

REVIEW

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“ in the discipline „Furniture Technology“

In the competition for professor, published in the State gazette, issue 102 / 07. 12.2021 and on the site 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, as a candidate participate Assoc. Prof. Dimitar Hristov Angelski Ph.D., Faculty of Forestry, Department of „Furniture Production“.

Reviewer: Panayot Angelov Panayotov, Ph.D., Professor in Professional Field 6.5 Forestry, from University of Forestry / retired

1. Short biographical data on the applicant

Dimitar Hristov Angelski was born on March 25, 1975 in the city of Sofia. He graduated in 1994 from the Technical School of Textile Engineering in Sofia, majoring in Production Automation. In 1999 he graduated with a degree in "Mechanical Technology of Wood" at University of Forestry. In the academic year 2000/2001 he was hired as a part-time assistant in the Department of "Furniture Production" for the discipline "Furniture Technology". In 2001 he participated in and won a competition for a regular assistant in the same discipline. He defended his dissertation in 2010 on "Research on the processes of plasticization and bending of solid wood parts" with supervisor Prof. Andrey Kavalov. He habilitated as an associate professor on January 27, 2015 in the discipline "Furniture Technology". Shortly afterwards, he was assigned by the Department of Furniture Production to prepare five curricula, for which he began lecturing. These are the following disciplines: Furniture Technology (specialty "Wood and furniture technology", Bachelor's degree), Furniture Technology (specialty „Engineering design“, Bachelor's degree), Furniture Production (specialty "Business Administration", Bachelor's degree), Decorative Technology furniture design (specialty "Wood and furniture technology", Master's degree) and Decorative design of furniture („Engineering design“, Master's degree). He is currently lecturing on: "Furniture Technology" in the specialties "Technology of Wood and Furniture" (Bachelor's degree with 60 hours) and Engineering Design (Bachelor's degree with 60 hours); Production of furniture (Bachelor's degree with 30 hours) and Technology for decorative design of furniture (Master's degree, with 30 hours). From 2016 until now he has been the Vice Dean for Education at the Faculty of Forest Industry.

2. Correspondence of the submitted documents and materials of the applicant according to the Rules of the Development of academic staff at the University of Forestry.

The submitted documents fully comply with those required by the Rules of the Development of academic staff at the University of Forestry

3. Evaluation of the teaching activity of the candidate (work with students and doctoral students)

Performs conscientiously and accurately his duties as a lecturer in the disciplines assigned to him: 1. Furniture technology; 2. Technology for decorative design of furniture; 3. Manufacture of furniture. Under his leadership, a total of 53 students from the two specialties ("Technology of Wood and Furniture" and "Engineering design"), have defended diplomas. Under his leadership Vladimir Mihailov (Chief Assistant in the Department of Furniture Production) defended his doctorate and currently in the process of defense is PhD student Krassimira Atanasova - his full-time PhD student (from 2019 to 2022), who has a scheduled defense in June 2022.

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

General description of the materials presented

Assoc. Prof. Dimitar Hristov Angelski participated in the competition with:

- Habilitation work - **10 scientific publications** in referenced and indexed in globally known databases with scientific information;
- textbooks - **1 pc.**; ("Furniture technology" in co-authorship with Prof. Andrew Kavalov)
- teaching aids in virtual libraries (electronic form) - **5 pcs**;
- Publications - **40 pcs**;
- Scientific projects - **5 pieces**;
- Educational projects - **4 pieces**;

4.1 Participation in scientific, scientific - applied and educational projects

He has participated in 5 scientific projects in 4 educational projects and in the Erasmus program.

4.2 Characteristics of published scientific results

The publications involved in the competition (**50 pieces**) can be classified as follows:

By type:

- Publications in scientific journals - **31 pcs**;
- Publications in collections of scientific forums - **19 pcs**;

By importance:

- Articles in magazines with Impact-factor - **1 pc.**;
[G7 - 16]
- Articles in journals, referenced and indexed in Web of Science and SCOPUS - **19 pcs**;
[G4 - 1, 2, 5, 8, 10; G7 - 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14]
- Reports from scientific forums Referee and indexed in Web of Science and Scopus - **8 pcs.**
[G4 - 3, 4, 6, 7, 9; G7 - 15, 17, 18]
- Articles in journals without Impact-factor - **11 pcs**;
[G8 - 1, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13]
- Reports in scientific forums - **11 pcs.**
[G8 - 2, 10, 14, 15, 16, 17, 18, 19, 20, 21, 22]

Place of publication:

- Articles in Bulgarian and foreign journals referred to in Web of Science and SCOPUS

- 20 pcs;

[G4 - 1, 2, 5, 8, 10; G7 - 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16]

- Articles in refereed Bulgarian and foreign journals refereed outside Web of Science and SCOPUS - 11 pcs;

[G8 - 1, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13]

- Articles in unrefereed Bulgarian and foreign journals - 0 pcs;
- Publications in proceedings of international scientific forums - 19 pcs;

[G4 - 3, 4, 6, 7, 9; G7 - 15, 17, 18; G8 - 2, 10, 14, 15, 16, 17, 18, 19, 20, 21, 22]

- Publications in collections of national scientific conferences, sessions and seminars - 0 pcs.;

Language they were published:

- In Bulgarian - 7 pcs.;

[B4 - 7; Г8 - 1, 10, 11, 18, 19]

- In foreign language (English) - 44 pcs.;

[all the others]

Number of co-authors:

- Stand alone - 6 pcs.;

[B4 - 7; Г8 - 1, 10, 18, 19, 20]

- With one co-author - 9 pcs.;

[B4 - 2, 6, 9, 10; Г7 - 15; Г8 - 11, 16, 21, 22]

- With two co-authors - 13 pcs.;

[B4 - 1, 3, 4, 5, 8; Г7 - 9, 17, 18; Г8 - 12, 13, 14, 15, 17]

- With three or more co-authors - 22 pcs.;

[Г7 - 1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 12, 13, 14, 16; Г8 - 2, 3, 4, 5, 6, 7, 8, 9]

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

- Total - 25 citations

According to the type of citations:

- In refereed journals and proceedings of scientific forums - 16 citations;
- In textbooks, monographs, dissertations, etc. - 7 citations.
- In unrefereed journals with scientific review - 2 citations.

4.4 Contributions in the works of the candidate (scientific, scientific-applied, applied)

The reference with the contributions presented by the candidate Assoc. Prof. Angelski is arranged thematically, and the respective contributions are described in detail (7 pages) in the following five directions: 1. Plasticization and bending of furniture elements; 2. Facing of furniture surfaces; 3. Smoothing of wooden surfaces in order to prepare for the formation of film protective decorative coatings; 4. Application of paint and varnish materials on furniture surfaces; 5. Other directions related to the production of furniture and wood products. I accepted the scientific, applied and applied contributions mentioned in the report, which are as follows:

- Contributions in the field of "Plasticization and bending of furniture elements"

A total of 2 scientific contributions have been defined, which are as follows:

1. Based on the partial differential equation of thermal conductivity under the respective initial and mixed conductive and convective boundary conditions, one-dimensional (1D) linear and nonlinear models for calculating the nonstationary temperature distribution in the thickness of solid wood parts subjected to unilateral heating were compiled and solved. plasticization before bending.

2. A methodology for mathematical modeling and research of two interrelated problems has been developed: temperature distribution along the thickness of the flat wooden parts subjected to unilateral heating before bending and energy consumption in this process. The methodology is based on the use of numerical solutions of the linear mathematical model of the process of one-sided heating of the details.

A total of 6 scientific and applied contributions have been defined, which are as follows:

1. Using the proposed one-dimensional (1D) linear and nonlinear models of the process of one-sided heating of wooden parts before bending, it was found that non-stationary temperature change at individual points in the thickness of spruce and oak parts is increasing, passing into each other exhibitors.

2. Using a 1D nonlinear mathematical model, the change in temperature field along the thickness of wooden parts subjected to one-sided heating before their subsequent bending was calculated and the change in their average mass coefficients of thermal conductivity and thermal conductivity coefficients on their unheated surface was determined.

3. An approach has been developed to calculate the heat flux required to heat flat wood parts by unilateral heating in order to plasticize them.

4. Using a developed methodology, the energy consumption was determined to cover the heat emission of spruce and oak parts with an initial temperature of 20 °C, water content of 15% and different thicknesses during their one-sided heating at different temperatures of heating metal strip.

5. Based on the proposed and used universal method for studying the formability of curvilinear furniture details, a regime has been drawn up for the production of curvilinear furniture details from glued wood fiber boards on a thermovacuum membrane press.

6. The shape stability of curvilinear furniture units, made by gluing wood fiber boards and internal filling of slats, using three types of adhesives, has been established.

- **Contributions in the field of "Furniture surface facing"**

A total of 2 scientific and applied contributions are defined, which are as follows:

1. Using statistically processed data from one-factor experiments, a mode for lining bent furniture elements with PVC foil and polyurethane adhesive has been developed.

2. Based on data from one-factor experiments, the influence of the sandpaper grain size during sanding of the surface to be veneered on the adhesion strength of adhesive joints between wood fiber boards and PVC foil was established.

A total of 1 applied-practical contribution is defined, which is as follows:

1. The influence of the type of adhesive on the adhesive strength of adhesive joints in the positional lining of particle board with oak veneer has been established.

Contributions in the field of "Smoothing of wood surfaces in preparation for the formation of film protective decorative coatings"

A total of 1 scientific contribution has been defined, which is as follows:

1. It has been proven that a guaranteed one hundred percent uniformity is achieved if friction devices are used for this purpose, which have a flexible support base and provide at least twice the compressive impact with the magnitude of the linearly distributed load $q \geq 6$ kN/m.

A total of 4 scientific - applied contributions are defined, which are as follows:

1. A lapping device with three constructions of working lapping bodies has been developed and experimentally applied, providing different formation of the bearing base (rigid, semi-elastic and flexible) of the lapping element.

2. The complex influence of the linearly distributed compressive load and the number of laps on the uniformity of the lapping and the arithmetic mean height of the microroughness heights was established by friction with working bodies on "solid" and "semi-elastic" basis.

3. It was found that the hardness of the veneer does not affect the quality of the veneered furniture panels smoothed by lapping.

4. Nomograms have been compiled to determine the final roughness and uniformity of the lapped surfaces during deformation smoothing by lapping with working bodies on a "hard" and "semi-elastic" basis by changing the regime parameters.

- **Contributions in the field of "Application of paints and varnishes on furniture surfaces"**

A total of 2 scientific contributions have been defined, which are as follows:

1. A methodology for calculation and study of the following two interrelated parameters has been developed: 1D non-stationary temperature distribution when flat wooden furniture elements subjected to unilateral convective heating before varnishing and change of their average mass thermal conductivity.

2. A mathematical model and numerical approach for calculating the specific energy consumption required for convective heating of flat furniture elements before their varnishing has been developed. The approach is based on the integration of the solutions of a nonlinear model for calculating the non-stationary 1D temperature distribution along the thickness of furniture elements subjected to unilateral convective heating.

A total of 3 scientific - applied contributions are defined, which are as follows:

1. Using the one-dimensional nonlinear mathematical model, the one-dimensional non-stationary distribution of the temperature and the average mass thermal conductivity of heated furniture elements before their varnishing was calculated.

2. The complex influence of the feed rate and the amount of varnish on the adhesion strength and the degree of UV hardening of polyurethane coatings during pass-through application was established. It was found that the feed rate has the most significant impact on the adhesion strength and the degree of hardening of polyurethane coatings applied to veneered wood fiber boards.

3. On the basis of compiled three-factor regression models, reflecting characteristic successive phases of the film formation of the lacquer system, the primary influence of the number of applied layers on the arithmetic mean deviation of the lacquer coating profile has been proved.

A total of 6 scientific - applied contributions have been defined, which are as follows:

1. Nomograms have been compiled to determine the adhesion strength and the phase of UV curing when changing the regime parameters feed rate and the amount of varnish during the pass-through application of polyurethane coatings.

2. It has been determined that ultraviolet radiation has the most adverse effect on the operational resistance of protective and decorative coatings applied to wood exposed to the weather. It has been established that long-term protective effect of coatings is achievable only in case of indirect effects of solar radiation on wood.

3. The adhesive strength of different types of paint coatings applied on spruce and oak wood has been determined. It has been found that paints developed for the formation of coatings on silicate surfaces form coatings on wood with normative adhesion strength and can also be used for decorating wood construction products.

4. Nomograms have been compiled to determine the arithmetic mean deviation of the profile of acrylic lacquer coating by changing the grain size of the sandpaper, the amount of primer and the number of coats applied.

5. From the data and observations conducted on a nano-based lacquer system, it was found that it forms a coating with higher adhesion strength and a surface with a larger arithmetic deviation of the profile compared to similar conventional lacquer systems.

6. The water permeability of nano-based varnish coatings applied to wood has been determined.

- **Contributions to "Other activities related to the production of furniture and wood products"**

A total of 3 scientific contributions have been defined, which are as follows:

1. A methodology for calculating optimal energy saving modes for steaming prisms for autoclave veneer production with limited heat output of the steam generator has been developed. The methodology includes two-dimensional mathematical models for non-stationary thermal conductivity and energy consumption by steaming prismatic and ice-free prismatic wood materials.

2. A mathematical description of the latent heat of the bound water in the wood during its freezing and melting of the formed ice in the cell walls of the wood is made.

3. A methodology for mathematical modeling, calculation and research of two interrelated problems has been developed: 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, which are obtained under the influence of this temperature, are presented.

A total of 4 scientific and applied contributions are defined, which are as follows:

1. Using a developed methodology, energy consumption was calculated and regimes for autoclave evaporation of beech-containing and ice-free beech prisms with different cross-sectional sizes and water content, as well as with varying degrees of filling the autoclave with prisms and limited thermal power of steam generator.

2. Using a methodology for calculating the relative degree of icing of logs stored in an open warehouse at winter temperature, a simulation study of 2D non-stationary temperature distribution, average mass temperature and three types of icing of beech logs of industrial size was performed.

3. The influence of the processed material and the cutting height on the sound pressure level during operation of a circular machine with a moving mass was determined and graphical dependences were presented, representing the relationship between the individual factors.

4. The quality of the processed surface is determined during milling, performed with a knife shaft with spirally arranged flat knives. The complex influence of the feed rate and the thickness of the removed layer on the change of the roughness parameter has been established.

A total of 1 scientific-applied contribution has been defined, which is as follows:

1. A high-performance technology has been proposed for the production of imitation wood carvings from rigid molded polyurethane foam.

5. Assessment of the candidate's personal contribution

The materials presented by the candidate for participation in a competition for the academic position "Professor" are undoubtedly the work of Assoc. Prof. Dimitar Angelski, Ph.D. The candidate for the position of professor in the discipline "Furniture Technology" in the Department of "Furniture Production" has 22 independent publications out of a total of 100 publications throughout his career. This is a sign of his creative initiative. It is also distinguished by the fact that it develops research in teams mainly from University of Forestry with one, two or more co-authors.

6. Critical remarks

I have no particular critical remarks.

7. Personal impressions

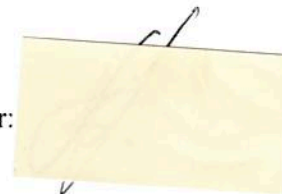
I have a personal impression of the candidate since his student years, when I taught him exercises in the subject "Wood Science". He is distinguished by initiative and creative charge. He is attentive and responsive with his colleagues. From the universities he visited abroad, he received good reviews of his lectures and reports in English. He is able to communicate and

successfully work with colleagues from Bulgaria and abroad: Greece, Slovakia, Poland, Austria and others. He is active in public and administrative activities. He conscientiously and accurately performs the administrative position of "Vice Dean" for Education at the Faculty of Forest Industry.

8. Conclusion

In connection with the above, I propose that Assoc. Prof. Dimitar Hristov Angelski, Ph.D. be elected as a „Professor“ in the discipline „Furniture Technology“ in the Professional field 6.5 Forestry, scientific specialty „Technology, mechanization and automation of the woodworking and furniture industry“.

Signature of the reviewer:



Review submitted to: