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(supervisor)

Evaluation of Jakub Dömény's Doctoral Studies and PhD Thesis Assessment

Jakub Dömény wrote the dissertation thesis submitted in the framework of his doctoral studies at the Department of Wood Science, Faculty of Forestry and Wood Technology, Mendel University in Brno. The topic of the thesis is the microwave modification of wood. The student researches the influence of microwave radiation of a particular frequency on the properties of wood and the possible use of the microwave technology in the processing of solid wood. The experimental part of the dissertation thesis was carried out using unique laboratory equipment, manufactured specifically for the needs of the department. The results of the experiments have confirmed the possible application of the microwave technology in the woodworking industry and suggested new possibilities in this area. The candidate started his doctoral studies in 2012, and in the course of the three-year period he passed all the obligatory examinations. At his request, he interrupted the study in 2015 to take the position of a researcher at the Department of Wood Science.

In the framework of the doctoral study, the candidate had two internships at the University of Ljubljana in Slovenia, a stay at the Aalto University in Finland and one at the Poznań University of Life Science. There he was actively involved in joint research in the framework of an international scientific cooperation. He published the results of his experiments as an author or a co-author in recognised scientific journals. In addition, he actively participated in international conferences in Braşov, Romania (2013), and Quebec, Canada (2014). In 2015, he participated in the international scientific conference held within the INWOOD project, organized under the auspices of the Department of Wood Science.

The predominant part of the professional and research activities of Jakub Dömény is described in his publications. At the beginning of the PhD study, he primarily focused on the field of the modification of beech (*Fagus Sylvatica* L.) permeability by means of electromagnetic field of microwave band and finding the optimum conditions of microwave modification of solid wood (Microwave radiation effect on axial fluid permeability in false heartwood of beech). This was followed by experiments which examined the uptake of impregnating substance by microwave-modified wood, especially false heartwood of beech (Impregnability of European beech false heart wood after microwave treatment). Recently, the

candidate has started to explore the microwave plasticization for the purposes of wood pressing (Application of microwave treatment for the plasticization of beech wood and its densification for flooring system purposes), the density profile and microscopic images of compressed wood (Density profile and microstructural analysis of densified beech wood plasticized by microwave treatment) as well as microwave acceleration of chemical reactions in the process of wood acetylation (Application of microwave heating for acetylation of beech and poplar wood).

The results show that the factors examined were significantly affected in particular by the microwave radiation output, the conveyor belt speed, the wood species, and the absolute moisture content of wood.

During his doctoral studies, Jakub Dömény has engaged in a series of projects. He actively worked in the international project aimed at the establishment of the international scientific team in the field of the modification of wood properties - INWOOD - and he personally engaged in the organization of the international conference held within this project. He was involved in projects supported by the Internal Grant Agency of the Faculty of Forestry and Wood Technology in Brno. Along with the scientific work, the candidate taught some expert subjects, especially practical seminars.

Currently, Jakub Dömény works as a researcher at the Department of Wood Science, and in addition to teaching, he is involved in the basic and applied research made by the department. He is a significant benefit for the department, both professionally and in terms of a good interdisciplinary overview. In respect of the above mentioned, I recommend accepting the dissertation thesis for defence and granting the candidate the Ph.D. degree in the study program after a successful defence.

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