

Welcome to Vienna!

Welcome to CompWood 2017!



Conference Venue:

Cupola Hall:

Boeckl Hall:

Festive Hall:

TU Wien, Main Building (main entrance marked with 1)

TU Wien, Main Building, 4th floor

TU Wien, Main Building, 1st floor

TU Wien, Main Building, 1st floor

**Meeting point bus
transfer to banquet:**

marked with 2

Conference Organisation

Organising Institutions

Vienna University of Technology (TU Wien)
 Institute for Mechanics of Materials and Structures
 Linnaeus University, Sweden
 Department of Building Technology

Chairmen

Josef FÜSSL (TU Wien)
 Thomas K. BADER (Linnaeus University)
 Josef EBERHARDSTEINER (TU Wien)

Secretary General

Martina PÖLL (TU Wien)

Scientific Advisory Committee

Hans Joachim BLASS (Germany)
 Ingo BURGERT (Switzerland)
 José Manuel CABRERO BALLARÍN (Spain)
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 Kristofer GAMSTEDT (Sweden)
 Joseph GRIL (France)
 Peer HALLER (Germany)
 Mark HUGHES (Finland)

Michael KALISKE (Germany)
 Markus LUKACEVIC (Austria)
 Ulrich MÜLLER (Austria)
 Peter NIEMZ (Switzerland)
 Anders OLSSON (Sweden)
 Sigurdur ORMARSSON (Sweden)
 Erick SAAVEDRA (Chile)
 Gerhard SCHICKHOFER (Austria)
 Erik SERRANO (Sweden)
 Luca UZIELLI (Italy)
 Jan-Willem VAN DE KUILEN (Germany, Netherlands)

The Conference Venue

The conference venue is Vienna University of Technology (TU Wien), Main Building, Karlsplatz 13, 1040 Vienna. All scientific events will take place in the Main Building.



Main Building, TU Wien



Cupola Hall



Heurigenrestaurant "10er Marie"

Your Way to the Conference Venue

The conference venue can be easily reached by public means of transport (underground: U1, U2, U4; tramways: D, J, 1, 2, 62, 65; buses: 4A, 59A):

From the Airport

- **by taxi** € 40.00
The ride takes approximately 20 minutes.
- **by bus** € 8.00 (one way), € 13.00 (return ticket)
Buses run at intervals of 20 min. in front of the arrivals' area of the airport: the ride to Schwedenplatz/Morzinplatz (connections to U1, U4) takes approx. 20 minutes.
- **by CAT (City Airport Train)** € 12.00 (one way), € 21.00 (return ticket) (reduced fares available if ticket is paid online in advance)
Trains run at intervals of 30 min. (xx:05 and xx:35); the non-stop ride to the City Air Terminal (Landstraße) (connections to U3, U4) takes approx. 16 minutes.
- **by train („Schnellbahn“)** € 4.40 (one way)
Trains also run at intervals of 30 min.; the ride to the City Air Terminal (Landstraße) (connections to U3, U4) takes approx. 25 minutes.

From Railway Station “Wien Meidling / Philadelphiabrücke”

- Take underground U6 (direction Floridsdorf) to Längenfeldgasse. There switch to underground U4 (direction Heiligenstadt) to Karlsplatz.

From Railway Station “Wien Westbahnhof”

- Take underground U3 (direction Simmering) to Stephansplatz. There switch to underground U1 (direction Reumannplatz) to Karlsplatz.

From Railway Station “Wien Hauptbahnhof”

- Take underground U1 (direction Leopoldau) to Karlsplatz.

By Car

- The conference venue is near the main transit route through Vienna. However, parking in the central areas of Vienna is limited to 1½ – 2 hours, and a parking voucher (available at tabacconists („Trafik’)) is required.

Social Programme

Banquet: Thursday, June 8, 2017, 20:00

The banquet, given by the Mayor of the City of Vienna for all registered participants and accompanying persons, will take place at the Heurigenrestaurant 10er Marie.

Busses for all participants will leave at 19:00 next to the conference venue. Please see the map on the cover page for details.

Tourist Information

Currency

The official currency in Austria is the Euro. 1 Euro = 100 Cents. The symbol for the Euro is €.

Foreign Exchange, Banks & Credit Cards

Money can be changed at the airport, at banks, exchange bureaus, and larger hotels. For a cash advance, credit cards can be used at cash dispensers ("Bankomat") which are available all over the city.

Important Telephone Numbers

Emergency Number	112	Police	133	Medical Service	141
Fire Brigade	122	Ambulance	144		

Pharmacy

The nearest pharmacy is located on Wiedner Hauptstraße 14 (open: Mon-Fri 8:00-18:00, Sat 8:00-12:00). The same opening times apply to most pharmacies in Vienna. A 24-hour pharmacy standby service is available throughout the city. Details of the nearest open pharmacy are posted at every pharmacy. For telephone information call +43 1 1455.

Prices and Tips

Menu prices usually include service and taxes. In restaurants, a tip of approximately 5-10 % is expected.

Shopping

Typical shopping hours are Monday to Friday 9:00 - 18:00 and Saturday 10:00 - 13:00 (17:00). Apart from some tobacconists and small supermarkets at petrol stations and at the main railway stations, shops are closed on Sundays. Luxury shops with an elegant clientele can be found in the pedestrian zone of the Graben and of Kärntnerstraße (underground lines U1 and U3 / station Stephansplatz). Street entertainers and outdoor cafés contribute to the special atmosphere of this area. A well known shopping area is Mariahilferstraße (underground line U3 / station Neubaugasse).

Taxi

The main taxi companies in Vienna can be reached on: +43 1 31300 or +43 1 40100 or +43 1 60160.

Transportation

The best way to discover Vienna is by public transport. The transport system is based on a dense network of trams, buses, subways, and trains. The following tickets are available:

- Single-ride ticket: € 2.20 (at vending machines), € 2.20 (in trams only)
- 24-hour (multiple-ride) ticket: € 7.60
- 48-hour (multiple-ride) ticket: € 13.30
- 72-hour (multiple-ride) ticket: € 16.50
- Week card (multiple-ride ticket): € 16.20 (valid from Monday to Monday)

Tickets are available at Vienna Transport sales counters and at tobacconists. Apart from the Vienna Card, tickets can also be obtained from vending machines at the underground stations.

- Vienna Card: € 13.90 (24-hour (multiple-ride)), € 21.90 (48-hour (multiple-ride)), or € 24.90 (72-hour (multiple-ride) ticket, reduced rates for guided tours, at restaurants, ...)

Voltage

Voltage: 230 Volts. Plugs are Continental-style two-pin. A plug adaptor should be taken along if incompatible electronic gadgets are used.

Scientific Programme

Information for Lecturers

- Please check the time and lecture room of your presentation in the daily programme and on the info boards as there might have been changes.
- Technical staff is assigned to each lecture room for help with technical equipment.
- Each lecture room is equipped with a notebook (Windows 7, Microsoft Office 2013, Acrobat Reader) and a video projector. You are asked to upload your presentation on this notebook as soon as possible, but at the very latest in the break before the session.
- Please be present at least 10 minutes prior to the start of your session and let the chairperson know you are there.
- Please make sure to stay in your session from the beginning on in order to ensure smooth changes between the individual presentations.
- The time allotted for the presentations is 20 min. (incl. discussion) for all presentations. The chairpersons are requested to stop presentations after the allotted time has passed.

Information for Chairpersons

- Please check the time and lecture room of the session you are chairing in the daily programme and on the info boards as there might have been changes.
- All lecturers of your session are requested to approach you in the lecture room at least 10 minutes before the start of the session. This allows you to identify lecturers who have not arrived yet.
- Technical staff is assigned to each lecture room for help with technical equipment. They are responsible for the technical equipment in the lecture room and are ready to help you in any other aspect.
- You are kindly asked to switch between presentations by simply announcing the name of the next presenter and the title of the presentation. Due to the tight schedule, there will not be sufficient time for introducing individual lecturers in a more detailed manner.
- Please do your best to strictly limit the duration of each presentation and discussion to the allotted time.
- If a lecturer is missing, please stick to the original programme, i.e., extend the discussion time of the preceding presentation or allow a break for the duration of the missing lecture(s). This enables participants to listen to chosen individual lectures according to the announced sequence.

Keynote Lectures

Wednesday, June 7, 2017

- 09:20 KL I **Massimo Fragiaco** (*University of L'Aquila, Italy*):
A framework for seismic analysis of timber structure
- 09:50 KL II **Hans Joachim Blaß** (*Karlsruhe Institute of Technology, Germany*):
State-of-the-art and challenges in engineered timber connections

Thursday, June 8, 2017

- 09:00 KL III **Michael Kaliske** (*Technical University of Dresden, Germany*):
Multiphysical simulations of wood and wooden structures

Friday, June 9, 2017

- 09:00 KL IV **Joseph Gril** (*University of Montpellier 2, France*):
Modelling the time-dependent behaviour of wood
- 14:30 KL V **Kristofer Gamstedt** (*Uppsala University, Sweden*):
Development of a support structure for the wooden shipwreck Vasa

Wednesday, June 7, 2017, 09:00 - 14:00

09:00 - 09:20

Opening session

J. Füssl (Conference Chairman)

Cupola Hall

09:20 - 10:20

Cupola Hall

Keynote lectures

Chair: Josef Eberhardsteiner

09:20 KL I **M. Fragiaco**, G. Rinaldin, C. Bedon, M. Izzi: A framework for seismic analysis of timber structures

09:50 KL II **H. J. Blaß**: State-of-the-art and challenges in engineered timber connections

10:20 - 10:50

Cupola Hall

Coffee Break

Session I

Brittle failure in wood products and connections

Chair: Erik Serrano

Cupola Hall

10:50 I:1 **J. L. A. Vessby**, S. Florisson, T. Sisay Habite: Numerical simulation of moisture driven fracture in mechanical timber connection using XFEM

11:10 I:2 **C. Avez**, B. Roensmaens, **M. Verbist**, J.M.G. Branco, T. Descamps: A cohesive zone model to study timber-to-steel-plates bonded joints

11:30 I:3 **K. Ostapska-Luczowska**, K. A. Malo: Numerical simulation of timber shear experimental test with cohesive zone fracture model

11:50 I:4 **M. Lukacevic**, J. Füssl, J. Eberhardsteiner: A microstructure-based multisurface failure criterion for the description of brittle and ductile failure mechanisms of wood

12:10 I:5 **A. d. M. Wahrhaftig**: Experimental exploratory study of failure modes in models of wooden rectangular beams

12:30 I:6 **S. O. Marthin**, E. K. Gamstedt: On the hierarchical structure of wood and its mechanisms providing high tensile strength

12:50 - 14:00

Festive Hall

Lunch Break

Wednesday, June 7, 2017, 14:00 - 16:30

Session II
Cupola Hall
Identification of mechanical properties & advanced grading

Chair: Kristofer Gamstedt

- 14:00 II:1 **A. Olsson, M. Hu:** Timber models and prediction of stiffness and strength
- 14:20 II:2 **Y. Faydi, L. Brancheriau, G. Pot, R. Collet:** Prediction of oak wood mechanical properties based on vibratory tests
- 14:40 II:3 **F. García Fernández, P. de Palacios, A. García-Iruela, L. García Esteban, B. González Rodrigo:** Predicting particleboard modulus of rupture through artificial neural networks using production parameters
- 15:00 II:4 **H. Petersson, B. Källsner, J. Vessby:** In-plane buckling analysis of transversely loaded timber beams
- 15:20 II:5 **T.-Y. Kuo, W.-C. Wang:** Experimental and numerical investigation of grain orientation of timber with knot by using digital image analysis
- 15:40 II:6 **G. Kandler, M. Lukacevic, J. Füssl:** Experimental and numerical investigations on the mechanical behavior of glued laminated timber

Session III
Boeckl Hall
Timber connections

Chair: Jose Manuel Cabrero

- 14:00 III:1 **M. Verbist, J. M. G. Branco, T. Descamps:** Hammock shape shear stress distribution in the single step joint
- 14:20 III:2 **F. W. Panella, A. Pantaleo:** Numerical simulation and experimental validation of fatigue behavior of wood-glass fiber composite T joint
- 14:40 III:3 **A. Pantaleo, D. Ferri:** Numerical 3D finite element modelling and experimental validation for dowel type vs tenon-mortise type wooden joints for window frames
- 15:00 III:4 **A. Livingstone, P. Patlakas, S. Smith, R. Hairstans:** Automated code compliance checking to EC5 in BIM for structural timber connections
- 15:20 III:5 **P. Sejkot, S. Ormarsson, J. Vessby:** Numerical and experimental study of punched metal plate connections to obtain spring stiffness needed for 3D buckling analysis of long-span timber trusses
- 15:40 III:6 **E. Nathan, T. Tsalkatidis:** Numerical analysis of the withdrawal capacity of large steel dowels in cross-laminated timber panels

16:00 - 16:30
Coffee Break
Cupola Hall

Wednesday, June 7, 2017, 16:30 - 18:30

Session IV

Cupola Hall

Cross-laminated timber

Chair: Henrik Danielsson

- 16:30 IV:1 **L. Franzoni, A. Lebéé, F. Lyon, G. Foret:** Closed-form homogenization of CLT panels with periodic gaps
- 16:50 IV:2 **E. I. Saavedra Flores, J. C. Pina, C. F. Guzmán, P. González, S. Yáñez:** Multi-scale modelling strategies for cross-laminated timber structures
- 17:10 IV:3 **B. González Rodrigo, A. Fraile de Lerma, J. C. Mosquera Feijoo:** Modeling of the seismic behavior of structures of cross-laminated timber panels
- 17:30 IV:4 **T. Furtmüller, B. Giger, C. Adam:** A mechanical material model for cross-laminated timber obtained by numerical homogenization
- 17:50 IV:5 **K. Saavedra, E. I. Saavedra Flores, J. Hinojosa:** On the multiscale simulation of buckling and delamination in cross-laminated timber structures

Session V

Boeckl Hall

Modelling viscous effects in wood

Chair: Joseph Gril

- 16:30 V:1 **S. Huč, T. Hozjan, S. Svensson:** Influence of misalignment between direction of observation and wood material orthotropy on viscoelastic strain measurements
- 16:50 V:2 **J. C. Pina, E. I. Saavedra Flores, C. F. Guzmán, S. Yanez:** A multi-scale model for the creep behaviour of wood
- 17:10 V:3 **M. Capron, S. Bardet, K.C. Sujan, M. Matsuo, H. Yamamoto:** One-dimension viscoelastic modelling of wood in the process of formation to clarify the hygrothermal recovery behavior of tension wood
- 17:30 V:4 **B. Homerin, M. Rhême:** Finite element modelling (FEM) of the viscoelastic behavior of a wooden spring system
- 17:50 V:5 **S. E. Hamdi, R. Moutou Pitti, O. Saifouni:** Moisture driven failure monitoring in wood material: numerical analysis based on viscoelastic crack growth approach
- 18:10 V:6 **S. Huč, S. Svensson:** Coupled two-dimensional modelling of long-term behavior of wood subjected to mechanical stress and varying climatic conditions

Thursday, June 8, 2017, 09:00 - 14:00

Cupola Hall

Keynote lecture
Chair: Josef Füssl

09:00 KL III **M. Kaliske:** Multiphysical simulations of wood and wooden structures

Session VI

Cupola Hall

Modelling moisture in wood I
Chair: Josef Füssl

09:30 VI:1 **R. Fleischhauer, J. U. Hartig, P. Haller, M. Kaliske:** Modelling and experimental investigations of densification of wood for forming processes

09:50 VI:2 **S. Florisson, S. Ormarsson:** The effect of surface emission, diffusion and initial moisture profiles on stress development in timber boards

10:10 VI:3 **S. Fortino, P. Hradil, A. Pousette:** A numerical approach to study the effects of coatings on the moisture gradients and moisture induced stresses in glulam beams of timber bridges

10:30 - 11:00
Coffee Break

Cupola Hall

Session VII

Cupola Hall

Modelling moisture in wood II
Chair: Sigurdur Ormarsson

11:00 VII:1 **C. F. Pambou Nziengui, R. Moutou Pitti, E. Fournely, J. Gril:** Impact of moisture content changes on the mechanical behavior of *Pseudotsuga Menziesii*

11:20 VII:2 **C. Zhang, D. Derome, J. Carmeliet:** Multiscale modeling of hygro-mechanical behavior of wood cell wall S2 layer

11:40 VII:3 **D. Konopka, M. Kaliske:** Multi-Fickian hygro-mechanical investigation of wooden cultural heritage

12:00 VII:4 **M. Schiere, S. Franke, B. Franke, A. Müller:** Numerical sensitivity study of moisture induced stress levels in glulam cross sections

12:20 VII:5 **K. Schulgasser:** Why tangential shrinkage of wood is greater than radial shrinkage

12:40 VII:6 **M. Autengruber, M. Lukacevic, J. Eberhardsteiner, J. Füssl:** A numerical simulation tool for coupled heat and mass transfer in wood

13:00 - 14:00
Lunch Break

Festive Hall

Thursday, June 8, 2017, 14:00 - 16:10

Session VIII

Cupola Hall

Composite and reinforced structural elements

Chair: Massimo Fragiacomò

- 14:00 VIII:1 **J. Pyykkö, S. Svensson:** Evaluation of computational models for timber-concrete composite beams
- 14:20 VIII:2 **A. Kovačić, B. Šubic, G. Fajdiga:** Computer modelling of hybrid wooden beams for window frames
- 14:40 VIII:3 **M. Frese:** Computational examination of the effect of beech LVL reinforcing modules on the bending stress of glulam beams with shear failure
- 15:00 VIII:4 **M. Riegler, S. Dworak, U. Müller:** Introducing a virtual technological model for the formation of wood-based composites
- 15:20 VIII:5 **M. Schneider, J. Mareš, S. Gigli:** The influence of damaged zones in wood columns on its load bearing capacity
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Session IX

Boeckl Hall

Vasa ship and wooden structures

Chair: Erick Saavedra Flores

- 14:00 IX:1 **R. Afshar, N. Alavyoon, A. Ahlgren, N. van Dijk, A. Vorobyev, K. Gamstedt:** A full-scale finite-element model of the Vasa ship
- 14:20 IX:2 **N. van Dijk, A. Ahlgren, A. Vorobyev, R. Afshar, K. Gamstedt:** Risk assessment for buckling of the original foremast of the Vasa ship
- 14:40 IX:3 **A. Vorobyev, F. Garnier, N. van Dijk, R. Afshar, O. Hagman, K. Gamstedt:** Evaluation of displacements of a wooden hull section of the Vasa ship by means of 3D laser scanning
- 15:00 IX:4 **F. Frontini, J. H. Siem:** Modelling of a historic timber roof using the finite element method
- 15:20 IX:5 **G. Rinaldin, M. Fragiacomò, C. Amadio:** Accuracy of N2 inelastic spectra for timber structures
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15:40 - 16:10
Coffee Break

Cupola Hall

Thursday, June 8, 2017, 16:10 - 18:10

Session X

Cupola Hall

Mechanical behaviour of joints and connections

Chair: Hans Joachim Blaß

- 16:10 X:1 **M. Dorn, K. De Borst:** Realistic modelling of the interface between wood and dowel in connections
- 16:30 X:2 **B. Iraola, J. M. Cabrero:** Strategies to model wood behavior and progressive failure
- 16:50 X:3 **T. K. Bader, J. Vessby:** Modeling displacement path dependence in nailed sheathing-to-framing connections
- 17:10 X:4 **N. Couvreur, D. Laplume, T. Descamps, B. Roensmaens:** Use of an optimization procedure for the ULS design of bolted glulam timber joints
- 17:30 X:5 **F. Nouri, H. R. Valipour:** Finite element modelling of steel-timber composite beam-to-column joints
- 17:50 X:6 **M. Yurrita, J. M. Cabrero:** New concepts for the development of a formula for the embedment strength of timber

Session XI

Boeckl Hall

Simulations

Chair: Markus Lukacevic

- 16:10 XI:1 **A. Khaloian Sarnaghi, J.-W. van de Kuilen:** Combined CFD and solid FEM numerical modelling of imperfections in wooden materials
- 16:30 XI:2 **Y.-H. Yeh, Y.-S. Tsai, M.-F. Hsu:** Life cycle assessment of high-rise residential timber building located in urban context
- 16:50 XI:3 **Z. Chen, F. Pled, L. Chevalier, H. Makhlof, E. Launay:** Identification of the mechanical properties of particle boards and stochastic simulation of the behavior of furniture
- 17:10 XI:4 **T. Yojo, C. O. Souza, M. J. A. C. Miranda, S. Brazolin:** Wood cell elastic model for stress and deformation analysis - implementation

20:00 - 23:30
Conference Banquet

Heuriger „10er Marie“
(see details on page 5)

Friday, June 9, 2017, 09:00 - 13:30

Cupola Hall

Keynote lecture

Chair: Thomas K. Bader

09:00 KL IV **J. Gril:** Modelling the time-dependent behaviour of wood

Session XII

Cupola Hall

Applications

Chair: Anders Olsson

09:30 XII:1 **S. Ormarsson, M. Johansson:** Numerical simulations of structural behaviour of volume modules used for construction of multifamily timber houses

09:50 XII:2 **K. Persson, O. Flodén:** Effect of variations in material properties on low-frequency vibrations in wood structures

10:10 XII:3 **U. Müller, G. Singer, S. Kirschbichler, W. Leitgeb, T. Jost:** The road from creating a material model to a structural component of wood for automotive applications

10:30 - 11:00 Coffee Break

Cupola Hall

Session XIII

Cupola Hall

Multiscale considerations

Chair: Michael Kaliske

11:00 XIII:1 **A. M. Rindler, C. Hansmann, U. Müller, J. Konnerth:** Mechanical contribution of the adhesive layer to the dimensional stability of multi-layered wood based panels

11:20 XIII:2 **C. F. Guzmán, E. I. Saavedra Flores, J. C. Pina, S. Yáñez:** Finite element approach to simulate cellulose molecules

11:40 XIII:3 **F. K. Wittel, D. Mora, S. O. Olaniran, M. Rüggeberg:** Micro-mechanical multi-scale models for spruce with generic modifications

12:00 XIII:3 **P. M. J. S. Godinho, M. Jajcinovic, T. K. Bader, W. J. Fischer, U. Hirn, W. Bauer, C. Hellmich:** A continuum micromechanics approach to the strength of planar fiber networks: paper material applications

12:20 XIII:5 **M. Li, J. Füssl, M. Lukacevic, J. Eberhardsteiner:** Numerical limit analysis approaches for strength predictions of cross-laminated timber plates

12:40 - 13:30 Lunch Break

Cupola Hall

Friday, June 9, 2017, 13:30 - 15:10

Session XIV

Cupola Hall

Modelling of wood products

Chair: Thomas K. Bader

- 13:30 XIV:1 **H. Danielsson, E. Serrano:** Experimental and numerical investigations of the stiffness of in-plane loaded CLT beam elements
- 13:50 XIV:2 **J. U. Hartig, S. Facchini, P. Haller:** Experimental and numerical investigations on a glass fiber reinforced molded wooden tube made of beech exposed to lateral vehicle impact
- 14:10 XIV:3 **G. Balduzzi, G. Kandler, J. Füssl:** Estimation of the bending stiffness of GLT beams: a novel procedure based on enhanced analysis of the boards' stiffness and first order beam models
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Cupola Hall

Keynote lecture

Chair: Thomas K. Bader

- 14:30 KL V **K. Gamstedt, R. Afshar, N. P. van Dijk, A. Vorobyev:** Development of a support structure for the wooden shipwreck Vasa
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Closing Session

Cupola Hall

- 15:00 **T.K. Bader** (Conference Chairman)