



Basis of Structural Timber Design
from Research to Standards



Member fact sheets WG2

COST Action FP1402 “Basis of Structural Timber Design from Research to Standards”

Working Group 2

“Solid / Massive Timber ”

Member fact sheets



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Prof. Dr. Reinhard Brandner – WG2 Leader (Austria)

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Graz, Austria

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COST FP1402, MC Member, WG2 Leader



| | | | |
|---|--|--|--------------|
| <i>Personal</i> | | <i>Organisation</i> | |
| Years of experience in relevant field: 9 Expertise: Timber Engineering , Wood technology, joints & fasteners, timber product modelling, probabilistic approaches, applied statistics, system modelling & effects Degree: PhD. (27.6.2012) | | Institute of Timber Engineering and Wood Technology (www.lignum.at , www.tugraz.at) Focus: theoretical and practical research/ innovation, design of structures and education / training) Facilities: own testing facilities (universal testing facility for max. 275 kN, tensile testing facility for max. 750 kN), climate chambers, joinery, etc.; access to testing facilities of institutions within the Building Technology Centre at TU Graz and to other facilities of TU Graz as well | |
| | | No. of staff | PhD students |
| | | 7 | 4 |
| | | | MSc/year |
| | | | 10 |
| <i>Research projects</i> | | | |
| COMET K-Project 'timber.engineering', 01/2008-12/2012, mainly staff of the competence centre holz.bau forschungs gmbh and of the institute, www.holzbauforschung.at COMET K-Project 'focus_sts', 01/2013-12/2016, mainly staff of the competence centre holz.bau forschungs gmbh and of the institute, www.holzbauforschung.at European Framework Programme 7 'Seismic Engineering Research Infrastructures for European Synergies (SERIES)', part Cross Laminated Timber, 07/2011-02/2013, Georg Flatscher, Andreas Ringhofer, Gerhard Schickhofer, www.series.upatras.gr/TIMBER_BUILDINGS FFG BRIDGE Project 'SCREWS', 03/2010-12/2012, Gernot Pirnbacher, Andreas Ringhofer, Gerhard Schickhofer | | | |
| <i>Publications</i> | | | |
| Bogensperger, T., Fitz, M., Hamm, P., Schickhofer, G. 2010, 'Untersuchungen des Schwingungsverhaltens von Deckensystemen aus Brettsper Holz (BSP)', Der Bauingenieur, Vol. 85, pp. 45 - 52. Brandner, R. 2013, 'Stochastic System Actions and Effects in Engineered Timber Products and Structures', Verlag der Technischen Universität Graz, ISBN 978-3-85125-263-7. Brandner, R., Schickhofer, G. 2014, 'Properties of Cross Laminated Timber (CLT) in Compression Perpendicular to Grain', 1st INTER-Meeting, INTER/47-12-5, Bath, UK. Harris, R., Ringhofer, A., Schickhofer, G. 2013, 'Focus Solid Timber Solutions - European Conference on Cross Laminated Timber (CLT)', The University of Bath, ISBN 978-1-85790-181-8. Jöbstl, R.A., Moosbrugger, T., Bogensperger, T., Schickhofer, G. 2006, 'A Contribution to the Design and System Effect of Cross Laminated Timber (CLT)', CIB-W18/39-12-4, Florenz, Italy. Hübner, U. 2014, 'Mechanische Kenngrößen von Buchen-, Eschen- und Robinienholz für lastabtragende Bauteile', Verlag der Technischen Universität Graz, ISBN 978-3-85125-314-6. Schickhofer, G., Bogensperger, T., Moosbrugger, T. (eds.) 2010, 'BSPHandbuch: Holz-Massivbauweise in Brettsper Holz - Nachweise auf Basis des neuen europäischen Normenkonzepts', Verlag der Technischen Universität Graz, ISBN 978-3-85125-109-8. Schickhofer, G. 2013, 'Starrer und nachgiebiger Verbund bei geschichteten, flächenhaften Holzstrukturen', Verlag der Technischen Universität Graz, ISBN 978-3-85125-262-0. | | | |

Prof. Dr. Roberto Tomasi – WG2 Vice leader (Italy)

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Trento Italy

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COST FP1402, MC Member, WG2 Vice Leader



| <i>Personal</i> | <i>Organisation</i> | | |
|--|---|--------------|----------|
| Years of experience in relevant field: 15 Expertise: Seismic resistance of multi-storey timber buildings (CLT and Timber Frame), Timber connections, TCC timber concrete composite structures Degree: PhD (17.02.2000) | Department of Civil, Environmental and Mechanical Engineering (http://lpms.dicam.unitn.it/?page_id=176) Focus: theoretical and practical research/innovation and education/training Facilities : Please refer to the web page: http://lpms.dicam.unitn.it/?page_id=176 | | |
| | No. of staff | PhD students | MSc/year |
| | 3 | 3 | 160 |

Research projects

SERIES Project - Seismic performance of multi-storey timber buildings (2010-2013) - European Framework Program 7. Duration 36 months. People of my organization involved: 7. Webpage: http://www.series.upatras.gr/TIMBER_BUILDINGS

RELUIS Project – Timber structures (2010-2013) - DPC-ReLUIS (National Network of Seismic University). Duration 36 months. People of my organization involved: 7. Webpage: <http://www.reluis.it/index.php?lang=en>

RELUIS Project – Timber structures in earthquake prone areas (2014-2016) - DPC-ReLUIS (National Network of Seismic University). Duration 36 months. People of my organization involved: 6. Webpage: <http://www.reluis.it/index.php?lang=en>

Publications

Piazza M., Tomasi R., Crosatti A., Theoretical and experimental analysis of timber-to-timber joints connected with inclined screws, *Construction and Building Materials* 24, 9 (2010), pp. 1560–1571

Zonta D., Loss C., Piazza M., Zanon P., Direct Displacement Based Design of glulam timber frame buildings, *Journal of Earthquake Engineering*, Taylor & Francis, 2010

Andreolli M., Piazza M., Tomasi R., Zandonini R., Ductile moment resistant steel-timber connections, *SPECIAL ISSUE IN TIMBER ENGINEERING*, Proceedings of the Institution of Civil Engineers - Structures and Buildings, Vol. 164, Issue 2, 2011, p. 65-78, ISSN: 0965-0911

C. Loss, D. Zonta, M. Piazza (2013), On estimating the seismic displacement capacity of timber portal-frames, *Journal of Earthquake Engineering*, 17:879–901, 2013 (available on line: DOI:10.1080/13632469.2013.779333)

Tomasi, R. and Smith, I. (2014). "Experimental Characterization of Monotonic and Cyclic Loading Responses of CLT Panel-To-Foundation Angle Bracket Connections." *J. Mater. Civ. Eng.*, 10.1061/(ASCE)MT.1943-5533.0001144, 04014189.

Crocetti, R., Sartori, T., and Tomasi, R. (2014). "Innovative Timber-Concrete Composite Structures with Prefabricated FRC Slabs." *J. Struct. Eng.*, 10.1061/(ASCE)ST.1943-541X.0001203, 04014224.

Tomasi, R., Sartori, T., Casagrande, D., Piazza, M. Shaking table testing of a full-prefabricated three-storey timber framed building. (2014) *Journal of Earthquake Engineering*

Dr. Mauro Andreoli (Italy)

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COST FP1402, MC Substitute Member, WG2 Member



| <i>Personal</i> | <i>Organisation</i> | | |
|--|---|--------------|----------|
| Years of experience in relevant field: 9 Expertise: Software for analysis and design of timber buildings Seismic resistance of multi-storey timber buildings Degree: PhD (24.03.2006) | TIMBER TECH SRL (www.timbertech.it) Focus: design of structures and software development Facilities: - | | |
| | No. of staff | PhD students | MSc/year |
| | 3 | 0 | 0 |
| <i>Research projects</i> | | | |
| CLT Training Course 2014 "Structural design of Cross Laminated Timber (CLT)", University of Trento, people in my organization involved: 2 http://web.unitn.it/dicam/evento/33372/clt-training-course-2014 | | | |
| <i>Publications</i> | | | |
| Andreoli M., Rigamonti M., Tomasi R, Diagonal compression test on cross-laminated timber panels (2014), World Conference of Timber Engineering, Quebec City, Canada | | | |
| M. Andreoli, R. Tomasi, Axial glued-in rods in ductile moment resistant steel-timber connections in COST Action FP1004, Zagabria: University of Bath, 2012. Atti di: COST, Zagabria, Croazia, April 19-20, 2012 | | | |

Dr. Andrii Bidakov (Ukraine)

O.M.Beketov National University of Urban Economy in Kharkiv
Kharkiv Ukraine

bidakov(at)mail.ru; bidakov(at)mdk-khnuba.com

COST FP1402, NNC Member, MC Observer, WG2 Member

*Personal*

Years of experience in relevant field: -
Expertise: Timber anisotropy of strength and elastic properties, scale factor, plywood thin-webbed beams, LVL, glued-in steel rods.

Degree Dr.-Ing. (22.12.2014)

Organisation

Metal and Timber Constructions
(www.kstuca.kharkov.ua)
Focus: theoretical and practical research/innovation, design of structures and education/training
Facilities: Testing labs, press equipment

| No. of staff | PhD students | MSc/year |
|--------------|--------------|----------|
| 3 | 2 | 25 |

Research projects

Recent research projects :

- investigation of new type of glued thin-webbed beam with curved plywood webs and without cross ribs, 2011-2013, Fursov, Bidakov
- renovation of glued laminated timber (GLT) electro- physical complex which stay in outdoor conditions with length 55m, width 6m and high 33m, 2012-2013, Fursov, Bidakov
- investigation of scale factor in solid timber (ST) and GLT, developing of module of volume deformation, Fursov, Bidakov

Present research projects :

- analysis of mechanical and elastic properties of laminated veneer lumber (LVL) and tests of flued-in steel rods, 2014, Fursov, Bidakov, Raspopov
- theoretical analysis of information about CLT panels as constructive orthotropic material

Publications

- 1.V.V. Fursov, A.M. Bidakov. Glued thin-webbed beams with X-form plywood webs. Design, manufacture and installation of steel constructions. Experience and prospects of development: collection of scientific papers "V.Shimanovsky Ukrainian Research and Design Institute of Steel Constructions" -2013.-No.12, p. 88-94
- 2.Fursov V, Bidakov A, Influence of cross sections dimensions on the strength characteristics of GLT. Promising Directions of Innovative Development of Construction Industry and Engineering Training (PDDC 2014), part 1, p.287-292, Brest, Belarus, 2014.
- 3.V.V. Fursov, A.M. Beidakov, M. Puriazdanhah. Comparative analysis of results theoretical and experimental full-scale investigations of GLT arch. (Electronic resource) Engineering Bulletin of Don. - 2014, No. 2: <http://www.ivdon.ru/magazine/archive/n2y2014/2395>.
- 4.V.V. Fursov, A.M. Beidakov. Puzzle joints of plywood elements building constructions. Scientific bulletin of building: collection of papers.-Kharkiv:KNUCEA, 2014, No. 76, p.90-93
- 5.V.V. Fursov, A.M. Bidakov. New Thin-webbed beam constructions with X-form plywood web. Materials of International scientific-technical conference "Innovative building technologies, theory and practice", - Orenburg Russia, 2013, p.209-214.
- 6.V.V. Fursov, A.M. Bidakov, M. Puriazdanhah. Timber compression strength by loading action in different angles to the grains. Scientific bulletin of building : collection of papers. – Kharkiv:KNUCEA, 2013

Mr. Renaud Blondeau-Patissier (France)

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 Boulogne-Billancourt, France
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 COST FP1402, WG2 Member



| <i>Personal</i> | <i>Organisation</i> | | |
|---|--|-----------------|----------|
| Years of experience in relevant field: 10 Expertise: Modelling of CLT (user) - Certification of CLT (France, Fire) Degree: Master in Timber Structures (01.06.2004) | Woodeum Ingénierie (www.woodeum.com) Focus: design of structure and execution of structures Facilities: on site project monitoring | | |
| | No. of staff | PhD students | MSc/year |
| | 12 | 0 | - |
| <i>Research projects</i> | | | |
| - Not yet (new company) | | | |
| <i>Publications</i> | | | |
| - Not yet (new company) | | | |

Dr. Daniele Casagrande (Italy)

University of Trento
Trento, Italy

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COST FP1402, WG2 Member

*Personal*

Years of experience in relevant field: 5
Expertise: Seismic behaviour of CLT buildings, Modelling of CLT buildings under lateral loads, Modal testing of CLT structures, Shake table tests of timber buildings, Vibrations of CLT floors
Degree: PhD. (10.04.2014)

Organisation

Department of Civil, Environmental and Mechanical Engineering
(http://lpms.dicam.unitn.it/?page_id=176)
Focus: theoretical and practical research / innovation , and education / training
Facilities: Please refer to the web page:
http://lpms.dicam.unitn.it/?page_id=176

| No. of staff | PhD students | MSc/year |
|--------------|--------------|----------|
| 5 | 2 | 160 |

Research projects

SERIES Project - Seismic performance of multi-storey timber buildings (2010-2013) - European Framework Program 7. Duration 36 months. People oinvolved: 7. Webpage: http://www.series.upatras.gr/TIMBER_BUILDINGS
RELUIS Project – Timber structures (2010-2013) - DPC-ReLUIS (National Network of Seismic University). Duration 36 months. People involved: 7. Webpage: <http://www.reluis.it/index.php?lang=en>

Publications

Daniele Casagrande, Simone Rossi, Tiziano Sartori, Roberto Tomasi, "Proposal of an analytical procedure and a simplified numerical model for elastic response of single-storey timber shear-walls" in CONSTRUCTION AND BUILDING MATERIALS, v. 2015, (2015). - URL: <http://www.sciencedirect.com/science/article/pii/S0950061815000021> . - DOI: 10.1016/j.conbuildmat.2014.12.114

D. Casagrande, M. Piazza, A. Franciosi, F. "Assessment of timber floor vibration performance: a case study in Italy" in World Conference on Timber Engineering 2014, WCTE 2014, Quebec City, canada: [WCTE 2014]

D. Casagrande, T. Sartori, R.Tomasi, "Capacity design approach for multi-storey timber-frame buildings" in 1st. International Network on Timber Engineering Research (INTER) Meeting 1, Gran Bretagna: INTER, Meeting 47, Bath, Uk, 2014, 2014. Atti di: INTRA, Bath, 1st-4th September 2014

R.Tomasi, T.Sartori, D.Casagrande, M.Piazza, , "Shaking table testing of a full-prefabricated three-storey timber framed building" in JOURNAL OF EARTHQUAKE ENGINEERING, v. 2014, (2014). - DOI: 10.1080/13632469.2014.974291

D. Casagrande, S. Rossi, T. Sartori, R. Tomasi, "Analytical and numerical analysis of timber framed shear walls" in World Conference on Timber Engineering 2012, WCTE 2012, Auckland, New Zealand: [WCTE 2012], 2012, p. 497-503. Atti di: WCTE, Auckland, New Zealand, 2012

Dr. Eduard Correal Mòdol (Spain)

Forest Sciences Centre of Catalonia – Incafust
 Lleida, Spain
 eduard.correal (at) incafust.cat
 COST FP1402, WG2 Member

Personal

Years of experience in relevant field: 10
 Expertise: Wood Technology, visual timber grading, machine timber grading, adhesives, engineered wood products, CLT, wood anatomy, surface properties, softwood, hardwood, forestry

Degree: PhD (23/9/2013)

Organisation

Incafust - Institut Català de la Fusta - Catalan Institute of Wood (<http://www.incafust.cat/>)
 Focus: Practical research / innovation and education/training.
 Facilities: Laboratory of Wood technology focused on physical and mechanical properties. Universal test machine, Bending test machine than can test a a board up to 6000x1400 mm and witha maximum load of 30 tones. Climate chamber.

| No. of staff | PhD students | MSc/year |
|--------------|--------------|----------|
| 3 | 0 | 1 |

Research projects

We are currently starting two projects related with the development of CLT for industrial production. Both projects will use local timber and local species. At this moment both are on a preliminary stage an both are confidential.

On the first project we will give support to a small factory that is expected to produce several thousands of cubic metres of CLT per year. The second project is for a bigger factory that will produce about 30.000 m³/year of CLT.

On both projects the role of the institute will be to assist the factories to obtain the CE marking and make the control of the production.

Publications

Correal-Mòdol, E.; Vilches-Casals, M.; Langbour, P.; Thevenon, M-F.; Gérard, J.; Guibal, D. (2016 expected). Physico-mechanical properties, durability and impregnability of Pinus uncinata from the Pyrenees. World Conference on Timber Engineering. Conference Innovators Ltd

Correal-Mòdol, E.; Vilches Casals, M. (2015). Characterization of cross-laminated timber panels of Pinus sylvestris from Catalonia. 26TH International Conference on Wood Science and Technology (ICWST). Implementation of Wood Science in Woodworking sector. Proceedings. Zagreb: University of Zagreb. Innovawood. Zagreb Fair

Correal-Mòdol, E.; Iglesias Rodríguez, C. (2014). Potential strength class of the glulam made of Castanea sativa from Catalonia. Proceedings of the 3rd International Conference on Processing Technologies for the Forest and Bio-based Products Industries. Kuchl

Correal-Mòdol, E.; Vilches Casals, M. (2009). Visual quality and physical and mechanical properties of glulam made with Pyrenean Pinus nigra. Ávila. 5th Spanish Forestry Congress. SECF

Mr. Thomas Ehrhart (Switzerland)

ETH Zurich

Zurich Switzerland

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COST FP1402, WG2 Member

*Personal*

Years of experience in relevant field: 1
 Expertise: material properties of CLT,
 testing methods and configurations
 Degree: Dipl.-Ing. (24.09.2014)

Organisation

Institute of Structural Engineering (www.ibk.ethz.ch)
 Focus: theoretical and practical research /
 innovation, design of structures and education /
 training
 Facilities: different testing machines (to perform
 tensile, compression, bending, shear, ...tests),
 measuring instruments (inductive, optical, ...),
 climate chambers

| No. of staff | PhD students | MSc/year |
|--------------|--------------|----------|
| 13 | 9 | 60 |

Research projects

WG 1: Influence of varying material properties on the load-bearing capacity of glued laminated timber
 Dr. Gerhard Fink, Dr. Jochen Köhler, Prof. Dr. Andrea Frangi

Completed (10.02.2009 – 30.12.2014)

https://www.rdb.ethz.ch/projects/project.php?proj_id=27423

WG 2: (1) Biaxial timber slab using hardwood - ETH HoNR; 2011 - ongoing; F. Wanninger, A. Frangi;
<http://www.honr.ethz.ch/en/the-group/structural-system/composite-floor-slab.html> (2) Fire behavior of
 cross-laminated solid timber panels; ongoing; M. Klippel, A. Frangi, M. Fontana,
http://www.ibk.ethz.ch/fr/research/Klippel1/index_EN

WG 3: (1) Post-tensioned timber structures; Flavio Wanninger, Jelena Ogrizovic, Prof. Dr. Andrea Frangi;
 Ongoing (01.03.2010); https://www.rdb.ethz.ch/projects/project.php?proj_id=26754 (2) Reliable timber and
 innovative wood products for structures - Beam-type structural elements made of LVL beech wood; Peter
 Kobel, Prof. Dr. Andrea Frangi; Ongoing (01.01.2012); <https://www.rdb.ethz.ch/projects/project.ph>

WG 4: Timber-concrete composite slab using beech wood plates; ongoing; L. Boccadoro, A. Frangi;
<http://www.honr.ethz.ch/en/the-group/structural-system/composite-floor-slab.html>

Publications

WG 1: Modelling the Bending Strength of Glued Laminated Timber - Considering the Natural Growth
 Characteristics of Timber, G. Fink; A. Frangi; J. Kohler, 46th Annual Meeting on Timber Structures 2013

WG 2: Fire tests on Loaded Cross-Laminated Timber Wall and Floor Elements; M. Klippel, C. Leyeder, A.
 Frangi; 11th International Symposium on Fire Safety Science; 2014

WG 3: (1) Experimental and analytical analysis of a post-tensioned timber connection under gravity loads,
 Wanninger, F; Frangi, A, Engineering Structures 2014, 70, 117-129 (2) Fully Threaded Self-tapping
 Screws Subjected to Combined Axial and Lateral Loading with Different Load to Grain Angles, Jockwer,
 Robert; Steiger, René; Frangi, Andrea, Materials and Joints in Timber Structures 2014, 9, 265-272 (3)
 Experimental Analysis on the Structural Behaviour of Connections with LVL Made of Beech Wood, Kobel,
 Peter; Steiger,

René; Frangi, Andrea, Materials and Joints in Timber Structures 2014, 9, 211-220

WG 4: (1) Elasto-Plastic Model for Timber-Concrete Composite Beams with Ductile Connection; A. Frangi,
 M. Fontana; Struct. Eng. Int., 13/1; 2003 (2) Experimental analysis on the structural behavior of timber-
 concrete composite slabs made of beech-laminated veneer lumber; L. Boccadoro, A. Frangi; Journal of
 Performance of Constructed Facilities; 2013 (3) Brandschutzkonzepte im Holz-Beton-Verbundbau; A.
 Frangi; Bau und Wissen Fachveranstaltung Holz-Beton-Verbunddecken in Theorie und Praxis; 2012

Dr. Andreas Falk (Sweden)

KTH Royal Institute of Technology

Stockholm, Sweden

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COST FP1402, MC Substitute Member, WG2 Member

*Personal*

Years of experience in relevant field: 15
 Expertise: Structural and architectural design of CLT, Wood material properties in structural applications, Innovative design of timber structures, Timber-based hybrid structures, Production chain perspective of refined engineered timber products.

Degree: PhD (30.11.2005)

Organisation

Civil and Architectural Engineering
 (<https://www.kth.se/en/abe/>)
 Focus: theoretical and practical research/innovation and education/training
 Facilities: -

| No. of staff | PhD students | MSc/year |
|--------------|--------------|----------|
| 120 | 70 | 300 |

Research projects

EnWoBio - Engineered Wood and Biobased Materials and Products Laboratory (2015-2017)
 Prof Magnus Wålinder, Dr Andreas Falk, Dr Kristoffer Segerholm, Prof Dick Sandberg (Luleå University of Technology, Sweden), Dr Anders Bystedt (SP Technical Research Institute of Sweden)

Hybrid structures for resource efficient construction (2015-2016)

Dr Andreas Falk, Prof Magnus Wålinder, Prof Tom Lindström

Multi-criteria optimisation of folded CLT-based shells (2008-2017)

Dr Andreas Falk, Prof Peter von Buelow (University of Michigan, US)

Publications

- Falk, A. and Wålinder, M. "Bio-based material hybrids seeking new applications in construction"; Proceedings of the IASS WORKING GROUPS 12 + 18 International Colloquium 2015: "Bio-based and Bio-inspired Environmentally Compatible Structures" Tokyo, Japan, A. FALK, P. VEGH and J. CHILTON (eds.), April 10-13, Tokyo Denki University, Tokyo 2015
- Falk, A. "Towards increased use of Bio-based Construction? – Architectural and Ecological Perspectives on Resource Management"; Proceedings of the International Association for Shell and Spatial Structures (IASS) 2014: "Shells Membranes and Spatial Structures: Footprints", Brasilia, Brazil 2014
- Falk, A. "Timber-Based Material Hybrid Systems for Improved Environmental Performance"; Proceedings of the International Association for Shell and Spatial Structures (IASS) 2013: "Beyond the Limits of Man", Wroclaw, Poland 2013
- Falk, A. "Cross-Laminated Timber: Driving Forces and Innovation"; Proceedings of the 2nd International Conference on Structures & Architecture 2013, Guimarães, Portugal 2013
- von Buelow, P., Falk, A. and Turrin, M. "Optimization of structural form using a genetic algorithm to search associative parametric geometry"; Proceedings of the 1st International Conference on Structures & Architecture 2010, Guimarães, Portugal 2010, pp. 609-706

Dr. Marcus Flaig (Germany)

Blaß & Eberhart GmbH

Karlsruhe Germany

[flaig\(at\)ing-bue.de](mailto:flaig(at)ing-bue.de)

COST FP1402, WG2 Member

*Personal*

Years of experience in relevant field: 6
 Expertise: strength and stiffness of CLT members, shear failure modes, CLT-beams, tapered CLT-beams, CLT beams with holes or notches, system strength factors for CLT, large finger joints in CLT
 Degree: PhD. (01.06.2013)

Organisation

Blaß & Eberhart GmbH (www.ing-bue.de)
 Focus: theoretical research / innovation, design of structure and education / training

Facilities: -

| No. of staff | PhD students | MSc/year |
|--------------|--------------|----------|
| 9 | 0 | 0 |

Research projects

WG2 CLT:

CLT Beams, 2010-2012, Marcus Flaig, holz.vaka.kit.eduLarge finger joints in CLT beams, 2012-2015, Marcus Flaig, holz.vaka.kit.edu

(both projects were carried out at KIT Holzbau und Baukonstruktionen)

Publications

Flaig, M. (2014) Design of CLT Beams with Rectangular Holes or Notches. In: Proceedings of the International Network on Timber Engineering Research (INTER), Meeting 47, Bath, United Kingdom, 01 - 04 September 2014. Paper 47-12-4, Timber Scientific Publishing, Karlsruhe, Germany

Blaß, H.J., Flaig, M. (2014) Bending strength of cross laminated timber beams loaded in plane. In: Proceedings of the 13th World Conference on Timber Engineering, WCTE 2014, August 10-14 2014, Quebec City, Canada

Flaig, M., Meyer, N. (2014) A new test configuration to determine the slip modulus of connections between crosswise bonded boards. In: Experimental Research with Timber, 21-23 May 2014, Prague. Pp77-84, University of Bath, UK

Blaß, H.J., Flaig, M. (2014) Tapered beams made of cross laminated timber. In: Materials and Joints in Timber Structures. RILEM Bookseries Vol. 9, pp 667-676, Springer, Berlin, Germany

Blaß, H.J., Flaig, M. (2013) Shear strength and shear stiffness of CLT-beams loaded in plane. In: Proceedings of the International Council for Research and Innovation in Building and Construction, Working Commission W18 - Timber Structures, Meeting 46, Vancouver, Canada, 26 August - 29 August 2013

Carina Fonseca Ferreira, Dina D'Ayala, Jose L. Fernandez Cabo, Marina Arce Blanco, Rafael Díez Barra, Pedro Hurtado Valdez (2015): Numerical Modelling and Seismic Assessment of Historic Planked Timber Arches. International Journal of Architectural Heritage. DOI: 10.1080/15583058.2015.1041194

Dr. Josef Füssl (Austria)

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COST FP1402, MC Substitute Member , WG2 Member

| <i>Personal</i> | <i>Organisation</i> | | |
|---|---|--------------|----------|
| Years of experience in relevant field: - Expertise: Numerical modeling of wood-based products (GLT, CLT) Prediction of effective strength and failure mechanisms Stochastic effects Degree: - (-) | Institute for Mechanics of Materials and Structures (www.imws.tuwien.ac.at) Focus: theoretical and practical research / innovation and education and training Facilities: high performance computation facilities and mechanical testing facilities: - uniaxial and triaxial testing machines for up to 250 kN - full-field deformation measurement system (DIC, ESPI) | | |
| | No. of staff | PhD students | MSc/year |
| | 0 | 0 | 0 |

Research projects

2011-2015

"Characterization of Wood Products and Connections - From Mechanical Modeling to Engineering Application"

FFG-Project in cooperation with the Association of the Austrian Wood Industries

2007-2010

"Mechanical characterization of wood for knowledge-based timber industry"

FFG-Project in cooperation with the Association of the Austrian Wood Industries

*Publications*G. Hochreiner, J. Füssl, J. Eberhardsteiner: "Cross-laminated timber plates subjected to concentrated loading - Experimental identification of failure mechanisms"; *Strain*, 50 (2014), S. 68-81G. Hochreiner, J. Füssl, E. Serrano, J. Eberhardsteiner: "Influence of Wooden Board Strength Class on the Performance of Cross-Laminated Timber Plates Investigated by Means of Full-Field Deformation Measurements"; *Strain*, 50 (2014), S. 161-173M. Lukacevic, J. Füssl: "Numerical Simulation Tool for Wooden boards with a Physically Based Approach to Identify Structural Failure"; *European Journal of Wood and Wood Products* (2014) 72:497-508M. Lukacevic, J. Füssl, M. Griessner, J. Eberhardsteiner: "Performance Assessment of a Numerical Simulation Tool for Wooden Boards with Knots by Means of Full-Field Deformation Measurements"; *Strain*, 50 (2014), S. 301-317

M. Lukacevic, J. Füssl, J. Eberhardsteiner: "Discussion of common and introduction of new indicating.

Prof. Vadim Fursov (Ukraine)

Kharkiv National University of Civil Engineering and Architectur
 Kharkiv Ukraine
 vadfursov(at)mail.ru
 COST FP1402, NNC Member, MC Observer, WG2 Member



| <i>Personal</i> | <i>Organisation</i> | | |
|--|---|--------------|----------|
| Years of experience in relevant field: - Expertise: Timber anisotropy of strength and elastic properties, scale factor, plywood thin-webbed beams, LVL, glued-in steel rods. Degree: Habilitation (24.04.1996) | Metal and Timber Constructions (www.kstuca.kharkov.ua) Focus: theoretical and practical research/innovation, design of structures and education/training Facilities: Testing labs, press equipment | | |
| | No. of staff | PhD students | MSc/year |
| | 3 | 2 | 25 |

Research projects

Recent research projects :

- work of GLT elements in conditions of complex stress (simultaneously action of tension and compression), 2006-2010, Fursov, Kovlev.
- investigation of new type of glued thin-webbed beam with curved plywood webs and without cross ribs, 2011-2013, Fursov, Bidakov
- renovation of glued laminated timber (GLT) electro- physical complex which stay in outdoor conditions with length 55m, width 6m and high 33m, 2012-2013, Fursov, Bidakov
- investigation of scale factor in solid timber (ST) and GLT, developing of module of volume deformation, Fursov, Bidakov

Present research projects :

- analysis of mechanical and elastic properties of laminated veneer lumber (LVL) and tests of glued-in steel rods, 2014, Fursov, Bidakov, Raspopov
- theoretical analysis of information about CLT panels as constructive orthotropic material

Publications

1. Fursov V, Standardization of timber constructions in building with accounting EC-5, Collected scientific papers of Moscow State Civil Engineering Institute, Materials of conference "Industrial and Civil Engineering"
2. V.V. Fursov, A.M. Bidakov. Glued thin-webbed beams with X-form plywood webs. Design, manufacture and installation of steel constructions. Experience and prospects of development: collection of scientific papers "V. Shimanovsky Ukrainian Research and Design Institute of Steel Constructions" -2013.-No.12, p. 88-94
3. Fursov V, Bidakov A, Influence of cross sections dimensions on the strength characteristics of GLT. Promising Directions of Innovative Development of Construction Industry and Engineering Training (PDDC 2014), part 1, p.287-292, Brest, Belarus, 2014.
4. V.V. Fursov, A.M. Beidakov, M. Puriazdanhah. Comparative analysis of results theoretical and experimental full-scale investigations of GLT arch. (Electronic resource) Engineering Bulletin of Don. - 2014, No. 2: <http://www.ivdon.ru/magazine/archive/n2y2014/2395>.
5. V.V. Fursov, A.M. Beidakov. Puzzle joints of plywood elements building constructions. Scientific bulletin of building: collection of papers.-Kharkiv:KNUCEA, 2014, No. 76, p.90-93
6. V.V. Fursov, A.M. Bidakov. New Thin-webbed beam constructions with X-form plywood web. Materials of International scientific-technical conference "Innovative building technologies, theory and practice", - Orenburg Russia, 2013, p.209-214.
7. V.V. Fursov, A.M. Bidakov, M. Puriazdanhah. Timber compression strength by loading action in different angles to the grains. Scientific bulletin of building : collection of papers. – Kharkiv:KNUCEA, 2013

Prof. Alessandra Gubana (Italy)

University of Udine
Udine, Italy

[alessandra.gubana\(at\)uniud.it](mailto:alessandra.gubana@uniud.it)

COST FP1402, WG2 Member

*Personal*

Years of experience in relevant field: 9
Expertise: Timber Structures, Seismic behaviour of Timber Structures, CLT modelling

Degree: MSc (28.04.1987)

Organisation

DICA Dipartimento di Ingegneria Civile e Architettura (www.uniud.it)

Focus: theoretical and practical research / innovation, design of structures and education/training.

Facilities: testing labs, shear test rigs, 500 kN hydraulic servocontrolled systems

| No. of staff | PhD students | MSc/year |
|--------------|--------------|----------|
| 4 | 1 | 60 |

Research projects

High reversible timber to timber strenghtening interventions on wooden floors by using CLT panels, OSB panels and multiple layers of boards

expected duration 3 years

1 PhD student 2 researchers

Cross laminated timber panels to strenghten wood floors

Several experimental tests and numerical models since 8 years

2 researcher and Phd students

Publications

GUBANA A., TOMASI G. (2014). Valutazione della risposta non lineare di pareti ed edifici a telaio leggero A mediante analisi piushover (Push over non linear analysis of wood platform frame buildings), Technical report, p. 1-46

GUBANA A (2010). Consolidamento sismico di solai in legno con pannelli XLam (Seismic strenghtening of timber floors by means of CTL panels). In: Atti del Convegno Sicurezza e Conservazione nel recupero dei Beni Culturali colpiti da sisma. p. 272-281, Venezia, 8-9 Aprile 2010

GUBANA A (2010). Experimental Tests on Timber-to-CrossLam Composite Section Beams. In: A. Ceccotti J.W. van de Kuilen, Proceedings of WCTE 2010 World Conference on Timber Engineering, Riva del Garda (ITALY), ISBN: 9788890166037

GUBANA A (2009). Prove sperimentali sul comportamento delle sezioni composte legno-XLam. In: Atti del VII Workshop Italiano sulle Strutture Composte. p. 287-296, ISBN: 9788890275234, Benevento, 23-24 Ottobre 2008

GUBANA A (2008). Comportamento sperimentale a taglio di pannelli in legno a strati incrociati. In: 17° Congresso C.T.E. p. 1149-1156, ISBN: 9788890364730, Roma, 5-8 Novembre 2008

GUBANA A (2008). Cross laminated timber panels to strenghten wood floors. In: D. D'Ayala, E. Fodde, Proceedings of the International Congress SAHC2008 Structural Analysis of Historical Constructions. p. 949-955, LEIDEN:CRC Press/Balkema, ISBN: 9780415468725, Bath (UK), JUL 02-04,2008, doi: 10.1201/9781439828229.ch108

Dr. Luis Jorge (Portugal)

TISEM LDA
 Figueira da Foz, Portugal
[luisfc\(at\)ipcb.pt](mailto:luisfc(at)ipcb.pt)
 COST FP1402, WG2 Member

*Personal*

Years of experience in relevant field: 5
 Expertise: Design of CLT
 Degree: PhD (12.06.2006)

Organisation

TISEM LDA (www.tisem.pt)
 Focus: practical research /innovation, design of structures and execution of structures
 Facilities: Laboratory for mechanical testing on elements and connections (static and dynamic tests).

| No. of staff | PhD students | MSc/year |
|--------------|--------------|----------|
| 4 | 0 | 1 |

Research projects

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Publications

- Jorge, L., Dias, A., X-Lam panels in swimming-pool building - monitoring the environment and the performance. *Advanced Materials Research*. Volume 778, 2013, Pages 779-785
- Jorge, L., Habenbacher, J., Dujic, B., TIMBER-CONCRETE COMPOSITE SYSTEMS WITH CROSS-LAMINATED TIMBER. 10th World Conference on Timber Engineering. WCTE10. Italy. 2010
- Jorge, L., Lopes, S., Aplicação de sistemas mistos madeira-betão com painéis Xlam. BE2010 – Encontro Nacional Betão Estrutural. Lisboa – 10, 11 e 12 de Novembro de 2010. (in portuguese)
- Jorge, L., Lopes, E., Martins, H., Sistema construtivo com painéis maciços de madeira lamelada-colada cruzada (Xlam). Reabilitar 2010. LNEC. 2010 (in portuguese)
- Jorge, L., Lopes, E., CONSTRUÇÃO EM PAINÉIS DE MADEIRA 'CLT': O ESTUDO DE CASO DA PISCINA MUNICIPAL DA CAPARICA. JPEE 2014. LNEC. LISBOA (in portuguese)
- Jorge, L., Dias, A., Lopes, E., SWIMMING-POOL BUILDING MADE WITH X-LAM PANELS. World Timber Engineering Conference 2014. Quebec City. Canadá. 2014
- Ventura, D., Negrão, J., Jorge, L., Torres eólicas em madeira lamelada cruzada colada. JPEE 2014. LNEC. 2014 (in portuguese)

Dr. Xavier José (Portugal)

Universidade de Trás-os-Montes e Alto Douro (UTAD)
Vila Real, Portugal

[jmcx\(at\)utad.pt](mailto:jmcx(at)utad.pt)

COST FP1402, WG2 Member

*Personal*

Years of experience in relevant field: 8
Expertise: Mechanical characterisation of biological tissues and structures; Full-field optical methods in experimental mechanics (digital image correlation, grid method, defletometry, feature tracking method, ESPI); Mechanical and fracture identification methods (e.g. virtual fields method)
Degree: PhD. (27.11.2007)

Organisation

Engineering (<http://www.jmcx.utad.pt/>)
Focus: practical research /innovation and education /training
Facilities: Digital Image Correlation, Testing machines

| No. of staff | PhD students | MSc/year |
|--------------|--------------|----------|
| 5 | 1 | 2 |

Research projects

Innovative photomechanical approaches in identification of the dynamic mechanical behaviour of materials. Responsible researcher: Fabrice Pierron. J.Xavier is responsible for Task 4.7: High strain rate tests on wood at the meso scale. Financial support: EPSRC Fellowship, UK. EPSRC Reference : EP/L026910/1.

Numerical and experimental study of cohesive laws in bonded wood joints

Principal contractor: University of Trás-os-Montes e Alto Douro.

Portuguese Foundation for Science and Technology: PTDC/EME-PME/114443/2009

Publications

- [1] Xavier, J.; Fernandes, J.R.A.; Frazão, O.; Morais, J.J.L. Measuring mode I cohesive law of wood bonded joints by combining digital image correlation and fibre Bragg grating sensors. *Composite Structures* 121:83-89, 2015.
- [2] Xavier, J.; Oliveira, M.; Morais, J.; de Moura, M.F.S.F. Determining mode II cohesive law of Pinus pinaster by combining the end-notched flexure test with digital image correlation. *Construction and Building Materials* 71:109–115, 2014.
- [3] Xavier, J.; Monteiro P.; Morais, J.; Dourado, N.; de Moura, M.F.S.F. Moisture content effects on the fracture characterisation of Pinus pinaster under mode I. *Journal of Materials Science* 49(21):7371-7381, 2014. [4] Xavier, J.; Oliveira, J.; Monteiro, P.; Morais, J.J.L.; de Moura, M.F.S.F. Direct evaluation of cohesive law in mode I of Pinus pinaster by digital image correlation. *Experimental Mechanics* 54(5): 829-840, 2014.
- [5] Silva, F.; Morais, J.; Dourado, N.; Xavier, J.; Pereira, F.A.M.; de Moura, M.F.S.F. Determination of cohesive laws in wood bonded joints under mode II loading using the ENF test. *International Journal of Adhesion and Adhesives* 51: 54–61, 2014.
- [6] Pereira, J.; Xavier, J.; Morais, J.; Lousada, J. Assessing wood quality by spatial variation of elastic properties within the stem: case study of P. pinaster in the transverse plane. *Canadian Journal of Forest Research*, 44(2): 107-117, 2014.
- [7] Xavier, J.; Belini, U.; Pierron, F.; Morais, J.; Lousada, J.; Tomazello, M. Characterisation of bending stiffness components of MDF panels from full-field slope measurements. *W Sci. Tech.* 47(2): 423-441, 2014

Prof. Sławomir Krzosek (Poland)

Faculty of Wood Technology WULS
Warsaw, Poland

[slawomir_krzosek\(at\)sggw.pl](mailto:slawomir_krzosek(at)sggw.pl)

COST FP1402, MC Substitute, WG2 Member

*Personal*

Years of experience in relevant field: 25
Expertise : sawmilling, stress grading of
sawn timber, visual grading,
densitometry
Degree: ()

Organisation

Department of Wood Science and Wood Protection
(www.sggw.wtd.pl)

Focus: theoretical and practical research
/innovation, education/ training

Facilities: testing machines different types, climatic
chamber, gamma ray densitometer, Mobile Timber
Grader

| No. of staff | PhD students | MSc/year |
|--------------|-----------------|----------|
| 3 | 1 | 1 |

Research projects

Polish sawn timber grading according European Standards, 2006-2008, 5

Publications

Krzosek Sławomir, Grzeskiewicz Marek, Bacher Martin, 2008: Mechanical properties of Polish-grown Pinus sylvestris L. structural sawn timber. COST E53 Conference proceedings, 29-30 of October, Delft, Netherlands. p. 253-260.

Krzosek Sławomir, Bacher Martin, Grzeskiewicz Marek, 2009: Comparison of strength grading machine settings for different grade Combinations for Polish-grown Pinus sylvestris L. structural sawn timber. COST Action E53 Conference 22 – 23 October, in Lisbon, Portugal.

Krzosek Sławomir 2011: Timber strength grading of Pinus sylvestris L. using a visual method according to Polish Standard PN-82/D-94021 and German Standard DIN 4074. Wood Research, Vol 56, nr 3, s.435-440.

Bacher Martin, Krzosek Sławomir, 2013: Modulus of elasticity tension/bending ratio of Polish grown pine (Pinus sylvestris L.) and spruce (Picea abies Karst.) timber. Annals of Warsaw University of Life Sciences – SGGW Forestry and Wood Technology, No 82/2013, p. 31-38.

Kotwica Ewa, Krzosek Sławomir, 2013: Technical requirements and practical guide for sawn timber and glulam applications in wooden constructions. Annals of Warsaw University of Life Sciences – SGGW Forestry and Wood Technology, No 83/2013, p. 57-62.

Bacher Martin, Krzosek Sławomir, 2014: Bending and Tension Strength Classes in European Standards. Annals of Warsaw University of Life Sciences – SGGW Forestry and Wood Technology, No. 88, p. 14 - 22.

Kotwica Ewa, Krzosek Sławomir, 2014: Comparison of sawn timber strength classes determined according old and new standards. Annals of Warsaw University of Life Sciences – SGGW Forestry and Wood Technology, No.87 p. 109-113

Kotwica Ewa, Krzosek Sławomir, 2015 : Historical timber bridges in Poland. COST Timber Bridge Conference CTBC 2014, 24-25 September 2014, Bern University of Applied Sciences Biel, Switzerland, p159-164.

Dr. Thomas Moosbrugger (Italy)

Rubner EBG GmbH

Bolzano Italy

[thomas.moosbrugger\(at\)rubner.com](mailto:thomas.moosbrugger(at)rubner.com)

COST FP1402, WG2 Member



| | | | | |
|---|---|---------------------|----------|--|
| <i>Personal</i> | | <i>Organisation</i> | | |
| Years of experience in relevant field: 10 Expertise: structural mechanics of CLT, design and product development of CLT Degree: Dr.techn. (12.04.2013) | Rubner EBG GmbH (www.rubner.com) | | | |
| | Focus: theoretical and practical research / innovation and education /training | | | |
| | Facilities : product development, testing lab, | | | |
| | No. of staff | PhD students | MSc/year | |
| | - | - | - | |
| <i>Research projects</i> | | | | |
| WG1: shrinking and swelling of clt, 1 year; | | | | |
| <i>Publications</i> | | | | |
| Design charts for a single spanned timber beam under bending – Part 2: Floor structures with inhomogeneous beam cross-section | | | | |

| | | | |
|--|--|---|--------------|
| Mr. Miguel Rgz. Nevado (Spain) enmadera.info Aldealengua, Spain mn(at)enmadera.info COST FP1402, WG2 Member | | | |
| <i>Personal</i> | | <i>Organisation</i> | |
| Years of experience in relevant field: 30 Expertise: Practical implementation of CLT Degree: Architect (30.06.2004) | | Freelance structural engineer (www.enmadera.info) Focus: design of structures, execution of structures Facilities: - | |
| | | No. of staff | PhD students |
| | | 1 | - |
| <i>Research projects</i> | | | |
| - | | | |
| <i>Publications</i> | | | |
| Articles in www.aitim.es bulletin: <ul style="list-style-type: none"> * Anta Natura Cellar in the Duero River, 2006 * Pavillion in Almazán, 2007 * A six storey building in Lérida, 2011 * Spanish Pavillion in Floriade, 2012 * Four urban dwellings between party walls, 2011-2013 * Spanish Pavillion in Expo Milan, 2015 | | | |

Mr. Tobias Schmidt (Germany)

Karlsruhe Institute of Technology (KIT)

Karlsruhe, Germany

tobias.schmidt2@kit.edu

COST FP1402, WG2 Member

Personal

Years of experience in relevant field: 1
 Expertise: in-plane contact joints in CLT, execution of tests
 Degree: M.Eng. (20.12.2011)

Organisation

Institute for Timber Structures and Building Construction (vaka.holz.kit.edu)
 Focus: theoretical and practical research / innovation and design of structures
 Facilities: testing lab (joint and element tests, shear wall tests, monotonic and cyclic tests, all relevant tests on fasteners), measuring equipment, drying chambers

| No. of staff | PhD students | MSc/year |
|--------------|--------------|----------|
| 21 | 5 | 30 |

Research projects

WG2 CLT:

Contact joints in CLT (Tobias Schmidt)

CLT Beams (Marcus Flaig)

WG3 connections:

High-performance joints for engineered softwood and hardwood structures (Marcus Enders-Comberg)

Mechanical performance of timber joints with slotted-in steel plates (Carmen Sandhaas)

Publications

WG2 CLT:

Flaig, M., 2014, 'Design of CLT beams with rectangular holes and notches', Paper 47-12-4, Meeting 47 of International Network on Timber Engineering Research (INTER), Bath, United Kingdom, pp. 193-207.

Flaig, M., Blaß, H. J., 2014, 'Bending strength of cross laminated timber beams loaded in plane', Proceedings of the 13th World Conference on Timber Engineering (WCTE), Quebec, Canada.

WG3 connections:

Steilner, M., Blaß, H. J., 2014, 'A method to determine the plastic bending angle of dowel-type fasteners', RILEM bookseries 9: Materials and Joints in Timber Structures. Ed.: S. Aicher, Springer, Berlin, pp. 301-306.

Van de Kuilen, J. W. G., Sandhaas, C., Blaß, H. J., 2014, 'ASteel-to-timber joints with very high strength steel dowels using spruce, beech and azobé', RILEM bookseries 9: Materials and Joints in Timber Structures. Ed.: S. Aicher, Springer, Berlin, pp. 157-165.

Enders-Comberg, M., Blaß, H. J., 2013, 'Influence of holes in the compression area of members - Querschnittsschwächung bei Druckbeanspruchung parallel zur Faser', European Journal of Wood and Wood Products, Vol. 70, Issue 3, pp. 309-317.

Mr. Bogdan Šega (Slovenia)

University of Ljubljana, Biotechnical Faculty
Ljubljana, Slovenia

[bogdan.sega\(at\)bf.uni-lj.si](mailto:bogdan.sega@bf.uni-lj.si)

COST FP1402, WG2 Member

*Personal*

Years of experience in relevant field: 21
Expertise: timber grading, gluing of wood, testing of mechanical properties

Degree: MSc. (21.03.2002)

Organisation

Department of Wood Science and Technology
(<http://www.bf.uni-lj.si>)
Focus: theoretical and practical research/innovation and education/training
Facilities: - Mechanical testing laboratory, Laboratory for wood adhesives
- Materials testing machines: Zwick Z100 and Zwick/Roell Z005
- Rheometer Ares G2, DSC Mettler Toledo, Heat Flow Meter Stirolab

| No. of staff | PhD students | MSc/year |
|--------------|--------------|----------|
| 6 | 1 | 2 |

Research projects

Strength grading of timber construction elements - Razvrščanje lesenih konstrukcijskih elementov po trdnosti (ARRS project L2-2214) ; 2009 - 2012; dr. Bučar Bojan, dr. Gornik Bučar Dominika, dr. Hozjan Tomaž, dr. Kroflič Aleš, dr. Pazlar Tomaž, mag. Srpčič Jelena, mag. Šega Bogdan, dr. Turk Goran; this project was related to GRADEWOOD project.

Publications

KITEK KUZMAN, Manja, KUTNAR, Andreja. Contemporary Slovenian timber architecture for sustainability, (Green energy and technology). Cham [etc.]: Springer, cop. 2014. XIX, 163 str., ilustr. ISBN 978-3-319-03634-2. ISBN 978-3-319-03635-9.

KARIŽ, Mirko, KITEK KUZMAN, Manja, ŠERNEK, Milan. The effect of heat treatment on the withdrawal capacity of screws in spruce wood. Bioresources, ISSN 1930-2126, 2013, vol. 8, no. 3.

ŠEGA, Bogdan. Vpliv značilnosti slovenskega smrekovega konstrukcijskega žaganega lesa na njegove mehanske lastnosti in prevedba sortirnih razredov v trdnostne = Influence of characteristics of structural sawn timber made from Slovenian spruce on its mechanical properties and assignment of visual grades to strength classes. Les, ISSN 0024-1067, 2010, letn. 62, št. 11/12.

ŠEGA, Bogdan, GORNIK BUČAR, Dominika, PAZLAR, Tomaž, PLOS, Mitja, SRPČIČ, Jelena, TURK, Goran. Report on the visual classification of structural timber of rectangular cross section from the Slovenian spruce and fir and the appropriate destructive tests : this report serves as a basis for including the Slovene rules for visual grading to the EN 1912 list : poročilo za Komisijo CEN TC124/TG1 Task group for grading and strength properties. Ljubljana: University of Ljubljana, Biotechnical faculty: Slovenian National Building and Civil Engineering Institute: University of Ljubljana, Faculty of Civil and Geodetic Engineering, 2010.

Prof. Dr. Erik Serrano (Sweden)
 Lund University, Structural Mechanics
 Lund, Sweden
erik.serrano@construction.lth.se
 COST FP1402, MC Member, WG2 Member



| <i>Personal</i> | <i>Organisation</i> | | |
|---|---|-----------------|----------|
| Years of experience in relevant field: 10 Expertise: modelling of fracture in timber products, fracture mechanics, testing, FEM Degree: PhD (01.02.2001) | Structural Mechanics (www.byggmek.lth.se) Focus: theoretical and practical research / innovation, and education and training Facilities: testing labs for mechanical testing, digital image correlation, acoustic lab, test facility for DOL test in outdoor sheltered climate (50 kN) | | |
| | No. of staff | PhD students | MSc/year |
| | 4 | 4 | 5 |

Research projects

WG 2

Mechwood II, 2012-2014, Erik Serrano (at former employer Linnaeus University)

AkuLite, AcuWood, 2010-2012 Delphine Bard

SilentTimber, 2014-2017, Delphine Bard

WG 3

Mechwood II, 2012-2014, Erik Serrano (at former employer Linnaeus University)

Innovative joints for timber structures, 2014-2016, Gustaf Larsson (PhD-Student), Per Johan Gustafsson (main supervisor), Roberto Crocetti, Henrik Danielsson, Johan Jönsson and Erik Serrano (co-supervisors)

Publications

WG 2

Serrano, E. & Enquist, B. Compression strength perpendicular to grain in cross-laminated timber (CLT) World Conference on Timber Engineering, 2010

Hochreiner, G.; Füssl, J.; Serrano, E. & Eberhardsteiner, J. Influence of wooden board strength class on the performance of cross-laminated timber plates investigated by means of full-field deformation measurements *Strain*, 2014, 50, 161-173

J. Negreira, A. Trollé, K. Jarnerö, L.-G. Sjökvist, D. Bard, Psycho-vibratory evaluation of timber floors – Towards the determination of design indicators of vibration acceptability and vibration annoyance, *Journal of Sound and Vibration*, Volume 340, 31 March 2015, Pages 383-408.

WG 3

T. Bader, M. Schweigler, G. Hochreiner, E. Serrano, B. Enquist. Dowel deformations in multi-dowel LVL-connections under moment loading. *Wood Material Science and Engineering* (submitted)

T. Bader, M. Schweigler, G. Hochreiner, M. Dorn, E. Serrano. Experimental characterization of the global and local behavior of multi-dowel LVL-connections under complex loading. *Materials and Structures* (submitted)

Prof. Dr. Mike Sieder (Germany)
 Technische Universität Braunschweig
 Braunschweig, Germany
[m.sieder\(at\)tu-braunschweig.de](mailto:m.sieder(at)tu-braunschweig.de)
 COST FP1402, WG2 Member



| | | | |
|--|--|---|--------------|
| <i>Personal</i> | | <i>Organisation</i> | |
| Years of experience in relevant field: 5 Expertise: modelling of CLT, practical application of CLT, joining techniques with CLT Degree: Dr.-Ing. (15.07.2003) | | Institut für Baukonstruktion und Holzbau iBHolz (http://www.ibholz.tu-bs.de) Focus: theoretical and practical research/innovation, design of structures, execution of structures and education/training and expert's opinion Facilities: iBHolz does not have an own testing lab. Close collaboration with material testing institute MPA Braunschweig and Fraunhofer Institute for Wood Research (Fraunhofer WKI) with usage of their facilities. | |
| | | No. of staff | PhD students |
| | | 10 | 5 |
| | | | MSc/year |
| | | | 10 |
| <i>Research projects</i> | | | |
| 1.) Development of a load-factor method for in-plane shear stressed timber panel elements (2015-2017 / Anheier, David / http://www.ibholz.tu-bs.de) 2.) Shear strength capacity of CLT (2014-2015 / Dietsch, Philipp (TU München) / Brandner, Reinhard (TU Graz) / Sieder, Mike (TU Braunschweig)) 3.) Methods for elastic and plastic modeling of in-plane shear stressed timber panel elements (2006-2009 / Hall, Christoph / http://www.ibholz.tu-bs.de/index.php?page=forschung) | | | |
| <i>Publications</i> | | | |
| 1.) Basic test method for valuation of shear strength of cross laminated timber (2013, "Die Bautechnik 90", Heft 5, Seite 314-316) 2.) Methods for elastic and plastic modeling of in-plane shear stressed timber panel elements (2012, doctoral thesis Hall, Christoph) | | | |

Prof.Dr. Christophe Sigrist

Bern University of Applied Sciences
 Biel-Bienne, Switzerland
 christophe.sigrist(at)bfh.ch
 COST FP1402, WG2 Member



| <i>Personal</i> | <i>Organisation</i> | | |
|---|---|-----------------|----------|
| Years of experience in relevant field: 30 Expertise: Connections, grading, hardwood, testing, glulam, CLT, hybrid structures, standardisation work Degree: PhD (01.01.1992) | Architecture, Wood and Civil Engineering (www.ahb.bfh.ch) Focus: practical research/innovation, design of structures, execution of structures and education/training Facilities: testing lab including universal testing machines (small clear testing to full scale testing), testing rig, climate chambers, U-value measurement, window testing, chemistry laboratory, robots | | |
| | No. of staff | PhD students | MSc/year |
| | 115 | - | 12 |

Research projects

WG2: Solid / massive timber
 Massivholzplatten für das Bauwesen - Berechnungsgrundlagen für mechanische Eigenschaften und
 Eckverbindungen, KTI-Projekt Nr. 5927.2 KTS, ETHZ / EMPA / SH-Holz
 Zugfestigkeit von BSH-Lamellen. Kontrolle der Wirksamkeit der visuellen Sortierung zur Er-zeugung von
 BSH gemäss Entwurf SIA 265: Holzbau", Buwal
 European construction systems made of timber elements using innovative products (Pro-secco),
 Forschungsgemeinschaft SH-Holz, TU Graz, Blass & Eberhard Karlsruhe, Industrieauftrag Stora Enso
 Timber, Finnland

WG3 Hybrid Timber Structures
 Hochleistungs-Hybridbausystem mit Holz und Stahl (HHHS), Commission for Technology and Innovation
 CTI, 1.4.2015 to 1.9.2018

Publications

WG2:

Sigrist C., Lehmann M: An integral production chain to reliably produce glued laminated timber, WCTE
 Auckland 2012, 16 -19 July, Proceedings; 2012

Sigrist C., Lehmann M: Development of a cross laminated, post tensioned bridge deck, WCTE Auckland
 2012, 16 -19 July, Proceedings; 2012

Sigrist C., Lehmann M.: Potential of CLT produced from non-structural grade Australian pinus radiata,
 WCTE Quebec City 2014, 10 -14 August, Proceedings; 2014

Sigrist C.: Mechanische Eigenschaften von Brettschichtholz hergestellt aus visuell sortierten
 Fichtenbrettern, in SIA Dokumentation 0251 Neue Erkenntnisse zur Zuverlässigkeit von Brettschichtholz,
 ETH Zürich, Lignum, 2015

Sigrist C., Lehmann M.: Mechanical properties of glulam produced from visually graded boards, WCTE
 Vienna 2016, 22 -25 August, Proceedings; 2016

WP3: Connections

Nailed joints in engineered timber structures using Australian hardwoods, PhD Theses, School of Civil
 Engineering, University of Technology, Sydney, Australia, C.Sigrist, 1992

C. Sigrist, M. Howald, P. Niemz, (2007), Verbindungen und Verbindungsmittel an Brettsperrholz,
 Tagungsband 39. Fortbildungskurs SAH 2007, Weinfelden, Seiten 157-174

Dr. Elizabeth Shotton (Ireland)

University College Dublin

Dublin, Ireland

elizabeth.shotton@ucd.ie

COST FP1402, MC Member, WG2 Member

*Personal*

Years of experience in relevant field: 20
 Expertise: Architecture, Design CLT
 detail junctions

Degree: PhD. (01.06.2013)

Organisation

Architecture
 (<http://www.ucd.ie/eacollege/architecture/>)
 Focus: theoretical and practical research /
 innovation, education / training and history of
 construction technology
 Facilities: Wood working shop. Structural testing

| No. of staff | PhD students | MSc/year |
|--------------|-----------------|----------|
| 6 | 0 | 75 |

Research projects

1. CASWOOD Economic and Environmental Mapping of Cascade Use of Wood 2014-2016

The project is conducted in conjunction with the Department of Life Sciences, University of Limerick, Ireland.

2. SECA WoodWeld 2010-13

Collaborative research project between School of Architecture, School of Civil, Structural and Environmental Engineering and School of Mechanical Engineering at UCD; École Nationale Supérieure Des Technologies et Industries Du Bois, Université Henri Poincaré, France.

Publications

O'Lionsigh, C., Oudjene, M., Shotton, E., Pizzi, A. and Fanning, P.J. Mechanical behaviour and 3D stress analysis of multi-layered wooden beams made with welded through wood dowels. *Composite Structures*. 2012.

O'Loinsigh, C., Oudjene, M., Ait-Aider, H., Fanning, P., Pizzi, A., Shotton, E., Meghlat, E.M. Experimental Study of Timber-to-Timber Composite Beam Using Welded-Through Wood Dowels. *Construction and Building Materials*. 2012.

Dr. Karol Sikora (Ireland)

National University of Ireland
Galway, Ireland

[karol.sikora\(at\)nuigalway.ie](mailto:karol.sikora@nuigalway.ie)

COST FP1402, MC Substitute Member, WG2 member



| <i>Personal</i> | <i>Organisation</i> | | |
|--|--|--------------|----------|
| Years of experience in relevant field: 2 Expertise: Testing, properties and durability of CLT Degree: PhD (07.03.2013) | Civil Engineering Discipline, College of Engineering and Informatics (www.irishtimber.org) Focus: theoretical and practical research / innovation and education / training Facilities: State-of-the art Structural Testing Laboratory (375 m ²) and fully equipped Timber Engineering Laboratory (174 m ²), including: two climate controlled rooms (39 m ² and 9 m ²), pressure chamber for durability testing, strength grading machines: Cook-Bolinders, MTG. | | |
| | No. of staff | PhD students | MSc/year |
| | 2 | 2 | 1 |

Research projects

1. Innovation in Irish Timber Usage

duration: 3 years (start: Jan 2013)

funded by the Department of Agriculture, Food and Marine of the Republic of Ireland under the FIRM/RSF/COFORD scheme; Queens University, Belfast (QUB) is collaborating partner

People involved:

Dr. Annette Harte (NUIG) - project coordinator, Dr. Danny McPollin (QUB) - principal investigator, Dr. Karol Sikora (NUIG) - postdoctoral researcher, Ms. Caoimhe O'Neill (QUB) - PhD student, Mr. Conan O'Ceallaigh (NUIG) - PhD student

website: www.irishtimber.org

2. Potential of Irish-grown Sitka Spruce for the manufacture of cross-laminated timber (CLT) panels

duration: 4 years (start: Oct 2014)

People involved:

Ms. Caitriona Ui Chulain - PhD student, Dr. Annette Harte – supervisor, Dr. Karol Sikora - 2nd supervisor

Publications

Sikora K. S., Harte A. M., McPolin D., Bonding strength and durability of adhesive bonds in Sitka spruce cross-laminated timber, *International Journal of Adhesion and Adhesives* (2015) (article in preparation)

Sikora K., Harte A., McPolin D., Irish Timber – Bond quality of cross-laminated timber (CLT) from Irish Sitka spruce, *Civil Engineering Research in Ireland*, Belfast, UK, 28-29/08/2014

Sikora K., Harte A., McPolin D., Durability of adhesive bonds in cross-laminated timber (CLT) panels manufactured using Irish Sitka spruce, The 57th SWST (Society of Wood Science and Technology) International Convention, Zvolen, Slovakia, 23-27/06/2014

Raftery, G.M., Harte, A.M., 2013, Material characterisation of fast-grown plantation spruce, *Structures and Buildings*, DOI: 10.1680/stbu.12.00052

Raftery, G.M., Harte, A.M., 2013, Nonlinear numerical modelling of FRP reinforced glued laminated timber beams, *Composites Part B: Engineering*, 52(Sep2013)40-50, doi:10.1016/j.compositesb.2013.03.038

Baylor, G., Harte, A.M., 2013, Finite element modelling of castellated timber I-joists. *Constr Build Mater* 47(Oct 2013)680-688 <http://dx.doi.org/10.1016/j.conbuildmat.2013.05.076>

Zhang, B., Jorissen, A., Rasmussen, B., Harte, A., 2013, Comparison of vibrational comfort assessment criteria for design of timber floors among the European countries, *Engineering Structures*, 52(1)592-607. <http://dx.doi.org/10.1016/j.engstruct.2013.03.028>

Harte, A.M., Baylor, G., 2011, Structural evaluation of castellated timber I-joists, *Engineering Structures*, 33(12)3748-3754, doi:10.1016/j.engstruct.2011.08.011

Dr. Marta Stojmanovska (fYR Macedonia)

UKIM-IZIIS

Skopje Macedonia

[marta\(at\)pluto.iziis.ukim.edu.mk](mailto:marta(at)pluto.iziis.ukim.edu.mk)

COST FP1402, WG2 Member



Personal

Years of experience in relevant field: 7

Expertise: -

Degree: PhD. (10.06.2015)

Organisation

Institute of Earthquake Engineering and Engineering Seismology (www.iziis.edu.mk/)

Focus: theoretical and practical research/innovation, design of structures and education/training

Facilities: Laboratory with two-component programmed seismic shaking table for dynamic testing of structures, material testing frames, equipment for quasi-static testing, data acquisition, acceleration, velocity and displacement transducer.

No. of staff

PhD students

MSc/year

7

0

1

Research projects

No recent or ongoing projects

Publications

V.Hristovski, B.Dujic, M.Stojmanovska, V.Mircevska. „Full-Scale Shaking table tests of Xlam Panel Systems and Numerical Verification : Specimen 1“ Journal of Structural Engineering ASCE, Volume 139, Number 11.

Dr. Vasileios Tsipiras (Greece)

itech

Athens, Greece

[v.tsipiras\(at\)itech-soft.com](mailto:v.tsipiras@itech-soft.com)

COST FP1402, WG2 or 3 Member

*Personal*

Years of experience in relevant field: 2
 Expertise: CAE oriented analysis and design of wood composite beams (according to EC5 and ETAs).
 CAE oriented modelling of CLT elements.
 Computer software development for analysis and design of timber elements and structures.
 Degree: PhD. (08.01.2014)

Organisation

Software development team (<http://www.itech-soft.com/>)
 Focus: design of structures , education/training and practical research and modelling of timber elements and structures for computer software development
 Facilities: 2 servers, 20 personal computers with the corresponding peripherals, 2 plotters.

| No. of staff | PhD students | MSc/year |
|--------------|--------------|----------|
| 17 | 0 | 0 |

Research projects

- Mechanical design of wooden staircases (in collaboration with "AFEB" (French association of wooden staircases constructors)). (2014-today) (3 people involved)
- Mechanical design of wooden pallets (in collaboration with "FCBA" (French technical center for wood construction)" and "HPE" (German association of wooden pallets constructors)). (2012-today) (4 people involved) (<http://www.pallet-express.com/>)
- CAE oriented analysis and design of wood panels (according to EC5 and ETAs). (2013-today) (5 people involved) (<http://www.itech-bois.com/>)
- CAE oriented analysis and design of direct and indirect connection systems of timber elements with metal fasteners (according to EC5 and ETAs). (2011-today) (7 people involved) (<http://www.itech-bois.com/>)

Publications

- Participation in the working group ELOT /TC 67 /WG5 Eurocode 5 "Timber Structures" (September 2014), which follows the corresponding works of the European Committee for Standardization CEN/TC 250 "Structural Eurocodes", having the subject of the revision of the norm EN1995-1-1:2005 [AC:2006 + A1:2008] (EC5 - Design of timber structures - general - common rules and rules for buildings): Compilation and assessment of proposed revisions.

Dr. Tobias Wiegand (Germany)

Studiengemeinschaft Holzleimbau e.V.
Wuppertal Germany

[wiegand\(at\)ib-wiegand.de](mailto:wiegand(at)ib-wiegand.de)

COST FP1402, WG2 Member



| | | | | |
|---|--|---------------------|----------|--|
| <i>Personal</i> | | <i>Organisation</i> | | |
| Years of experience in relevant field: 6 Expertise: Secretary of German association of producers of structural glued materials (e.g. CLT and glulam); convenor of CEN/TC 124 WG 3 "glued products" and CEN/TC 250 SC 5 WG 1 "CLT" Degree: Dr.-Ing. (01.01.2006) | Studiengemeinschaft Holzleimbau e.V. (www.brettschichtholz.de) Focus: Association dealing with R&D, standardization and other technical issues Facilities: none | | | |
| | No. of staff | PhD students | MSc/year | |
| | 1 | 0 | 0 | |
| <i>Research projects</i> | | | | |
| None | | | | |
| <i>Publications</i> | | | | |
| None | | | | |