



COST Action FP1402

“Basis of Structural Timber Design – from Research to Standards”

Minutes of the Workshop

“How will we plan / build in 25 years and how will this process be regulated?”

Attendance List

Name	Country	Institution
Philipp DIETSCH (PD, Chair)	DE	Technical University of Munich
Jochen KÖHLER (JK, Vice-Chair)	NO	Norwegian University of Technology, Trondheim
Jean-François BOCQUET (JFB)	FR	Lermab, Épinal
Izabela BURAWSKA-KUPNIEWSKA (IB)	PL	Warsaw University of Life Sciences
Steffen FRANKE (SF)	CH	Bern University of Applied Science
Julien GAMERRO (JG)	CH	École polytechnique fédérale de Lausanne (EPFL)
Bilgin ICEL (BI)	TR	Canakkale Onsekiz Mart University
Robert JOCKWER (RJ)	CH	ETH Zurich
Svetozar MADZHOV (SM)	BG	Forest Research Institute, Sofia
Peter NIEBUHR (PN)	DE	Technische Universität Braunschweig
Anna ROZANSKA (AR)	PL	Warsaw University of Life Sciences
Gerhard SCHICKHOFER (GS)	AT	Graz University of Technology
Ivan SOPUSHYNSKY (IS)	UA	Ukrainian National Forestry University, Lviv
Mislav STEPINAC (MS)	HR	University of Zagreb
Eero TUHKANEN (ET)	ES	Tallinn University of Technology
Petra VOJTASIKOVA (PV)	SE	Kjellander Sjöberg Architects, Malmö

Total: 16



Block A - Presentations

Petra Vojtasíková (Kjellander Sjöberg Architects, Malmö)

“Regulate the unregulated”

Keywords: Architecture, city planning, responsibility for the built environment, future city, informal city, "story-telling", it takes a Block, Sege park, communing kits, common space, space policy

Steffen Franke (SF) asked, if the main intention of this presentation was to emphasize collaboration between architects, planners, and engineers.

Petra Vojtasíková (PV) answered that the main question is how to find common space and how to distinguish between common and private space. It is not the question of one single client, rather the interest of more clients.

This was followed by a common discussion on how to make the city livable and how to avoid competition in common space (freedom vs. growth).

Gerhard Schickhofer (GS) discussed, for whom do we build? There are too many people in the city: how to manage such an amount of people?

Ivan Sopushynskyy (Ukrainian National Forestry University)

„How will we plan / build in 25 years and how will this process be regulated?”

Keywords: smart houses, energy consumption, knowledge: locally oftentimes low, necessity to share knowledge with communities

Julien GAMERRO (JG) asked if the objective is to use more local wood.

Ivan Sopushynskyy (IS) agreed and added that it is about enabling communities to help themselves.

Julian Gamberro (EPFL)

“How will we plan and build in future?”

Keywords: Resource optimization, decarbonisation, sustainable reorganization, deconstruction vs. refurbishment, digitalization, BIM, CAM, AEC, wood-wood connections, geometrical stiffness, K_{ser} , Théâtre Vidy-Lausanne, Mobic SA Industry Hall

SF asked how the connection between different parts is realized.

JG answered that it is realized by surface treatment / machining to get as much as possible timber-to-timber connections and to reduce steel.



Robert Jockwer (ETH)

“How will be build in 25 years?”

Keywords: how did we build 25 years ago? (“Wood Engineering in the 21st Century: Research Needs and Goals” SEI/ASCE Structures Congress XV in Portland, Oregon), topics: material properties, performance-based design, hybrid structures, assessment of structures; what are the challenges for future building? new products, material efficiency vs. carbon storage, system design, performance of connections, advanced mechanical models, building process, standardized systems, monitoring, system updating, the impact of loading history

Block A - Common Discussion

Jochen Köhler (JK) discussed resource efficiency.

GS argued that, even if the annual worldwide CLT production is expected to exceed 1,000,000 m³ by the end of this decade, it is a fraction compared to the available resources. CLT is a mass product but still light, and efficiency is achieved by other means.

Philipp Dietsch (PD) asked what the impact of such a scenario would be if we include countries where wood is less abundant.

RJ discussed the use of CLT in structures

GS discussed the use of CLT for modules, which is much simpler as timber frame and allows cheap volumes for flats.

PD discussed the energy consumption in production and how to bring together (i) safety, (ii) energy efficiency and (iii) the need for common spaces in areas of limited potential for further growth. How to best divide available space into individual and common space (case study of city planned from scratch, e.g. in Asia or the Arabian Peninsula).

A common discussion followed around some examples: (1) in commercialized airports, seats are removed to force people to move and to buy; (2) in Scandinavia people are forced to use a bike instead of a car as no garage is planned for in some residential homes.

Bilgin Icel (BI) introduced the migration aspect: one Turkish city - after the refugee crisis – had three times as many inhabitants as it was planned for. How to plan things for which one cannot plan?

A common discussion followed on political and psychological aspects.

PD asked if it is possible to reduce CO₂ in an era of capitalism and individualism.



Svetozar Madzhov (SM) gave an example from Bulgaria: in Soviet times many efficient but less aesthetic buildings were built around the working areas. Due to this, every Bulgarian who could, bought or built an additional house in the countryside to be used on the weekends. This meant a lot of traveling during the weekends = CO2 emission. The same tendency can be seen in China today.

GS mentioned an object in Hamburg where 371 flats were built instead of the 150 flats planned for.

JK discussed the house as a product that could be given a strong image (such as a company name or model name, compare Tesla)

Eero Tuhkanen (ET) mentioned that in Estonia timber houses already have a good image and that timber house producers are amongst the most successful companies. The low popularity is more an issue of the former mentality "a real man will build a stone house."

Block B - Presentations

Izabela Burawska-Kupniewska (Warsaw University of Life Sciences)

"How will we plan / build in 25 years and how will this process be regulated?"

Keywords: process lines, sawmill industry, low grade timber, fast growing species, reprocessing wood side products, material from industrial waste, repair engineering, upgrading with natural materials (natural fibers), production cost vs. improvement

Svetozar Madzhov (Forest Research Institute, Sofia)

"Clay Houses in Bulgaria – past, present, and future"

Keywords: clay houses, technology, building climate, architectural style, renovation, building technologies

It was asked if this clay system has potential all over Europe.

SM answered yes.

It was questioned whether old wood burns / ignites more slowly and how high the energy consumption of such buildings was.

Anna Rozanska (Warsaw University of Life Sciences)

"Application possibilities of Solid Wood Layered Floors in Reconstruction of Polish Manor Houses"

Keywords: rehabilitation, conservation of old floors / parquets, upgrading of floor structure, acoustics, air circulation, dimensional stability



Steffen Franke (Bern University of Applied Science)

“Columns, slabs, ready – gluing instead of screwing or nailing”

Keywords: timbatec, TS3, butt joint technology, column grids 8x8 m, glue line thickness 4 – 40 mm, bending strength 5,7 N/mm², temperature requirements, folded structures

GS questioned whether the glue burns less fast than the timber.

Bilgin Icel (Suleyman Demirel University, Isparta)

“How will we plan/build in 25 years and how will this process be regulated”

Keywords: future planning, sustainability, lobbies, wood as decorative vs structural element, speed of change of society vs. change of building sector, Turkish National Development Plans, implementation of EU-standards

It was mentioned that the objective of environmentally sustainable buildings and the use of innovative materials in construction should be placed in the NDP's (National Development Plans).

It should be considered for future planning that factors (socio-economic, topographic, cultural etc.) influencing the selection of construction systems vary among countries. Nationally Determined Parameters are a tool, but increasing number of NDP's would cause problems for legislation in EU zone.

Society changes faster than policy making and implementation processes. Therefore a dynamic planning approach is very important for future planning.

Block B - Common Discussion (following the presentations in Block B)

JK discussed the building lifecycle: Planning > Design > Construction > Reassessment > Reconstruction/Rebuilding. The Eurocode(s) influence quasi only the design phase, i.e. a small decision phase in the life cycle. How can we then enforce more sustainable decisions in the building sector? Questions of sustainability are currently only partially regulated. How sustainable is sustainable enough?

It was mentioned that in former times the responsibility was mostly with the individual engineer while today more and more responsibility is moved to the Eurocodes.

GS stated that designing for sustainability today might not lead to the sustainable buildings when at the same time the building culture is decreasing. One possible solution is modularity as it enables us to achieve better quality on-site.

It was mentioned that high-rise timber buildings are not sustainable.



PD mentioned that the Eurocodes are the wrong document to enforce planners to think about sustainability of their buildings. They are applied at a stage where the important decisions on sustainability are already taken.

It was suggested to promote early sustainable decisions by providing sustainable technical solutions that don't require compromises for investors/users.

It was mentioned that a sustainable building must be flexible inside, to allow a re-use after decades without the need to dismantle. Flexibility in use might be the key to long usability of buildings.

Jean-Francois Bocquet (JFB) mentioned that the use of energy is the primary fuel for capitalism, i.e. energy consumption needs to be added to calculate sustainability.

It was added that the most efficient way to realize change in the construction industry towards higher sustainability is to render sustainable solutions more profitable. This can either be realized by making non-sustainable solutions more expensive (CO₂-tax, make energy more expensive, i.e. not likely) or to make sustainable solutions more affordable (subsidies, i.e. not likely) or to promote sustainability by technical innovations (can be influenced by us).

Block C - Presentations

Mislav Stepinac (University of Zagreb) & Eero Tuhkanen (TalTech)

"Design Process of Prefabricated Timber Frame Modular Houses"

Keywords: planning, smart production, building components, modular buildings – modular thinking?, separation of structure for vertical and horizontal loads?, modular building of complex geometries? Integration of functions

Modular building could be proposed

- when we have a good and sustainable solution
- in order to facilitate the implementation of technical solutions into the industry
- depending on the type of buildings that we want (housing, office, tall timber buildings etc...)

The presentation was followed by a presentation of Gerhard Schickhofer on modular building

GS stated that friction between modules takes account of the horizontal forces

ET asked if there is a need for hold-downs in heavy wind or earthquake situation.

GS replied, there might be a need for hold-downs.



It was questioned whether it makes sense to plan structures for which the structural elements are differentiated into those that should transfer horizontal and others that transfer vertical loads

It was mentioned that for modular buildings, optimization of e.g. wall thickness makes sense (example 1mm thickness saved for 300 units can save a lot of money).

It was emphasized that the concept of modular building (image of a containerized world) needs to be discussed with architects otherwise it could be dangerous (image in society, aesthetics etc.).

Another option could be modularization at a smaller scale (i.e. only bathrooms and kitchens).

Eero Tuhkanen (Tallinn University of Technology)

“Renovation of Multi-Storey Building with Prefabricated Modular Panels”

Keywords: energy efficiency of old concrete buildings (heritage of Soviet era), energetic rehabilitation, thermal bridges, photogrammetry, laser scanning, prototyping, modularization

It was asked if it is efficient to do laser scanning.

ET answered yes, to see the imperfection of the buildings after 50 years of service.

But: (1) there is a lot of data to compute so one needs strong equipment, (2) it can be really time consuming (3) the onsite scanning process takes a lot of time, (4) the precision of the scanner may vary according to the outdoor conditions.

It was agreed that energetic renovation of old building stock is a prerequisite to reach our objectives in term of CO2 emissions.

Peter Niebuhr (Technische Universität Braunschweig)

“Dismissing Strength Classes and Partial Safety Factors for Wood”

Keywords: big data, computing capacity, material assessment, simulation technology, verification not of random characteristics but of members with known properties, tailor made members

JK questioned the idea with respect to the known delivery and transportation problems - how to manage timber components on site (how to avoid gross human error)?

GS stated that timber is highly orthotropic with natural growth characteristics and that the grading process is too complicated to achieve this goal. It is not possible to predict the strength, even with tomography. Currently we can only predict stiffness.



It was also mentioned that there are additional problems for implementation: (1) different timescale of the building construction (concept, planning, design...) and (2) supply chain.

But it should be possible to ask for certain specifications at the design stage and the company guarantees characteristics (like now) but in a Building Information Model (semantic richness of the components). After that we can check in a big data base containing all producers and choose according to what is available locally (locally for sustainability).

Mislav Stepinac (University of Zagreb)

“Adaptive façades”

Keywords: requirements to building envelopes, integration of additional functions, adaption to changing external conditions, structural health monitoring, smart materials

It was mentioned that this technology is still at a research level. It is an apparently promising technology but first we will have to create some design rules if we want to implement it correctly.

Block C - Common Discussion

It was discussed how science can keep up with the speed of development triggered / requested by industry.

It was discussed how the change in timber construction industries will influence timber construction in Europe? In future we will have more general contracting (all-in one) companies who integrate all processes in a single big company like Kattera because they are more competitive in economic terms. The traditional small but locally working carpentries will decrease. This will result in centralization of manufacture of timber products and elements, hence in increased transportation. Is this what we want in terms of sustainability?

The topics Artificial Intelligence (A.I.) and Building Information Modelling could not be discussed in depth due to time limitations.