 47 who submitted a thesis for a bachelor's degree and 6 for a master's degree.

I think that the candidate demonstrate a very high level of pedagogical and teaching activities with students from the various fields of study in which he teaches. I highly appreciate his pedagogical training and believe that it fully corresponds to the academic position of professor. Assoc. Prof. Angelski is highly respected by students and the academic community.

4. Assessment of candidate's scientific, scientific-applied and publishing activities

General description of the submitted materials

The candidate Assoc. Prof. Dimitar Angelski participated in the competition with:

- One textbook;
- 5 teaching and learning materials (materials for distance learning);
- 50 publications;
- 17 projects.

Ten of the publications (4.1 - 4.10) that are refereed and indexed in a world-famous database of scientific information were compiled into a habilitation thesis. All publications were published in recognized prestigious international scientific journals and scientific volumes with scientific review and editing. Forty-three of the publications are in a foreign language.

The total number of points for all indicators according to the submitted report for the minimum national requirements under art. 2a, para. 2 for the academic position of professor is 1122.15, which is more than twice the required 550 points.

4.1 Participation in scientific, scientific-applied and educational projects

Assoc. Prof. Dimitar Angelski participated in a total of 21 scientific, applied and educational projects as follows:

- five research projects financed by the University of Forestry under Regulation 9, of which for two of them Assoc. Prof. Angelski was project manager;
- four national educational projects;
- eight scientific and applied projects financed by the Training and Experimental Forestry Centers of the University of Forestry, including 4 by Yundola Training Range and 4 by Barziya Training Range.

4.2 Characterization of published scientific results

Of the submitted publications and scientific achievements of the candidate Assoc. Prof. Angelski I accept for evaluation the publications in scientific journals, collective scientific volumes and proceedings of scientific forums with the exception of the publications 4.1, 4.5, 4.9, 7.9 and 7.17 of which I am a co-author.

For the publications in co-authorship there are no protocols for the individual participation of each of the authors, so I accept that they have equal participation.

4.3 Reflection of Candidate's Scientific Publications in Literature (known citations)

Assoc. Prof. Angelski has 25 known citations, of which:

- 16 are in citations in scientific journals refereed and indexed in world-famous databases with scientific information or in monographs and collections of scientific publications;
- 7 are in citations in monographs and collections of scientific publications with scientific review;
- 2 are citations in non-refereed journals with scientific review.

According to publication type the citations are as follows:

- 16 citations in refereed journals and proceedings of scientific forums;
- 9 citations textbooks, monographs, dissertations, etc.

4.4 Contributions of the candidate's publications (scientific, scientific-applied, applied contributions)

The contributions of the candidate's scientific publications are related to solving theoretical and practical problems of technologies in the furniture production. They can be grouped in the following areas:

- plasticization and bending of furniture pieces;
- lamination of furniture surfaces;
- construction of wooden surfaces in order to prepare for film protective and decorative coating;
- application of paint and varnish materials on furniture surfaces;
- other areas related to production of furniture and wood products.

The contributions resulting from the scientific publications in each area can be summarized as follows:

1. Scientific contributions:

- One-dimensional (1D) linear and non-linear models for calculating the non-stationary temperature distribution along the thickness of solid wood parts subjected to one-sided heating for the purpose of plasticization before bending were developed with solutions proposed. (*papers 7.1, 8.3*)

- A methodology for mathematical modeling and research on two interrelated problems was developed involving temperature distribution along the thickness of the flat wooden parts subjected to one-sided heating before bending and energy consumption of this process. (*papers 7.2, 7.4, 7.6, 8.8*)

- For the first time research was conducted using an original installation on the influence of flexibility of the working tool used for lapping on the quality of smoothing of veneered furniture panels (*papers 8.11, 8.12*)

- A methodology was developed for calculation and research on the following two interrelated parameters involving 1D non-stationary temperature distribution of flat wood furniture parts subjected to one-sided convective heating before varnishing and variation of their average mass thermal conductivity. (*papers 7.3, 7.5, 7.12, 8.5, 8.6*)

- A mathematical model and numerical approach for calculating the specific energy consumption required for convective heating of flat furniture parts before varnishing was developed. (*papers 7.8, 8.7*)

- A methodology was developed for calculating optimal energy-saving modes for steaming prisms for veneer production in an autoclave with limited heat output of the steam generator. (*papers 7.7, 7.10, 7.15, 7.16, 7.18*)

- A mathematical description of latent heat of bound water in wood during freezing and melting of ice formed in wood cell walls was presented. Temperature variation of bound water and of ice formed from it in wood during heating, cooling and in the course of phase transitions was described and analyzed. (*paper 7.11*)

- A methodology for mathematical modeling, calculation and research on two interrelated problems was developed involving 2D non-stationary temperature distribution in

logs stored for a long time in an open warehouse at periodically changing ambient air temperature in winter and the degree of icing of logs. Mathematical descriptions of the periodically changing ambient temperature and of three types of relative degree of icing of the logs under the influence of this temperature were presented. These descriptions made use of two interrelated 2D nonlinear mathematical models of heat distribution in logs during their freezing and thawing. (*papers 7.13, 7.14*)

2. *Scientific-applied contributions:*

- With the help of the proposed one-dimensional (1D) linear and non-linear models of the process of one-sided heating of wood parts before bending, it was found that non-stationary temperature variation at individual points of spruce and oak parts' thickness occurred along two increasing exponents. (*papers 7.1, 8.3, 8.9*)

- An approach was developed for calculating the heat flux necessary for one-sided heating flat wood parts in order to plasticize them. The approach was based on numerical integration and differentiation of the solutions of a linear model for calculating non-stationary 1D temperature distribution over parts' thickness. (*paper 8.4*)

- Using the methodology proposed, the energy consumption was calculated for covering heat emission of spruce and oak parts with initial temperature of 20 °C, water content of 15% and different thicknesses during their one-sided heating at different temperatures of the heating metal strip. (*papers 7.2, 7.4, 7.6, 8.8*)

- Based on the proposed and applied universal method for studying the dimensional stability of curvilinear furniture parts, a protocol was established for producing curvilinear furniture parts from glued HDF using a thermal vacuum membrane press, and shape stability of curved furniture parts made of internal prismatic fiberboard laths laminated with fiberboard panels using three types of adhesives was determined. (*No 8.18*)

- Using statistically processed data from one-factor experiments, a protocol was developed for laminating curved furniture parts with PVC foil and polyurethane adhesive. (*paper 8.16*)

- Based on data from one-factor experiments, the influence was established of sandpaper grain size of sanded surfaces subjected to lamination on strength of adhesion between fiberboards and PVC foil. (*paper 8.17*)

- A lapping device was developed and applied that had three working tools' structural variations resulting into different base formation (rigid, semi-flexible and flexible) of the lapping part. The device allowed changing the size of linearly distributed pressure load in the range from 0 to 10 kN/m at an adjustable feed rate. (*papers 8.11, 8.12*)

- The complex influence was established of linearly distributed pressure load and the number of lappings on lapping evenness and the arithmetic mean of the micrograde heights by using working tools with rigid and semi-flexible base. (*No 8.12*)

- Using the methodology developed, energy consumption was calculated and regimes were established for autoclave steaming of ice-containing and ice-free beech prisms at different cross-sectional sizes and water content, as well as at varying autoclave loading levels and limited heat power of the steam generator. (*papers 7.7, 7.10, 7.15, 7.16, 7.18*)

- Using a methodology for calculating the relative degree of icing of logs stored in an open warehouse at winter temperature, a simulation study was performed of 2D non-stationary temperature distribution, average mass temperature and three types of icing of beech logs of industrial size. The calculations were made for 5 days with alternating freezing and thawing with sinusoidal changes in ambient temperature with different initial values and different amplitudes. (*papers 7.13, 7.14*)

- The influence was determined of processed material and cutting height on sound pressure level during the operation of a circular machine with a sliding table and graphical dependences were presented showing the relationship between the individual factors. It was found that under the same cutting conditions the sound pressure level, depending on the processed material, varied as follows: plywood - 89.5 dB(A); oriented strand board - 88 dB(A) and fiberboard - 86.5 dB(A). (*paper 7.9*)

- Processed surface quality was determined during milling performed with a knife shaft with spirally arranged flat knives. The complex influence was established of feed rate and thickness of the removed layer h on roughness variation parameter. It was confirmed that feed rate has a greater effect on surface quality than thickness of the removed layer. (*paper 7.18*)

- It was established that veneer hardness does not affect the quality of veneered furniture panels smoothed by lapping. (*paper 8.11*)

- The one-dimensional non-stationary distribution of temperature and the average mass thermal conductivity of heated furniture parts before varnishing was calculated. (*paper 7.3, 7.5, 7.8, 7.12, 8.5, 8.6, 8.7*)

- The complex influence was established of feed rate and amount of varnish on adhesive strength and degree of UV curing of polyurethane coatings during through-feed layering. It was found that feed rate has the most significant effect on adhesion strength and degree of curing of polyurethane coatings on veneered fiberboards(*papers 8.18, 8.20*)

- On the basis of developed three-factor regression models showing characteristic successive phases of film formation using varnish, the primary influence of the number of applied layers on the arithmetic mean deviation of varnish coating profile was proved. (*paper 8.13*)

3. *Applied contributions:*

- Nomograms were compiled for determining final roughness and evenness of lapped surfaces during deformation smoothing by lapping with working tools with rigid and semi-flexible base using varying regime parameters, linearly distributed pressure load and number of impacts. (*paper 8.12*)

- Nomograms were compiled for determining adhesion strength and UV curing phase at varying regime parameters of feed rate and amount of varnish in through-feed layering of polyurethane coatings. (*papers 8.18, 8.20*)

- It was established that ultraviolet radiation has the most adverse effect on operational resistance of protective and decorative coatings applied to wood exposed atmospheric conditions. It was found out that long-term protective effect of coatings is achieved only in case of indirect solar radiation on wood. (*paper 8.10*)

- Adhesion strength of different types of paint coatings applied on spruce and oak wood was determined. It was found out that paints developed for coating formation on silicate surfaces also form coating on wood with sufficient adhesion strength, and can also be used for decorating wood construction products. (*paper 8.2*)

- Data and observations conducted on nano-based varnishes showed that these form coating with higher adhesion strength and the surface has a larger arithmetic deviation of profile compared to similar conventional varnishes. (*papers 8.21, 8.22*)

5. **Assessment of the applicant's personal candidate**

I accept that the scientific achievements of the candidate's publications included in the submitted materials for participation in the competition are result of his own work or of his active assistance and under his guidance.

6. Critical remarks

The materials submitted by Assoc. Prof. Dimitar Angelski for participation in the competition for the academic position of PROFESSOR are well arranged and presented according to the requirements. No errors or inaccuracies were found. All scientific papers of the candidate are well structured in terms of theoretical introduction, methodology, interpretation and analysis of the results obtained and with an appropriate reference list.

I am fully convinced that the candidate has the necessary potential and abilities to prepare and deliver plenary reports at international scientific forums, for which no information is available at the moment. I recommend that Assoc. Prof. Dimitar Angelski continue to share his experience in working with undergraduate and graduate students, PhD students and the academic community both in Bulgaria and abroad.

7. Personal impressions

I have known Assoc. Prof. Dimitar Angelski since my student years. I had the pleasure of being a student when he started teaching the labs in furniture technology. Even as a young assistant professor, Assoc. Prof. Angelski managed to gain the respect of students and demonstrated knowledge that he wanted to pass on to us. Now, myself being a university associate professor and a colleague of his, I can state with responsibility that for me Assoc. Prof. Angelski is an expert in the field of furniture production, a respected associate professor by students and the academic staff. As a result of his many scientific studies, publications and participation in prestigious international scientific forums, Assoc. Prof. Angelski is well recognized in international scientific circles in the field of furniture production.

8. Conclusion

Considering the above, I propose that Assoc. Prof. Dr. Dimitar Hristov Angelski be elected PROFESSOR in the discipline of Furniture Technology in the Professional field 6.5 Forestry, and the scientific specialty of Technology, Mechanization and Automation of the Woodworking and Furniture Industry.

Opinion written by:

/Assoc. Prof. Pavlin Vitchev, PhD/

Opinion delivered to: