



WARSAW  
UNIVERSITY  
OF LIFE SCIENCES



# 7<sup>th</sup> International Conference on Wood Composites Modification and Machining

Conference proceedings



September 03-05., 2025

Kiry, Poland



WARSAW  
UNIVERSITY  
OF LIFE SCIENCES



# **7<sup>th</sup> International Conference on Wood Composites Modification and Machining**

September 03-05., 2025  
Kiry, Poland

Conference proceedings

**7<sup>th</sup> International Conference  
on Wood Composites Modification and Machining**

The aim of the Conference is to meet at a forum of scientific, research, pedagogical and technological specialists, where the current problems of wood and wood composites modification and processing can be presented and discussed.

***Members of Scientific Committee***

Prof. Ladislav DZURENDA – Technical University in Zvolen, Slovakia  
Prof. Dorota DZIURKA - Poznań University of Life Sciences, Poland  
Prof. Jarosław GÓRSKI - Warsaw University of Life Sciences, Poland  
Prof. Kazimierz ORŁOWSKI - Gdansk University of Technology, Poland  
Prof. Alena OČKAJOVÁ – Technical University in Zvolen, Slovakia  
Prof. Tomasz ROGOZIŃSKI - Poznań University of Life Sciences, Poland  
Prof. Jan SEDLIAČIK - Technical University in Zvolen, Slovakia  
Prof. Janusz ZAWADZKI - Warsaw University of Life Sciences, Poland  
Doc. Ing. Zdeněk KOPECKÝ, CSc. - Mendel University in Brno, Czech Republic  
PhD, DSc Cezary GOZDECKI - Kazimierz Wielki University, Poland  
PhD, DSc Paweł KOZAKIEWICZ - Warsaw University of Life Sciences, Poland  
PhD, DSc Sławomir KRZOSEK - Warsaw University of Life Sciences, Poland  
PhD Marek BARLAK - National Centre for Nuclear Research Świerk, Poland  
PhD, DSc Izabela BURAWSKA - Warsaw University of Life Sciences, Poland

***Organizing Committee***

PhD, DSc Piotr BORYSIUK – president  
PhD Jacek WILKOWSKI – v-ce president  
MSc, Leszek DANECKI - v-ce president  
PhD Mariusz CYRANKOWSKI - secretary  
PhD, Radosław AURIGA – secretary  
PhD, Karol SZYMANOWSKI – secretary  
MSc, Jarosław POMARAŃSKI – secretary

**Contact**

Institute of Wood Sciences and Furniture  
Nowoursynowska Str. 159  
02-776 Warsaw, Poland  
phone: +48 22 59 38 565  
+48 22 59 38 547  
e-mail: conference\_kiry@sggw.edu.pl

## Contents

<b>Intelligent efficiency control of automated technological to produce wooden doors</b> Tomasz Rogoziński, Zdzisław Kwizdiński, Marta Pędzik -----	7
<b>Specific cutting work of reclaimed wood beam during drilling</b> Barbara Prałat, Zbigniew Potok, Dorota Michalak, Sergei Trofimov, Tatiana Nikitina, Krzysztof Wiaderek, Tomasz Rogozinski -----	8
<b>Influence of UV radiation on color changes of beech wood with false heartwood after steaming</b> Ladislav Dzurenda, Michal Dudiak -----	9
<b>Contact drying of birch wood using different drying pressures</b> Ivan Klement, Tatiana Vilkovská, Peter Vilkovský-----	10
<b>Analysis of shape changes during different stages of air drying at the hornbeam (Carpinus Betulus L.)</b> Hugo M. Uličný, Peter Vilkovský, Ivan Klement -----	11
<b>Modeling of technological parameters of CNC milling of solid wood based on the targeted quality of the surface roughness</b> Lukáš Adamčík, Richard Kminiak, Adrián Banski -----	12
<b>Treatment of UF adhesives with modified collagen for scavenging of formaldehyde emission from wood-based panels</b> Ján Matyašovský, Peter Jurkovič, Igor Novák, Ján Sedliačik -----	13
<b>European hardwoods treated by atmospheric discharge plasma</b> Igor Nováka, Peter Jurkovič, Ján Matyašovský, Peter Duchovič, Angela Kleinová, Matej Mičušík, Jan Sedliačik -----	14
<b>Properties of particleboards with partial replacement of MUF resin by lignosulfonates</b> Iryna Lytvyna, Nataliya Bekhtaa, Iryna Kusniaka, Pavlo Bekhtaa, Ján Sedliačik -----	15
<b>Effects of sugar beet pulp on the properties of particleboards</b> Pavlo Bekhtaa, Volodymyr Hamanchuk, Tomáš Pipiška, Jozef Ráheľ, Iryna Kusniak, Ján Sedliačik -----	16
<b>Effect of grain direction on particle size distribution during sanding of spruce, beech and oak wood</b> Kučerka Martin, Alena Očkajová -----	17
<b>Low-temperature drying mode of beech lumber in chamber hot-air dryers without changing the color of the wood</b> Ladislav Dzurenda -----	18
<b>Kinetics of drying beech wood contain red false heartwood</b> Patrik Halčín, Ivan Klement, Tatiana Vilkovská, Peter Vilkovský -----	19

<b>Strength characteristics of furniture elements with particleboard cutting waste core</b> Krasimira Atanasova, Dimitar Angelski, Dobriyan Dobriyanov, Tsacho Tsachev -----	<b>20</b>
<b>Application of polyurethane adhesive in laminating furniture elements with particleboard cutting waste core</b> Dobriyan Dobriyanov, Valentin Yonchev -----	<b>21</b>
<b>Influence of diamond grain size on the basic properties of WC-Co/diamond composites used in tools for wood-based materials machining</b> Joanna Wachowicza, Jacek Wilkowski -----	<b>22</b>
<b>Influence of the type of element implanted into the surface layer of WC-Co tools on the cutting forces during the milling of wood-based materials</b> Jacek Wilkowski, Marek Barlak -----	<b>23</b>
<b>Modelling of the radiation damage in WC-Co and PCD tools used in wood processing</b> Marek Barlak, Jacek Wilkowski, Jerzy Zagórski -----	<b>26</b>
<b>Badania z wysokim naprężeniem dynamicznym dla inżynierii materiałowej za pomocą maszyny Shimadzu HITS-X, kamery HPV-X2 i cyfrowej korelacji obrazu</b> Jan Podgórski-----	<b>28</b>

## **Effect of grain direction on particle size distribution during sanding of spruce, beech and oak wood**

Kučerka Martin <sup>a,\*</sup>, ORCID: 0000-0002-3875-0232

Alena Očkajová <sup>a</sup>, ORCID: 0000-0001-9347-4501

<sup>a</sup> Poznan1 Faculty of Natural Sciences, Matej Bel University, Banská Bystrica 974 01, Slovakia

\*Corresponding author: martin.kucerka@umb.sk; alena.ockajova@umb.sk

---

### **Introduction**

This paper focusses on the impact of the direction orientation of the sanding of selected wood types on the particle size distribution. In the experiment, a hand-held GBS 100 AE belt sander was used, with particles obtained through two sanding models: at angles of 0 ° and 90 ° with respect to the wood structure. The study examined the effects of cutting orientation on the particle size distribution in beech, oak and spruce wood sawdust. Statistical analysis was used to characterise the particle size distribution, and a combination of orientations was compared for each type of wood. Statistical analysis revealed significant differences in the particle size distribution between the two cutting orientations, with p-values of 0.018 and 0.0002 for beech and spruce, respectively. On the contrary, oak did not show minimal statistically significant differences between orientations ( $p = 0.912$ ). The results highlight the crucial role of the wood microstructure in determining the effect of cutting orientation on particle morphology. Specifically, spruce showed the highest sensitivity to orientation changes, while oak remained relatively stable in different cutting directions.

**Keywords:** Wood sawdust, Particle size distribution, Cutting orientation, Belt sanding, Beech, Oak, Spruce, Sieve analysis