

## Lech Muszyński, CURRICULUM VITAE

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### EDUCATION:

Ph.D. in Forestry and Wood Technology, Agricultural University of Poznań\*

M.S. in Wood Technology, Agricultural University of Poznań\*

*\*currently the University of Life Sciences in Poznań, Poland*

### PROFESSIONAL EXPERIENCE:

2010-present Associate Professor, Wood Science and Engineering, Oregon State University

2014 (Sept): Visiting Professor, Mendel University in Brno, Czech Republic (1 month)

2011-2012: Visiting Professor, Vienna University of Technology, Vienna, Austria (10 months)

2004-2010: Assistant Professor, Wood Science and Engineering, Oregon State University

2006-present Graduate Faculty, Department of Material Sciences, Oregon State University

2004-present Faculty Member of the Wood-Based Composites Center (WBC)

2001-2009: External Graduate Faculty, Department of Forest Management, University of Maine.

2000-2004: Assistant Scientist, Advanced Engineered Wood Composites Center, University of Maine.

1998-2000: Post-Doctoral Research Associate, Advanced Engineered Wood Composites Center, University of Maine.

1997-1998: Assistant Professor, Dept. of Eng. Mechanics and Thermal Techniques, Agricultural University of Poznań.

1987-1997: Graduate Teaching & Research Assistant, Dept. of Eng. Mechanics and Thermal Techniques, Agricultural University of Poznań.

### RESEARCH FIELDS:

Structure-property relations in bio-based composites: Micro-morphology and micromechanics of bio-composites;  
Application of advanced optical measurement techniques: Digital Image Analysis (DIA), Digital Image Correlation (DIC), Computed Tomography (CT)

Advanced hybrid wood-plastic and wood-FRP composites: interface performance, bonding, durability, damage assessment, fracture properties, coatings and multifunctional barriers

Cross laminated timber (CLT) technology

Mechanics of wood and wood composites: time dependent phenomena, hygro-mechanical behavior, mechano-sorption, drying stresses in wood (detection, measurement and modeling)

### AWARDS:

2012 Markwardt Wood Engineering Award, by FPS for an article in Wood and Fiber Science (to: R. Lagaña, W. Davids, **L. Muszyński** and S.M. Shaler)

2012 The George G. Marra Award, First Place, by SWST: for excellence in writing and science (to: R. Lagaña, W. Davids, **L. Muszyński** and S.M. Shaler)

2011 [International Professional Visiting Professor Award](#), by the Society of Wood Science and Technology

2004 Best Testing and Design Technical Paper Award presented by American Composites Manufacturers Association (ACMA), (to: R. Lopez-Anido, F.W. El-Chiti, **L. Muszyński**, H.J. Dagher, L.D. Thompson, P.E. Hess)

2004 [International Professional Visiting Scientist Award](#), by the Society of Wood Science and Technology

2003 The [George G. Marra Award](#), First Place, by the Society of Wood Science and Technology (SWST): for excellence in writing and science (to: **L. Muszyński**, F. Wang and S.M. Shaler).

- 1998 Rector's Award for scientific achievements for AY 1997/8, Agricultural University of Poznań
- 1996 IUFRO Development Fund competition - travel-grant to participate in the 5th IUFRO Wood Drying Conference held in Quebec, Canada, in 1996
- 1996 Travel-grant from Stefan Batory Foundation (agency of Soros Foundation in Poland)
- 1995 Rector's Award for scientific achievements for AY 1994/5, Agricultural University of Poznań

## **GRANTS**

- 2014 S. Leavengood & L. Muszynski (2014): Checking in maple plywood (F-02-LE). Wood-Based Composites Center NSF I/UCRC, (\$15,000/6 mo) funded
- 2014 L. Muszyński, A. Barbosa, A. Sinha, R. Gupta, J. Redfield (2014): Commercialization of Cross Laminated Timber Panels Production in Oregon. Oregon Built Environment & Sustainable Technologies Center (BEST) Commercialization Grants (ref. # CG-SOW-2014-OSU-Riddle Laminators), (\$150,000/24 months) funded
- 2014 L. Muszyński (2014): DeLoach Work Scholarship support for Aaron Weidman (\$1,000)
- 2013 L. Muszyński (2013): CoF Board of Visitors Student Success Award 2013-14 (for Aaron Weidman) (\$5,000)
- 2013 J.A. Nairn, F. A. Kamke, L. Muszyński (2013): Nonlinear micro-mechanics and failure analysis of wood adhesive bonds. USDA NIFA FPR, Proposal #: 2013-05977 (\$289,763 /36 months), funded
- 2013 L. Muszyński, A. Sinha, A. Barbosa, R. Gupta (2013): Hybrid CLT panels for sustainable building solutions. USDA NIFA FPR, Proposal #: 2013-05978 (\$289,942/36 months), funded
- 2012 L. Schimleck, E. Hansen, C. Knowles, L. Muszynski (2012): Multicultural Scholarships to Develop Professionals in Renewable Materials & Sustainability, USDA NIFA MSP, (\$191,000/72 mo)
- 2012 L. Muszyński, J. Nairn (2012): Load transfer in wood-plastic composites filled with low-grade woody biomass. OSU Center for Wood Utilization Research, (\$53,000/24 mo), USDA
- 2012 L. Muszyński (2012): OSU College of Forestry Board of Visitors Student Success Award 2011-12 (for Ben Sundberg) (\$4,960)
- 2012 L. Muszyński (2012): CoF Board of Visitors Student Success Award 2011-12 (for Ben Sundberg) (\$4,960)
- 2011 L. Muszyński, M. Schwarzkopf (2011): Integrated stereo-microscopic system for optical measurements of 3D deformation and strain fields in microscopic material samples. OSU Research Equipment Reserve Fund (RERF) Fall 2011, (\$93,335)
- 2011 L. Muszyński (2011): DeLoach Work Scholarship support for Ben Sundberg (\$1,000)
- 2011 L. Muszyński (2011): CoF Board of Visitors Student Success Award 2011-12 (for Ben Sundberg) (\$4,960)
- 2010 L. Muszyński (2010): CoF Board of Visitors Student Success Award 2010-11 (for Ben Sundberg) (\$4,960)
- 2010 Todorovic, S., L. Muszyński (2010): Advancing Bio-based Composites by Automated Image Analysis. OSU General Research Fund (GRF) - Fall 2010-11: (\$9,978/ 12 mo)
- 2010 Smith G.D., L. Muszyński, J. Simonsen (2010): Resin Efficiency for Non-Structural Panels, Wood-Based Composites Center NSF I/UCRC, (\$59,500/12 mo)
- 2010 Kamke, F., J.A. Nairn, L. Muszyński (2010): Evaluation of the effect of novel OSB resin application technique on the adhesive bond performance. Wood-Based Composites Center NSF I/UCRC (\$85,360/12 mo)
- 2010 S. Leavengood, L. Muszyński, L. Ganio (2010): Key Variables Influencing Checking in Maple Veneer Plywood. OSU Center for Wood Utilization Research, (\$55,771/24 mo), USDA
- 2009 J. Simonsen, J. Nairn, L. Muszyński (2009): Development of high performance cellulose-based nanocomposites. OSU Center for Wood Utilization Research, (\$94,800/24 mo), USDA
- 2008 L. Muszyński, F. Kamke E.N. Hansen, C. Knowles (2008): Team-oriented graduate training in forest resources utilization and advanced forest-based products marketing. USDA NNF Program (\$129,000, 60 mo) Award# 2008-03569
- 2008 J. Simonsen, L. Muszyński, W. Tze, S. Ramaswamy (PIs): Replacing petroleum-based polymers with a novel reinforced biopolymer system, USDA NRI (\$496,711, 36mo)

- 2008 J.A. Nairn, L. Muszyński (PIs): Morphology Based Modeling of Micro-Mechanics and Failure Mechanisms in Bio-Materials with Polymer Matrices, USDA NRI (\$397,311, 36 mo)
- 2006 L. Muszyński: Empirical Data for Modeling: Development of Integrated Experimental Protocols for Wood and Wood-Based Composites, (\$237,200), McIntire-Stennis Project
- 2005 L. Muszyński: Mechano-sorptive characteristics of three NW softwoods in compression parallel to the grain. OSU Center for Wood Utilization Research, (\$79,923/36 mo)
- 2005 L. Muszyński, J. Yamamuro (2005): Integrated device for full-field, non-contact measurement of displacements and strains based on high-resolution 3D image correlation, OSU Research Equipment Reserve Fund (RERF) Fall 2004-05, (\$66,938)
- 2002 L. Muszyński, M. Wålinder, C. Pîrvu & D.J. Gardner, Assessment of Water Penetration Resistance of Coatings on Wood by Droplet Dynamics Anal. USDA NRI (\$100,000/24 mo).
- 2000 L. Muszyński, S.M. Shaler: Determination of the mechano-sorptive properties of wood on material level. USDA NRI (\$113,500/24 mo)

### **TEACHING current**

Physical & Mechanical Properties of Renewable Materials (OSU, WSE322);  
Renewable Materials Laboratory (OSU, WSE324);

### **TEACHING past**

Advanced Topics in Wood-Based Composites (Mendel Univ, Brno)  
Composites Manufacturing (Vienna TU, E202.645);  
Mech. Prop. Wood (Vienna TU, E202.644);  
Wood & Fiber Physics (OSU, WSE314);  
Composites Manufacturing (OSU, WSE442/542);  
Mechanics of Wood and Wood-Based Composites (U Maine);  
Engineering Mechanics (AU Poznań)

### **INTERNATIONAL EXCHANGES**

**Visiting Scientists:** Dr. Chun-Won Kang, Chonbuk N.U., Korea (2011/13); Vaclav Sebera, Fulbright fellow, Mendel University, Brno, Czech Republic (2009/10); Hayedeh Rahmati, Gorgan, Iran (2009); Dr. Ho-Yang Kang, Chungnam National University, Korea (2006/8), Regis Pommier, Fulbright fellow, Technical University of Bordeaux, France (2006)

**Interns/Trainees:** Quentin Grenaoulillet & Mathieu Niemczyk (2014), Nicolas Fressard (2013), Mélanie Noyel & Thomas Pisaneschi, ENSTIB, Epinal, France (2010); Boris Clouet, UTT, Troyes, France (2007/8); Himanshu Pathak, IIT, Kanpur, India (2007); Saaransh Gulati, IIT, Kanpur, India (2007); Jerome Lonjaret, IUP, France (2006/7); Jagannathan Madhusudan, IIT, Kanpur, India (2006); Aurelien Sevrain, ENSAM, France (2006); Henrik Lund Fransen, Aalborg University, Denmark (2005)

### **PROFESSIONAL SOCIETIES**

FPS Forest Products Society, since 2000 (vice chair 2003 of the Northeast Section)  
SWST Society of Wood Science and Technology, since 2000  
SEM Society for Experimental Mechanics 2000, 2002

### **EXTERNAL REVIEWER FOR**

Wood & Fiber Sci., SWST; J. Eng. Mechanics, ASCE; J. Mat. in Civil Eng., ASCE; Holzforschung; J. Adhesion Sci. & Technol.; Drying Technology, Int. J.; Elsevier Composites Part A: Applied Sci. & Manufacturing; Elsevier: Composites Sci. & Technol.; Cellulose A (by Springer); Forest Prod. J.; Mechanics of Materials; J. Applied Polymer Sci.; J. Cultural Heritage; Wood Mat. Sci. & Eng. Eng. Structures.

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## SELECTED PUBLICATIONS

### Publications in refereed journals:

- Schwarzkopf M, L. Muszyński (2014): Stereomicroscopic optical method for the assessment of load transfer patterns across the wood-adhesive bond interphase. *Holzforschung HOLZ*.2014.0098 (in press)
- Kang C-W, M. Schwarzkopf, L. Muszyński, T. Jin, H-J. Park, H-Y. Kang and J. Matsumura (2014): Mechanical Behavior of Separated Earlywood and Latewood of Douglas-Fir Using Digital Image Correlation Method. *Journal of Faculty of Agriculture, Kyushu Univ.* (ISSN: 0023-6152), 59 (1), 127-131
- Schwarzkopf M, L. Muszyński, J.A. Nairn, X. Lin (2014): An Integrated Method for Measurement and Modeling of the Micromechanics of the Internal Bond in Wood Plastic Composites. *Holzforschung*. Published online: DOI: 10.1515/hf-2013-0243
- Kamke, F.A., J.A. Nairn, L. Muszyński, J.L. Paris, M. Schwarzkopf, and X. Xiao (2014): Methodology for micro-mechanical analysis of wood-adhesive bonds using XCT and numerical modeling. *Wood and Fiber Science*, 46(1): 1-14
- Sebera V., L. Muszyński, J. Tippner, M. Noyel, T. Pisaneschi, B. Sundberg (2013): FE Analysis of CLT Panel Subjected to Torsion and Verified by DIC. *Materials and Structures*. DOI 10.1617/s11527-013-0195-1.
- Baptista D., L. Muszyński, D.J. Gardner, E. Atzema (2012): Three dimensional droplet dynamics analysis. Part I: Experimental Setup and Model Demonstration. *Journal of Adhesion Science and Technology*: 26(18-19): 2199-2215
- Kang, H.-Y., L. Muszyński, M.R. Milota, C.-W. Kang and J. Matsumura (2011): Preliminary Tests for Optically Measuring Drying Strains and Check Formation in Wood. *Journal of the Faculty of Agriculture, Kyushu University* (ISSN: 0023-6152) 56(2), 313-316
- Lagaña, R., W. Davids, L. Muszyński and S.M. Shaler (2011): Moment-Curvature Analysis of Coupled Bending and Mechano-sorptive Response of Red Spruce Beams. *Wood and Fiber Science* 43(3): 280-292 (2012 G. Marra Award; 2012 Markwardt Wood Engineering Award)
- Sebera V., L. Muszyński (2011): Determination of local material properties of OSB sample by coupling advanced imaging techniques and morphology-based FEM simulation. *Holzforschung* 65: 811-818
- Kang, H-Y, L. Muszyński, M.R. Milota (2011): Optical Measurement of Deformations in Drying Lumber. *Drying Technology*, 29(2): 127-134
- Karas M., L. Muszyński (2011): Sustainable Bio-Composites for Highway Infrastructure: Feasibility of Material Substitution in Existing Products. *BioResources* 6(4), 3915-3932
- Cheng Q., L. Muszyński, S.M. Shaler, J. Wang (2010): Microstructural changes in wood plastic composites due to wetting and re-drying evaluated by X-ray microtomography. *Journal of Nondestructive Evaluation*. 29(4), 207-213
- Thompson, D.W., E.N. Hansen, C.D. Knowles, L. Muszyński (2010): Opportunities for wood plastic composite products in the U.S. highway construction sector. *Bioresources*, 5(3), 1336-1352
- Muszyński L. (2009): Imaging Wood Plastic Composites: X-Ray Computed Tomography, a Few Other Promising Techniques, and Why We Should Pay Attention, *Bioresources*, 4(3), 1210-1221
- Zhang X., L. Muszyński, D.J. Gardner (2009): Measuring resin-adhesive spray characteristics using a laser diffraction analyzer. *Forest Products Journal*, 59(1/2): 83-87
- Zhang X., D.J. Gardner, L. Muszyński (2009): Ultrasonic atomization of pMDI wood resin-adhesive. *Wood and Fiber Science*, 41(1): 84-89
- Zhang X., L. Muszyński, D.J. Gardner (2008): Spinning disk atomization of wood resin-adhesives: I. Spray characteristics, atomization mechanism and resin efficiency. *Forest Products Journal*, 58(11): 62-68
- Wang Y., L. Muszyński, J. Simonsen (2007): Gold as an X-ray CT Scanning Contrast Agent: Effect on the Mechanical Properties of Wood Plastic Composites. *Holzforschung*, 61(6): 723-730
- Muszyński L. (2006): Empirical Data for Modeling: Methodological Aspects in Experimentation Involving Hygro-Mechanical Characteristics of Wood. *Drying Technology* 24(9): 1115-1120
- Muszyński, L., R. Lagaña, and S.M. Shaler, (2006): Hygro-mechanical Behavior of Red Spruce in Tension Parallel to the Grain. *Wood and Fiber Science* 38(1): 155-165
- Lopez-Anido R., L. Muszyński, D.J. Gardner, B. Goodell, and B. Herzog, (2005): Performance-based material evaluation of fiber-reinforced polymer-wood interfaces in reinforced glulam members. *Journal of Testing and Evaluation*, 33 (6): 385-394
- Hong Y., L. Muszyński and R. Lopez-Anido (2005): Modeling and Calibration of a Laminating Press Prototype for FRP-

Glulam Billets. *Journal of Testing and Evaluation*, 33(6): (395-405)

- Muszyński, L., R. Lagaña, W. Davids, and S.M. Shaler, (2005): Comments on the experimental methodology for quantitative determination of the hygro-mechanical properties of wood. *Holzforschung*, 59(2): 232-239
- Herzog B., B. Goodell, R. Lopez-Anido, L. Muszyński, D.J. Gardner, and C. Tascioglu (2004): Effect of Creosote or Copper Naphthenate Preservative Treatments on Properties of FRP Composite Materials Used for Wood Reinforcement. *Journal of Advanced Materials, SAMPE*, 36(4): 11-17
- Herzog B., B. Goodell, R. Lopez-Anido, L. Muszyński, D.J. Gardner, W. Halteman, and Y. Qian, (2004): The Effect of Creosote and Copper Naphthenate Preservative Systems on The Adhesive Bondlines of FRP/Glulam Composite Beams. *Forest Products Journal*, 54(10): 82-90.
- Muszyński, L., F. Wang, S.M. Shaler, (2002): Short Term Creep Tests on Phenol Resorcinol Formaldehyde (PRF) Resin Undergoing Moisture Content Changes. *Wood and Fiber Science*, 34 (4): 612-624. (Marra Award 2003)
- Moliński, W., J. Raczkowski, L. Muszyński, (2000): Acoustic Emission Generated upon Mechano-Sorptive Creep of Wood Bent Across to the Grain under Asymmetrical Moistening. *Holzforschung*, 54: 305–308.
- Ganowicz, R., L. Muszyński, (1995): A simulation method for stresses in drying wood determination. (in Polish). *Zeszyty Naukowe Politechniki Gdańskiej. Series: Budownictwo Lądowe*. L, 520: 111-124.
- Muszyński, L. (1994): Stress concentration in wooden specimens during the bending test. *Holzforschung und Holzverwertung*, 46(1): 12-13

#### **Book chapters:**

- Karas M., L. Muszyński (2010): Sustainable Bio-Composites for Highway Infrastructure: Feasibility of Material Substitution in Existing Products. In: F. Caldeira (Ed.), *Minimizing the Environmental Impact of the Forest Products Industries*. Fernando Pessoa Editions, 2011. Porto, Portugal: 173-184
- Muszyński L., M.E. Launey (2010): Advanced imaging techniques in wood-based panels research. in: *Wood-Based Panels - An Introduction for Specialists. State-of-the-Art in Wood-Based Panels Research. COST Action E49*. 177-201
- Muszyński L., D. Baptista, D.J. Gardner (2006): A simple geometrical model to predict evaporative behavior of spherical sessile droplets on impermeable surfaces. in: *Contact Angle, Wettability and Adhesion*. vol. 4, Ed. K.L. Mital, VSP, Utrecht the Netherlands: 61-76
- Muszyński L., M.E.P. Wålinder, C. Pîrvu, D.J. Gardner, S.M. Shaler, (2003): Application of droplet dynamics analysis for assessment of water penetration resistance of coatings. in: *Contact Angle, Wettability and Adhesion*. vol. 3, Ed. K.L. Mital, VSP, Utrecht the Netherlands: 463 – 478.
- Ganowicz R., L. Muszyński, (1996). Recent trends in mechano-sorptive creep models for wood. in: A. Jakowluk (ed.). *Creep and Coupled Processes. Selected and revised papers of the 5th International Symposium on Creep and Coupled Processes, Białystok 28-30.09.1995*: 17-22.

#### **Peer-reviewed proceedings and other publications:**

- Burnard M., L. Muszyński, S. Leavengood, L. Ganio (2013): An Automated Optical Method for Assessing Surface Check Development in Veneer Overlays. COST Actions FP0904 and FP1006 „Characterization of modified wood in relation to wood bonding and coating performance“, October 16-18, 2013 at Rogla, Slovenia: ... pp.
- Schwarzkopf M, L. Muszyński, J.A. Nairn, X. Lin (2013): Empirical Investigation of Micromechanics of the Internal Bond in Wood Plastic Composites. *Proceedings of the 6th International Symposium on Wood Fibre Polymer Composites*, September 23-24, 2013, in Biarritz, France, 13 pp
- Muszyński L., F. Kamke, J. Nairn, M. Schwarzkopf, J. Paris (2013): Integrated Method For Multi-Scale/Multi-Modal Investigation Of Micro-Mechanical Wood-Adhesive Interaction. *Proceedings of the International Conference on Wood Adhesives*, Toronto, ON, Canada, October 9-11, 16 pp.
- Schwarzkopf M., L. Muszyński, J. Nairn, J. Paris (2013): Analysis of Load Transfer in Laminated Wood Composites Based on Optical Strain Measurements Across the Bondline: Interfacing Between Empirical Data and Numerical Simulations. *Proceedings of the International Conference on Wood Adhesives*, Toronto, ON, Canada, October 9-11, 9 pp.
- Nairn J.A., F. Kamke, L. Muszyński, J. Paris, and M. Schwarzkopf (2013): Direct 3D Numerical Simulation of Stresses and Strains in Wood Adhesive Bond Lines Based on Actual Specimen Anatomy from X-Ray Tomography Data. *Proceedings of the International Conference on Wood Adhesives*, Toronto, ON, Canada, October 9-11, 11 pp.
- Paris, J., F. Kamke, J.A. Nairn, M. Schwarzkopf and L. Muszyński (2013): Wood-Adhesive Penetration: Non-destructive, 3D visualization and quantification. *Proceedings of the International Conference on Wood Adhesives*, Toronto,

Ontario, Canada, October 9-11, 13pp.

- L. Muszyński, (2013): Peer Review in Renewable Materials Courses. Teaching With Writing: The ODU WIC Newsletter. <http://wic.oregonstate.edu/news/peer-review-renewable-materials-courses>. 4pp (invited feature paper)
- Karas M., L. Muszyński (2010): Utilization of Low Viability Assessment Method. In the proceedings of the 11th International Conference on Biocomposites: Transition to Green Material, Toronto, Canada, May 2-4, 2010 (in press) -grade W oody
- Muszyński L. (2009): Is what you see all you can get? Bridging experimentation and modeling with advanced imaging techniques. In proceedings of the Final Conference of COST Action E49: Processes and Performance of Wood-based Panels, Nantes, France, September 14-15, (Ed. M. Irle): 71-83 (invited keynote presentation)
- Cheng Q., L. Muszyński, S.M. Shaler, J. Wang (2009): Property Changes of Wood-Polypropylene Composites Due to Extended Moisture Cycling. In the proceedings of the 10th International Conference on Wood & Biofiber Plastic Composites and Cellulose Nanocomposites Symposium in Madison, WI, May 11-13: 232-237
- Hussain F., L. Muszyński (2009): Morphological and Micro-mechanical Characterization of Individual Wood Flour Particles used in WPCs. In the proceedings of the 10th International Conference on Wood & Biofiber Plastic Composites and Cellulose Nanocomposites Symposium in Madison, WI, May 11-13: 16 pp.
- Hussain F., L. Muszyński (2009): Tensile Fatigue Properties of Wood-PVC Composites. In the proceedings of the 10th International Conference on Wood & Biofiber Plastic Composites and Cellulose Nanocomposites Symposium in Madison, WI, May 11-13: 10 pp. (poster)
- Thompson, D.W., E.N. Hansen, C.D. Knowles, L. Muszyński (2009): Opportunities for Wood Plastic Composites in the Highway Construction Sector. Forest Business Solutions Research Brief, 7(3): 2 pp.
- Muszyński L., D.J. Gardner, X. Zhang (2009): Ultrasonic atomization of resins for bio-based composites industry: opportunities, challenges and limitations. In the proceedings of FPS International Conference on Wood Adhesives, Lake Tahoe, NV September 28-30, 2009: 81-84
- Wolcott M., L. Muszyński (2008): Position paper: "Materials and Wood-Based Composites" in: "Wood Engineering Challenges in the New Millennium – Critical Research Needs", Materials of Pre-Conference Workshop for ASCE Structures Congress April 23-24, 2008, Vancouver, BC, Canada: 36-45
- Wolcott M., L. Muszyński (2008): Summary report of discussion groups #3, 11 & 19: "Advanced Materials" in: "Wood Engineering Challenges in the New Millennium – Critical Research Needs", Materials of Pre-Conference Workshop for ASCE Structures Congress April 23-24, 2008, Vancouver, BC, Canada: 46-51
- Muszyński L. (2007): Imaging WPCs: X-Ray Computed Tomography. Wood Plastics Composites Workshop: WPC's 2007 – The changing technology in WPCs, April 1-4, Seattle, WA, 9 pp. (invited presentation)
- Sinha A., R. Gupta, L. Muszyński (2006): Load Sharing Between Gypsum Wall Board and Structural Wood Panel in Wood Frame Shear Walls. The 9th World Conference on Timber Engineering, WCTE 2006, August 6-10, Portland, OR
- Muszyński L., H.L. Frandsen (2006): Experimental characterization of the variability of Poisson effect in wood and wood-based composites. Integrated Approach to Wood Structure, Behaviour and Applications. Joint meeting of ESWM and COST Actions E35, May 14 -17, 2006, Florence, Italy: 72-75
- Frandsen H.L., L. Muszyński (2006): Significance of the time and strain dependent Poisson effect in wood and wood-based composites. Integrated Approach to Wood Structure, Behaviour and Applications. Joint meeting of ESWM and COST Actions E35, May 14 -17, 2006, Florence, Italy: 143-148
- Muszyński L., B.K. Bay, J. Simonsen (2005): Characterization of Micromechanical Performance and Internal Damage Accumulation in Wood-Plastic Composites. SEM Annual Conference & Exposition on Experimental and Applied Mechanics, June 7-9, Portland, OR (#: 311/063)
- El-Chiti F., R.A. Lopez-Anido, H.J. Dagher, L. Thompson, L. Muszyński, and P.E. Hess (2005): Experimental Approach for Characterizing VARTM Composites using a 3-D Digital Image Correlation System. SEM Annual Conference & Exposition on Experimental and Applied Mechanics, June 7-9, Portland, OR (#: 206/058)
- Muszyński, L., R. Lagaña, and S.M. Shaler, (2004): Characterization of hygro-mechanical properties of solid wood on the material level. Proceedings of the 8th World Conference on Timber Engineering, WCTE 2004, June 14-17, Lahti, Finland, Vol 2: 161-166.
- Lagaña, R., L. Muszyński, S.M. Shaler (2004): Mechano-Sorptive Properties of Red Spruce (*Picea Rubens*, Sarg.) in Compression Parallel to Grain. Proceedings of "Interaction of wood with various forms of energy", October 21-22, Zvolen, Slovakia, 143-149
- Lagaña R., W.G. Davids, L. Muszyński, S.M. Shaler (2004): Modeling of long term loaded wooden structural elements in variable climate, (in Slovak). In: Proceedings of 4th symposium Drevo v stavebných konštrukciách [Wood in

- Engineering structures], Bratislava-Kocovce, Slovakia, October 28-29, 2004: 91-104
- Lopez-Anido R., F.W. El-Chiti, L. Muszyński, H.J. Dagher, L.D. Thompson, P.E. Hess (2004): Composite Material Testing Using a 3-D Digital Image Correlation System. COMPOSITES 2004, Convention and Trade Show, American Composites Manufacturers Association, October 6-8, 2004, Tampa, FL: 7pp (ACMA award)
- Shaler, S.M., E. Landis, L. Muszyński, S. Vasic, Q. Cheng, (2003): Damage Assessment in Wood Plastic Composites (WPC) by Means of Material Level Microstructural Characterization. Proceedings of the 7th International Conference on Woodfiber-Plastic Composites, Madison, WI, May 19-20, 2003: 151 – 156.
- Muszyński L., M.E.P. Wälinder, C. Pîrvu, D.J. Gardner, (2003): Application of droplet dynamic method for characterization of water penetration into permeable surfaces. Proceedings of the 8th International IUFRO Wood Drying Conference. Brasov, Romania (August 24-29): 360-365.
- Muszyński, L., R. Lagaña, and S.M. Shaler, (2003): An optical method for characterization of basic hygro-mechanical properties of solid wood in tension. Proceedings of the 8th International IUFRO Wood Drying Conference. Brasov, Romania (August 24-29): 77-82.
- Muszyński, L., R. Lagaña, and S.M. Shaler, (2002): Requirements for experimental methods for quantification of the mechano-sorptive behavior of wood. Proceedings of “Quality Drying: The Key to Profitable Manufacturing” FPS Conference in Montreal (September 23-25): 185-188.
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#### **Patents and Other Intellectual Property**

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#### **Other scientific output**

148 professional conference presentations (+47 other presentations), 121 conference abstracts, 32 research reports