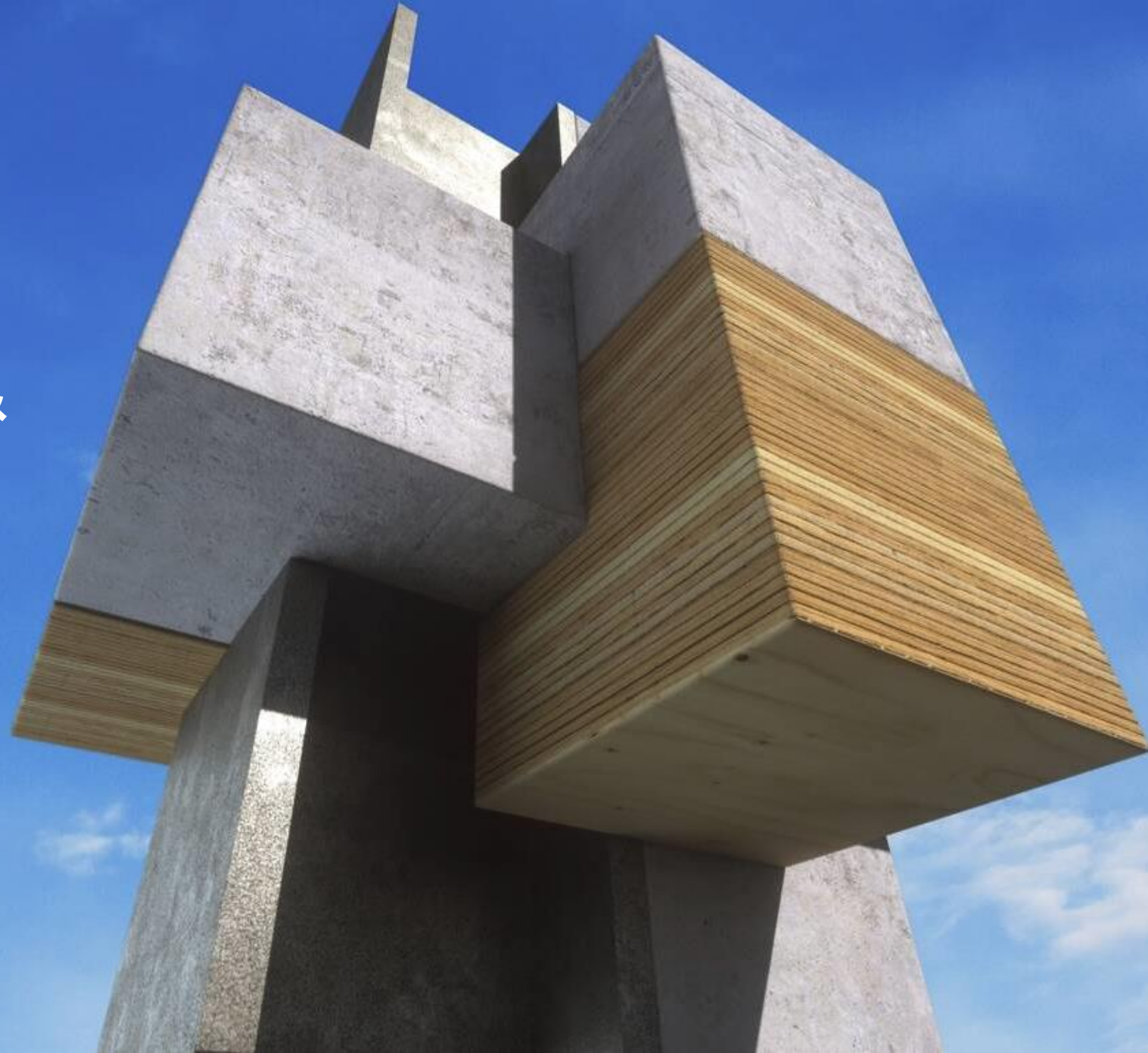




Open Source Wood & Hybrid Construction

Metsä Wood / Tuukka Kyläkallio



Agenda

- Metsä Wood in brief
- Open Source Wood
- Hybrid Construction



Metsä Group | Sales* EUR 5.1 billion | Personnel 9,200 | Renewable energy** 27.7 TWh

Metsäliitto Cooperative | The Group's parent company | Owned by appr. 100,000 Finnish forest owners



METSÄ FOREST
Wood Supply and Forest Services

Sales:
EUR 1.8 billion
Personnel:
840



METSÄ WOOD
Wood products

Sales:
EUR 0.4 billion
Personnel:
1,600



METSÄ FIBRE
Pulp and sawn timber

Sales:
EUR 1.8 billion
Personnel:
1,300



METSÄ BOARD***
Paperboard

Sales:
EUR 1.9 billion
Personnel:
2,400



METSÄ TISSUE
Tissue and greaseproof papers

Sales:
EUR 1.0 billion
Personnel:
2,500

METSÄ SPRING | Innovation company

Metsä Wood Products

A stack of light-colored, laminated wood beams, showing the layered structure of the LVL product.

Kerto® LVL

A stack of spruce plywood sheets, showing the characteristic wavy grain pattern of the wood and the layered construction.

Spruce Plywood

A stack of birch plywood sheets, showing the smooth, light-colored surface and the layered structure.

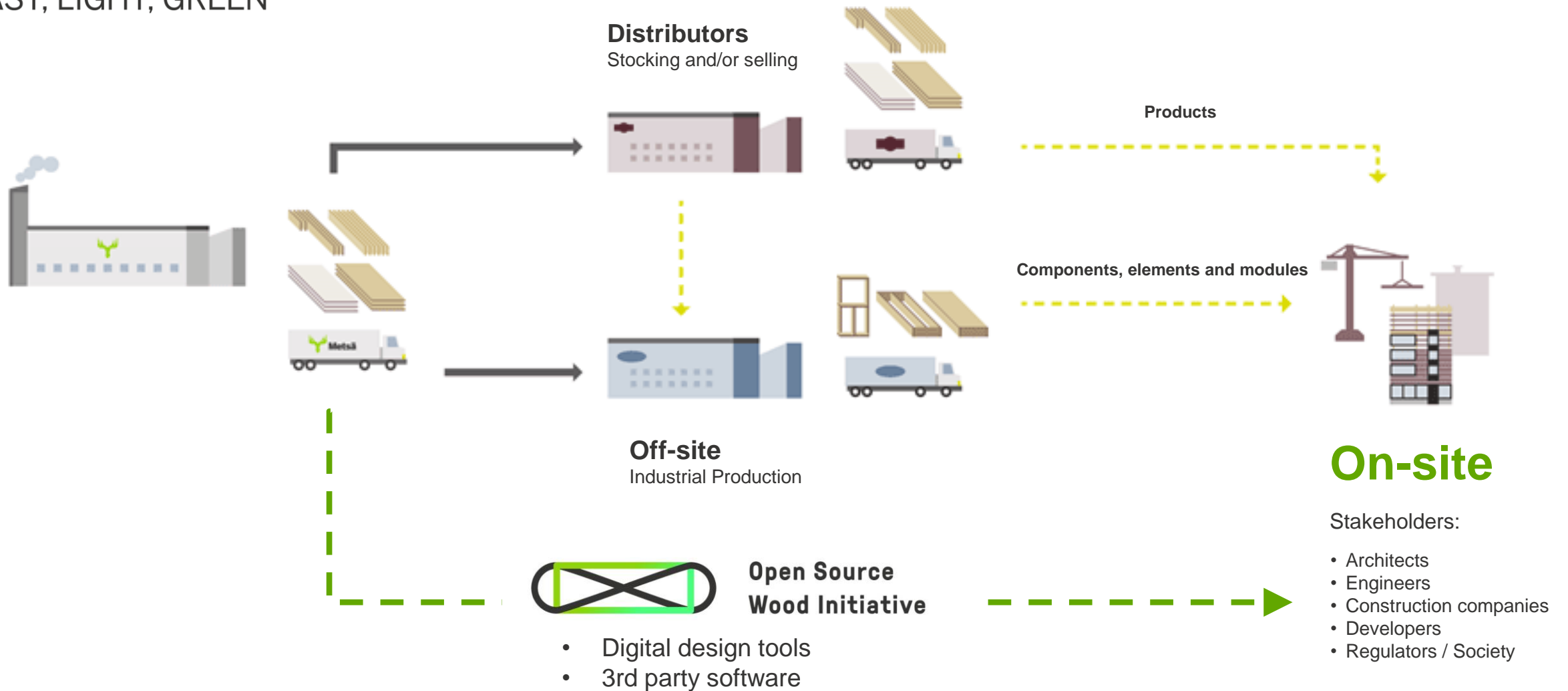
Birch Plywood

A stack of timber upgrade products, including various profiles and beams, showing the natural wood grain and the finished edges.

Timber Upgrades

Kerto® LVL

FAST, LIGHT, GREEN



Open Source Wood initiative

Open Source Wood initiative

is a pioneering open innovation project aimed at facilitating knowledge sharing and growth in modular wood construction.

- OpenSourceWood.com
- Hackathon concept
- Open source design challenges
- Webinars...



Open Source
Wood Initiative

OpenSourceWood.com

Opensourcewood.com is a collaborative online platform for architects, engineers and designers to share innovative ideas for modular wood construction.

- Find elements
- Share your work
- Connect with professionals
- Get Support
- Find Tools for design

All content is shared with **Creative Commons 4.0** license, open to be used by anyone, anywhere.



**Open Source
Wood Initiative**

~1000

Professionals registered

From 85 countries

~250

Designs shared

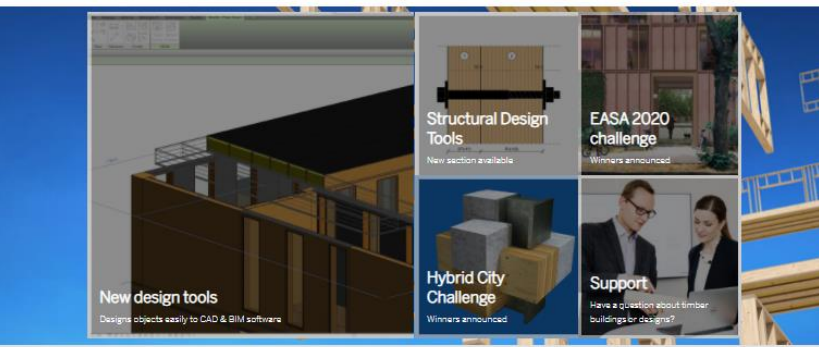
~50 000

Visits 2020

Open Source Wood Initiative by MetsäWood

My Profile
My Messages

Find elements Share idea Connect with Pros Find tools Get support About



New design tools
Designs objects easily to CAD & BIM software

Structural Design Tools
New section available

EASA 2020 challenge
Winners announced

Hybrid City Challenge
Winners announced

Support
Have a question about timber buildings for designs?

Innovation process

NEW REVIEWED REWARDED

How does this work?

Welcome to the Open Source Wood

Metsä Wood is calling on all architects and engineers to share their innovations in wood construction. Open Source Wood initiative is a pioneering open innovation project aimed at facilitating knowledge sharing and growth in modular wood construction. [Learn more about the initiative.](#)

Metsä Wood Award
Metsä Wood is rewarding innovative element and modular designs using Kerto® LVL (laminated veneer lumber). So far we have rewarded twelve designs, that can be found in the [Rewarded section](#).

[Share your best ideas](#) and you might be the next winner.

Latest press releases:
[Estonian architecture students awarded for innovative and economy friendly modular terraced housing building design](#)
[Open Source Wood hackathon goes online – virtual innovation event organised by Metsä Wood and FCBA](#)
[Open Source Wood challenge architecture students participating in the EASA 2020 event](#)
[Open Source Wood gathers structural calculation tools in one place](#)
[Hybrid City competition results offer solutions to improve both sustainability and efficiency](#)

OpenSourceWood.com



Open Source Wood Initiative by MetsäWood

My Profile
My Messages

Find elements Share idea Connect with Pros Find tools Get support About

NEW REVIEWED REWARDED

New Ideas

See new ideas shared by other community members and give your comments. [Share your idea](#)

Search Filter by property Sort by

Wood modules

- All
- Building Concept
- Columns & Frames
- Components
- + Floors
- Infrastructure
- Modules
- Other
- Renovation
- + Roofs
- + Walls

LVL Hybrid Massive Wall

by Metsä Wood

Hybrid Massive Wall is a prefabricated wall element build with Kerto LVL. The main application is in Concrete multi-storey buildings, the main structure, columns and floors are traditionally built with concrete and the exterior façades with bricks and blocks. Idea is to remove only those external walls with Kerto LVL Massive wall elements. The level of prefabrication could be high including insulation, external cladding or coating, internal plasterboard and even the windows. The connection to the concrete structure is enabled by "L wood" linear piece to compensate possible tolerances between the wooden wall element and the main concrete structure. Kerto LVL S-Beams or T-Studs and Kerto-Q or L panels are designed to support the horizontal loads (wind) and vertical (dead load of the panel).

Hybrid Precast UHPFRC x LVL Wall

by Metsä Wood

Starting from the example of a 3 x 4 m Precast Insulated Concrete wall, this new Hybrid precast and prefab wall will bring more efficiency and sustainability to developers, designers, builders and users. This wall concept consists in mixing timber frame wall composed of 220 x 69mm Kerto-LVL T-studs on which a 30mm Ultra High Performance Fiber Reinforced Concrete panel made with organic fibers is fixed using special inserts. This concept would be suitable for Multi-Storey buildings up to 4 levels in case of concrete floor slabs and up to 8 levels for wooden floor slabs.

LVL stairs in a hybrid building

by Metsä Wood

Prefab staircase are composed of straight blocks of stairs and landing slabs. Those elements are heavy and can account up to 5 tons. This means that a limited number of precast stairs can be transported per truck to site, max 3-4 elements. Craning and assembling on site are even not so easy. Using similar prefabricated Kerto LVL elements may reduce the transport rotation and facilitate craning and assembling. Kerto prefab stairs for multi-storey buildings is an interesting element that could replace heavy prefab concrete stairs. Using Kerto LVL for this would simplify prefabrication and will make it faster, lighter and greener. Basically for 1 level we need twice same stair blocks composed of 27x200mm Kerto LVL pieces and 1 landing slab of 1280 x 3000mm prefabricated as a screwed

Find new & reviewed ideas

Open Source Wood Initiative by MetsäWood

My Profile
My Messages

Find elements Share idea Connect with Pros Find tools Get support About

Connections Fire Design Structural design software Span Tables for LVL

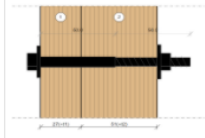
Select country

Structural Design Tools

Connections

Connection calculators allow quick calculations for basic connection types with LVL, Sawn timber and Glulam with most typical fastener types.

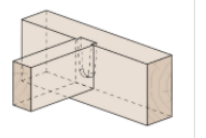
Bolt Connections



Bolt connection calculator allows quick calculations for bolt connections with LVL, Sawn timber and Glulam with typical bolt types. Calculations are according to Finnish rule RIL 205-3-2017. Provided by: [www.calculationtools.com](#)

[Open >](#)

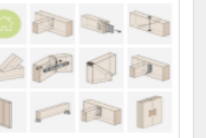
Dovetail connections



Dovetail module enables static proof of main and secondary beam connections as wood to wood connection according to building approval Z-9-1-649 by on the basis of DIN 1052:2008 or DIN EN 1995-1-1:2010-12 in connection with the National Application Document. Provided by: [www.ing-tools.de/](#)

[Open >](#)

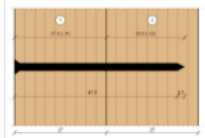
Ingtools



Ingtools offers you tools to design connections and combinations in a simple and material-specific way. The self-explanatory user interface allows intuitive operation. Free and payed modules available. Provided by: [www.ing-tools.de/](#)

[Open >](#)

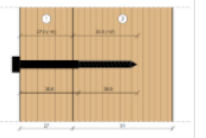
Nail connections



Nail connection calculator allows quick calculations for nail connections with LVL, Sawn timber and GL with most typical nail types. Calculations are according to Finnish rule RIL 205-3-2017. Provided by: [www.calculationtools.com](#)

[Open >](#)

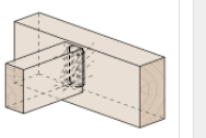
Screw Connections



Screw connection calculator allows quick calculations for screw connections with LVL, Sawn timber and GL with most typical screw types. Calculations are according to Finnish rule RIL 205-3-2017. Provided by: [www.calculationtools.com](#)

[Open >](#)

Sherpa connector



The sherpa connector offers a wide range of applications. For each connector, characteristic static actions ranging from 5 to over 300 kN can be recorded. The design is according to ETA-12/0067 of 17 September 2019. Provided by: [www.ing-tools.de/](#)

[Open >](#)

Tools for design

Open Source Design Challenges

Open online architecture/engineering design challenges focused on a specific theme. All entries shared on C.C 4.0.

- Hybrid City challenge 2020
- EASA challenges 2018 & 2020 (European Architect Student Assembly)
- Element challenge 2019
- Open Source Wood challenge 2017

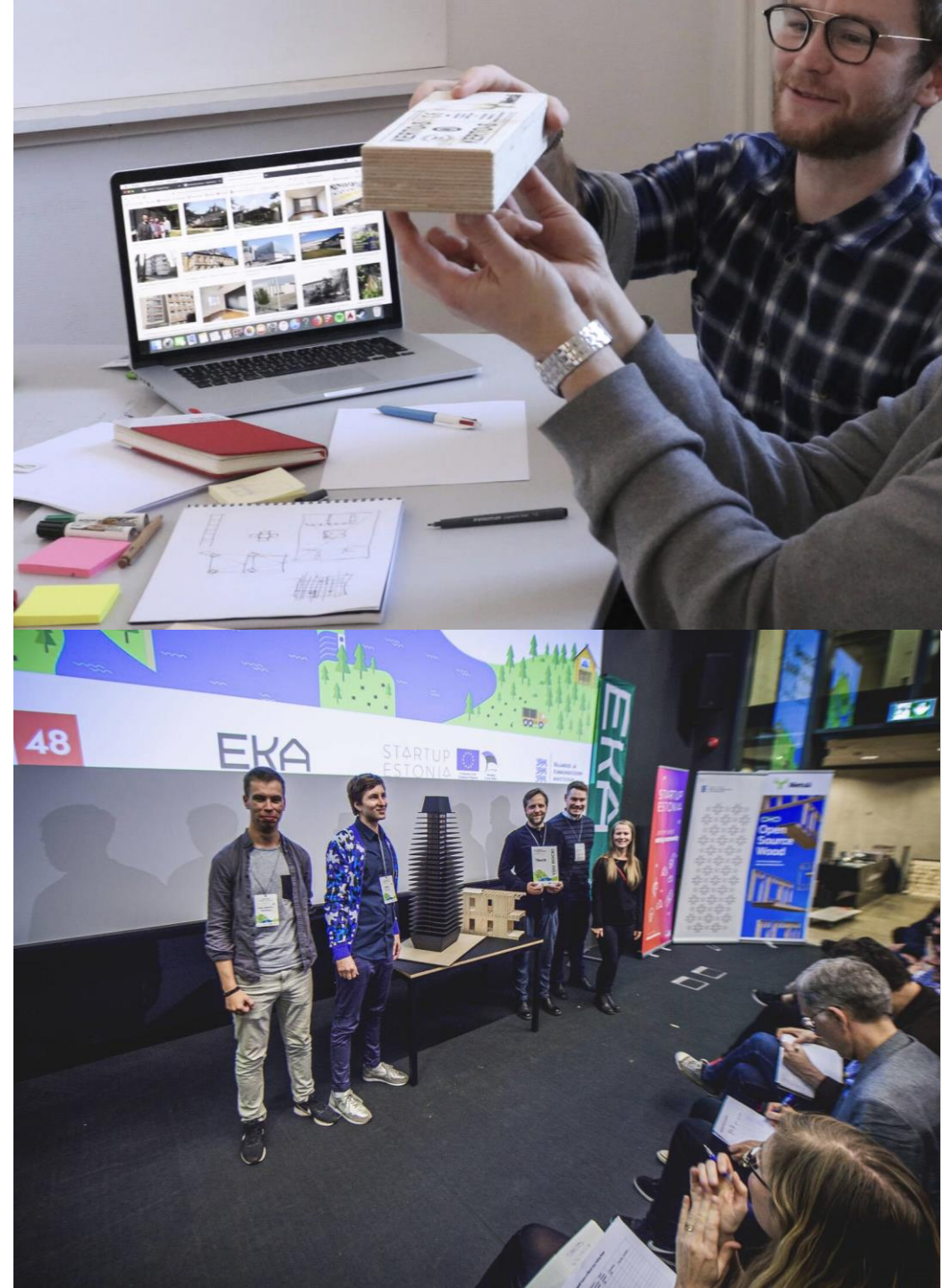


Hackathons & Events

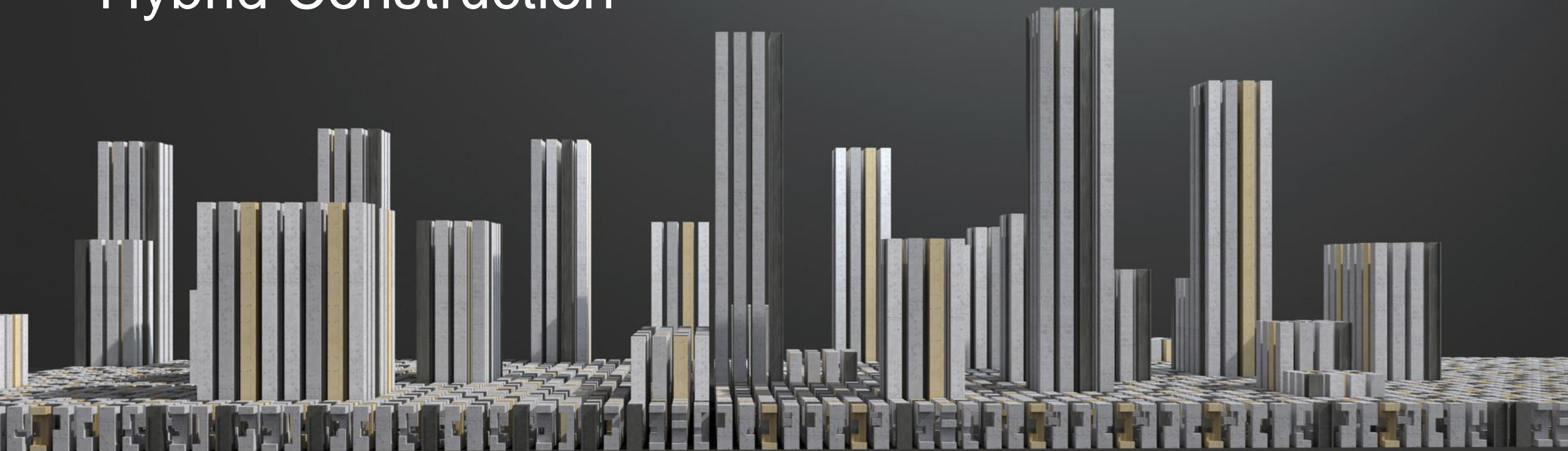
Events gathering wood construction professionals, architects, engineers and university students to solve building design related problems and create new timber designs.

1-2 day events resulting in multidisciplinary **teams sharing** their designs and innovations on [OpenSourceWood.com](https://www.opensourcewood.com)

So far 8 European events with an Open Source Wood challenges.



Hybrid Construction



Create carbon storages and reduce emissions with Hybrid Construction

Aim to find ways to use more wood with the current local processes of building industry.

Step 1: Hybrid City Challenge

Step 2: Redesign local elements as hybrid with local co-operation



Hybrid City Challenge

Design challenge for hybrid structures to fit current ways of building.

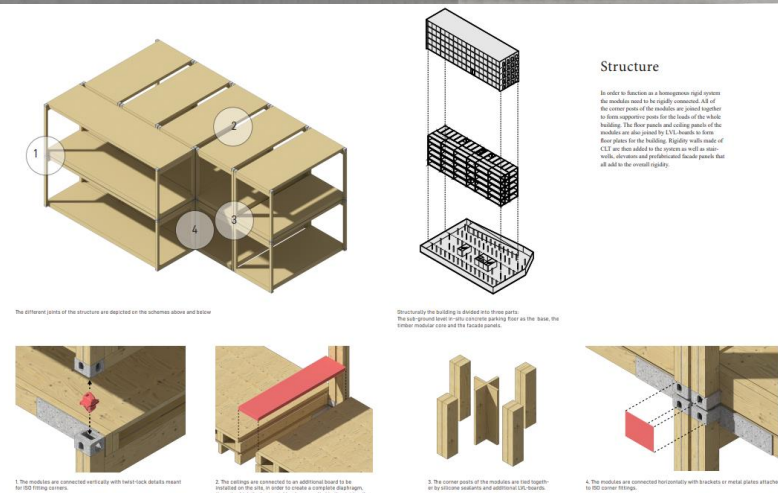
~40 entries from 22 countries

Top 4 entries:

- WHAT IF... New York's SEAGRAM Building was a HYBRID building / *Jose Gustavo Garzon, CO*
- Alexandra Road Estate Reimagined / *Frederick Pittman, UK*
- Villa Mokum, mostly wood, some steel and a concrete base / *Jasper Middelberg, NL*
- A Pattern Building in Turu 21, Estonia / *Renee Puusepp, EST*



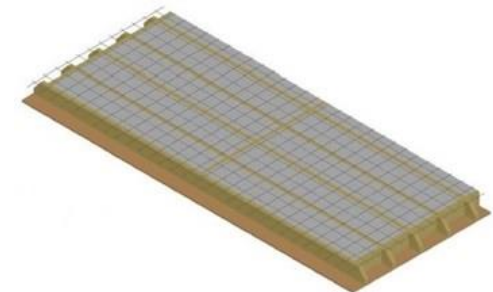
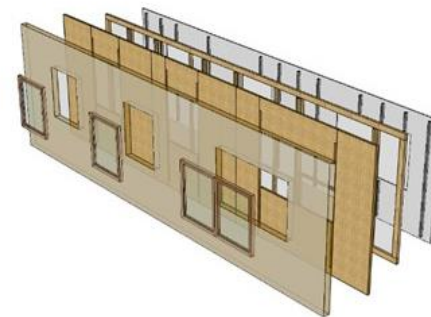
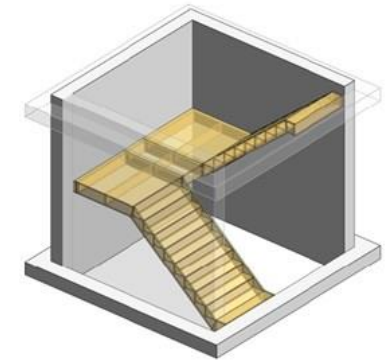
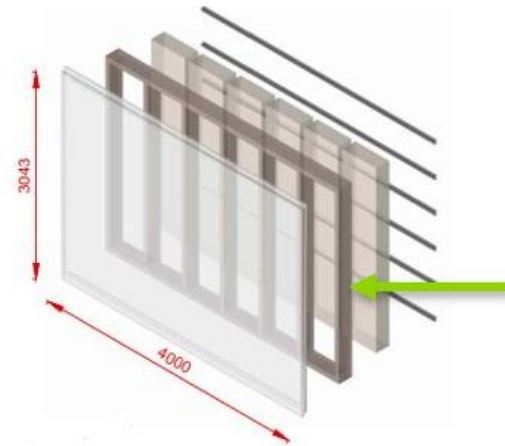
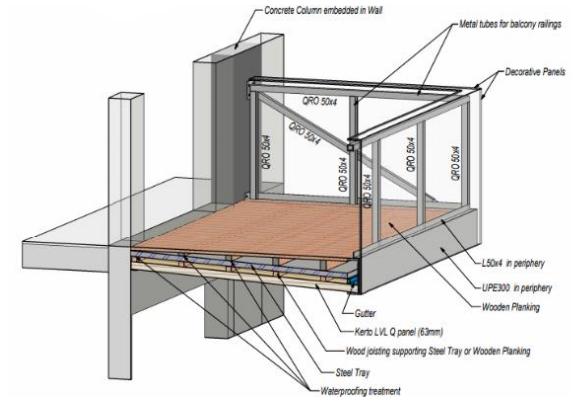
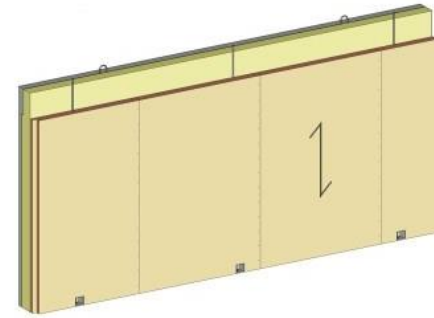
VILLA MOKUM
mostly wood, some steel
and a concrete base



Hybrid Elements

Redesign local elements as hybrid with local co-operation

- Hybrid sandwich wall element / FI
- Hybrid Balcony / FR
- Hybrid Precast UHPFRC x LVL Wall / FR
- LVL stairs in a hybrid building /NL
- LVL Hybrid Massive Wall /SP
- Hybrid Floor Slab / IT



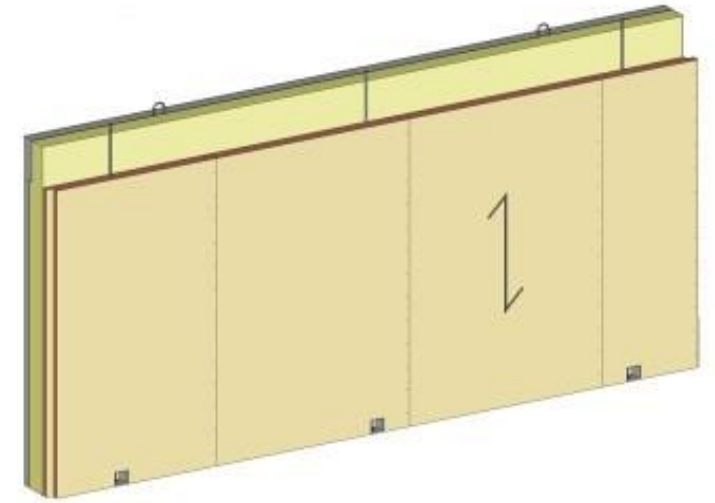
Hybrid Sandwich wall element

A commonly used sandwich façade wall element with a replaced Kerto LVL Q inner core.

Designed for up to 7 stories in co-operation with structural designers, concrete & wood element manufacturers, construction company and a connector manufacturer.

- Element weight reduced ~50%
- Carbon footprint decreased
- Carbon storage increased

Pilot project starting at Rauma sawmill





Metsä

Tuukka Kyläkallio

✉ tuukka.kylakallio@metsagroup.com

