

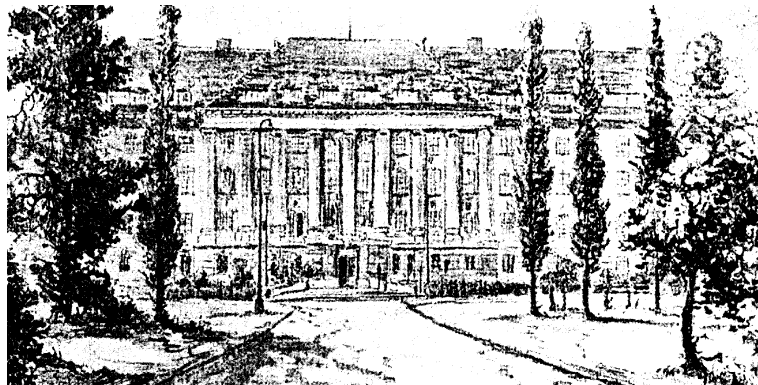
Mendelova univerzita v Brně

Publikační činnost

Projekt: Vytvoření mezinárodního vědecko-výzkumného týmu pro vývoj nových materiálů na bázi dřeva

Garant projektu: prof. Dr. Ing. Petr Horáček

Pracoviště projektu: Ústav nauky o dřevě (LDF)



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Abstrakt článku ve sborníku

KRÁL, P. Assessing the shape stability of particleboards surface-treated by decorative veneer. In *Chip and Chipless Woodworking Processes 2012*. 1. vyd. Zvolen, Slovakia: Technical University Zvolen, 2012, s. 31. ISBN 978-80-228-2386-9.

The paper summarizes results of research work aimed at the determination of shape stability, modulus of rupture (MOR) and modulus of elasticity (MOE) of components manufactured of particle boards, which were veneered from their tight side by the decorative veneer of American walnut (*Juglas nigra*) 0.6 mm thick and on the underside by decorative veneers of different species 0.6–1.5 mm in thickness or by a countermove foil of 85–90 g/m² surface weight. Subsequently, measurements were carried out of the shape stability (warping) of test specimens cut from various combinations of surface-finished boards. These test specimens were air conditioned in three different environments. At the same time, values were determined of bending strength and modulus of rupture with respect to the direction of fibres of sheathing materials

Klíčová slova: tvarová stálost, pevnost v ohybu, dekorativní dýha

KRÁL, P. – KOPECKÝ, Z. – HRAPKOVÁ, L. – HAVÍŘOVÁ, Z. – LAVICKÝ, M. The influence of pressing parameters at gluing quality of spruce plywood. In *FORTECHENVI 2013*. 1. vyd. Novotného lávka 5, Praha 1: Orit, s.r.o., 2013, s. 49. ISBN 978-80-02-02467-5.

The aim of this work was evaluation of impact assessment of pressing parameters on the shearing strength of gluing of spruce plywoods. In pressing, heat transmission through the set of veneers was analysed and effects of the moisture of veneers on the heat transmission were tested. Results were statistically analysed. The dependence was determined of shearing strength, coefficient of compressibility and heat transmission on changes in pressing parameters. Results of the study consist in the proposal of pressing parameters for particular constructions of plywood.

Klíčová slova: dýha, lisovací tlak, překližka

DÖMÉNY, J. – KOIŠ, V. – PAŘIL, P. Impregnability of european beech false heart wood after microwave treatment. In *INTERNATIONAL CONFERENCE "WOOD SCIENCE AND ENGINEERING IN THE THIRD MILLENNIUM" – ICWSE 2013*. 9. vyd. Romania: Transilvania University of Brasov, 2013, s. 190–194. ISSN 1843-2689.

The purpose of this study was to experimentally evaluate the microwave radiation effect on weight percentage gain (WPG). The species European beech (*Fagus sylvatica* L.) was selected and testing samples from false heartwood with dimensions of 20x20x30 mm³ were used. The microwave treatment was carried out on laboratory device at a frequency of 2.45 GHz. Afterwards the oil impregnation in transverse directions was performed. Results were compared with the reference samples (untreated). The samples exposed at 20s intervals (20s treatment, 30s relaxation and 20s treatment) shows improvement of impregnability (WPG 33.84%), which is with agreement of authors hypothesis. The WPG at 30s intervals of exposure (30s treatment, 30s relaxation and 30s treatment) decreased to 26.59%. Based on results, the future work dealing with time influence of exposure in microwave treatment is needed.

Klíčová slova: Microwave Modification, False Heartwood, Impregnability

DĚCKÝ, D. – KÚDELA, J. Heat load effect on glued joint strength. In *InWood2015: Innovations in Wood Materials and Processes*. 1. vyd. Mendelova univerzita v Brně, 2015, s. 21–22. ISBN 978-80-7509-255-7.

KLÍMOVÁ, H. – TIPPNER, J. – SEBERA, V. Influence Analysis of Density Distribution of the Wood-based Composite Material on the Stiffness with Use of Numerical Simulation. In *INTERNATIONAL CONFERENCE "WOOD SCIENCE AND ENGINEERING IN THE THIRD MILLENNIUM" – ICWSE 2013*. 9. vyd. Romania: Transilvania University of Brasov, 2013, s. 918. ISSN 1843-2689.

There were described several types of vertical density profile by mathematical functions which was the principal variable in case of analysis density distribution influence on wood-based composites. It was created parametric finite element model with linear-elastic material model using numerical simulation by ANSYS Mechanical APDL. Models with different vertical density distribution were used for standardized three-point and four-point bending test and compression test. The individual material types were evaluated on the basis of established modulus of

elasticity. It was found out the optimal density distribution in wood-based composite is dependent on a boundary conditions. E.g. The homogenous vertical density profile is applicable for compression stress and the parabolical density profile is applicable for the bending stress. This work also compares standard density profiles with less known special structures inside of material.

Klíčová slova: konečněprvková analýza (MKP), vertikální hustotní profil, kompozit na bázi dřeva

KOŠ, V. – DÖMÉNY, J. – TIPPNER, J. The Effect of Microwave Plasticization and Densification on Density and Density Profile. In *InWood2015: Innovations in Wood Materials and Processes*. 1. vyd. Mendelova univerzita v Brně, 2015, s. 117–118. ISBN 978-80-7509-255-7.

TESAŘOVÁ, D. – ČECH, P. – HLAVATÝ, J. Influence of classic finished surfaces of massive wood on indoor environment. In *International Symposium WoodSciCraft*. 1. vyd. Montpellier, Francie: Equipe BOIS, LMGC, 2014, s. 75–76.

This paper will be discussed the influence of classic finished surfaces of samples made from wooden massive materials, such as beech, cherry and oak on indoor environment. In this contribution there is investigated the problematic of VOC emissions and assessment of their olfactory impacts on indoor environment.

Klíčová slova: VOC, masivní dřevo, klasické povrchové úpravy

KRÁL, P. – KLÍMEK, P. Plywood: Novel solutions for sustainable industrial production. In *InWood2015: Innovations in Wood Materials and Processes*. 1. vyd. Mendelova univerzita v Brně, 2015, s. 169–171. ISBN 978-80-7509-255-7.

Branch of the plywood industry compete with other materials such as Oriented strand board or laminated particle-board. Their superior mechanical properties, appearance or considerably easy production always find applications in transport, building or furniture industry. To comply standards of these applications and maintain competitive in this field, the novel solutions in product development, using of different wood species or process optimization are proposed to match the needs of producers and customers. In this proceeding we summarize own approaches, driven by needs of industrial partners, where achievements in (1) Novel product development by mean of lighter plywood board, (2) development of multi-species plywood, (3) Process development to use of low grade veneers in plywood production are attained (4) Using of glass fabric to increase bending properties of the plywood panel. Pro udržování standardů,

Klíčová slova: skelné vlákno, vlastnosti překližek, překližka

HORNÍČEK, S. – RADEMACHER, P. – KUTNAR, A. – KAMKE, F. – ROUSEK, R. Selected physical properties of viscoelastic thermal compressed wood from fast growing poplar. In *InWood2015: Innovations in Wood Materials and Processes*. 1. vyd. Mendelova univerzita v Brně, 2015, s. 28–29. ISBN 978-80-7509-255-7.

Klíčová slova: rychle rostoucí topol, modifikace vlastností dřeva, VTC

BRABEC, M. – ČERMÁK, P. – MILCH, J. – SEBERA, V. – TIPPNER, J. Analysis of Deformation Distribution and Neutral Axis Location in Thermally Modified Wood by means of Digital Image Correlation. In *InWood2015: Innovations in Wood Materials and Processes*. 1. vyd. Mendelova univerzita v Brně, 2015, s. 68–69. ISBN 978-80-7509-255-7.

Klíčová slova: Deformace, Neutrální osa, Ohyb

KLÍMEK, P. – MEINLSCHMIDT, P. – WIMMER, R. Microscopic swelling of components in wood based panels: first trials. In *InWood2015: Innovations in Wood Materials and Processes*. 1. vyd. Mendelova univerzita v Brně, 2015, s. 130–132. ISBN 978-80-7509-255-7.

Composite materials by its complex structure, consisting of microscopic polymer bonds and interphases between particles created by heat, moisture and pressure may produce complicated intrinsic swelling interactions. Although the classical thickness swelling may give sufficient information about product quality, the microscopic swelling of

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composites giving insight into the swelling behavior of product components is missing. We believe that this can be important for specification of input materials, since geometry of particles, used resin or production process used, may give various microscopic swelling interactions. In our research are stating following research questions: (1) Is it possible to develop reliable method for specification of microscopic swelling in particleboard and fiberboard? (2) Is it possible to indicate swelling behavior of various particles, contained in particleboard? (3) How is the swelling of wood fibers different to swelling of wood particles?

ROUSEK, R. – DEJMAL, A. Comparison of hydrothermal and chemical methods of wood plasticization. In *InWood2015: Innovations in Wood Materials and Processes*. 1. vyd. Mendelova univerzita v Brně, 2015, s. 26–27. ISBN 978-80-7509-255-7.

Klíčová slova: čpavek, zhušťování, plastifikace, lisování dřeva, amoniak, modifikace dřeva

ŠPRDLÍK, V. – MIHAILOVIĆ, S. – BRABEC, M. – KLÍMOVÁ, H. Bonding strength of ammonified beech veneer. In *InWood2015: Innovations in Wood Materials and Processes*. 1. vyd. Mendelova univerzita v Brně, 2015, s. 110–111. ISBN 978-80-7509-255-7.

Furniture design helps to find and show possibilities of material. Here in this study, experimental stool is presented and showed maximal bending angles usable in design of seating furniture. This study is focused on bonding properties of ammonified beech veneer. The main purpose of ammonia treatment is to produce modified wood which imitates the appearance of exclusive dark coloured wood species. This material is often used for furniture and flooring systems. The most often modified wood is European beech (*Fagus sylvatica*, L.). Ammonia treatment causes significant increase of hygroscopicity. Moisture absorption of ammonia modified wood is higher than with natural wood which negatively affect bonding strength. Wood bonding process becomes more complicated due to the anisotropic behaviour and highly variable surface of wood. Structures of wood differ from species to species thus the interaction between wood and adhesive is very difficult to evaluate.

Klíčová slova: čpavkovaná buková dýha, buk lesní (*Fagus sylvatica*), pevnost lepeného spoje

BRABEC, M. Heterogenita deformačních polí v rámci celého povrchu zkušebního tělesa při tlakové zkoušce dřeva podél vláken. In *SilvaNet-WoodNet 2013*. 1. vyd. Zemědělská 1, Brno, 613 00: Mendelova univerzita v Brně, 2013, s. 101–102. ISBN 978-80-7375-903-2.

Příspěvek je zaměřen na popis heterogenity planárních deformačních polí v rámci všech bočních ploch zkušebního tělesa zatíženého tlakem rovnoběžně s vlákny metodou korelace obrazových dat. Cílem je využít tyto plno-polní informace pro detekci regionů na povrchu tělesa vykazujících nízkou a naopak vysokou variabilitu v hodnotách posunutí, resp. poměrných deformací. Na základě tohoto rozčlenění je snahou určit optimální regiony na povrchu tělesa pro snímání deformací během zatěžování a zvýšit tak spolehlivost mechanických tlakových testů dřeva. Zároveň jsou diskutovány možné ovlivnitelné příčiny heterogenity deformačních polí a navrženy opatření pro jejich eliminaci. Variabilita poměrných deformací v rámci všech bočních ploch jednoho tělesa se pro posuzovaný interval 10-40 % z maximální síly většinou pohybovala v rozsahu dvou řádů. Nezávisle na délce tělesa byly po jeho výšce (ve směru zatížení) detekovány tři poměrně dobře rozlišitelné deformační zóny. Od obou kontaktních povrchů do 1/6-1/5 výšky tělesa byl pozorován prudký pokles poměrné deformace. Střední zóna tělesa vykazovala téměř konstantní poměrnou deformaci blízkou nulovým hodnotám. Smrková tělesa vykazovala symetričtější distribuci deformací po výšce tělesa a v rámci střední zóny také nižší variabilitu než tělesa z buku. Do délky tělesa 40 mm se snižovala variabilita poměrné deformace ve střední zóně. Z pohledu spolehlivosti mechanických tlakových testů dřeva podél vláken se tedy jeví jako výhodné snímat deformace ve střední deformační zóně u tělesa s maximální délkou 40 mm. Jako jedna z příčin heterogenity deformačních polí při tlakové zkoušce dřeva podél vláken bylo prokázáno selhání dřeva v oblasti kontaktních ploch. Perspektivním opatřením by mohla být změna geometrie tělesa ve smyslu rozšíření v oblasti kontaktních ploch.

Klíčová slova: Digitální korelace obrazu (DIC), Tlak ve směru vláken, Délka zkušebního tělesa, Heterogenní deformační pole, Příčnick

Autorské dílo

ŠPRDLÍK, V. – MIHAILOVIĆ, S. *Série koupelnového nábytku Retro.2014.*

Tento set nábytku je založen na retro prvcích. Všechny kusy v sérii jsou dokončeny bukovou dýhou, která byla čpavkována a lisována ve vysoké teplotě. Výsledkem je odolnější materiál vůči vlhkosti a rozměrovým změnám, které jsou v koupelnových prostorech časté. Dvířka jsou vyrobena z kovového rámu s chromovou úpravou a jsou vyplněny bílým sklem.

Klíčová slova: čpavkováná buková dýha, koupelnový nábytek, kolekce

Certifikované metodiky, léčebné a památkové postupy

Zkouška únosnosti závěsných nábytkových jednotek přetížením. HOLOUŠ, Z. – TESAŘOVÁ, D. – HLAVATÝ, J. – MÁCHOVÁ, E. 2012.

Zkušební metodika specifikuje metodu zkoušení pro zjištění celkové únosnosti všech typů závěsných nábytkových jednotek, které jsou smontovány a připraveny k používání. Zkušební metoda se vztahuje pouze na úložnou funkci. Pevnost závislá na konstrukci stavby není zahrnuta, celková únosnost závěsných jednotek zahrnuje pouze její části, stěna a upevnění do stěny nejsou zahrnuta.

Klíčová slova: zkušební metoda, závěsná nábytková jednotka, únosnost

Stanovení emisí těkavých organických látek ze stavebních materiálů a nábytku (VOC) metodou GC / MS a TVOSMS výpočtem z naměřených hodnot. TESAŘOVÁ, D. – ANSORGOVÁ, A. – ČECH, P. – TOBIÁŠOVÁ, K. 2013.

Vypracována nová certifikovaná zkušební metoda pro stanovení emisí organických těkavých látek emitovaných stavebními materiály, nábytkovými materiály a nábytkem pod označením PP 05. Metodika vychází z norem (ČSN EN ISO 16000-9, ČSN EN 717-1). Certifikovaná metodika byla certifikována ČIA VE SPRÁVNÍM ŘÍZENÍ.

Klíčová slova: emise voc

Stanovení odolnosti tavného lepidla proti postupnému zvyšování teploty. TESAŘOVÁ, D. – HOLOUŠ, Z. – ČECH, P. 2012.

Tento zkušební metodika specifikuje metodu stanovení odolnosti lepeného spoje tavného lepidla, naneseného na olepovací hranovací pásek a na substrát z aglomerovaného materiálu (dřevotřískové desky, laminované dřevotřískové desky, středně tvrdé dřevovláknité desky, masivních dřev apod.) vůči postupnému zvyšování teploty od teploty (50 °C do 120 °C po 10 °C) nebo po 5 °C podle požadavků zadavatele.

Klíčová slova: zkušební metoda, odolnost, tavné lepidlo

Stanovení odolnosti povrchové úpravy proti působení vodní páry. TESAŘOVÁ, D. – HOLOUŠ, Z. – ČECH, P. 2013.

Zkušební metodika specifikuje metodu stanovení odolnosti povrchové úpravy vůči působení vodní páry u všech pevných povrchů nábytku bez ohledu na použité materiály. Zkouška je určena pro provedení na části hotového nábytku, ale je možné ji použít i pro zkušební panely ze stejného materiálu, upravené shodným způsobem jako hotový výrobek.

Klíčová slova: povrchové úpravy, nábytek, zkoušky nábytku

Článek v elektronickém sborníku

FRYDRYCHOVSKÝ, J. – TESAŘOVÁ, D. Virtuální vzdělávací program pro nábytkářský obor. [CD-ROM]. In Nábytok 2012 – dizajn a škola pre prax. s. 1–2. ISBN 978-80-228-2349-4.

Příspěvek popisuje nový virtuální vzdělávací portál, kde můžeme najít výkladový slovník s definicemi podmínek nábytku a virtuální polyfunkční dům se speciálními pokoji. Tyto pokoje jsou vybaveny specifickými kusy nábytku v souvislosti s databází vnitrostátních a evropských standardů v angličtině, bulharštině, slovenštině a němčině.

Klíčová slova: nábytek, vzdělání, normy, internetový portál, slovník

Článek ve sborníku

BAAR, J. Evaluation of decay resistance of Lignamon. In *InWood2015: Innovations in Wood Materials and Processes*. 1. vyd. Mendelova univerzita v Brně, 2015, ISBN 978-80-7509-255-7.

Wood densification after its plastification is a well-known technique providing improvement of the wood mechanical properties, such as hardness or compression strength. The product of this technology process, where beech wood is plasticized by ammonia gas and then densified in perpendicular direction to wood fibers, is called Lignamon.

Klíčová slova: trvanlivost, Lignamon, dřevokazné houby

KLÍMEK, P. – WIMMER, R. In-situ imprinting of particleboards to create locally-shaped density and alter internal bonding. In *Proceedings of the 3rd International Conference on Processing Technologies for the Forest and Bio-based Products Industries (PTF BPI 2014)*. 1. vyd. Markt 136a, 5431 Kuchl, Salzburg – Austria: Fachhochschule Salzburg GmbH, 2014, s. 379–385. URL: http://ptfbpi2014.fh-salzburg.ac.at/fileadmin/files/documents/PTFBPI2014_ProceedingStart.pdf

Due to the increasing demand of biomass the costs for wood particles are constantly raised. Consequently, wood-based panel manufacturers try to minimize their material input. On the other hand, panels with reduced density commonly show decreased mechanical performance. Although several mechanical properties of boards are usually determined, the internal bond strength is considered to be one of the most important quality criteria. According to this, the development of a technique which increases the internal bond strength is of major interest. In this research the change of particleboards intrinsic density is proposed to increase the internal bond strength. On top of commonly measured mechanical properties the finite element analysis is employed to support our findings and assess few panel alternatives. By our method the internal bond strength of laboratory prepared particleboard was significantly increased (+100%). Although the stiffness was lowered the finite element method introduced alternatives where this decline is by veneer overlay compensated.

KOPECKÝ, Z. – JEDINÁK, M. – KRYL, J. – HLÁSKOVÁ, L. Hladina hluku při velkoplošném formátování OSB desek. In *Trendy lesníckej, drevárskej a environmentálnej techniky a jej aplikácie vo výrobnom procese*. 1. vyd. Zvolen: Technická univerzita ve Zvolene, 2014, s. 42–48. ISBN 978-80-228-2695-2.

Některé firmy (např. Leitz, Freud, ...), se snaží snižovat hlučnost pilových kotoučů použitím nepravidelné roztoče zubů. V článku jsou uvedeny výsledky mechanického a aerodynamického hluku pilových kotoučů určených pro velkoplošné formátování aglomerovaných materiálů. Hodnocena je úroveň hluku čtyř pilových kotoučů od firem Leitz a Pilana provozovaných na zkušebním měřícím zařízení při chodu naprázdno a při řezání. Zkoumán je vliv nepravidelné roztoče zubů na hladinu hluku při změně rychlosti posuvu.

Klíčová slova: pilový kotouč, nepravidelná rozteč zubů, hlučnost, vibrace

PAŘIL, P. – BAAR, J. – PRUCEK, R. – KVÍTEK, L. Antifungal effect of copper and silver nanoparticles against white-rot and brown-rot fungi. In *InWood2015: Innovations in Wood Materials and Processes*. 1. vyd. Mendelova univerzita v Brně, 2015, s. 108–109. ISBN 978-80-7509-255-7.

Nowadays, there is a great boom in nanotechnology. Nanoparticles are used in many industrial products which are applied in medicine, cosmetics, automotive industry, etc. Large specific surface area and high reaction activity are very attractive properties for a lot of applications. Nanoparticles also have a great potential for wood protection industry, especially in the time of substituting demands of currently used substances (creosote, CCA, etc.). Silver and copper nanoparticles are well-known for their biocide properties which improve the wood durability. There are also some other applications, like prevention of leaching in otherwise soluble biocides or altering treatability properties such as penetration and biocide distribution. Nevertheless, we must keep in mind the potential environmental and health risks and the risk governance recommendations

Klíčová slova: hmotnostní úbytky, nanočástice, dřevokazné houby

HLÁSKOVÁ, L. – KOPECKÝ, Z. Energy parameters during machining chemically modified beech. In *InWood2015: Innovations in Wood Materials and Processes*. 1. vyd. Mendelova univerzita v Brně, 2015, s. 71–72. ISBN 978-80-7509-255-7.

V dřevozpracujícím průmyslu je obrábění pilovým kotoučem nejpoužívanějším způsobem obrábění dřeva. Vzhledem ke spotřebě energie v průběhu řezání je důležité znát velikost řezného odporu, který je důležitou vlastností obráběného materiálu. V současné době se využívá různých modifikací dvou základních metod – technologicko-statistické a analytické metody. Tento článek prezentuje nový výpočetní model, který využívá aplikaci lomové mechaniky a rozpracování Ernst-Merchantovy teorie do podmínek řezání pilovým kotoučem.

Klíčová slova: řezný odpor, lomová mechanika, pilový kotouč

TESAŘOVÁ, D. – ČECH, P. – SVOBODA, J. Vnitřní prostředí a faktory, které ho ovlivňují. In *Interiéry 2014*. 1. vyd. Volyně: Vyšší odborná škola a Střední průmyslová škola Volyně, 2014, s. 40–44. ISBN 978-80-86837-63-5.

V příspěvku je řešena problematika mikroklimatu vnitřních prostor a faktory, které jeho ovlivňují. Je řešena problematika organických těkavých látek, jejich vliv na kvalitu vnitřního prostředí, na pachové mikroklima a na iontové mikroklima.

Klíčová slova: organické těkavé látky, ionty, pachy, mikroklima, prostor, pachová aktivita

KOPECKÝ, Z. – HLÁSKOVÁ, L. – ORLOWSKI, K. – KRÁL, P. New approaches to cutting resistance estimation of wood cutting process with circular-saw blades. In *FORTECHENVI 2013*. 1. vyd. Novotného lávka 5, Praha 1: Origít, s.r.o., 2013, s. 182–190. ISBN 978-80-02-02467-5.

Theoretical and experimental determination of values of cutting resistance belongs to the basic and also the most developed field of mechanics of this process. Energetic effects of wood sawing process are mainly calculated on the basis of the specific cutting resistance which, in wood cutting, is a function a lot of factors. In this paper, a new method for the calculation of cutting resistance is described. The latter method is based on modern fracture mechanics for the determination of sawn material data – e.g. the specific work of surface formation (toughness) and the shear yield stress. This paper presents a new method which might be applied for the estimation of cutting resistance while sawing with circular saw blades.

Klíčová slova: stříhové napětí, lomová mechanika, pilový kotouč, řezání dřeva

ŠPRDLÍK, V. – RADEMACHER, P. – BRABEC, M. – ROUSEK, R. – KLÍMOVÁ, H. – MIHAILOVIĆ, S. Beech Veneer Plasticity Change after Steaming and Ammonia Treatment: Case Study – "Limit" Stool. In HERNÁNDEZ, R. – CÁCERES CUADROS, C. *Proceedings of the 22nd International wood machining seminar*. 1. vyd. 2425, rue de la Terrasse, Quebec City, QC Canada G1V 0A6: Centre de Recherche sur les Matériaux Renouvelables, Université laval, 2015, s. 183–191. ISBN 978-0-9947964-0-0. URL: <http://www.iwms22.ca>

Steaming and ammonia treatments are used in order to change the color of wood and also to plasticize the wood before bending or compressing. The mechanisms and process of gaseous ammonia treatment alone or in combination with steaming the wood are not very well known. The goal of this study is to quantify the effect of gaseous ammonia or steam on wood densification and bending as well as on mechanical properties i.e., modulus of elasticity (MOE), modulus of rupture (MOR) and deflection at maximal loading force (γF_{max}). When wood was treated by water and ammonia vapour treatment, significant changes in the plasticity of wood were observed. The samples which were first exposed to water vapour and then to ammonia vapour exhibited the lowest values of MOE and MOR, enhancing the flexibility of the material. The results show that ammonia treatment increases plasticity of wood. This process can be used for the manufacture of bent furniture. The stool "limit" is presented in the second part of the study.

Klíčová slova: změna pružnosti, paření a čpavkování, buk lesní (*Fagus sylvatica*)

KRÁL, P. Assessing the shape stability of particleboards surface-treated by decorative veneer. In DZURENDA, L. – BANSKI, A. *VIII. MVK Trieskové a beztrieskové obrábanie dreva 2012*. 1. vyd. Zvolen: Technická univerzita vo Zvolene, 2012, s. 199–204. ISBN 978-80-228-2385-2.

The paper summarizes results of research work aimed at the determination of shape stability, modulus of rupture (MOR) and modulus of elasticity (MOE) of components manufactured of particle boards, which were veneered from their tight side by the decorative veneer of American walnut (*Juglas nigra*) 0.6 mm thick and on the underside by decorative veneers of different species 0.6–1.5 mm in thickness or by a countermove foil of 85–90 g/m² surface

weight. Subsequently, measurements were carried out of the shape stability (warping) of test specimens cut from various combinations of surface-finished boards. These test specimens were air conditioned in three different environments. At the same time, values were determined of bending strength and modulus of rupture with respect to the direction of fibres of sheathing materials

Klíčová slova: tvarová stálost, pevnost v ohybu, dekorativní dýha

SEBERA, V. – PRAUS, L. – TIPPNER, J. – ČEPELA, J. Optical full-field measurement based on DIC: a new tool in urban forestry?. In ROSS, R. – WANG, X. *Proceedings 18th International Nondestructive Testing and Evaluation of Wood Symposium*. Madison, Wisconsin, USA: Forest Products Laboratory, 2013, s. 70–78.

The goal of the study was to analyze and measure behavior of tree (*Juglans regia* L.) subjected to the mechanical load in terms of its strain response. The analysis addresses issues of urban forestry that calls for a high quality deformation data measured on trees' surfaces in a non-contact and non-invasive way. For these purposes, the 3d digital image correlation (DIC) was proposed and tested against standard extensometers. Measured tree was subjected to a bending by a pulling test to induce the strain in tree stem. DIC successfully provided field strain on a tree bark despite its highly complicated geometry. Vertical averaging of the strain field obtained by the DIC revealed that a tree stem behaves according to the beam theory showing compression and tension parts. The absolute values of strain measured by both techniques agree with each other in order of magnitude, DIC returning lower values (approximately 21.1% and 40.8% for compression and tension part respectively).

Klíčová slova: korelace digitálního obrazu, tahová zkouška, arboristika, optické měření, poměrná deformace

KLÍMEK, P. – WIMMER, R. Novel type of particleboard with enhanced internal bonding property. In *SilvaNet-WoodNet 2014*. 1. vyd. Brno: Mendelova univerzita v Brně, 2014, s. 106–107. ISBN 978-80-7509-137-6.

In the present work, a new simple method is suggested that enables modification the intrinsic density pattern of particleboards. This is accomplished by inserting a stainless steel pattern into the hotpress, imprinting a geometric pattern into the particleboard furnish prior to curing. The results are divided in two sections, firstly (1) the mechanical properties of the prepared panels were determined. The MOE and MOR indicated decrease of the properties when the imprinted density pattern modification was used and IB properties has shown significant increase (+64 %). (2) Secondly the FEM model delivered results of the novel panel with differently placed veneer overlays. According to FEM the veneer overlay will mitigate decline of the bending properties.

BRABEC, M. – TIPPNER, J. – SEBERA, V. – MILCH, J. – RADEMACHER, P. Identification of the "Non-standard" Deformation Behaviour of European Beech and Norway Spruce during the Compression Loading. In *Proceedings of the 58th SWST International Convention*. 1. vyd. Monona: Society of Wood Science nad Technology, 2015, s. 290–299. ISBN 978-0-9817876-5-7.

The purpose of paper was to analyze a negative increment of strain in the load direction observed in range of a plastic deformation during the compression parallel to the grain. The strain data for its description were obtained with use of different samples' lengths by means of two approaches: a) "clip on" extensometers and b) full-field optical technique based on digital image correlation (DIC). The samples were cut from the European beech (*Fagus sylvatica* L.) and Norway spruce (*Picea abies* L. Karst.) as clear special orthotropic blocks with a cross section radial (R) × tangential (T) = 20 × 20 mm² and the different lengths (h = 30, 40, 50 and 60 mm). Based on the strain analysis, it can be concluded that the deformation field consists of three sub-regions with different stiffnesses. The failure of less stiff zones located near the compression plates during loading reduced compression deformation of the stiffer middle zone to minimum or even leads to its expansion. The negative strain phenomenon of spruce and beech wood was most frequently occurred when h was 60 mm and 30 mm, respectively. The three-zone heterogeneity of deformation field induced a sharp difference of the displacement and strain (correlatively stiffness) when measured by mentioned approaches at various sample surface areas. Therefore, it should be of concern when wood is loaded in such mode.

Klíčová slova: Dřevo, Digitální korelace obrazu, Zóna poškození, Tlakový test, Deformace

ŠPRDLÍK, V. – MIHAILOVIĆ, S. – RADEMACHER, P. – KLÍMOVÁ, H. Ammonia treatment of beech veneer and application in furniture design. In GRBAC, I. *New materials and technologies in the function of wooden products*. 25. vyd. Zagreb: Faculty of Forestry, Zagreb University: 2014, s. 175–181. ISBN 978-953-292-034-5. URL: <http://ambienta2014.com/about.html>

Ammonia treatment was used to modify a beech veneer. The mechanism and process of ammonia treatment is yet to be fully examined. The goal of this paper was to find out the impact of gaseous ammonia on mechanical properties. i.e., modulus of rupture (MOR) and modulus of elasticity (MOE). Significant changes of plasticity of wood were observed when veneers were treated by water or ammonia vapour. The samples which were firstly exposed to water vapour and then to ammonia vapour exhibit the lowest values of MOE and MOR and an enhanced flexibility of the material. The results show that ammonia treatment increases wood plasticity. On the basis of this experiment an experimental stools were designed. Mechanical stability was considered by FEM simulations in ANSYS software. Both values have not reached destructive values of loading force.

Klíčová slova: pružnost a pevnost, design, modifikace amoniakem

SEBERA, V. – TIPPNER, J. – KUNECKÝ, J. – MUSZYNSKI, L. – RADEMACHER, P. FE model of Oriented Strand Board Made by Two Different Geometry Generation Techniques. In BARNES, H M. – HERIAN, V L. *57th SWST International convention. 7th Wood structure and properties conference. 6th European hardwood conference*. 1. vyd. Monona: Society of Wood Science and Technology, 2014, s. 821–827. ISBN 978-0-9817876-4-0. URL: <http://www.swst.org/meetings/AM14/pdfs/proceedings.pdf>

For finite element modeling of wood-based composites (WBC's) can be used two different approaches. The first one is so-called morphological modeling meaning the WBC is first imaged in 2d or 3d and, then, transformed using empirical laws into FE model. The second approach that is more traditional, is based on a priori knowledge of properties and geometry of the WBC's. The goal of the work was to create parametric finite element model of oriented strand board (OSB) and study an influence of material properties and strands orientations on modulus of elasticity. For these purposes the two different techniques for building the FE model were used. The first model was built via volume entities (OSBVOL), but because of its high errors achieving ci. 600% due to a coupling of strongly heterogeneous meshes, it was rejected in the end. The second model (OSBMAT) was build via mapped finite element mesh using modified algorithm created in the first model. OSBMAT exhibited lower error in terms of modulus of elasticity than OSBVOL (ci. 69% and after the material properties adjustment it was only 1,21%). This proved that it is more suitable to model strand composites such as OSB using the mapped a priori prepared FE mesh.

ŠEBELOVÁ, E. – KOPECKÝ, Z. Problems of tool wear while cutting wood-based materials. In *FORTECHENVI 2013*. 1. vyd. Novotného lávka 5, Praha 1: Origit, s.r.o., 2013, s. 220–221. ISBN 978-80-02-02467-5.

This paper is focused on problems of tool wear in cutting process of wood-based materials resulting from experimental work targeted at the comparison between radial wear of cutting edge and radius value of blunting edge. Methodology of radial wear determination is based on its monitoring with subsequent created curves of wear which are represented by diagram of wear (KR) vs. cutting time. Just for comparison the measured results of profile radius of blunting edge and the procedure of measurement is also stated.

MUZIKÁŘ, Z. – SVOBODA, J. – ČECH, P. Vliv záporných iontů na redukci emisí VOC z nátěrových hmot. In *43rd International Conference on Coatings Technology*. Pardubice: Univerzita Pardubice, 2012, s. 281–288. ISBN 978-80-7395-490-1.

Příspěvek se zabývá problatikou vlivu záporných iontů na VOC emitované vybranými nátěrovými hmotami ve zkušebním zařízení.

Klíčová slova: emissions, ions, VOC

ČECH, P. – KINDL, P. – CAPIKOVÁ, A. – FRYDRYCHOVSKÝ, J. – CHUMCHALOVÁ, D. Olfaktometrické posouzení zvolených typů potahových textilií používaných při výrobě čalouněného nábytku. In *SilvaNet-WoodNet 2012*. 1. vyd. Zemědělská 1, Brno, 613 00: Mendelova univerzita v Brně, 2012, s. 81–82. ISBN 978-80-7375-653-6.

Článek se zabývá posouzením materiálů používaných na výrobu čalouněného nábytku zejména potahových textilií metodou tzv. nepřímé olfaktometrie. Současně je stanoven vliv emisního zatížení organickými těkavými látkami (VOCs) v interiéru, jež emitují materiály používané k výrobě čalouněného nábytku. Na základě chemické analýzy dosažených výsledků byla stanovena významnost jednotlivých komponentů na množství emisí, intenzitě zápachu a hédonického tónu. Naměřené hodnoty emisí VOC byly porovnávány s hygienickými limity dle vyhlášky MZ ČR 6/2003 (stanovení hygienických limitů chemických, fyzikálních a biologických ukazatelů pro vnitřní prostředí obytných místností některých staveb).

Klíčová slova: Sniffer 9000, VOC, potahová textilie

HLÁSKOVÁ, L. – KOPECKÝ, Z. – JEDINÁK, M. Conventional methods and new approach to determine cutting resistance. In *IX. Medzinárodná vedecká konferencia, Trieskové a beztrieskové obrábanie dreva 2014*. 1. vyd. TU vo Zvolene: 2014, s. 55–61. ISBN 978-80-228-2658-7.

Tento článek prezentuje nový výpočetní model, který využívá aplikaci lomové mechaniky k určení řezného odporu. V klasických metodách jsou energetické účinky počítány zejména na základě specifického řezného odporu, který je v případě obrábění dřeva funkcí mnoha faktorů. Nový model využívá k určení sil působících na řezný nástroj i obrobek aplikaci Ernst-Merchantovy teorie do podmínek řezání pilovým kotoučem. Zahnuje také určení stříhového úhlu, stříhové meze kluzu a lomové houževnatosti.

Klíčová slova: pilový kotouč, stříhová mez kluzu, lomová mechanika, buk, lomová houževnatost, řezný odpor

TESAŘOVÁ, D. – ZÁVADA, V. Faktory ovlivňující světlostálost UV protektivních povrchových úprav. In TESAŘOVÁ, D. – ŠEBELOVÁ, E. *Trendy v nábytkářství a bydlení 2013*. 1. vyd. Brno: Mendelova univerzita v Brně, 2013, s. 220–230. ISBN 978-80-7375-756-4.

V příspěvku je pojednáno o faktorech, které ovlivňují fyzikálně-mechanické a chemické vlastnosti povrchových úprav materiálů na bázi dřeva, dokončené UV protektivními nátěrovými hmotami. V článku je studován vliv podmínek různých městských zástaveb, kterým byly vzorky během měření vystaveny. Byl prokázán vliv průmyslových emisí na fyzikálně-mechanické vlastnosti a na světlostálost. V další části se práce věnuje vlivu přípravy povrchu materiálů před dokončováním UV protektivními nátěrovými hmotami na vzhledové vlastnosti a na fyzikálně-mechanické vlastnosti povrchových úprav. V rámci hodnocení výše uvedených vlivů byl hodnocen také vliv způsobu přidání UV absorbérů Soltex EE, navázáním UV absorbérů do polymerního řetězce pojava kovalentní vazbou nebo přimícháním do směsi akrylátové disperze.

Klíčová slova: exteriéry, drsnost, vodou ředitelné nátěrové hmoty, světlostálost, lesk

NEVRILÝ, O. – BAAR, J. Natural durability of subfossil oak. In *InWood2015: Innovations in Wood Materials and Processes*. 1. vyd. Mendelova univerzita v Brně, 2015, s. 73–74. ISBN 978-80-7509-255-7.

The natural durability tests were carried out using the European standards EN 350-1 and EN 113. Three species of wood-decay fungi were used to test natural durability, two brown-rot fungi: *Poria placenta* (Fr.) Cooke and *Laetiporus sulphureus* (Bull.) Murrill, and one white rot fungus *Trametes versicolor* (L.) Lloyd. Fungi were inoculated in malt agar medium in Kolle flasks under sterile conditions. After complete covering of medium surface the sterilized samples were put into flasks. As a reference samples the wood of beech (*T. versicolor* and *L. sulphureus*) and pine sapwood (*P. placenta*) were used. Ten samples from each set were exposed to fungi degradation for 16 weeks, at a temperature of 22 °C and 65% air humidity. Finally, they were dried at 103 °C, mass loss was determined gravimetrically. Three subfossil oak trunks of different ages were found in the bank of the Bečva River, near Osek nad Bečvou. All trunks were dated by radiocarbon dating and also dendrochronologically. The individual trunks come from these periods: A - after year 1018; B - 208 BC - 137 AD; C - 1131-804 BC.

Klíčová slova: přirozená trvanlivost, dřevokazná houba, subfosilní dub

TESAŘOVÁ, D. – ČECH, P. The Emissions emitted by beech thermowood with and without surface finished. In *Production Engineering and Management*. 1. vyd. Lemgo, Německo: Hochschule Ostwestfalen -Lippe, 2014, s. 205–217. ISBN 978-3-941645-10-3.

This paper investigates the problematic of VOC emissions by surface finished of different thermowood wood and emitted by finished surfaces of the same kinds of wood but without treatment. The tested samples were untreated and thermotreated beech. This contribution researches the cooperation between the results, which were obtained by the measurements of VOC by treatment and untreated the kinds of wood. Emissions were also assessed the influence of climatic conditions in small space chamber. The results are compared with sensory perceptions and the analysis of VOCs performed by using the gas chromatograph.

Klíčová slova: olfaktonmerické stanovení, voc emise, plyvá chromatografie.

TIPPNER, J. – TROPPOVÁ, E. – HRČKA, R. – HALACHAN, P. – LAGAŇA, R. – SEBERA, V. – TRCALA, M. Probabilistic Numerical Analysis of Quasi-stationary Thermal Measurement of Medium Density Fiberboard. In BARNES, H

M. – HERIAN, V L. *57th SWST International convention. 7th Wood structure and properties conference. 6th European hardwood conference.* 1. vyd. Monona: Society of Wood Science and Technology, 2014, s. 878–886. ISBN 978-0-9817876-4-0. URL: <http://www.swst.org/meetings/AM14/pdfs/proceedings.pdf>

Quasi-stationary thermal analysis of materials is based on time-recording of temperature in the middle of heated block of samples. The method enables determination of heat capacity, longitudinal and transverse thermal conductivity and heat transfer coefficient from a single measurement. All outputs are influenced by many varying factors as for example density, temperature and moisture, heat losses, heterogeneity of structure etc. Theoretical analysis based on verified numerical models streamlines description of variability of results in many of various input combinations. Probabilistic transient finite-element analyses of problem were performed. The Medium Density Fiberboard specimens with 4 different thicknesses were prepared and density profiles of samples were scanned, then thermal parameters were calculated and statistically evaluated. Numerical model of the experimental apparatus consists of two samples described by thermal solid elements. Orthotropic material properties based on experimentally derived data were assigned to the model. A high number of time steps enabled to calculate the temperature increase in the center point between samples and to compare the curve with experimental recording. The numerical and experimental data were in close agreement with each other. Verified model was used for thousands of variable solutions with randomization of each parameter. Factors which significantly affect results include sample properties, boundary conditions and parameters of apparatus.

Klíčová slova: Kvazi-stacionární tepelná analýza, Metoda konečných prvků, MDF deska

SEBERA, V. – KUNECKÝ, J. – PRAUS, L. – TIPPNER, J. – HORÁČEK, P. Using DIC in measurement of strains induced in trees during bending. In *Euromech Colloquium 556 Theoretical, Numerical, and Experimental Analyses in Wood Mechanics*. Dresden: 2015, ISBN 978-3-00-049643-1.

Assessment of mechanical behavior and safety of trees have been paid a big attention in recent years in both ways research and practical. The research – tree biomechanics – mostly focuses on evaluation of tree mechanical response that is dependent on a root-soil interaction and also on wood properties. The goal of the study was to measure and investigate an influence of a bark of Turkish hazel (*Corylus colurna* L.) on strain transfer from xylem to bark surface. The study addresses issues of tree biomechanics that calls for a high quality deformation data measured on trees' surfaces in a non-invasive way. For these purposes, the optical technique employing 3D digital image correlation (3D-DIC) was used and tested against extensometers commonly used for such applications. Measured tree was subjected to a bending by a two pulling tests to induce the strain in tree stem during which the analyzed area of interest (AOI) on the tree was studied in both variants with bark and without.

Klíčová slova: kůra, DIC, Poměrná deformace

KRÁL, P. – KOPECKÝ, Z. – HRAPKOVÁ, L. – HAVÍŘOVÁ, Z. – LAVICKÝ, M. The influence of pressing parameters at gluing quality of spruce plywood. In *FORTECHENVI 2013*. 1. vyd. Novotného lávka 5, Praha 1: Oritg, s.r.o., 2013, s. 230–235. ISBN 978-80-02-02467-5.

The aim of this work was evaluation of impact assessment of pressing parameters on the shearing strength of gluing of spruce plywoods. In pressing, heat transmission through the set of veneers was analysed and effects of the moisture of veneers on the heat transmission were tested. Results were statistically analysed. The dependence was determined of shearing strength, coefficient of compressibility and heat transmission on changes in pressing parameters. Results of the study consist in the proposal of pressing parameters for particular constructions of plywood.

Klíčová slova: dýha, překližka, lisovací tlak

ŠPRDLÍK, V. – MIHAILOVIĆ, S. – DLAUHÝ, Z. – NOVÁK, V. Innovation and manufacturing of bended CNC furniture. In *SilvaNet-WoodNet 2014*. 1. vyd. Brno: Mendelova univerzita v Brně, 2014, s. 120–121. ISBN 978-80-7509-137-6.

This project is focused on interdisciplinary design of bend flat pack furniture and continues previous research in projects IGA 57/2013, IGA 47/2014 a InWood. Project extents possibilities of plywood use and its utilization in CAD/CAM using 3axis CNC machine and nesting technology (Šimek et al. 2013). Main advances were made in design of perforations, which made the plywood bendable in 2 axis. In combination with dovetail joint, stiffness and stability of the construction increased (Eckelman 2003). Various combinations of shapes and intervals of perforation were tested and then included in design of a chair.

Klíčová slova: nábytek, CNC, ohýbání

Článek v odborném periodiku

ČERMÁK, P. – DEJMAL, A. The effect of heat and ammonia treatment on colour response of oak wood (*Quercus robur* L.) and comparison of some physical and mechanical properties. *Maderas. Ciencia y tecnología*. 2013. sv. 15, č. 3, s. 375–389. ISSN 0718-221X.

In this paper the effect of heat and ammonia treatment on the change in colour of oak wood (*Quercus robur*.) and comparison of physical and mechanical properties were investigated. Wood specimens were made from heartwood and sapwood in dimensions 30x30x30 mm³. The specimens were subjected to heat treatment at 180°C and 230°C for 2 and 4 hours, others were treated by ammonia for 24 hours. After these processes, CIELAB colour, hardness, EMC, density and MOE of wood were tested in comparison with untreated samples. The results show that the heat treatment contributed to darkening of sapwood and heartwood and the total colour change increased up to 38.47 units (CIELAB) in the radial direction and 37.75 units (CIELAB) in the tangential direction. Previous research into ammonia treatment shows that the most significant changes were noticed after 1 day. The colour changes between sapwood and heartwood were more noticeable in ammonia treatment than in the case of heat treatment. All other observed properties were decreased in the case of heat treatment. Ammonia treatment does not have a significant influence on the other observed properties. The results proved that ammonia treatment is a modification that improves the decorative value but has a minimal effect on technologically relevant properties of solid wood. Nevertheless, the heat treatment can be used as comparable process for colour change of wood.

Klíčová slova: změna barvy, rovnovážná vlhkost dřeva, tepelná úprava, CIELAB, úprava amoniakem

ČECH, P. – TESAŘOVÁ, D. Materials Used for the Production of Upholstered Furniture Like Source of Odors in Interior. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*. 2014. sv. 62, č. 1, s. 39–52. ISSN 1211-8516.

This paper investigates the problematic of VOC emissions and their assessment by olfactory methods. The main goal of this contribution is determine the odors emitted by upholstery fabrics used for upholstered furniture. This contribution researches the correlation between the results, which were obtained by the olfactory assessment and the results of the measurements of volatile organic compounds emitted by choose the kind of covering textiles. This research judged the influence of upholstery fabrics with different chemical composition – polyester, cotton and mixture of viscose and cotton on olfactometric assessment. It was mainly focused on the determination of Hedonic tone and intensity of the odor. These olfactometric characteristics were determined using an equipment Sniffer 9000. Concurrently was also assessed the influence of climatic conditions in small space chamber on olfactometric assessment of tested materials. The climatic conditions differed mainly in terms of temperature and relative humidity in small space chamber. The results are compared with sensory perceptions and the qualitative and quantitative analysis of VOCs performed by using the gas chromatograph Agilent GC 6790 with mass spectrometer detector 5973. The experimental section shows that, the various types of criticized upholstery fabrics with different chemical composition emitted relatively low concentrations of VOC emissions. It was also demonstrated the influence of climatic conditions on VOC emissions and while on their olfactometric assessment. The tested materials of upholstery fabric showed very intensive olfactory sensation, which were described as very unpleasant minus 4 in some cases.

Klíčová slova: olfaktometrie, odéry, VOC, potahová textilie

SEBERA, V. – MUSZYNSKI, L. – TIPPNER, J. – NOYEL, M. – PISANESCHI, T. – SUNDBERG, B. FE analysis of CLT panel subjected to torsion and verified by DIC. *Materials and Structures*. 2015. sv. 48, č. 1-2, s. 451–459. ISSN 1359-5997.

The goal of this study was to analyze behavior of the Cross-laminated Timber (CLT) panel subjected to torsion and develop an efficient procedure for quick verification of numerical model of CLT that subsequently may be used for virtual prototyping of non-standard CLT products. Study used both experiments based on optical measurement using digital image correlation (DIC) and numerical modeling by means of finite element method (FEM). A physical torsion test of the CLT panel was first analyzed in terms of a displacement field that was computed on its surface. The FE simulation of the torsion test followed real boundary conditions and was carried out with use of 2 geometrically different FE models of the CLT. The first FE model did not take into account edge-bonding of the lamellas, the second one demonstrated alternative manufacturing option by considering the lamellas' edge-bonding. The experiment and FE simulations were mutually compared based on displacement paths created on the panel surface. Results showed that the presented procedure offers relatively easy way of verification of FE analyses of CLT. FE model with edge-bonding of lamellas exhibited higher stiffness and higher relative error to DIC measurement than FE model without

edge-bonding. Edge-bonding of lamellas introduces influential factor in FE modeling of CLT and should be omitted for accurate and realistic FE analyses of their behavior. Study also showed that lack of orthotropic properties of Oregon hybrid poplar can be in FEA sufficiently substituted by using cottonwood properties. Combining the DIC measurement and FEM in the analysis of the CLT is favorable since it offers a full-field validation of numerical models, which can be subsequently used for virtual prototyping.

Klíčová slova: konečněprvková analýza, křížem laminované dřevo, torze, korelace digitálního obrazu

ROUSEK, M. – WILKOWSKI, J. – SVOBODA, E. – NOVÁK, V. – KOPECKÝ, Z. Experimental study of milling wood surface properties (roughness). *Annals of Warsaw University of Life Sciences – SGGW Forestry and Wood Technology*. 2013. č. 81, s. 217–222. ISSN 1898-5912.

This paper reports the results of experiments to investigate surface roughness during milling of European and tropical woods (beech, spruce, merbau and jatoba). A standard CNC router was used in the tests. The evaluation was performed using a 3D surface profiling system and a non-contact method.

Klíčová slova: povrch dřeva, drsnost, bezkontaktní měření, frézování

TESAŘOVÁ, D. – ČECH, P. Kvalita ovzduší vnitřního prostředí v nábytkářských firmách. *Časopis výzkumu a aplikací v profesionální bezpečnosti (Journal of Safety Research and Applications. (JOSRA))*. 2012. sv. 2012, č. 1-2, s. 5–13. ISSN 1803-3687.

Příspěvek řeší problematiku emisí těkavých organických látek tzv. VOCs (Volatile Organic Compounds) těkajících do ovzduší pracovního prostředí během výrobního procesu v nábytkářských, truhlářských a čalounických firmách a do ovzduší nevýrobních místností těchto firem. Součástí práce bylo porovnání jednotlivých pracovních míst ve výrobě nábytku a vyhodnocení vlivu pracovních procesů na kvalitu ovzduší vnitřního prostředí firem, to je na kvalitativním a kvantitativním složení VOC. Vzorky ovzduší pracovních, kancelářských prostor včetně vnějšího okolního prostředí firmy, byly odebírány pomocí čerpadla na odběrové sorpční trubičky, plněné sorbentem Tenax TA. Metodika odběru vzorků byla prováděna dle normy ČSN EN ISO 16000 – 1, 5, stanovující parametry měření VOC. Vzorky VOC byly analyzovány spojením plynového chromatografu s hmotnostním detektorem s termální desorpce. Výsledkem analýz je kvalitativní a kvantitativní stanovení v podobě grafu a číselného vyjádření v mikrogramů.m⁻³ a porovnání dosažených hodnot na jednotlivých pracovištích. Získané výsledky se pak porovnávají s příslušnými limitními hodnotami stanovenými předpisy.

Klíčová slova: těkavé organické látky, VOC, pracovní a pobytové prostředí, plynový chromatograf, hmotnostní spektrometr, termální desorpce

JEDINÁK, M. – HLÁSKOVÁ, L. – KOPECKÝ, Z. Alternatives in determining the cutting resistance during machining of agglomerated materials. *Annals of Warsaw University of Life Sciences – SGGW Forestry and Wood Technology*. 2014. sv. 2014, č. 85, s. 251–258. ISSN 1898-5912.

This paper presents a comparison of computing the specific cutting resistance using a conventional method and a new computing model that is based on the application of fracture mechanics in the practice of processing wood-based materials with a circular saw blade. The model makes use of fracture mechanics to determine the fracture toughness and shear yield strength of the workpiece. The forces acting on the workpiece and the tool are determined with elaborating the Ernst-Merchant theory in the practice of cutting with a circular saw blade.

Klíčová slova: pilový kotouč, měrný řezný odpor, lomová houževnatost, stříhová mez kluzu, lomová mechanika

KRÁL, P. – KLÍMEK, P. – MISHRA, P. K. – WIMMER, R. – DĚCKÝ, D. Specific modulus and density profile as characterization criteria of prefabricated wood composite materials. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*. 2015. sv. 63, č. 2, s. 433–438. ISSN 1211-8516. URL: <http://dx.doi.org/10.11118/actaun201563020433>

Wood based product industry has developed and modified a wide range of products to cater changing demands of construction industry. Development of a product necessitates characterization to ensure compliance to established standards. Traditionally a product was characterized by properties like bending properties, density and swelling factor etc. Whereas, advances in technology has introduced more sophisticated parameters which represent a combination of various classical factors and provide more practical and detailed information. In this study, we procured

Článek v odborném periodiku

four different types of commercial products, viz. Gypsum board, cement board, oriented strand board and gypsum fiber board and tried to characterize them using density profile ratio and stiffness ratio. We observed some interesting empirical relations between various parameters as represented in various plots.

Klíčová slova: specifický modul, kompozitní dřevní materiály, hustotní profil, dřevo

TESAŘOVÁ, D. – ČECH, P. The emissions emitted by beech "thermally modified wood" with and without surface finished. *Holztechnologie*. 2015. sv. 56, č. 4, s. 33–39. ISSN 0018-3881.

This paper describes the VOC emissions emitted by massive beech wood treated at 180 °C and 200 °C. The focus was on the influence of temperature, on the quality and quantity of volatile organic compounds, especially on the amount of emitted phenol and furfural. The emission was analyzed as function of time after heat-treatment. The influence of the finishing with water borne lacquer on VOC emission was also investigated

Klíčová slova: bukové masivní dřevo, dokončování vodou ředitelnými laky, povrchová úprava tepelně upraveného modifikovaného dřeva, TVOC, VOC emise

PAŘIL, P. – DEJMAL, A. Moisture absorption and dimensional stability of poplar wood impregnated with sucrose and sodium chloride. *Maderas. Ciencia y tecnología*. 2014. sv. 16, č. 3, s. 299–311. ISSN 0718-221X. URL: http://www.scielo.cl/scielo.php?script=sci_arttext&pid=S0718-221X2014000300004&lng=en&nrm=iso

This paper deals with the effect of vacuum-pressure impregnation of Poplar wood (*Populus alba*) by aqueous solutions of sucrose and sodium chloride on its physical properties. Groups of samples with different concentrations of substances in the aqueous solution were compared within each other and also with a reference (non-impregnated) group. The specimens from all groups were tested for density, moisture absorption and dimensional stability. The obtained data were statistically analysed and compared each other. The most satisfying final properties were achieved in impregnation of sucrose with concentration of 6,25 g/100 ml H₂O. The retention was 31 kg m⁻³ (WPG around 8 %). The values of ASE (anti-swelling efficiency) reached to 36 % and MEE (moisture exclusion efficiency) was reduced by 33 %.

Klíčová slova: swelling, Wood modification, sucrose

HAMŠÍK, P. – KRÁL, P. Composite materials from hemp and hydraulic lime for use in building and wood constructions. *Wood Research*. 2014. sv. 59, č. 5, s. 871–881. ISSN 1336-4561.

This paper deals with the results of the development of optimal composition of the composite material based on hemp and hydraulic lime for use in wooden and other constructions. The aim of the research is to design and test composite plate material with low water vapour diffusion resistance, resistant to moisture, weathering and fire while minimizing negative impacts on the environment. 14 panels of seven different formulas of composition were produced and tested. The formulas varied in amount of hemp reinforcement fibres (5 and 10 weight part), water-hydraulic lime ratio ($u=0,6$ a $u=0,7$), hydraulic limes by different producers and use or lack of use of waterglass as mineralization reagent. Mechanical properties (strength and modulus of elasticity in three-point bending), moisture impact, water vapour permeability and thermal conductivity were measured at test specimens made from the panels. The results of laboratory tests were statistically analysed and compared.

Klíčová slova: plošné kompozitní materiály, konopí, hydraulické vápno

VESELÝ, V. – RYCHTÁŘ, J. – HRAPKOVÁ, L. Methodology of evaluating water tightness of innovate planch facade. *Annals of Warsaw University of Life Sciences – SGGW Forestry and Wood Technology*. 2013. č. 81, s. 274–278. ISSN 1898-5912.

Methodology of evaluating water tightness of innovate planch façade. The subject of this contribution is to evaluate degree of water tightness of existing type of facade tiles in terms of durability and reliability. The innovation of facade cladding was designed based on this evaluation. It was subsequently solved the methodology of testing suitability of this innovation in practice. The methodology was based on the standard EN 1305 – External claddings – Waterproofness. For this testing, it was necessary to modify the testing methodology to meet requirements of planch facade tiles testing.

Klíčová slova: opláštění fasád, vodotěsnost, spoj, laťky

ŠEBELOVÁ, E. – CHLADIL, J. Tool Wear and Machinability of Wood-based Materials during Machining Process. *Manufacturing Technology*. 2013. sv. 13., č. 2., s. 231–236. ISSN 1213-2489.

The article is focused on the machinability classification of wood-based materials resulting from experimental work targeted on the wear procedure of cutting edge. These types of materials are not currently classified into groups of machinability. Two representatives of the materials – laminated chipboard (DTD-L) and medium density fibreboard (MDF) were tested in the project. The process of material classification from the view point of machinability is well processed in engineering materials contrary to materials from wood processing. Experimental measurements were based on the determination of the radial tool wear. Tested materials were included according to achieved results in the material groups and their relevant classes. One of the most important classification indicators was the index of kinetic machinability KV. Material DTD-L has been selected as a reference sample – standard as the material most often used in woodworking industry.

Klíčová slova: trvanlivost, otupení nástroje, obrobitelnost, třída obrobitelnosti

ČERMÁK, P. – RAUTKARI, L. – HORÁČEK, P. – SAAKE, B. – RADEMACHER, P. – SABLÍK, P. Analysis of dimensional stability of thermally modified wood affected by re-wetting cycles. *BioResources*. 2015. sv. 10, č. 2, s. 3242–3253. ISSN 1930-2126. URL: http://www.ncsu.edu/bioresources/BioRes_10/BioRes_10_2_3242_Cermak_RHSRS_Dimen_Stab_Thermal_Mod_Wood_Rewetting_Cycles.pdf

The dimensional stability of thermally modified wood exposed to several wetting-drying cycles was analyzed. Specimens of dimensions 15×15 ×15 mm were thermally modified at 180 and 200 °C. The mass loss and chemical composition of the wood were determined in order to evaluate the effect and degree of modification. Afterwards, the radial, tangential, and volumetric swelling, anti-swelling efficiency, water absorption, water repellence efficiency, and mass loss due to wetting-drying cycles were determined and compared. The specimen's mass tended to decrease with each additional rewetting cycle. Additional extractives that were formed via thermal decomposition leached out during wetting cycles. Thermal modification positively affected the dimensional stability of all investigated species. The wood's swelling was reduced, a result attributed to hemicellulose degradation. Dimensional stability was improved by 24 to 30% following mild treatment and by 26 to 54% following more severe treatment. When specimens were exposed to six consecutive rewetting cycles, the swelling of the modified wood increased, whereas it slightly decreased for the control (hornification). The effective dimensional stability of thermally modified wood was reduced by 34 and 28.4% for beech, 47 and 19.6% for poplar, and 19.3 and 24.5% for spruce compared to the initial anti-swelling efficiency following the first wetting cycle.

Klíčová slova: ASE, rozměrová stabilita, chemické složení, tepelná modifikace

ČERMÁK, P. – HORÁČEK, P. – RADEMACHER, P. Heat distribution in thermally modified timber. *European Journal of Wood and Wood Products*. 2013. sv. 71, č. 6, s. 827–830. ISSN 0018-3768.

The heat distribution during thermal modification of beech (*Fagus sylvatica* L.) and spruce (*Picea abies* L. Karst) wood with dimensions of 80 x 80 x 200 mm³ has been investigated. Heat distribution was continuously measured by thermocouples in longitudinal and transverse directions. Significant temperature gradients occur in the initial phase of the process as well as during the modification phase (set temperature 200 °C for 3 h), where ongoing chemical reactions in wood were taking place. Thus, the temperature in the investigated positions increased to 240 °C (beech) and 215 °C (spruce). The mentioned properties should be taken into account when optimizing the heat treatment process (quality control, energy savings, etc.).

Klíčová slova: tepelná modifikace dřeva, termočlánky, rozložení tepla

HLÁSKOVÁ, L. – KOPECKÝ, Z. Energetic effects predictions by using new fracture mechanics approach. *Annals of Warsaw University of Life Sciences – SGGW Forestry and Wood Technology*. 2013. č. 82, s. 318–323. ISSN 1898-5912.

This paper presents a new calculating model which might be applied for estimation of energetic effects (cutting forces and cutting power) of wood sawing with circular saw blades. Modern fracture mechanics is further used in this new method for determination of the specific work of surface formation (fracture toughness) and the shear yield strength. In order to verify the validity and function of the new calculation model, the samples of native, samples of ammonia refined wood material Lignamon and chemically treated beech (DMDHEU) Belmadur were used in the experiment.

Klíčová slova: Lignamon, řezný odpor, lomová mechanika, buk, Belmadur, pilový kotouč

HLÁSKOVÁ, L. – KOPECKÝ, Z. Use of fracture mechanics to determine the cutting resistance. *Annals of Warsaw University of Life Sciences – SGGW Forestry and Wood Technology*. 2013. sv. 2013, č. 81, s. 97–103. ISSN 1898-5912.

This paper presents a new method which might be applied for estimation of cutting resistance while sawing with circular saw blades. This method is based on modern fracture mechanics for determination the specific work of surface formation (toughness) and the shear yield stress. The calculation model is usable not only for technologists, who are involved in processing wood, but also for constructors, who design new circular saw blades.

Klíčová slova: pilový kotouč, řezný odpor, stříhová mez kluzu, lomová houževnatost, lomová mechanika, řezný proces

PAŘIL, P. – BRABEC, M. – ROUSEK, R. – MAŇÁK, O. – RADEMACHER, P. – ČERMÁK, P. – DEJMAL, A. Physical and mechanical properties of densified beech wood plasticized by ammonia. *Pro Ligno*. 2013. sv. 9, č. 4, s. 195–202. ISSN 1841-4737.

Gaseous ammonia treatment in combination with densification of wood has been known since several decades, but nowadays there is no industrial production of thus modified material; also little research is published in this area of wood science. Selected physical and mechanical properties, i.e., density profile, bending strength, hardness and equilibrium moisture content were investigated for Lignamon material, which was obtained from Czech industrial production. Densitometry showed a large variability of the density profile. It is due to the position of the sample in the original block and is affected by the loading of the sample in tests (direction orthogonal or parallel to compressing). Strength properties, hardness and moisture exclusion efficiency of Lignamon are enhanced. Further investigation will be carried out with self-produced samples.

KOIŠ, V. – DÖMÉNY, J. – TIPPNER, J. Microwave Device for Continuous Modification of Wood. *BioResources*. 2014. sv. 9, č. 2, s. 3025–3037. ISSN 1930-2126. URL: http://www.ncsu.edu/bioresources/BioRes_09/BioRes_09_2_3025_Kois_DT_Microwave_Device_Continuous_Mod_Wood_5342.pdf

The aims of this study were to introduce a new laboratory microwave device developed for the modification of wood properties and to examine the effect of microwave radiation on moisture loss, surface temperature, and mechanical properties (the static modulus of elasticity – MOE, and the modulus of rupture – MOR) of Norway spruce (*Picea abies*). The device was developed for a continuous modification process. The microwave (MW) generator works at a frequency of 2450 MHz, and the adjusted output ranges from 0.6 to 6 kW. The experiment was based on four different modes of MW modification, each of them with a varied generator output and conveyor speed. Regarding mechanical properties, the results showed that a feasible output for the MW modification of the samples was up to 3 kW, with a conveyor speed of around 0.4 m/min. The greatest moisture loss, approximately 40%, was found in the group treated at 5 kW and 0.2 m/min. The highest surface temperature, 87 °C, was measured in the group treated at 5 kW and 0.4 m/min after the second passage through the modification chamber.

Klíčová slova: mikrovlny, modifikace dřeva, dřevo

KRÁL, P. – KLÍMEK, P. – MISHRA, P K. Bonding Strength of Thermally Treated Spruce (*Picea abies*) and Oak Wood. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*. 2014. sv. 62, č. 3, s. 539–542. ISSN 1211-8516. URL: <http://acta.mendelu.cz/62/3/0539/>

Thermally modified wood has been widely reported to have improved durability and aesthetic appeal than its natural counterparts in same economic range. Due to this, there has been a constant effort to utilize its durability properties in different commercial products. Utilization of outer layer thermally modified wood on exposed surface is a classical idea, but bonding of thermally modified to natural wood has been a challenging part and needs extensive investigation on different species. In this study, we tried to investigate bonding properties of oak wood with thermally modified wood (spruce) and compared it with natural oak – oak bond strength. We observed a significant decrease of 47% in value of shear strength for thermally treated wood with natural wood when compared with natural oak – oak bonding. Thermally treated wood can be used as outermost layer in those products, where shear strength does not play a crucial role and more research is required to improve its bonding with natural wood to increase its applicability range.

Klíčová slova: pevnost ve smyku, tepelně upravené dřevo

JEDINÁK, M. – KOPECKÝ, Z. – KRYL, J. – KOWALSKI, M. Wpływ warunków przecinania i konstrukcji pil tarczowych na hałas generowany podczas formatowania płyt OSB. *Mechanik: miesięcznik naukowo-techniczny*. 2014. sv. 2014, č. 8-9, s. 729–735. ISSN 0025-6552. URL: <http://www.mechanik.media.pl>

W artykule omówiono zagadnienia związane z problematyką hałasu mechanicznego i aerodynamicznego generowanego przez piły tarczowe przeznaczone do przycinania wielkoformatowych płyt wykonanych z materiałów aglomerowanych. Zmierzone i poddano ocenie poziom hałasu generowany przez piły tarczowe różnych konstrukcji, produkowane przez firmy Leitz i Pilana. Pomiary przeprowadzono na stanowisku badawczym podczas cięcia płyt i w trakcie biegu luzem badanych pił. Badano wpływ nierównomiernej podziałki ostrzy skrawających pił oraz zmian prędkości posuwu podczas cięcia na generowany poziom hałasu.

Klíčová slova: pilový kotouč, hlučnost, deska OSB

ČERMÁK, P. – HORÁČEK, P. – RADEMACHER, P. Measured temperature and moisture profiles during thermal modification of beech (*Fagus sylvatica* L.) and spruce (*Picea abies* L. Karst.) wood. *Holzforschung*. 2014. sv. 68, č. 2, s. 175–183. ISSN 0018-3830. URL: <http://www.degruyter.com/view/j/hfsg.2014.68.issue-2/hf-2013-0047/hf-2013-0047.xml?format=INT>

The temperature and moisture profiles during thermal modification of beech (*Fagus sylvatica* L.) and spruce (*Picea abies* L. Karst.) wood have been investigated. Specimens with dimensions of 80x80x200 mm³ were heat treated based on ThermoWood technology. Heat transfer was continuously measured by several thermocouples placed into various positions of the samples. In the course of the treatment, samples were removed from the chamber at different times, and their moisture content (MC) was measured by the so-called slicing technique. The complete data of heat and moisture movement during the heat treatment process are presented. Significant temperature gradients occur in the initial and modification stages of the process. In the latter, the chamber temperature was 200°C for 3 h, but exothermic reaction increased the sample temperatures to 240°C (beech) and 215°C (spruce). Thermodiffusion (Soret effect) at the beginning of the process was observed. Therefore, the MC under surfaces (in transverse and in longitudinal direction) was increasing 0.5%–3% for 5 h. The results provide a better insight into details of thermal modification of wood.

Klíčová slova: tepelná úprava dřeva, buk (*Fagus*), distribuce tepla, vlhkost dřeva

KRÁL, P. – RÁHEL, J. – STUPAVSKÁ, M. – ŠRAJER, J. – KLÍMEK, P. – MISHRA, P. K. – WIMMER, R. XPS depth profile of plasma-activated surface of beech wood (*Fagus sylvatica*) and its impact on polyvinyl acetate tensile shear bond strength. *Wood science and technology*. 2015. sv. 49, č. 2, s. 319–330. ISSN 0043-7719. URL: <http://link.springer.com/article/10.1007%2Fs00226-014-0691-7>

High surface selectivity of atmospheric pressure plasma treatment was demonstrated experimentally by XPS depth profile measurement of plasma-activated beech wood. Wood surface activated by diffuse coplanar surface barrier discharge was sequentially sputtered by Ar⁺ ion beam followed by immediate XPS analysis of freshly uncovered surface. According to the assessment, less than 330 nm of sputtered material was sufficient for complete removal of all plasmaformed functional groups. For the sake of practical implications of minimal vertical extent of plasma-mediated changes, the character of tensile shear bond strength improvement of polyvinyl acetate adhesive was examined with respect to its specific mass. A constant additive character of plasma activation to the bond strength was observed within the examined range of adhesive-specific mass.

HASSAN, K T S. – HORÁČEK, P. – TIPPNER, J. Evaluation of stiffness and strength of Scots pine wood using resonance frequency and ultrasonic techniques. *BioResources*. 2013. sv. 8, č. 2, s. 1634–1645. ISSN 1930-2126. URL: <http://ojs.cnr.ncsu.edu/index.php/BioRes/article/view/3549>

The aim of this paper was to predict the static bending modulus of elasticity (MOES) and modulus of rupture (MOR) of Scots pine (*Pinus sylvestris* L.) wood using three nondestructive techniques. The mean values of the dynamic modulus of elasticity based on flexural vibration (MOEF), longitudinal vibration (MOELV), and indirect ultrasonic (MOEUS) were 13.8, 22.3, and 30.9 % higher than the static modulus of elasticity (MOES), respectively. The reduction of this difference, taking into account the shear deflection effect in the output values for static bending modulus of elasticity, was also discussed in this study. The three dynamic moduli of elasticity correlated well with the static MOES and MOR; correlation coefficients ranged between 0.68 and 0.96. The correlation coefficients between the dynamic moduli and MOES were higher than those between the dynamic moduli and MOR. The highest correlation between the dynamic moduli and static bending properties was obtained by the flexural vibration technique in comparison with longitudinal vibration and indirect ultrasonic techniques. Results showed that there was no obvious relationship between the density and the acoustic wave velocity that was obtained from the longitudinal vibration and ultrasonic techniques.

Klíčová slova: nedestruktivní testování, hustota, ohybové kmity, podélné kmity, ultrazvuk

HLAVATÝ, J. – TESAŘOVÁ, D. Temperature-related resistance of bonds between wood particle board and surface finishing materials. *Acta Facultatis Xylogologiae Zvolen*. 2015. sv. 57, č. 1, s. 89–97. ISSN 1336-3824.

The lateral surfaces of furniture components made of wood particleboard are commonly completed with finishing materials. The aim of this work was to investigate heat-induced changes in resistance of glue joints between finishes and substrate. The glue we used was a hotmelt ethylene-vinyl-acetate. The methods for glued joint strength testing were three following the Standard, peel test performed shear under compression loading. The experimental results revealed that the glued joint stability decreased with increasing temperature. The performance of glued joints was significantly affected by temperatures ranging. The temperature also depended on the specific materials glued together with the EVA glue tested.

Klíčová slova: dřevotřískové desky, mechanická pevnost, (EVA), HPL, hrabovací pásy ABS, lepené spoje, teplota, mechanická pevnost

DÖMÉNY, J. – KOIŠ, V. – DEJMAL, A. Microwave Radiation Effect on Axial Fluid Permeability in False Heartwood of Beech (*Fagus sylvatica* L.). *BioResources*. 2014. sv. 9, č. 1, s. 372–380. ISSN 1930-2126. URL: http://www.ncsu.edu/bioresources/BioRes_09/BioRes_09_1_372_Domeny_KD_Microwave_Rad_Axial_Fluid_Permability_Beech_4619.pdf

The purpose of this study was to evaluate the effect of microwave radiation on the fluid permeability and compression strength parallel to the grain of beech false heartwood. The European beech (*Fagus sylvatica* L.) was selected, and samples of false heartwood with dimensions of 30x20x20 mm³ were used. The microwave treatment was carried out in a laboratory device at a frequency of 2.45 GHz. The testing samples were divided into three groups (untreated, treated at 20-s intervals, and treated at 30-s intervals). The permeability was measured in the axial direction using distilled water. The coefficient of specific permeability was calculated using Darcy's law. The results showed that the coefficient of specific permeability increased by up to 159% in comparison with untreated samples. The compression strength parallel to the grain decreased by up to 15%.

Klíčová slova: Propustnost, Vysokofrekvenční energie, Buk, Mikrovlnná úprava, Nepravé jádro, Pevnost v tlaku

ŠTRBOVÁ, M. – TESAŘOVÁ, D. – KÚDELA, J. Adhesion of UV-curable coating to beech wood. *Materials Science Forum*. 2015. sv. 2015, č. 818, s. 202–205. ISSN 0255-5476.

In this paper, adhesion of solid coatings to wood is assessed through interactions among surface forces at their phase boundary. The issue is treated on an example of beech wood and a priming UV lacquer. Our approach used analogy with the laws valid for system solid-liquid. The results show that cohesion of wood is higher than adhesion of coating to wood and cohesion of coating. This relation was also confirmed by the testing of mechanical loading in tension of the whole system.

Klíčová slova: adheze, bukové dřevo Uv -zařením vytvrzované nátěrové hmoty

ROGOZIŃSKI, T. – KOPECKÝ, Z. – HLÁSKOVÁ, L. – VESELÝ, P. – ROUSEK, M. Dust creation during mahogany wood sawing. *Annals of Warsaw University of Life Sciences – SGGW Forestry and Wood Technology*. 2013. č. 81, s. 191–202. ISSN 1898-5912.

Dust creation during mahogany wood sawing. The use of modern technologies in wood industry to reduce dust emission is necessary to prevent occupational health hazard. This paper compares the results of particle-size determination of dust created in the cutting of mahogany wood using modern circular saws. The particle-size determination was carried out by different methods: sieving analysis, microscopic image analysis, particle measurement with laser diffraction

Klíčová slova: stanovení velikosti částic, mahagonové dřevo, řezání

TESAŘOVÁ, D. – ČECH, P. Quality of Indoor Air in Small Czech Furniture Companies. *Innovation in forest industry and engineering design*. 2013. sv. 2/2013, č. 4, s. 23–30. ISSN 1314-6149.

This paper investigates the problematic of emission volatile organic compounds emitted to working, indoor air of the furniture company, which produces wooden furniture during. The main goal of this research were assessment of quality of indoor air in working environment, which was load of emission VOC emitted from production processes

of made furniture. The one part of this research deals of the influence individual technological operations in made furniture in dependence on quality and quantity composition of VOC, which they effects of quality external and internal environment of the furniture company. The samples of indoor air from working, residential areas including external environment by load VOC were collected in sorption tube with adsorbent Tenax TA. The methodology of sampling samples of indoor air was done according to standard ČSN EN ISO 16000- part 1, 5. We analyzed the columns with captured VOC by analytical method that was used: the gas chromatograph in conjunction with mass spectrometer and Direct Thermal Desorption. The result of analysis is qualitative and quantitative data in form graph and numerical expression in $\mu\text{g}\cdot\text{m}^{-3}$. The obtained results are then compared with appropriate limit values set in regulations.

Klíčová slova: těkavé organické látky, vnitřní prostředí, nábytek

KLÍMOVÁ, H. – TIPPNER, J. Modal Analysis of Soundboard of the Upright Piano by Finite Element Method (FEM). *Wood Research*. 2014. sv. 59, č. 1, s. 123–135. ISSN 1336-4561.

This work is engaged in the study of the change eigenfrequencies and eigenmodes of vibration of soundboard of the upright piano owing to change of material qualities (density, module of elasticity, spiro grain), change of geometry (slab thickness, ribs proportions, ribs number, bridges form) and the way of anchoring. Modal analysis was made by finite elements method in computer program ANSYS. Analysis model was arranged parametrically by the help of script tongue APDL what allowed the construction of probabilistic design system sequence. The results describe influence of density and longitudinal module of elasticity of material with eigenfrequencies of board. Effect of spiro grain in cross plane appears like least relevant. Generally supposed influence of change of geometry and density with eigenfrequencies was more closely described for soundboard of upright piano. It follows from the research that values of eigenfrequencies grow with increasing of implasticity system what is incurred by mutual placing of ribs and blanks and anchoring. It comes to changes of eigenmodes of vibration especially with changes of fixation of soundboard.

Klíčová slova: modální analýza, pianini, metoda konečných prvků

TESAŘOVÁ, D. – ČECH, P. Virtual educational programme for furniture branch. *Innovation in woodworking industry and engineering design*. 2012. sv. 1, č. 1, s. 59–63. ISSN 1314-0663.

The contribution describes and introduces the new virtual educational portal a nad programme , where we can find the explanatory dictionary with the definitions od furbiturew terms a nd virtual multifunctional house with special rooms equipped ba special pieces od furniture in connection with database od bational and European standarts in Bulgarian, English, Slovak and Geramn language.

SEBERA, V. – TIPPNER, J. – ŠIMEK, M. – ŠRAJER, J. – DĚCKÝ, D. – KLÍMOVÁ, H. Poisson's ratio of the MDF in respect to vertical density profile. *European Journal of Wood and Wood Products*. 2014. sv. 72, č. 3, s. 407–410. ISSN 0018-3768.

The work deals with Poisson's ratios (PR's) of medium density fiberboard (MDF) measured using digital image correlation and correlated to vertical density profiles (VDP). MDFs of four different thicknesses were first scanned by X-ray to obtain VDPs and then subjected to compression while measuring by DIC. PR's of MDF reveal low correlations with VDP (<0.08), but strong local behavior ranging from 0.025 to 0.06 for 12 mm thickness, from 0.018 to 0.105 for 18 mm, from 0.03 to 0.175 for 25 mm, and from 0 to 0.43 for 38 mm.

Klíčová slova: Korelace digitálního obrazu, Poissonovo číslo, Středně hustá vláknitá deska

TRCALA, M. – ČERMÁK, P. Numerical analysis of temperature profiles during thermal modification of wood: chemical reactions and experimental verification. *Holzforschung*. 2015. sv. 69, č. 3, s. 321–328. ISSN 0018-3830. URL: <http://www.degruyter.com/view/j/hfsg.2015.69.issue-3/hf-2014-0118/hf-2014-0118.xml?format=INT>

Numerical analysis of temperature profiles during thermal modification of wood was carried out. The numerical solution – based on finite element analysis, FEA – of the 3D problem of transient nonlinear heat transfer model is presented for wood as a typical anisotropic material. The numerical model was enhanced for describing chemical reactions of cellulose, hemicelluloses and lignin (pyrolysis model), which takes into account the exothermic reactions as an internal source of heat energy. Experimental as well as theoretical process schedules were applied and the

influence of sample dimensions (sample geometry) and wood species was studied. The influence of wood species was negligible on heating time to reach the highest temperature, i.e., the temperature differences were about 2°C during the drying phase. As expected, the sample size played an important role in the heating duration and in terms of the exothermic reactions of wood. The experimental and numerical data are generally in good agreement. The numerical error increased in the range of higher temperatures. The results can be improved by consideration of wood species (mass of wood compounds) and boundary conditions in the pyrolysis model, thus, better insight into details of thermal modification of wood could be reached.

SABLÍK, P. – RADEMACHER, P. Influence of solvent on the amount of extractive content in sapwood, heartwood and bark of *Robinia pseudoacacia*. *Pro Ligno*. 2013. sv. 9, č. 2, s. 576–580. ISSN 1841-4737.

Total amount of extractive content of heartwood, sapwood and bark of *Robinia pseudoacacia* L. were determined. For extraction there were used feXKA vario control extractor and several types of solvents (Cold Water, Hot water, Acetone, Benzene, Cyclohexane and Ethanol) with different results. Best results respectively mean highest amount of extracts, were identified with using ethanol, on the other side, lowest amounts were obtained with using cyclohexane as solvent.

BRABEC, M. – TIPPNER, J. – DEJMAL, A. – RADEMACHER, P. Investigation of Hydrothermal Plasticization Process with Convective and Dielectric Heating. *Pro Ligno*. 2013. sv. 9, č. 4, s. 670–678. ISSN 1841-4737.

In this paper time needed for convectional and dielectric heating of wood samples to the desired plasticizing temperature was experimentally determined. The temperature was measured using a contactless infrared thermometer on the surface of samples and after their splitting in the spatial center of gravity. The same temperature of the samples was achieved by dielectric heating using microwave radiation six times faster than steaming within convection. Both methods of heating have caused moisture reduction of samples. In the case of microwave heating, the decrease in moisture content was twice as much as steaming. In the second part of this study mechanical properties of samples in a plastic and reference state were measured. The samples were tested in a static three-point bend. The results did not confirm statistically significant effect of heating methods on the degree of wood plasticity. Comparison of the mechanical properties of plastic and reference samples showed the expected large drop due to increased temperature and high moisture content. Test samples were made from beech (*Fagus sylvatica*, L.).

Klíčová slova: Konvekční ohřev, Časová náročnost, Plasticita dřeva, Dielektrický ohřev, Hydrotermická plastifikace

KÚDELA, J. – GRYC, V. – TÓTH, V. Deformation of beech wood – the sources and their identification before beech logs processing. *Annals of Warsaw University of Life Sciences – SGGW Forestry and Wood Technology*. 2014. sv. 2014, č. 87, s. 121–125. ISSN 1898-5912.

Longitudinal buckling is a very serious problem in production of solid wood panels assembled of beech lamellae joined alternatively breadthwise and longwise into large-sized blocks. The aim of our work was to identify the main factors causing misshaping of beech dowels in solid wood panels production, with the primary focus on identification of reaction tension wood in dowels and logs. According to our results, the most common source of longitudinal buckling of beech dowels was the presence and non-uniform distribution of tension wood in them. The tension wood occurrence in logs is possible to predict with a considerable confidence based on eccentric pith presence. The tension wood presence and distribution over the cross section are possible to identify if the cross-cut surface has been milled and its moisture content reduced under FSP. The tension wood can be discerned through its lighter hue and pearlescent-white gloss.

Klíčová slova: masivní vrstvené dřevo, podélné borcení, tahové dřevo, bukové dřevo

KOWALSKI, M. – KAROLCZAK, P. – ROUSEK, M. – KOPECKÝ, Z. Assessment of suitability of the wavelet analysis for description of roughness of wooden materials. *Technologické inženýrstvo*. 2012. sv. IX, č. 1, s. 25–28. ISSN 1336-5967.

The work presents theoretical bases and possibilities of application of a wavelet analysis as a supplementary indicator for assessment of surface roughness. They discussed results of experimental tests on description of characteristics of milled wooden surfaces with the use of Daubechies continuous wavelet and Gauss discrete wavelet. They assessed suitability of selected types of wavelets for geometrical structure of deciduous and coniferous tree wood.

Klíčová slova: dřevo, vlnová analýza, geometrická struktura

KRÁL, P. – KLÍMEK, P. – MISHRA, P. K. Effect of Refiner Plate Pattern Design on Refined Fibre Size Distribution – a Time Series Study. *Drona Industrija*. 2015. sv. 66, č. 1, s. 63–67. ISSN 0012-6772. URL: http://hrcak.srce.hr/index.php?show=clanak&id_clanak_jezik=201759

In a multi-step batch or continuous operating process, quantitative & qualitative optimization of every single step is always aimed at. Even the smallest aberration in processing parameters affects the quality of the final product. Therefore, it is necessary to study time series quality of products delivered by every single step, so as to ensure product quality in a long run. Refining is one of the most crucial steps in fibreboard manufacturing, as it has a major impact on fibre quality and energy consumption. Refining plate pattern is key to good results, which have to be optimized based on experience or onsite testing. We tested three different refining plate patterns: straight bar design pattern (TYPE 1), spiral bars design pattern (TYPE 2) and bar with groove pattern (TYPE 3), and their impact on fibre size quality in a time series. Reported results include fibre size distribution of three different types of plate patterns observed for 1500 hrs and relative quantity of fine fibres observed in time series for three variants of disc type refiners. Our research showed that fibre quality within desired limits was best delivered by TYPE 2 plates; however, fibre quality also varied with time series for three of them, so different time periods of desired fibre quality were analysed.

DÖMÉNY, J. – KOIŠ, V. – PAŘIL, P. Impregnability of european beech false heart wood after microwave treatment. *Pro Ligno*. 2013. sv. 9, č. 4, s. 190–194. ISSN 1841-4737. URL: <http://www.proligno.ro/en/index.htm>

The purpose of this study was to experimentally evaluate the microwave radiation effect on weight percentage gain (WPG). The species European beech (*Fagus sylvatica* L.) was selected and testing samples from false heartwood with dimensions of 20x20x30 mm³ were used. The microwave treatment was carried out on laboratory device at a frequency of 2.45 GHz. Afterwards the oil impregnation in transverse directions was performed. Results were compared with the reference samples (untreated). The samples exposed at 20s intervals (20s treatment, 30s relaxation and 20s treatment) shows improvement of impregnability (WPG 33.84%), which is with agreement of authors hypothesis. The WPG at 30s intervals of exposure (30s treatment, 30s relaxation and 30s treatment) decreased to 26.59%. Based on results, the future work dealing with time influence of exposure in microwave treatment is needed.

Klíčová slova: Impregnovatelnost, Nepravé jádro, Buk lesní, Mikrovlnná modifikace, *Fagus sylvatica* L.

KRÁL, P. – KLÍMEK, P. Utilization of spruce (*Picea abies* [L.] Karst.) and beech (*Fagus sylvatica* L.) wood in plywood production using different processing pressures. *Journal of Forest Science*. 2014. sv. 60, č. 12, s. 495–499. ISSN 1212-4834. URL: <http://www.agriculturejournals.cz/publicFiles/138087.pdf>

In this research the spruce plywood board and combined spruce-beech plywood board were prepared in laboratory conditions using two levels of processing pressure. The bending properties in perpendicular and longitudinal direction were measured and compressibility and density were specified. Considering the obtained results, there was found an overall increase of the bending properties in spruce plywood manufactured by the higher pressure and a decline of properties perpendicular to the grain in combined spruce-beech plywood board. On the other hand, combined spruce-beech plywood boards produced by the common processing pressure performed better than both types of spruce plywood.

Klíčová slova: slisování, komposit, hustotní profil, dýhy

TESAŘOVÁ, D. Dokončené povrchové úpravy schodů na bázi dřeva – metody posuzování a laboratorní zkoušení. *TZB-info*. 2013. č. 16. 9. 2013, s. 1–5. ISSN 1801-4399. URL: <http://stavba.tzb-info.cz/schodiste/10342-dokoncene-povrchove-upravy-schodu-na-bazi-dreva-metody-posuzovani-a-laboratorni-zkouseni>

Příspěvek se zabývá požadavky na fyzikálně-mechanické a chemické vlastnosti dřevěných stupnic schodů a faktory, které ovlivňují tyto vlastnosti při dlouhodobém užívání dřevěných stupnic schodů. V článku je sledován zejména vliv teploty prostředí a jejich střídání a působení UV záření jako složky slunečního záření na kvalitu nátěrových filmů povrchových úprav. Pozornost je také zaměřena na vliv UV záření a střídání teplot na tvrdost a přilnavost povrchových úprav stupnic schodišť, na jejich odolnost vůči působení vody, na světlostálost nátěrových filmů a na odolnosti povrchových úprav vůči oděru

Klíčová slova: schody, povrchová úprava, světlostálost, UV absorbery

KRÁL, P. – KLÍMEK, P. – DĚCKÝ, D. Comparison of the bond strength of oak (*Quercus* L.) and beech (*Fagus*

sylvatica L.) wood glued with different adhesives considering various hydrothermal exposures. *Journal of Forest Science*. 2015. sv. 61, č. 5, s. 189–192. ISSN 1212-4834.

The investigation of the hydrothermal exposure effect on the glue-line strength is obvious when outdoor application of wood products is in option. In our research the bonding quality of oak (*Quercus L.*) and beech (*Fagus sylvatica L.*) wood was tested in different conditions according to EN 205. After each exposure the lap joint test specified the shear strength of wood bonded with PVAC and PU adhesive. In our research different behaviour concerning both types of adhesives and selected wood species was observed. The most significant decrease of the shear strength was found when the PVAC was used to bond oak wood. Therefore the PVAC adhesive is most likely less suitable for the bonding of the block board in outdoor conditions. On the contrary, the best results in the same conditions were obtained by the oak when the polyurethane adhesive was used. It indicates that the PU adhesive is more suitable for the bonding of oak wood. Considering results of beech wood, there were not found this interaction.

Klíčová slova: hydrotermická expozice, lepení dřeva, dub, buk

KLÍMEK, P. – WIMMER, R. – KRÁL, P. Novel Decorative Particleboards by Means of Post-imprinted Surface Patterns. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*. 2015. sv. 63, č. 1, s. 45–48. ISSN 1211-8516. URL: <http://acta.mendelu.cz/pdf/actaun201563010045.pdf>

While high surface smoothness of particleboards is usually desired, boards with expressed surface topology can be seen as a more recent development. This research is about the development of 3D-imprinted surface patterns applied to both sides of single-layer particleboards. The imprintment was done as a post-treatment, meaning it was carried out as a final processing step during particleboard production. Commercial particleboard samples were imprinted using a hexagonal steel pattern under high pressure. Results show that because of the imprinting bending strength and stiffness were both reduced by 2/3 to 3/4 of the compared control values. Even with such severe reductions the imprintment process is seen as successful. A minimum of internal mechanical integrity remained making the new type of particleboard suitable for a number of design-related applications. With proper coating applications could be wall cladding, ceiling cladding, or decorative products. With the shown imprintment a new type of 3D-surface particleboard is introduced.

Klíčová slova: povrchová úprava, dřevotřísková deska, 3D povrch

NASSWETTROVÁ, A. – ŠMÍRA, P. – ZEJDA, J. – NIKL, K. – SEBERA, V. Axial permeability of beech wood treated by microwave heating for distilled water. *Wood Research*. 2014. sv. 59, č. 1, s. 25–37. ISSN 1336-4561.

The paper presents results of measuring axial permeability of beech wood for distilled water after the wood has been treated by microwave energy. Heating was applied to the wood structure in two different versions of energy exposure. Permeability was ascertained in stationary conditions using a device produced in the Department of Wood Science, Mendel University in Brno. Permeability coefficients were calculated by Darcy's law and compared with permeability coefficients of natural beech wood. The results showed an increase in mean values of permeability coefficients in the samples dried by microwave energy.

Klíčová slova: mikrovlnná energie, struktura dřeva, *Fagus sylvatica L.*, propustnost dřeva

BAAR, J. – DAMICO, S. – WIMMER, R. Color and light-induced discoloration of wood from the tropical species Jatoba and African Padauk. *Pro Ligno*. 2013. sv. 9, č. 4, s. 581–586. ISSN 1841-4737.

This study investigates the relationships between total extractive content and wood color as well as discoloration caused by artificial sunlight, of the tropical species Jatoba (*Hymenaea courbaril L.*) and African Padauk (*Pterocarpus soyauxii Taub.*). The surface color was measured before and after light exposure by a spectrophotometer (CIEL*a*b*). Wood powder samples were extracted with acetone/methanol/distilled water mixture to determine the total extractives content. Color parameters of wood were related to the amount of extractives. The influences on the individual parameters L*, a* or b* were found to be species dependent. The strongest influence was observed for lightness L*. The other color parameters measured after ultraviolet- light exposure were also related to the extractives contents, or to generated photodegradation products.

Klíčová slova: extraktiva, Jatoba, barva, Africký Padauk, fotodegradace

SEBERA, V. – PRAUS, L. – TIPPNER, J. – KUNECKÝ, J. – ČEPELA, J. – WIMMER, R. Using optical full-field measurement based on digital image correlation to measure strain on a tree subjected to mechanical load. *Trees – Structure and Function*. 2014. sv. 28, č. 4, s. 1173–1184. ISSN 0931-1890.

The goal of this study was to analyze and measure the displacement and strain response behavior of the tree (*Juglans regia* L.) subjected to a mechanical load. The analysis addresses issues of tree biomechanics that call for a high-quality deformation data measured on trees' surfaces in a noninvasive way. For these purposes, the 3D digital image correlation (3D-DIC) was proposed and tested against standard extensometers. The measured tree was subjected to a bending by a pulling test to induce strain on the tree stem. The DIC technique successfully provided strain field on a tree bark despite its highly complicated geometry. Vertical averaging of the strain field obtained by the DIC revealed that a tree stem behaves according to beam theory exhibiting compression and tension parts. The absolute values of strain measured by both techniques agree with each other in order of magnitude, DIC returning lower values (approximately 21.1 and 40.8 % for compression and tension part, respectively). The results reveal necessity for future study of stress/strain transfer from xylem to bark. The sensitivity analysis shows that the computed strain highly depends on subset size used in the DIC computation. Based on the projection error and strain, the optimal subset size was found out to be between 21 and 31 pixels. The measurement proved that the DIC method can be successfully used in tree biomechanics. In general, our results and the character of DIC technique that allows testing at different scales depending on imaging methods indicate its big potential in plant biomechanics.

Klíčová slova: Arboristika, Poměrná deformace, Korelace digitálního obrazu, Biomechanika stromu, Tahová zkouška, Nedestruktivní

ALEŠ, S. – MITKOVSKI, B. – TIPPNER, J. – ČUFAR, K. – GORIŠEK, Ž. Structural and acoustic properties of African padouk (*Pterocarpus soyauxii*) wood for xylophones. *European Journal of Wood and Wood Products*. 2015. sv. 73, č. 2, s. 235–243. ISSN 0018-3768.

The possibility of supplementing the subjective traditional assessment of wood quality for percussion instruments with reliable acoustic measurements was studied. Sawn boards of African padouk (*Pterocarpus soyauxii* Taub.) were selected in a timber yard and classified into five grades by using the dynamic combined specific modulus of elasticity. Then they were sawn into raw xylophone bars, which were afterwards traditionally graded by listening to the sound damping at flexural bending excitation and additionally by acoustic measurements. A high quality grade matching of xylophone bars and sawn boards was confirmed. Highly graded material was mostly quarter sawn with straight or moderately interlocked grain. The sound quality of raw xylophone bars was not influenced by the wood density. It negatively correlated with sound damping and positively with the specific modulus of elasticity and with absolute and relative acoustic conversion efficiency. The audial grading of xylophone bars could be improved or substituted by relative acoustic conversion efficiency.

Klíčová slova: akustika, xylofon, dřevo

PAŘIL, P. – BRABEC, M. – ROUSEK, R. – MAŇÁK, O. – RADEMACHER, P. – ČERMÁK, P. – DEJMAL, A. Comparison of selected physical and mechanical properties of densified beech wood plasticized by ammonia and saturated steam. *European Journal of Wood and Wood Products*. 2014. sv. 72, č. 5, s. 583–591. ISSN 0018-3768. URL: <http://link.springer.com/article/10.1007%2Fs00107-014-0814-8>

Gaseous ammonia treatment in combination with densification of wood has been known for several decades, but these days there is no industrial production of materials modified in this way; also, little has been published in this area of wood science. In this study, selected physical and mechanical properties, i.e. density profile, bending strength, hardness and moisture absorption were investigated for Lignamon (1), which was obtained from the Czech industrial production. Selected properties were also investigated using steam-densified beech (2) and native beech (3) and compared with each other. Densitometry of Lignamon showed a large variability in the density profile compared to that of only densified beech. It is affected by the degree of densification, temperature and moisture gradients, and their relationship to the glass transition of the wood cell wall. Modulus of elasticity, hardness, moisture exclusion and anti-swelling efficiency of Lignamon are enhanced compared to densified beech. The enhanced dimensional stability and lower hygroscopicity of Lignamon are probably caused by heat treatment during the process. Further investigation will be carried out with self-produced Lignamon samples.

Klíčová slova: density, Lignamon, Ammonia treatment, modulus of rupture, *Fagus sylvatica* L.

TRCALA, M. Spectral stochastic modelling of uncertainties in nonlinear diffusion problems of moisture transfer in wood. *Applied Mathematical Modelling*. 2015. sv. 39, č. 5-6, s. 1740–1748. ISSN 0307-904X.

This paper deals with the stochastic numerical analysis of moisture transfer in wood with the random diffusion coefficient after heating of wood (when temperature is already constant). The simulation is based on the unsteady-state nonlinear (the model respects the dependence of diffusion coefficients on moisture and constant temperature)

diffusion of moisture with respect to the orthotropic nature of wood. The spectral solution of this problem is based on discretization the resulting random field (moisture) in the stochastic dimension by the orthogonal polynomials (generalized polynomial chaos algorithm). A Galerkin projection is applied in the stochastic dimension to obtain the deterministic set of partial differential equations that is solved by finite element method. The main purpose of this paper is to demonstrate that the stochastic spectral method based on polynomial chaos expansion can be more efficient in modeling uncertainties associated with moisture transfer in wood than Monte Carlo method mainly when considering a small number of random variables. This spectral approach has a big advantage over the Monte Carlo method (statistical approach) in terms of computer time. Numerical example of diffusion of moisture in convective drying of wood is given and there is shown that the results (mean and the standard deviation) obtained with the stochastic spectral method are in good agreement with the results of the Monte Carlo simulations.

Klíčová slova: polynomiální chaos, spektrální stochastická metoda konečných prvků, metoda Monte Carlo, náhodný difuzní koeficient

KOPECKÝ, Z. – HLÁSKOVÁ, L. – KOWALSKI, M. – ROUSEK, M. Wskaźniki energetyczne procesu obróbki drewna modyfikowanego chemicznie i ciśnieniowo. *Mechanik: miesięcznik naukowo-techniczny*. 2013. sv. 86, č. 8-9/708, s. 65–72. ISSN 0025-6552. URL: http://www.mechanik.media.pl/_pdf/5254_vii_szk_obr_skrav.pdf

W przemyśle drzewnym cięcie piłami tarczowymi jest jedną z najczęściej wykorzystywanych operacji rozdzielania materiału. Pomimo wieloletnich, szczegółowych badań z zakresu teorii i praktyki skrawania materiałów drewnianych nie udało się dotychczas stworzyć zaleceń, na podstawie których byliby możliwe dokładne określenie wartości siły skrawania i oporu skrawania występujących w trakcie przecinania drewna. Określenie wartości poszczególnych składowych oporu skrawania jest, w przypadku obróbki drewna, bardzo skomplikowane. Związane to jest z anizotropowością w budowie wewnętrznej drewna oraz ze zmianą właściwości fizycznych i mechanicznych drewna w zależności od kierunku włókien. W pracy zaprezentowano nowy model obliczeniowy oporu skrawania bazujący na zastosowaniu zasad mechaniki pęknięcia (modern fracture mechanics). Wartość siły skrawania i siły posuwowej może być określona przy dostosowaniu teorii Ernst–Merchanta do warunków charakterystycznych, jakie występują podczas przecinania drewna piłami tarczowymi, gdzie proces tworzenia się wióra jest decydującym czynnikiem przy określaniu siły: skrawania i posuwowej [Atkins 2003]. Model bazuje na określeniu pracy wewnętrznej potrzebnej do zwinienia a następnie oddzielenia wióra, a także na określeniu energii niezbędnej do pokonania tarcia między przedmiotem

Klíčová slova: pilový kotouč, modifikované dřevo, proces řezání dřeva

TROPPOVÁ, E. – TIPPNER, J. – HRČKA, R. – HALACHAN, P. Quasi-Stationary Measurements of Lignamon Thermal Properties. *BioResources*. 2013. sv. 8, č. 4, s. 6288–6296. ISSN 1930-2126. URL: http://ojs.cnr.ncsu.edu/index.php/BioRes/article/view/BioRes_08_4_6288_Troppova_Quasi_Stationary_Measurement_Lignamon

Thermal properties of wood and modified wood-based materials are important parameters that influence the manufacturing process and final industrial utilization. The aim of this work was to investigate three main thermal properties (thermal conductivity, thermal diffusivity, and specific heat capacity) of ammonia-treated compressed beech wood (Lignamon material) and natural beech wood (*Fagus sylvatica*). These properties were measured based on the quasi-stationary method developed at the Department of Wood Science at the Technical University in Zvolen. The influence of increased density (caused by ammonium treatment and compression) of four different types of Lignamon material on the thermal properties was discovered, and the results were compared with those from untreated beech wood. The results confirmed a dependency on the density of the material. With increasing Lignamon compression extent (increasing density value), the thermal conductivity increased and the thermal diffusivity decreased. The maximum value of thermal conductivity reached (0.26 W.m-1.K-1 at 1070 kg.m-3) in the case of Lignamon 6k and (0.26 W.m-1.K-1 at 950 kg.m-3) in the case of Lignamon 7n.

Klíčová slova: lignamon, tepelná vodivost, quasi-stacionární metoda

KRÁL, P. – HRÁZSKÝ, J. – HRAPKOVÁ, L. – HAMŠÍK, P. Shape Stability of Particleboards Covered with Decorative Veneers. *Drva Industrija*. 2013. sv. 64, č. 3, s. 211–220. ISSN 0012-6772.

The paper summarizes results of research work aimed at the determination of shape stability, modulus of rupture (MOR) and modulus of elasticity (MOE) of components manufactured of particle boards, which were veneered from their tight side by the decorative veneer of American walnut (*Juglans nigra*) 0.6 mm thick and on the underside by decorative veneers of different species (*Picea abies* and *Fagus sylvatica* 0.6–1.5 mm in thickness or by a countermove

foil of 85–90 g/m² surface weight. Subsequently, measurements were carried out of the shape stability (warping) of test specimens cut from various combinations of surface-finished boards. These test specimens were air conditioned in three different environments. At the same time, values were determined of bending strength and modulus of rupture with respect to the direction of fibres of sheathing materials. It has been found that the lowest values of warping were achieved at material combinations consisting of American walnut of a thickness of 0.6 mm on the tight side and alder (*Alnus glutinosa*) 0.6 mm in thickness on the underside.

Klíčová slova: tvarová stabilita, velkoplšný materiál, dýhování, dýha, borcení

KRÁL, P. – KLÍMEK, P. – MISHRA, P. K. – RADEMACHER, P. – WIMMER, R. Preparation and Characterization of Cork Layered Composite Plywood Boards. *BioResources*. 2014. sv. 9, č. 2, s. 1977–1985. ISSN 1930-2126. URL: http://www.ncsu.edu/bioresources/BioRes_09/BioRes_09_2_1977_Kral_KMR_Prep_Char_Cork_Layered_Plywood_5023.pdf

In the furniture and construction industries, there is increased demand for lightweight, high-performance, and low-maintenance materials with specific properties. Increased demand necessitates testing of new and composite materials to find a viable alternatives to classical materials. In this study, two different types of cork layered plywood composites (plywood board with a cork core (PLYW-K1), and plywood board with a cork core and cork face layers (PLYW-K2)) were prepared and tested for their basic mechanical properties as well as screw withdrawal resistance. The measured properties were compared with standard particleboard (PB) and plywood board (PLYW1) to determine the difference in properties and potential applications. The results presented include preparation parameters, mechanical properties, maximum withdrawal force, and withdrawal resistance. In addition, the effect of screw diameter and material density on withdrawal resistance was observed. Results indicate that cork-layered plywood possessed superior mechanical properties and withdrawal strength at a much lower density than particleboard. In comparison to classical plywood, the improved factors were a reduction in density and production cost.

Klíčová slova: Pevnost držení, překližka, Korková překližka, třísková deska

HRAPKOVÁ, L. – RYCHTÁŘ, J. – VESELÝ, V. – HLÁSKOVÁ, L. – KRÁL, P. Evaluation of moisture and suitability of package ply wood usage impact on protection quality of transported material liable to corrosion. *Annals of Warsaw University of Life Sciences – SGGW Forestry and Wood Technology*. 2013. č. 81, s. 111–116. ISSN 1898-5912.

Assessment of moisture and appropriate packing plywood usage effect to protection quality of the transported material susceptible to corrosion. The subject of the article is to assess the influence of moisture, located inside the package, on the transported material and the suitability of packing plywood usage for packing and transporting materials inclinable to corrosion. Based on this requirement, the relative moisture has been precisely defined for reinforcing the fixation of the transported material. In order to evaluate the influence of plywood moisture to protection quality of the transported material, the test methodology accordant with the related European standards was used. It is complemented by the method of sampling, sample preparation for tests including air conditioning. According to the proposal, the moisture content measurement of selected reinforcements in the packaging was made and the measurement of the moisture influence on the quality of the protection of transported material was made. Values of plywood moisture and their possible negative impact on the transported material were found. These values can be considered reliable.

Klíčová slova: balení, skladování, překližka, vlhkost

WILKOWSKI, J. – ROUSEK, M. – SVOBODA, E. – KOPECKÝ, Z. – CZARNIAK, P. Analysis of the influence of cutting parameters on surface roughness of milled wood based on Taguchi techniques. *Annals of Warsaw University of Life Sciences – SGGW Forestry and Wood Technology*. 2013. č. 84, s. 321–325. ISSN 1898-5912.

Influence of cutting parameters (cutting speed, feed per tooth, height of cutting and tool wear) on the surface roughness of wood (oboeche and spruce) after face milling was obtained in experiments. In conducted analysis of Taguchi method was used. Samples were machined on a CNC controlled milling machine. The Mitutoyo stylus unit (model SJ-201) was used in this study. Standard 2D surface parameter (Ra) used to evaluate of the smoothness. Only useful factor influence on surface quality during milling of oboeche and spruce turned out degree of tool wear.

Klíčová slova: čelní frézování, drsnost povrchu, dřevo, 2D parametr povrchu, metoda Taguchi

KOPECKÝ, Z. – HLÁSKOVÁ, L. – ORLOWSKI, K. An innovative approach to prediction energetic effects of wood cutting process with circular-saw blades. *Wood Research*. 2014. sv. 59, č. 5, s. 827–834. ISSN 1336-4561.

In the classical approach, energetic effects (cutting forces and cutting power) of wood sawing process are generally calculated on the basis of the specific cutting resistance, which is in the case of wood cutting the function of more or less important factors. The aim of the paper is to present a new calculating model using the application of modern fracture mechanics and to compare cutting parameters of native beech, Bendywood and Belmadur. Cutting and feed forces are determined by the application of the Ernst-Merchant theory in the conditions of circular-saw blade cutting. It includes the prediction of the shear plane angle for the cutting models, which include fracture toughness in addition to plasticity and friction, broaden possibilities of energetic effects modelling of the sawing process even for small values of the uncut chip.

Klíčová slova: lomová houževnatost, nativní buk, pilový kotouč, bendywood, belmadur, lomová mechanika, řezný odpor, stříhová mez kluzu

TIPPNER, J. – GRYC, V. – BAAR, J. The Relation of Fibre Length and Ray Dimensions to Sound Propagation velocity in wood of selected Tropical Hardwoods. *IAWA Journal*. 2013. sv. 34, č. 1, s. 49–60. ISSN 0928-1541.

This study investigates the relation of fibre length and ray dimensions to the sound propagation velocity in four commercial tropical hardwoods. The species used in the study were Doussié (*Azelia bipindensis* Harms), Merbau (*Intsia bijuga* (Colebr.) Kuntze), Muiracatiara (*Astronium graveolens* Jacq.) and Wengé (*Millettia laurentii* De Wild.). The sound propagation velocity was established by the frequency-resonance method. A positive correlation was obtained between fibre length and sound velocity within species. The correlation was stronger in species with a higher proportion of libriform fibres. A trend analogous to fibre length within species was observed for ray ratio but, in contrast to fibre length, the correlation was strong also between species. The samples with higher and at the same time narrower rays (higher ray ratio) showed a higher velocity of sound propagation along the grain.

Klíčová slova: rozměry dřevových paprsků, *Millettia*, délka vláken, *Intsia*, *Azelia*, rychlost zvuku, *Astronium*

DÖMÉNY, J. – KOIŠ, V. – ZAPLETAL, M. Application of Microwave Treatment for the Plasticisation of Beech Wood (*Fagus sylvatica* L.) and its Densification for Flooring System Purposes. *BioResources*. 2014. sv. 9, č. 4, s. 7519–7528. ISSN 1930-2126. URL: http://www.ncsu.edu/bioresources/BioRes_09/BioRes_09_4_7519_Domeny_KZ_App_Microwave_Treat_Plasticization_Beech_6047.pdf

In this study, the application of microwave treatment for wood plasticisation and its densification for flooring system purposes is presented. Microwave plasticisation was carried out using a continuous laboratory device at a frequency of 2.45 GHz, and the testing samples made from European beech (*Fagus sylvatica* L.) wood were plasticised at different power modes (2 kW, 3.5 kW, and 5 kW). Afterwards, the densification (ratio 50%) of pre-treated samples was performed. The surface temperature (T_s) and average moisture content (MC) of the samples were measured after plasticisation. The results showed the influence of the chosen mode on MC decrease and rapid T_s increase. Thus, the densification of testing samples is affected by different initial conditions that occur during the plasticisation process (MC and T_s). The Brinell hardness (HB) of the densified samples increased by about 57% (2 kW), 103% (3.5 kW), and 83% (5 kW), compared with control samples. These results provide a better understanding of microwave plasticisation usability and its potential optimisation and application in the wood flooring industry.

Klíčová slova: vysokofrekvenční energie, hustota, plastifikace

LAVICKÝ, M. – KRÁL, P. Vady dřeva jako primární příčiny havárie. *Soudní inženýrství*. 2013. sv. 24, č. 3, s. 195–200. ISSN 1211-443X.

Článek popisuje dva konkrétní případy havárií, u nichž se při analýze prováděné v rámci znaleckého posudku ukázalo, že pravděpodobnými primárními příčinami zřícení konstrukce jsou vady dřeva. Prvním případem je zřícení dřevěné pracovní plošiny sloužící jako lešení při výstavbě zděné výtahové šachty. Druhým případem je selhání konstrukce montážního podepření spřažené stropní konstrukce z keramicko-betonových nosníků s prostorovou výztuží a cihelných stropních vložek MIAKO.

Klíčová slova: zřícení konstrukce, Havárie, vada dřeva

BAAR, J. – TIPPNER, J. – RADEMACHER, P. Prediction of mechanical properties – modulus of rupture and modulus of elasticity – of five tropical species by nondestructive methods. *Maderas: Ciencia y tecnología*. 2015. sv. 17, č. 2, s. 239–252. ISSN 0717-3644.

This paper analyzes the usability of different dynamic moduli of elasticity and wood density for the prediction of mechanical properties – static modulus of elasticity and modulus of rupture – in samples with grain deflection from the longitudinal direction. Five tropical hardwoods (*Azela bipindensis*, *Intsia bijuga*, *Millettia laurentii*, *Astronium graveolens* and *Microberlinia brazzavillensis*) with different grain characteristics were used for this purpose. The fiber deflection was caused by the presence of interlocked grain or the working process. The three nondestructive techniques used in this study – longitudinal and flexural resonance method and ultrasound method – provided higher values of modulus of elasticity than the static bending test, but close correlation was observed between these variables. The weakest correlation was found for the ultrasound method which is probably caused by its measuring mechanism. The prediction of the modulus of rupture is less accurate when the dynamic modulus of elasticity is compared with the static modulus of elasticity; on the other hand, it was still good in comparison with the density model, which is inapplicable when grain deflection occurs in wood. In the wood of *Zebrano* where the interlocked grain was strongly developed, almost all of the correlation coefficients showed the lowest values and the prediction of modulus of rupture by nondestructive techniques was unsatisfactory.

Klíčová slova: dynamický modul pružnosti, mez pevnosti, tropické dřevo, hustota, nedestruktivní metody

BAAR, J. – WIMMER, R. – DAMICO, S. Dependence of colour and discolouration on total extractive content of African Padauk and Jatoba. *Wood science and technology*. 2014. sv. 48, č. 6, s. 1155–1165. ISSN 0043-7719.

This study is about relationships between total extractive contents, heartwood colour and light-induced discolourations of the tropical species African Padauk (*Pterocarpus soyauxii* Taub) and Jatoba (*Hymenaea courbaril* L.). Wood surface colour was measured spectrophotometrically before and after light irradiation. Subsequently, the total extractive content was determined and linked to the colour parameters. Total extractive content varied between 6 % (Jatoba) and 27 % (African Padauk). The fact that non-irradiated Jatoba appeared lighter and more yellow with higher extractives contents, opposed the often assumed relationship that more heartwood extractives cause darker wood. For light-irradiated Jatoba wood only the reddishness was more intense when samples had higher extractive content. In contrast, light-irradiated African Padauk showed significant differences in all colour parameters as extractives varied. High overall colour change in African Padauk due to light irradiation was observed; however, no relationship with the extractive content existed. In contrast, discolouration rate of Jatoba wood strongly varied with its extractive content. Individual wood species react differently during exposure to light and therefore require specific surface treatment to maintain the desired colour appearance and colour stability.

Klíčová slova: světlostálost, tropické dřevo, barva dřeva, extraktivní látky

Elektronické dokumenty (textové a hypertextové dokumenty, databáze, prezentace)

KLÍMOVÁ, H. – TIPPNER, J. – SEBERA, V. Elastic Material Constants of MDF. [disk]. 2014.

SLÁČÍK, P. – ZAPLETAL, M. Klasifikační třídy zkoušených vlastností oken a vchodových dveří Využitelnost klasifikace pro použití v praxi. [online]. 2013. URL: <http://stavba.tzb-info.cz/okna-dvere/9695-klasifikacni-tridy-zkousenych-vlastnosti-oken-a-vchodovych-dveri>.

Příspěvek se zabývá obecnou problematikou klasifikace oken a vchodových dveří z pohledu dosažených výsledků zkoušek a jejich využitelností. Znalost klasifikace oken a vchodových dveří je vhodná jak pro výrobce a dodavatele, tak pro architekty a projektanty z hlediska návrhu vhodné okenní a dveřní konstrukce při předpokládaném zabudování v daném typu budovy a větrné oblasti v ČR.

Klíčová slova: dveře, klasifikační třída, okna

LACONTE, S. Wood Musick Opening Conference. [jiný]. Paris (France). 2014.

TIPPNER, J. – SEBERA, V. Vibro-acoustic Properties of Wood and Wooden Musical Instruments. [jiný]. Paris, City of Music. 2014.

Klíčová slova: Akustika, hudební nástroje, numerické výpočty

Kapitola v knize

KOPECKÝ, Z. – HLÁSKOVÁ, L. – KOWALSKI, M. – ROUSEK, M. *Wskaźniki energetyczne procesu obróbki drewna modyfikowanego chemicznie i ciśnieniowo*. In: *Obróbka skrawaniem 7 – Interakcja proces-obrabiarka*. I. Poznań: Politechnika Poznańska, 2013. s. 65–72. ISBN 978-83-7775-268-5.

W przemyśle drzewnym cięcie piłami tarczowymi jest jedną z najczęściej wykorzystywanych operacji rozdzielania materiału. Pomimo wieloletnich, szczegółowych badań z zakresu teorii i praktyki skrawania materiałów drewnianych nie udało się dotychczas stworzyć zaleceń, na podstawie których byłoby możliwe dokładne określenie wartości siły skrawania i oporu skrawania występujących w trakcie przecinania drewna. Określenie wartości poszczególnych składowych oporu skrawania jest, w przypadku obróbki drewna, bardzo skomplikowane. Związane to jest z anizotropowością w budowie wewnętrznej drewna oraz ze zmianą właściwości fizycznych i mechanicznych drewna w zależności od kierunku włókien. W pracy zaprezentowano nowy model obliczeniowy oporu skrawania bazujący na zastosowaniu zasad mechaniki pęknięcia (modern fracture mechanics). Wartość siły skrawania i siły posuwowej może być określona przy dostosowaniu teorii Ernst–Merchanta do warunków charakterystycznych, jakie występują podczas przecinania drewna piłami tarczowymi, gdzie proces tworzenia się wióra jest decydującym czynnikiem przy określaniu siły: skrawania i posuwowej [Atkins 2003]. Model bazuje na określeniu pracy wewnętrznej potrzebnej do zwinienia a następnie oddzielenia wióra, a także na określeniu energii niezbędnej do pokonania tarcia między przedmiotem

Klíčová slova: pilový kotouč, modifikované dřevo, proces řezání dřeva

Odborná kniha

KOVÁČ, J. – KRILEK, J. – KUČERA, M. – KOPECKÝ, Z. – HLÁSKOVÁ, L. *Ergonomické parametry procesu řezání dřeva*. 1. vyd. Brno: Mendelova univerzita v Brně, 2013. 68 s. Folia, 3. ISBN 978-80-7375-766-3.

Důležitou činností v procesu těžby a prvotního zpracování dřeva je zkracování kmenů při výrobě sortimentů na lesních skládkách, na odvozním místě nebo v porostu. Výroba výřezů (řezání dřeva) je důležitá operace, bez níž se neobejde žádný lesní podnik. S procesem řezání dřeva souvisí výběr nejvhodnějšího nástroje pro dané podmínky a volba nejdůležitějších parametrů procesu řezání, řezné a posuvné rychlosti. Řezné mechanismy kromě toho musí splňovat další kritéria – vysokou řezivost, pevnost materiálu, trvanlivost, provozní spolehlivost, optimální možnost opravy a údržby, nízkou energetickou náročnost a optimalizované ergonomické aspekty práce v daném procesu. Předkládaná publikace je zaměřena na poznání procesu příčného dělení dřeva řetězovými řeznými mechanismy a kotoučovými pilami, se zahrnutím vhodných podmínek řezání dřevní hmoty a řezných nástrojů s ohledem na ergonomické aspekty celého procesu.

Klíčová slova: řezný proces, ergonomie, pilový řetěz, pilový kotouč

Trendy v nábytkářství a bydlení 2013 : 22.-23. května 2013, Křtiny. Brno: Mendelova univerzita v Brně, 2013. 294 s. ISBN 978-80-7375-756-4.

TESAŘOVÁ, D. a kol. *Povrchové úpravy dřeva : [lakování, moření, lazurování a lepení]*. 1. vyd. Praha: Grada, 2014. 134 s. ISBN 978-80-247-4715-6.

Kniha se zabývá problematikou lepení dřeva a problematikou povrchové úpravy dřeva, a to jak to interiéru tak do exteriéru. Zvláštní pozornost je věnována vhodným nátěrovým hmotám pro dokončování povrchových úprav, vzniku vad povrchových úprav a jejich odstraňování. V kapitolách věnovaných lepení je věnována pozornost nejen jednotlivým druhům lepidel, jejich aplikace, vzniku vad a jejich odstraňování.

Klíčová slova: Povrchové úpravy, lepení, nátěrové hmoty, lepidla , vady lepení, vady povrchových úprav

TESAŘOVÁ, D. – HLAVATÝ, J. – ČECH, P. *Povrchové úpravy dřeva*. 1. vyd. Praha: grada Publishing , a.s., 2014. 136 s. 168. ISBN 978-80-247-4715-6.

Kniha pojednává podává přehled o dokončování povrchové úpravy a lepení výrobků ze dřeva, které jsou umístěné v interiéru a v exteriéru. Po teoretickém přehledu podstaty dokončování povrchové úpravy a podstaty tvorby lepeného spoje následuje přehled nevýznamnějších zástupců nátěrových hmot a způsobů jejich nanášení a nejvýznamnějších zástupců lepidel. V knize je dále věnovaná pozornost technologickým způsobům dokončování povrchových úprav a odstraňování vzniklých vad. Po dokončování povrchových úprav je věnovaná pozornost způsobům lepení používaným při výrobě výrobků ze dřeva. Závěr knihy se věnuje i problematice možných míst vzniku vad lepených spojů.

Klíčová slova: povrch dřeva, dokončování dřeva v interiéru i exteriéru , lepení dřeva v exteriéru a interiéru, nátěrové hmoty, lepidla

TESAŘOVÁ, D. – STRNADOVÁ, A. *Nábytek made in Brno*. 1. vyd. Brno: Mendelova univerzita v Brně, 2014. 55 s. ISBN 978-80-7509-155-0.

Kniha se zabývá historií výroby a navrhování a vývoje nábytku v oblasti Brna a jeho okolí v období let 1950 až do současnosti. V knize je věnována pozornost zejména významným nábytkovým designerům a také novým trendům dokončování povrchových úprav

Klíčová slova: Halabala, VVÚN, historie nábytku, 50-léta

Patent nebo jiný výsledek chráněný podle zvláštních právních předpisů

MENDELOVA UNIVERZITA V BRNĚ. *Způsob rovnoměrného plošného zhušťování dřeva, zejména smrkového.* MERENDA, L. – DEJMAL, A. – NIKL, K. 304024, Úřad průmyslového vlastnictví, Česká republika. URL: <http://spisy.upv.cz/Patents/FullDocuments/304/304024.pdf>

Dokument popisuje způsob rovnoměrného plošného zhušťování dřeva a dřevěných materiálů, zejména se zaměřením na dřevo smrkové. Dřevo o vlhkosti 22 až 35% se vloží do mikrovlnného aplikátoru. Zde dojde ke zvýšení teploty na 60 až 80 °C, a plastifikuje se. Následně se slisuje a ve slisovaném stavu vysuší na požadovanou rovnovážnou vlhkost. Stupeň komprimace je až 60 %. Pomocí tohoto způsobu je zhodnoceno měkké tuzemské dřevo. Výsledný produkt umožňuje nahradit dovážená tvrdá dřeva.

Klíčová slova: zhušťování, dřevo, smrk

MENDELOVA UNIVERZITA V BRNĚ. *Způsob povrchového zušlechtění dřeva a dřevěných materiálů.* NIKL, K. – HORÁČEK, P. – DEJMAL, A. 304025, Úřad průmyslového vlastnictví, Česká republika. URL: <http://spisy.upv.cz/Patents/FullDocuments/304/304025.pdf>

Způsob zušlechtění povrchů masivního dřeva a materiálů na bázi masivního dřeva, které byly upraveny při teplotách 150–210 °C a následně slisovány tlakem 250 až 350 kPa. Způsob se skládá z fáze povrchové úpravy dřeva rovnoběžným drážkováním trojúhelníkovitého tvaru, následně je dřevo plastifikováno a částečně slisováno a sušeno. Poté se proces drážkování opakuje s tím, že vrchol drážkování je posunut do středu mezi původní dva vrcholy. Takto upravený materiál se opět plastifikuje a slisuje se tak, aby povrch tvořil jednu rovinu. Jedná se způsob povrchového zhuštění masivního dřeva.

Klíčová slova: lisování, zušlechtění povrchu, teplota, masivní dřevo

MENDELOVA UNIVERZITA V BRNĚ. *Způsob tepelné modifikace dřeva, zejména dřeva slisovaného smrkového.* DEJMAL, A. – MERENDA, L. – ZEJDA, J. 304026, Úřad průmyslového vlastnictví, Česká republika. URL: <http://spisy.upv.cz/Patents/FullDocuments/304/304026.pdf>

Tepelná úprava lisovaného smrkového dřeva za účelem rozměrové stabilizace dřevěného materiálu. Slisované dřevo díky vyšší hustotě více bobtná. Dodatečná tepelná úprava slisovaného dřeva pomocí vysokých teplot (170 až 240 °C) sníží příjem vlhkosti dřeva a eliminuje rozměrové změny. Dřevo navíc získá tmavší odstín exotických dřev a je vhodnější do prostředí s vyšší vlhkostí.

Klíčová slova: vysoká teplota, lisované dřevo, bobtnání

MENDELOVA UNIVERZITA V BRNĚ. *Způsob povrchového zušlechtění dřeva a dřevěných materiálů.* NIKL, K. – HORÁČEK, P. – DEJMAL, A. 304025, Úřad průmyslového vlastnictví, Česká republika. URL: <http://spisy.upv.cz/Patents/FullDocuments/304/304025.pdf>

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Klíčová slova: lisování, zušlechtění povrchu, teplota, masivní dřevo

MENDELOVA UNIVERZITA V BRNĚ. *Způsob tepelné modifikace dřeva, zejména dřeva slisovaného smrkového.* DEJMAL, A. – MERENDA, L. – ZEJDA, J. 304026, Úřad průmyslového vlastnictví, Česká republika. URL: <http://spisy.upv.cz/Patents/FullDocuments/304/304026.pdf>

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Patent nebo jiný výsledek chráněný podle zvláštních právních předpisů

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MENDELOVA UNIVERZITA V BRNĚ. *Způsob rovnoměrného plošného zhušťování dřeva, zejména smrkového.* MERENDA, L. – DEJMAL, A. – NIKL, K. 304024, Úřad průmyslového vlastnictví, Česká republika. URL: <http://spisy.upv.cz/Patents/FullDocuments/304/304024.pdf>

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Klíčová slova: zhušťování, dřevo, smrk

Sborník

PETrA Pollution and Environment-Treatment of Air. 1. vyd. Beroun: Od. our Ltd, 2013. 1. ISBN 978-80-02-02464-4.

INTERNATIONAL CONFERENCE "WOOD SCIENCE AND ENGINEERING IN THE THIRD MILLENNIUM"– ICWSE 2013. 9. vyd. Romania: Transilvania University of Brasov, 2013. ISSN 1843-2689.

SilvaNet-WoodNet 2014. 1. vyd. Brno: Mendelova univerzita v Brně, 2014. 126 s. ISBN 978-80-7509-137-6.

Technicky realizované výsledky (prototyp, funkční vzorek)

PETR NOVAGUE. *design hliníkové židle*. NOVAGUE, P. 2012.

EDGE je odolná, stohovatelná, celohliníková židle vyvinutá pro univerzální užití v interiéru i exteriéru.

Klíčová slova: hliníková židle stohovatelná

MENDELOVA UNIVERZITA V BRNĚ. *Věšáky "Rohatý"*. ŠPRDLÍK, V. – MIHAILOVIĆ, S. 2014. URL: <http://www.designmagazin.cz/bienale-studentskeho-designu-vystavuje-238-praci.html>

Rohatý jsou věšáky, které získaly svůj název podobností s rohy zvířat. Konstrukce věšáků je pevná s co nejjednoduššími spoji. Věšáky byly navrženy do prostředí střední Ameriky a koncipovány jako otevřené skříně vzhledem k místní vlhkosti a náchylnosti k plísním. Celá konstrukce je z masivního dřeva, odkládací plochy jsou vyrobeny z ratanového výpletu, který je pro oblast Nikaragui typický. Masivní prvky jsou kartáčované a dokončeny voskováním.

Klíčová slova: bukový masiv, věšák, ratanový výplet

MENDELOVA UNIVERZITA V BRNĚ. *Performe – židle z ohýbané překližky*. MIHAILOVIĆ, S. – ŠPRDLÍK, V. 2014. URL: <https://www.facebook.com/events/291420541052329>

Performe je flat pack židle z bukové překližky, která je tvořena 5 dílci. Ohnutí překližky je dosaženo pomocí perforací v ploše. Na složení není třeba žádné lepidlo, ani jiné spojovací prostředky.

Klíčová slova: perforace, ohýbaní dřeva, buková překližka

PETR NOVAGUE. *design hliníkové židle*. NOVAGUE, P. 2012.

EDGE je odolná, stohovatelná, celohliníková židle vyvinutá pro univerzální užití v interiéru i exteriéru.

Klíčová slova: hliníková židle stohovatelná

Výsledky s právní ochranou (užitný vzor, průmyslový vzor)

MENDELOVA UNIVERZITA V BRNĚ. *Zařízení na výrobu desek na bázi dřeva s vylepšeným hustotním profilem.* KLÍMEK, P. – WIMMER, R. 2015-30572, Úřad průmyslového vlastnictví, Česká republika. URL: <http://spisy.upv.cz/UtilityModels/FullDocuments/FDUM0028/uv028072.pdf>

Technické řešení spadá do oblasti změny hustotního profilu, a to jak plošného, tak i vertikálního při výrobě třískových a vláknitých desek. Cílem technického řešení je představení lisovacího nástroje a procesu, který zlepší hustotní profil desek a tím vlastnosti desek, aniž by se musel zvýšit hmotnost či rozměry desky. To vše za využití stávající dostupné technologie

Klíčová slova: kompozitní materiál, dřevotřísková deska, lisování

UNIVERZITA TOMÁŠE BATI VE ZLÍNĚ. *Zařízení ke kontinuálnímu ekologicky šetrnému odstraňování škodlivých organismů z elektricky nevodivých materiálů.* DVOŘÁK, Z. – HORÁČEK, P. – KŘŮMAL, M. 24786, Úřad průmyslového vlastnictví, Česká republika. URL: <http://spisy.upv.cz/UtilityModels/FullDocuments/FDUM0024/uv024086.pdf>

Technické řešení se týká zařízení ke kontinuálnímu ekologicky šetrnému odstraňování škodlivých organismů z elektricky nevodivých materiálů, zejména pak dezinfekci a dezinfekci těchto materiálů bez použití chemických prostředků, případně jejich sterilizaci bez použití zatěžujícího kontaktního ohřevu.

Klíčová slova: sterilizace, mikrovlnné záření, materiálové inženýrství

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Garant projektu: prof. Dr. Ing. Petr Horáček

Pracoviště projektu: Ústav nauky o dřevě (LDF)

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