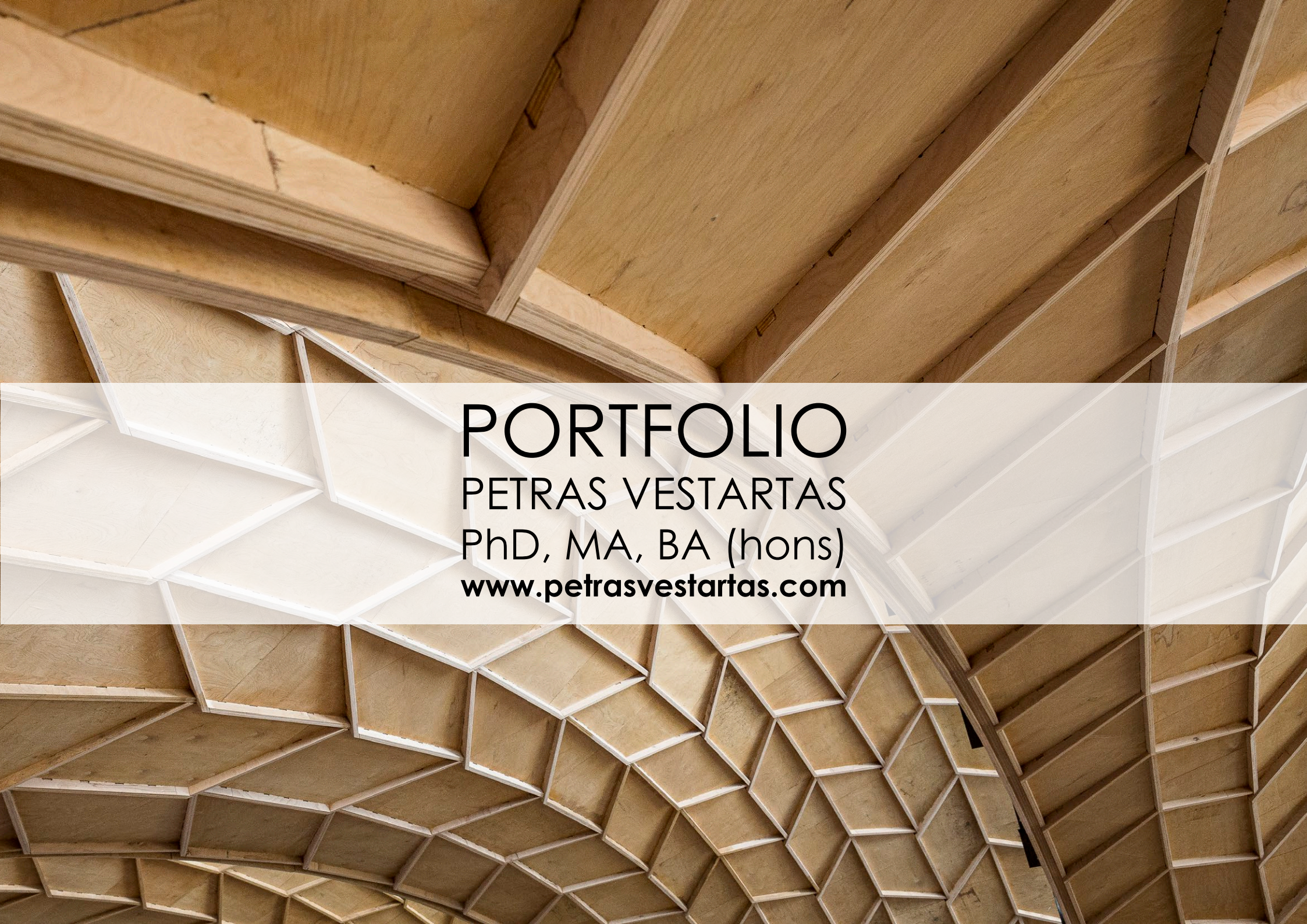


PORTFOLIO

PETRAS VESTARTAS

PhD, MA, BA (hons)

www.petrasvestartas.com

PROJECTS

TYPE

PROJECTS

TITLE

Annen head office
Manternach,
Luxenbourg

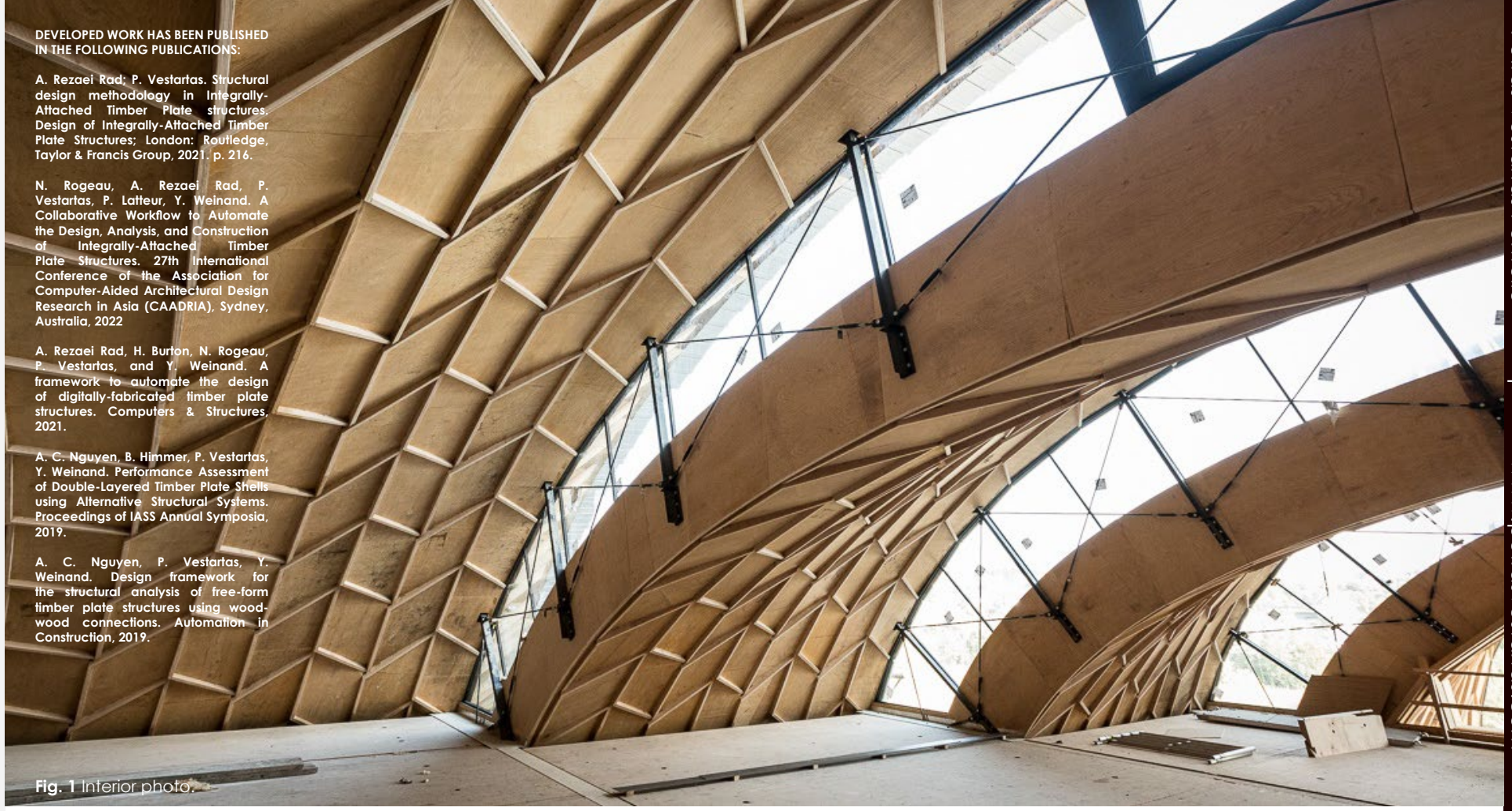
TEAM

Laboratory for Timber Construction, IBOIS, EPFL, Didier Callot, Dr. Petras Vestartas, Dr. Anh Chi Nguyen, Dr. Aryan Rezaei Rad and Dr. Christopher Robeller, Prof. Dr. Yves Weinand.

DESCRIPTION

The Annen Head Office Project consists of a series of 23 vaults with spans ranging from 22.5 m to 53.7 m (due to the constraints of the project and the terrain) and constant high and width of 9 and 6 m respectively. The project accommodates a 5800 m^2 facility including a timber prefabrication factory space and offices, see **figures 2 and 3**.

Each arch is a double-curved shell structure with a design inspired by Eladio Dieste's Gaussian masonry vaults, see **figure 1**. The shell is made of two interconnected layers of timber plates assembled



DEVELOPED WORK HAS BEEN PUBLISHED IN THE FOLLOWING PUBLICATIONS:

A. Rezaei Rad; P. Vestartas. Structural design methodology in Integrally-Attached Timber Plate structures. Design of Integrally-Attached Timber Plate Structures; London: Routledge, Taylor & Francis Group, 2021. p. 216.

N. Rogeau, A. Rezaei Rad, P. Vestartas, P. Latteur, Y. Weinand. A Collaborative Workflow to Automate the Design, Analysis, and Construction of Integrally-Attached Timber Plate Structures. 27th International Conference of the Association for Computer-Aided Architectural Design Research in Asia (CAADRIA), Sydney, Australia, 2022

A. Rezaei Rad, H. Burton, N. Rogeau, P. Vestartas, and Y. Weinand. A framework to automate the design of digitally-fabricated timber plate structures. Computers & Structures, 2021.

A. C. Nguyen, B. Himmer, P. Vestartas, Y. Weinand. Performance Assessment of Double-Layered Timber Plate Shells using Alternative Structural Systems. Proceedings of IASS Annual Symposia, 2019.

A. C. Nguyen, P. Vestartas, Y. Weinand. Design framework for the structural analysis of free-form timber plate structures using wood-wood connections. Automation in Construction, 2019.

Fig. 1 Interior photo.

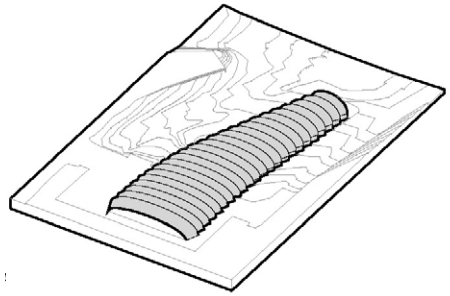


Fig. 2 Annen head office project concept.

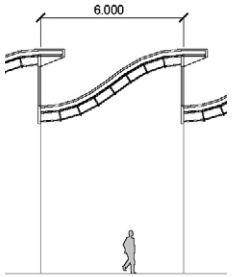


Fig. 3 Cross section.

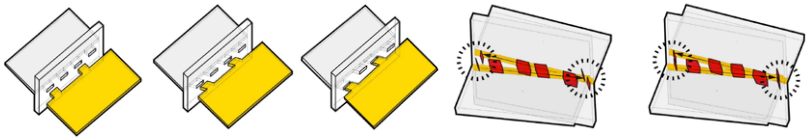


Fig. 4 Three-valence joint scheme: a-c joint in 3d, d-e joint alignment.

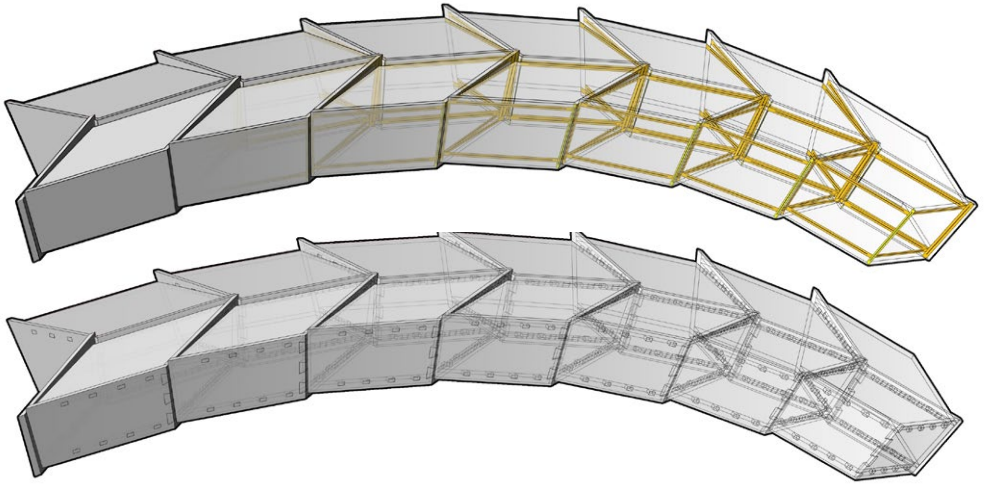


Fig. 5 Joinery generation based on side detection marked in yellow and orange colors.

Petras Vestartas Portfolio | www.petrasvestartas.com | petrasvestartas@gmail.com

with through-tenon joints. The vaults present overlapping s-shaped cross-sections. The plates are interconnected using integral joints between all the plates (vertical and horizontal).

When I joined IBOIS, EPFL I continued the geometrical development of the structure. The previous geometrical model had to be re-written because structural calculations were needed. I helped two Phd students first by for an Abaqus structural model, then for a OpenSees software as shown in **figure 6**. Lastly an alternative model was proposed by shifting quads using a hexagonal pattern.

The joinery was generated using my developed **compas_wood** application seen in **figures 4,5 and 7**. The joinery modelling is open-sourced: **https://ibois-epfl.github.io/compas_wood/latest/** . Lastly, **MOOC (EPFL)** lectures were recorded to create the fabrication geometry and live tutorials were given to Atelier Weinand students.

It was a great opportunity to work for project in construction as seen in **figure 8**.

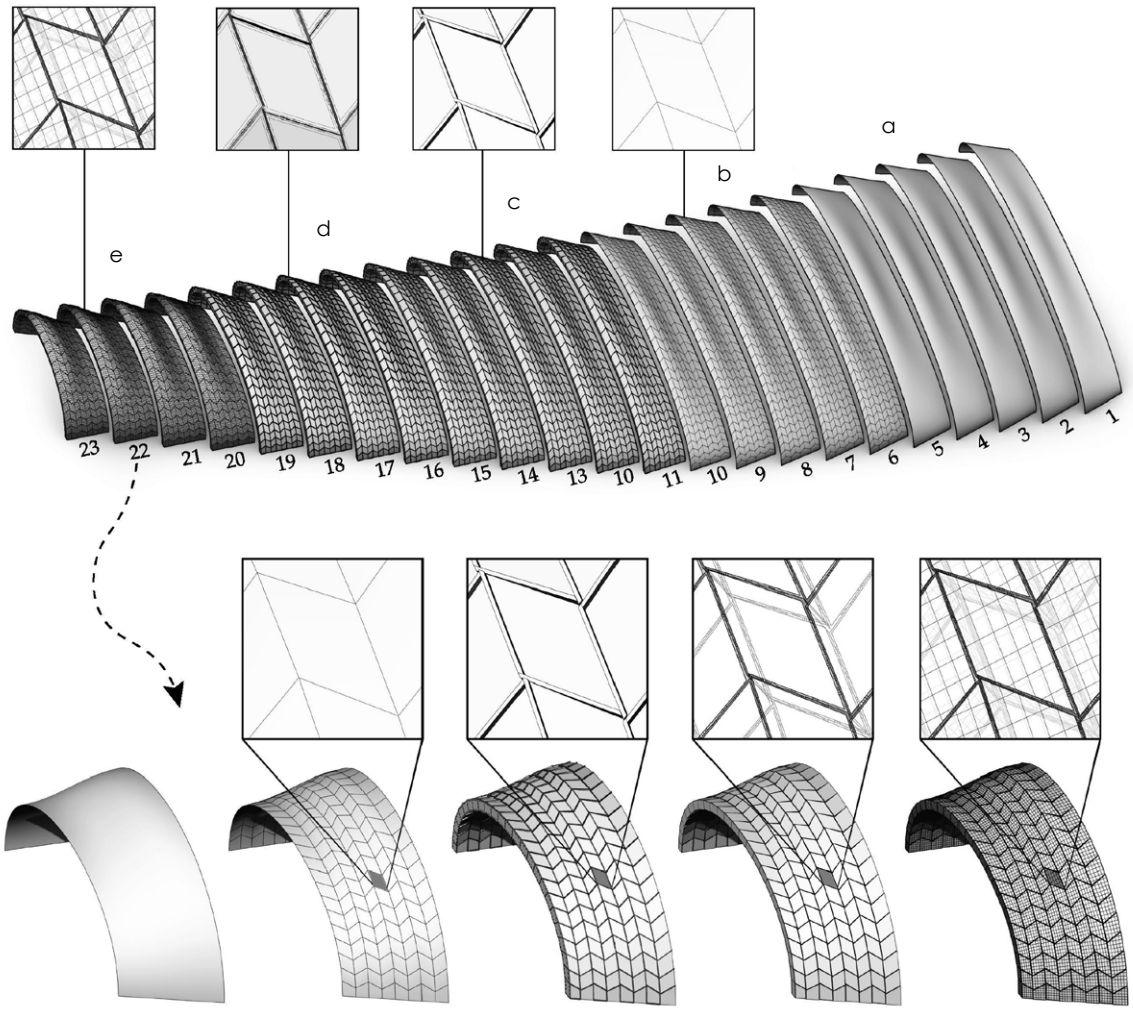


Fig. 6 Project development stages: a) global NURBS geometry, b) mesh subdivision, c) fabrication model, d) geometry simplification for structural analysis, e) input for structural model.

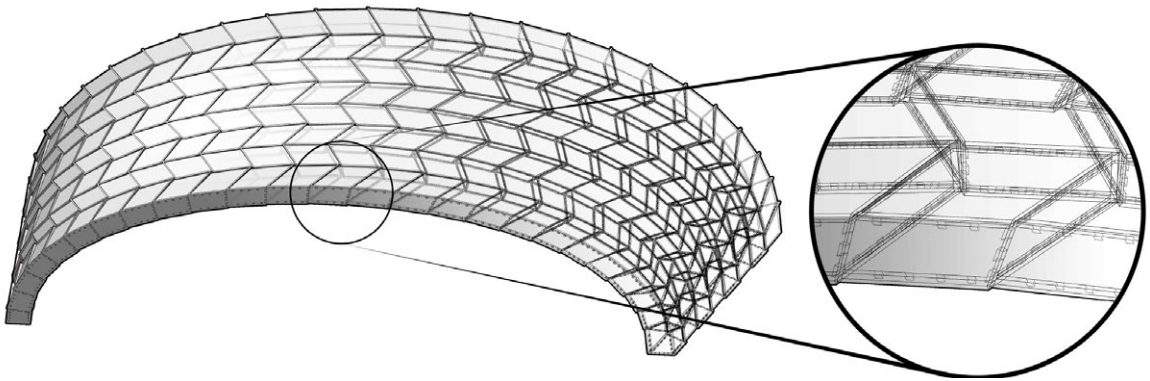


Fig. 7 Joinery is generated using a two polyline representation using **https://ibois-epfl.github.io/compas_wood/**

Fig. 8 Construction sequence.

TYPE

PROJECTS

TITLE

Stage for Nabucco Opera, Notre Dame de Lausanne, Switzerland.

TEAM

Laboratory for Timber Construction, IBOIS, EPFL, Petras Vestartas, Loic Pelletier, Martin Nakad, Prof. Dr.Aryan Rezaei Rad, Prof. Dr. Yves Weinand

DESCRIPTION

In November 2018, the Lausanne Cathedral has hosted four (+ 2 additional) representations of Nabucco's opera. For that specific event, IBOIS has developed a new wooden scenography, showing a technology transfer of the snap-fit joints for seats and the spiraling stage as seen in **figure 1**.

The spiral was generated using a conic geometry including a structural and fabrication models as seen **figure 2.**

The scenography include benches and bleachers for spectators. Those benches are all in wood

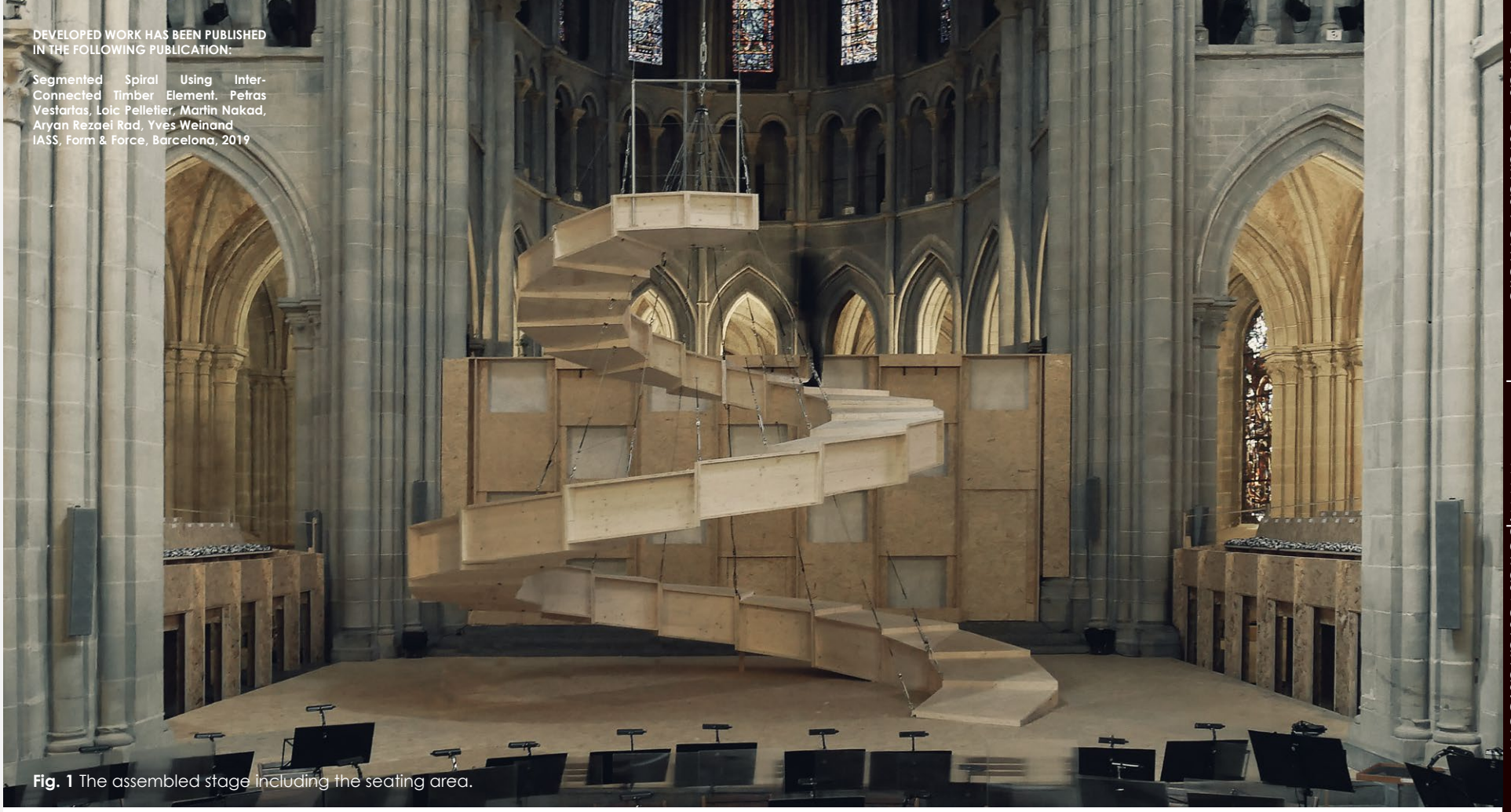


Fig. 1 The assembled stage including the seating area.

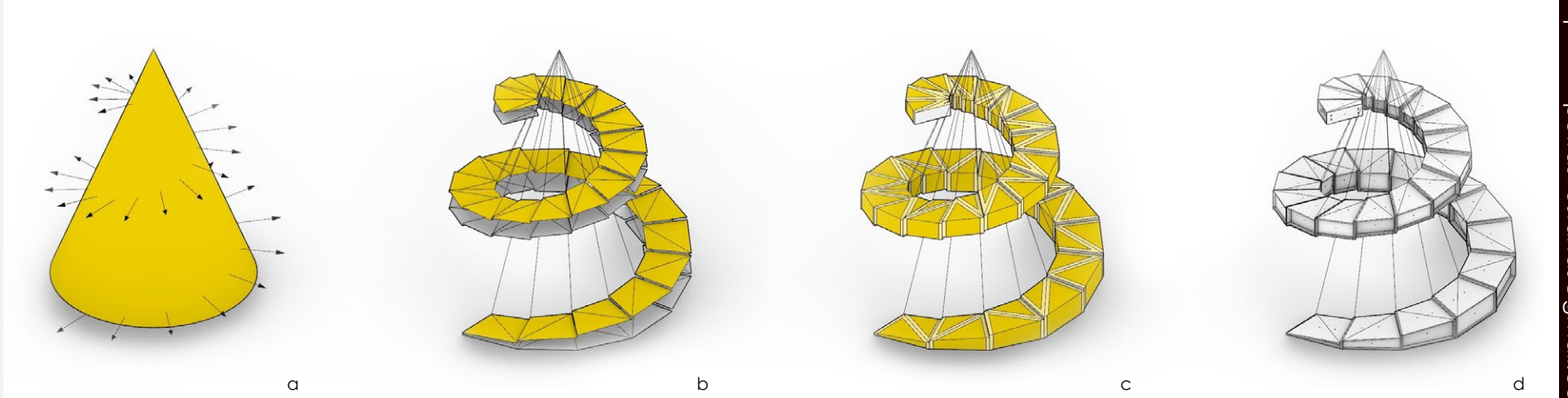


Fig. 2 The geometry of the spiral: a) base geometry - cone, b) extrusion of two layers, c) FEM model, d) fabrication model including the fixtures of the cables.

Petras Vestartas Portfolio | www.petrasvestartas.com | petrasvestartas@gmail.com

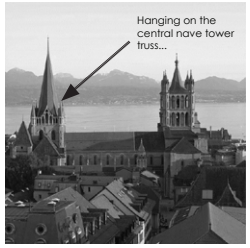
panels, assembled together thanks to a combination of snap-fit joints and mortise and tenon joints, for about 740 spectators at each representation as seen in **figures 3**.

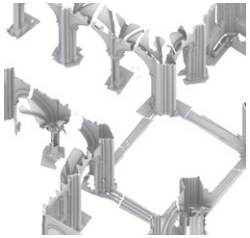
The church was scanned using a Faro Focus S 150 laser scanner. Then a 3d mesh was generated to ensure a collision free geometry of the seats and increase the number of benches to maximum as seen in **figure 4**.

The spiral was cut at EPFL while the benches were produced in JPF Ducret factory using 5-axis CNC machine as seen **figure 5**. The assembly of the spiral was done in two stages: a) modules were prefabricated first and then the module by module assembly was done inside church.

Two plugins were developed for this project: 2d nesting application **OpenNest** (**https://www.food4rhino.com/en/app/opennest**) and 5-axis CNC tool **Raccoon** (**https://github.com/ibois-epfl/Raccoon**)

Fig. 3 Opera even, the spiral structurally could handle maximum 2 walking people at a time.





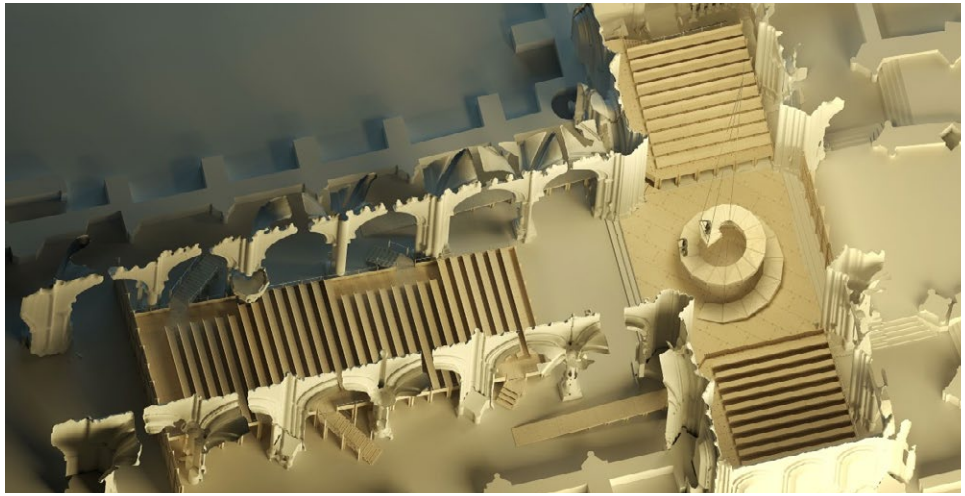
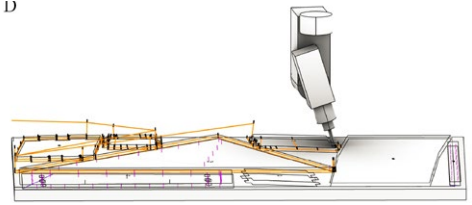
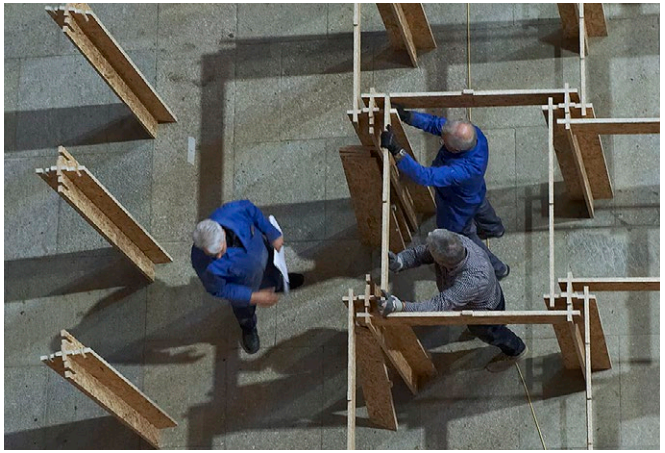


Fig. 4 The church was scanned to fit as many seats as possible and avoid collision between 3D and reality.





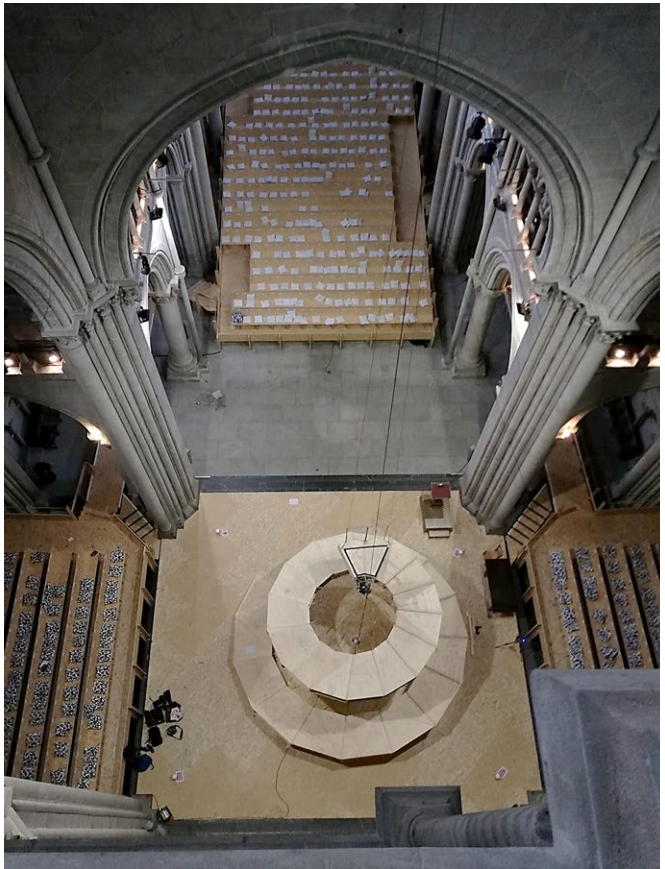


Fig. 5 CNC cutting, assembly and preparation for the event.

Petras Vestartas Portfolio | www.petrasvestartas.com | petrasvestartas@gmail.com

TYPE

PROJECTS

TITLE

"Tree House in Dinopark", Lithuania

TEAM

Petras Vestartas

DESCRIPTION

This is a building where elegance and lightness is achieved through the balance between transparency and privacy. This balance is reached by designing a facade shell, which is translucent - meaning it lets trough the light, while omitting the view. This way actual windows are left with only one function - framing the outside view, thus decreasing the necessity of them to a bare minimum. The triangular hole in the front of the building which is aligned towards the sky creates a sensation of flight while also bearing the function of privacy assurance, **see figure 1.**

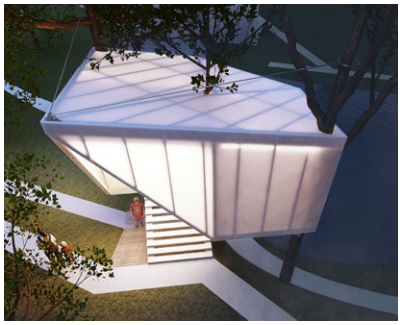
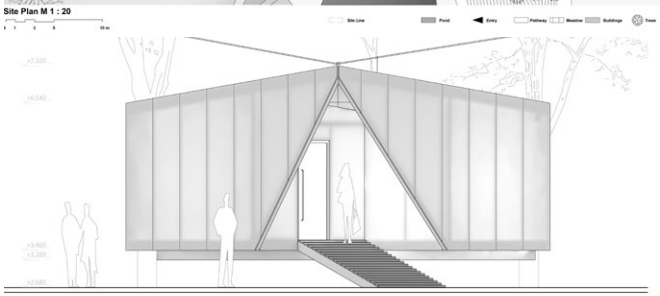
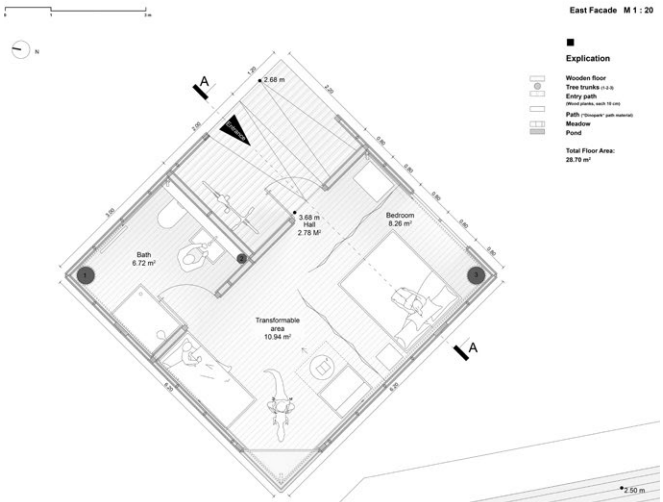
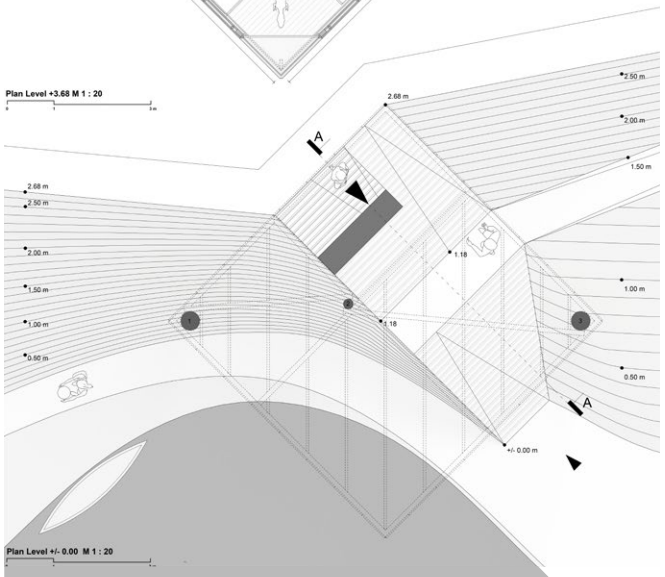


Fig. 1 Drawings and visualizations of the tree house made from a timber frame system.







TYPE

PROJECTS

TITLE

Train station,
Rossiniere,
Switzerland.

TEAM

Laboratory for Timber Construction, IBOIS, EPFL, Petras Vestartas, Prof. Dr. Yves Weinand

DESCRIPTION

In collaboration with Le Pays-d'Enhaut, Ibois laboratory is developping a new Activity Center at the Rossinière Train Station (Centre d'Activité Gare Grand Chalet) as seen in **figure 1**. In this natural context, environmental issues are fundamental. The project focuses on using local resources in the construction field, and offer new architectural perspectives while using non standard timber elements.
The roof is covered using the vernacular Tavillon system as seen in **figure 2**. The program will be used for local forest companies with office functions and a multi-purpose hall.

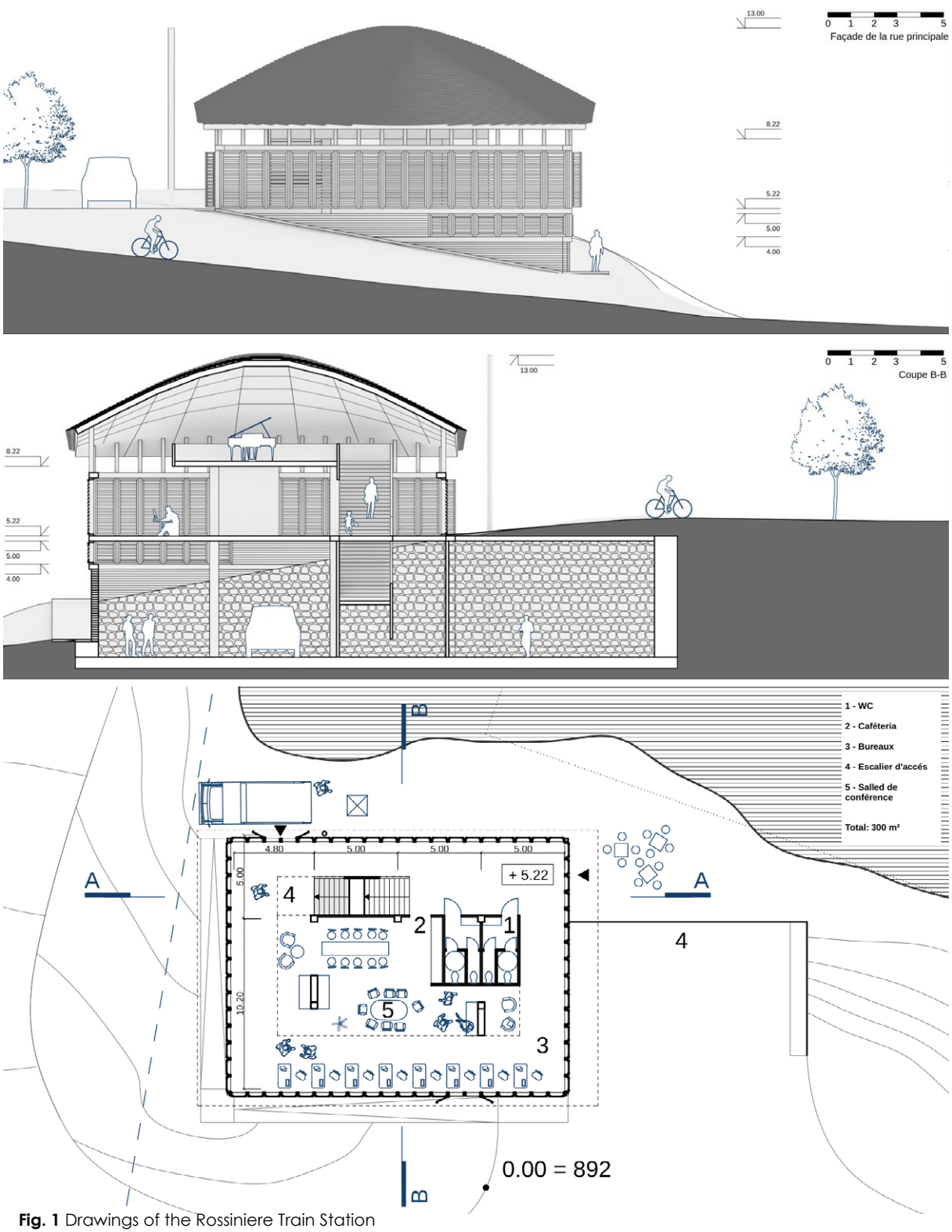


Fig. 1 Drawings of the Rossiniere Train Station

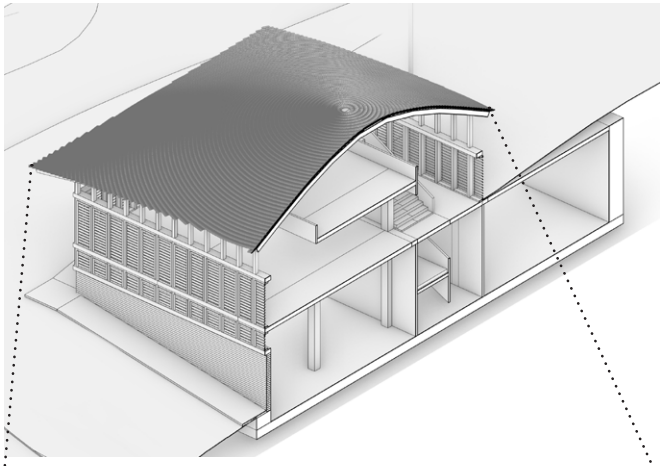


Fig. 2 Traditional building envelope system, called Tavillon.

Petras Vestartas Portfolio | www.petrasvestartas.com | petrasvestartas@gmail.com

TYPE

PROJECTS

TITLE

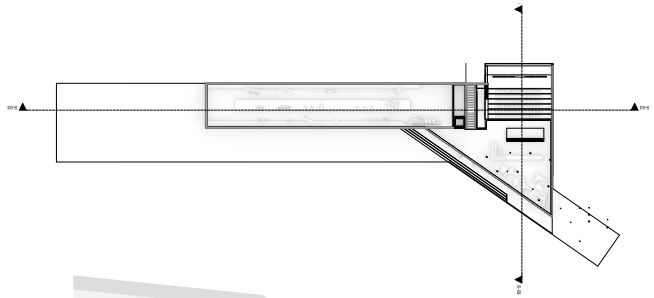
Film Archive
Laxenburg, Austria.

TEAM

Petras Vestartas,
Thomas Peter-Hindelang,
Roman Delugan,
(DMAA)

DESCRIPTION

The architectural concept of the Film Archive Austria in Laxenburg, the central collection and documentation point for the country's audio-visual heritage, is designed as a combination of introverted areas (film and artifact depot, rooms for restoration, film labs) and publicly accessible zones, such as exhibition areas, spaces dedicated for events and a center of excellence. The already existing ensemble of individual buildings situated in a scenic landscape near the small town of Laxenburg is restructured thanks to the new building of the Film Preservation.



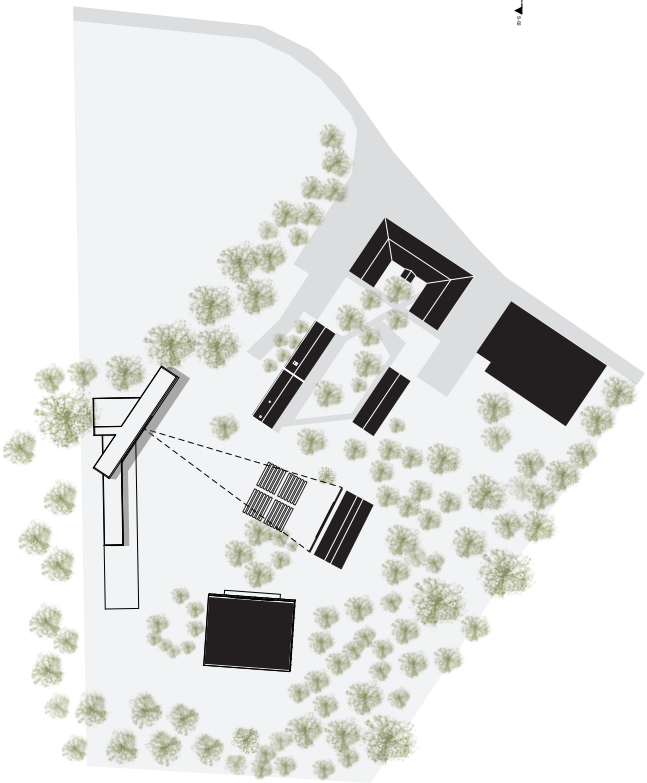


Fig. 1 Drawings and renders of the Film Archive.

Petras Vestartas Portfolio | www.petrasvestartas.com | petrasvestartas@gmail.com

RESEARCH AND SOFTWARE DEVELOPMENT

TYPE

SOFTWARE

TITLE

compas_wood

TEAM

Petras Vestartas

DESCRIPTION

This an algorithm aiming at geometry generation for pair-wise wood-wood connections. The method is based on a collision detection using the following methods: face-to-face, curve-to-curve, face-to-plane, mesh-to-mesh. The technique is subdivided into several connection types: a) cross, b) side-side, c) top-side, d) top-top, e) custom-cuts as shown in **figure 1**. The re-use of geometrical recipes that were observed both in IBOIS research prototypes and built projects, as seen in **figure 2** and **3,** helped to define the principal idea of the algorithm.

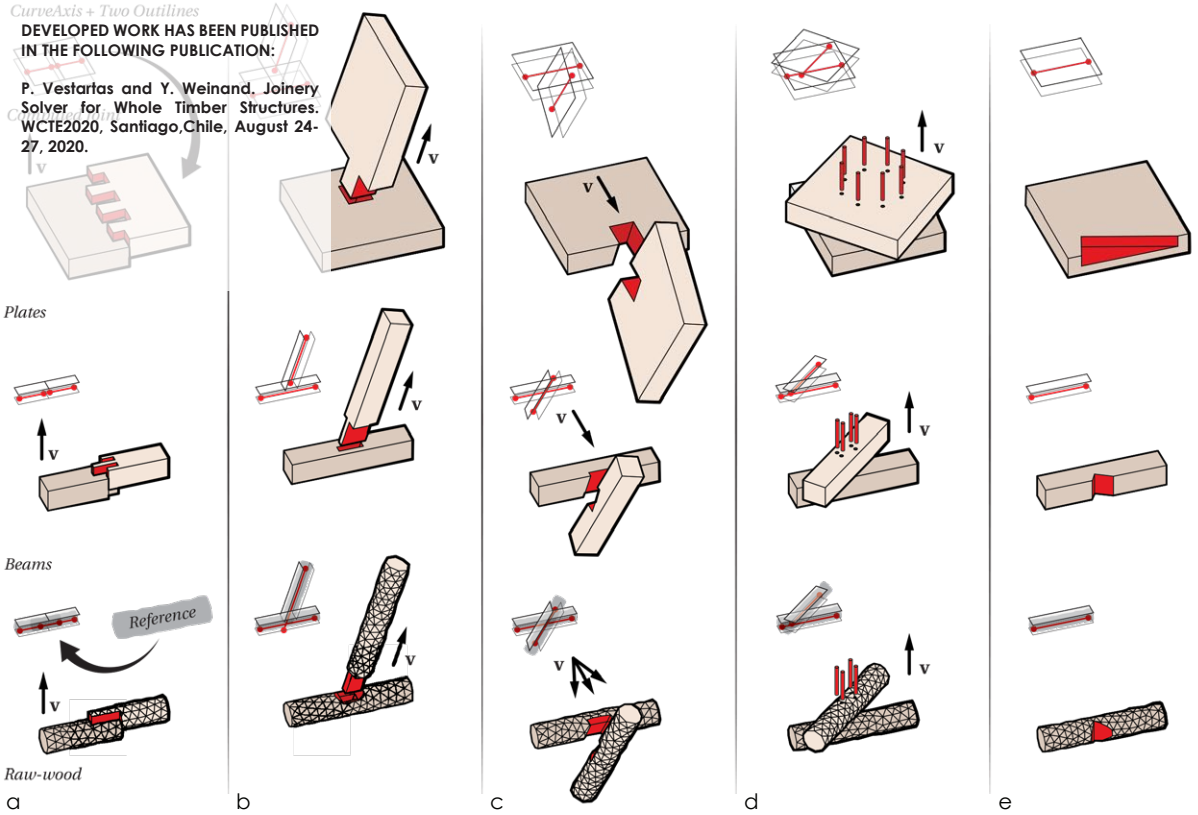


Fig. 1 Joinery types: a) side-to-side, b) top-to-side, c) cross, d) top-to-top, and e) custom.

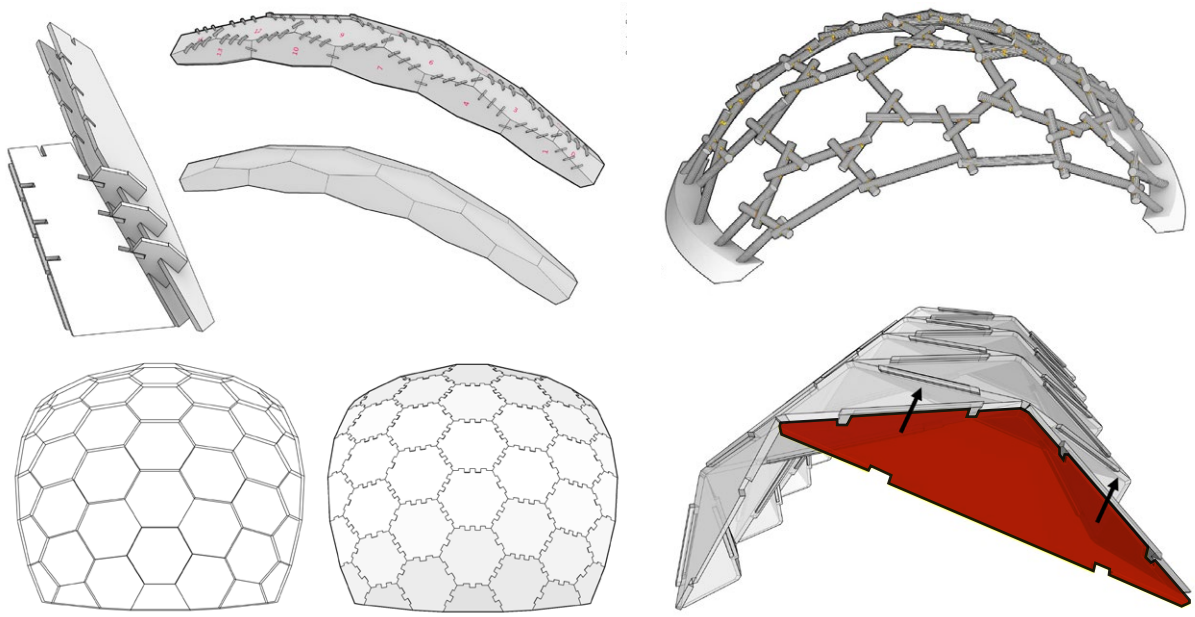


Fig. 2 Examples of the joinery using **compas_wood**. Download: **https://ibois-epfl.github.io/compas_wood/latest/**

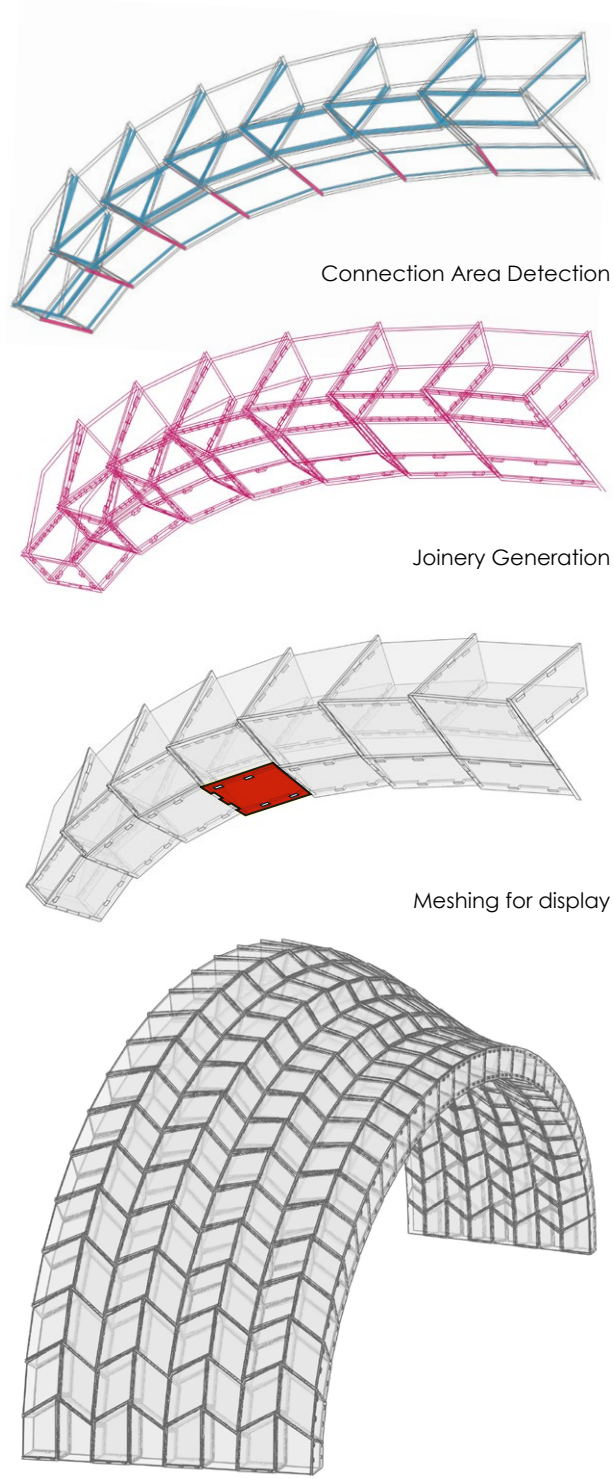


Fig. 3 Annen Project Application

Petras Vestartas Portfolio | www.petrasvestartas.com | petrasvestartas@gmail.com

TYPE

SOFTWARE

TITLE

Cockroach

TEAM

Petras Vestartas
Andrea Settimi

DESCRIPTION

The pointcloud processing tools focus on: a) fast and easy-to-use geometric manipulation, characterization and decomposition of point clouds directly in Rhinoceros6 and 7 as seen in **figure 1**, b) improves the link between CAD modeling software (Rhinoceros) and point-cloud processing, c) integrates point-cloud processing with other frameworks such as easy-to-use .NET programming languages (C#, IronPython, VB) using the interface of Grasshopper, Rhinoceros as shown in **figure 2**, d) possibility to use for digital fabrication frameworks as shown in **figure 3**.

DEVELOPED WORK HAS BEEN PUBLISHED IN THE FOLLOWING PUBLICATION:

A. Settimi, P. Vestartas, J. Gamerro, Y. Weinand. Cockroach: an open-source tool for point cloud processing in cad. 27th International Conference of the Association for Computer-Aided Architectural Design Research in Asia (CAADRIA), Sydney, Australia, 2022. (*BEST PAPER AWARD*).

Fig. 1 Methods implemented in the PointCloud processing library

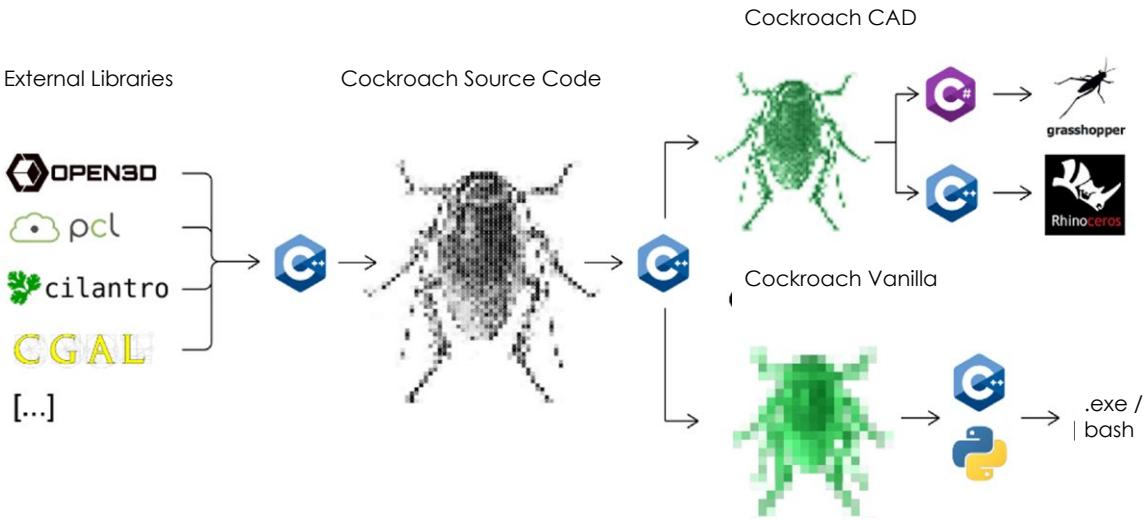


Fig. 2 Structure of the PointCloud library - **cockroach**. Download: **https://github.com/ibois-epfl/Cockroach**

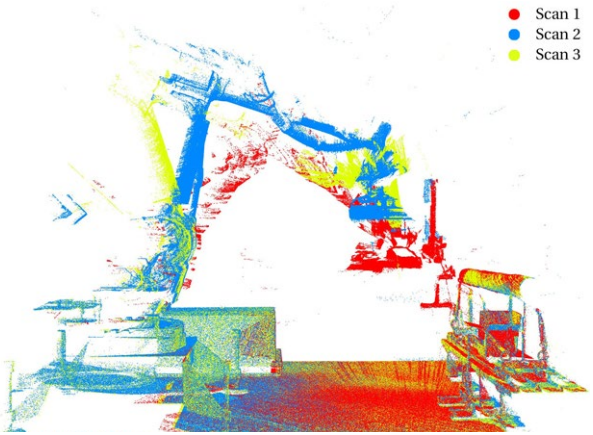


Fig.3 Target: Robotic Fabrication and Building Design.

Petras Vestartas Portfolio | www.petrasvestartas.com | petrasvestartas@gmail.com

TYPE

SOFTWARE

TITLE

OpenNest

TEAM

Petras Vestartas

DESCRIPTION

OpenNest - 2D Polyline Packing for fabrication such as laser or CNC cutting as seen in **figure 1**. The tool was first implemented for the Nabucco Opera Project as a 2D nesting application for CNC fabrication. It became useful for student projects as seen in **figure 2**, workshops and CNC companies that kindly supported the development of this application. At the moment of writing it has more 80 000 downloads. It can be downloaded from **https://www.food4rhino.com/en/app/opennest** and all the tutorials are available here: **https://www.learn-visual-programming.com/open-nest** .

DEVELOPED WORK HAS BEEN PUBLISHED IN THE FOLLOWING PUBLICATION:

Segmented Spiral Using Inter-Connected Timber Element. Petras Vestartas, Loic Pelletier, Martin Nakad, Aryan Rezaei Rad, Yves Weinand IASS, Form & Force, Barcelona, 2019

L. Vestarte, P. Vestartas, and R. Kucinskas. Corrugated Cardboard Shell: A Pavilion Project of An Architectural Workshop. Advances in Architectural Geometry (AAG), 2020.

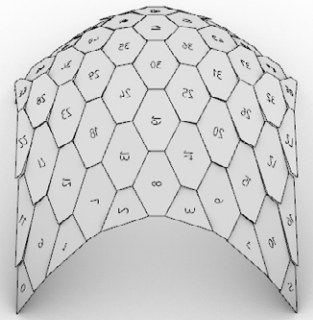
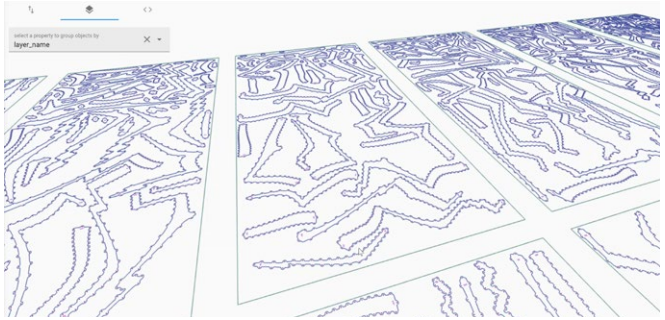


Fig. 1 Examples of the 2D nesting - **OpenNest**. Download: **https://www.food4rhino.com/en/app/opennest**



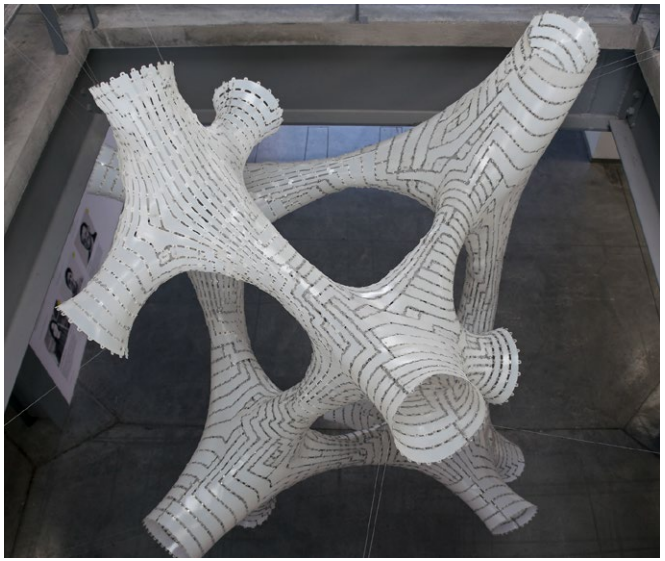


Fig.2 OpenNest was used for CEDIM exhibition.

Petras Vestartas Portfolio | www.petrasvestartas.com | petrasvestartas@gmail.com

TYPE

SOFTWARE

TITLE

OpenNest

TEAM

Petras Vestartas

DESCRIPTION

Mesh NGon methods for Grasshopper and Rhino3D. It is a set of tools that allows polygonal mesh transformation including: mesh adjacency queries, planarization, reciprocal patterns, mesh analysis, graph algorithms and subdivisions as seen in **figure 1**. It was used for multiple research projects for base geometry generation. Furthermore, the application can be used as a library for custom .NET applications. The plug-in is open-sourced at **https://www.food4rhino.com/en/app/ngon** and video tutorials are available here: **https://www.learn-visual-programming.com/ngon** .

DEVELOPED WORK HAS BEEN PUBLISHED IN THE FOLLOWING PUBLICATION:

L. Vestarte, P. Vestartas, and R. Kucinskas. Corrugated Cardboard Shell: A Pavilion Project of An Architectural Workshop. Advances in Architectural Geometry (AAG), 2020.

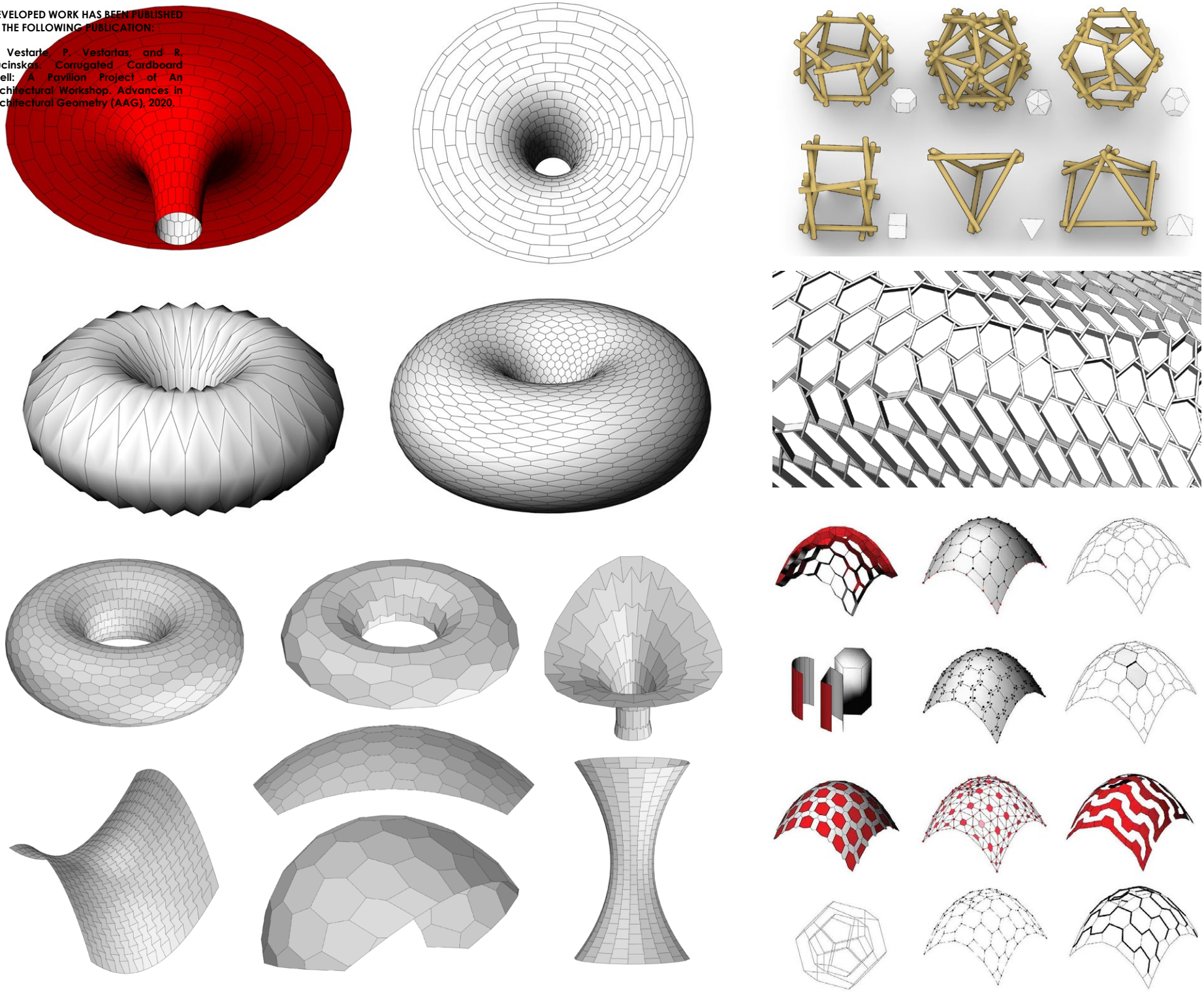


Fig. 1 Examples of the polygonal mesh processing plugin - **NGon**. Download: **https://www.food4rhino.com/en/app/ngon**

Petras Vestartas Portfolio | www.petrasvestartas.com | petrasvestartas@gmail.com

TYPE

SOFTWARE

TITLE

Raccoon

TEAM

Petras Vestartas

DESCRIPTION

This is a tool for CNC fabrication for drilling, milling, cutting, slicing, engraving and saw-blade fabrication as show in the **figure 1**. The tool-path was tested on machines: Orthogonal 5-axis Maka, Cardan 5-axis Maka and industrial robot arm ABB IRB 6400R. The application employs the G-Code using A and B rotations and XYZ values for translation. The algorithm considers machine methods such as the tool-changer, zero referencing, speed of movement, etc. The tool path can be simulated including the collision detection between timber, spindle and the table.

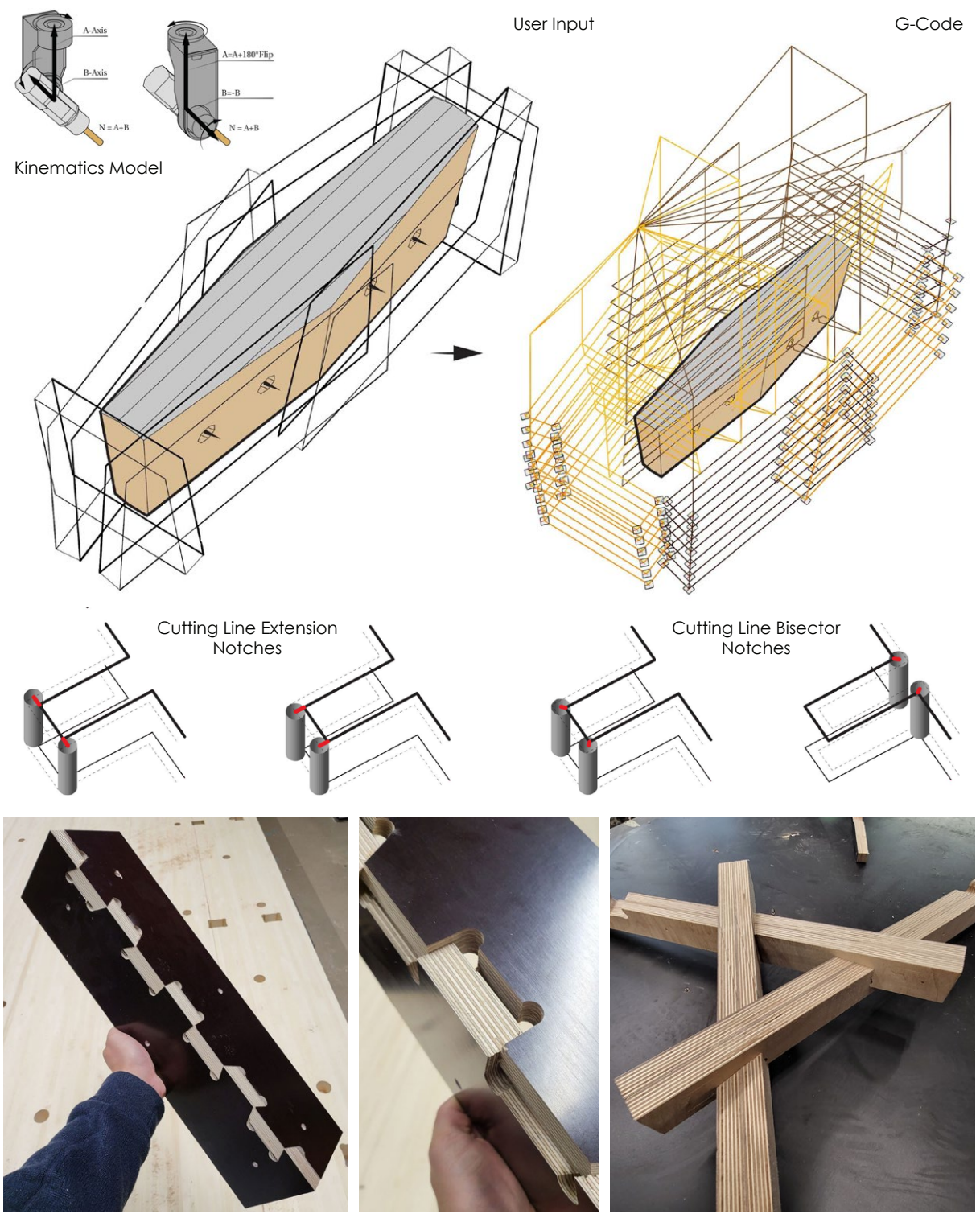


Fig. 1 CNC plugin for tool-path generation - **Raccoon**. Download: **https://github.com/ibois-epfl/Raccoon**

Fig.2 Timber examples made using Raccoon plug-in.

Petras Vestartas Portfolio | www.petrasvestartas.com | petrasvestartas@gmail.com

TYPE

RESEARCH

TITLE

Hex-box prototype from timber boards.

TEAM

Petras Vestartas

DESCRIPTION

The inspiration is taken from timber dome structures, where solid timber walls were built from planks, connected side by side seen in **figure 1**. Furthermore, The geometry modeling workflow is split into following parts as seen in **figure 2**: surface discretization, joint modeling and fabrication. Firstly, projection-based solver is applied to the planarization of volumetric blocks. Secondly, the joint geometry is computed according to the insertion vector and a tool-path is generated using G-Code to guide the 4.5 Axis CNC machining. The arch is finally tensioned as seen in **figure 3**.

Fig. 1 Assembly of box components using timber dowels

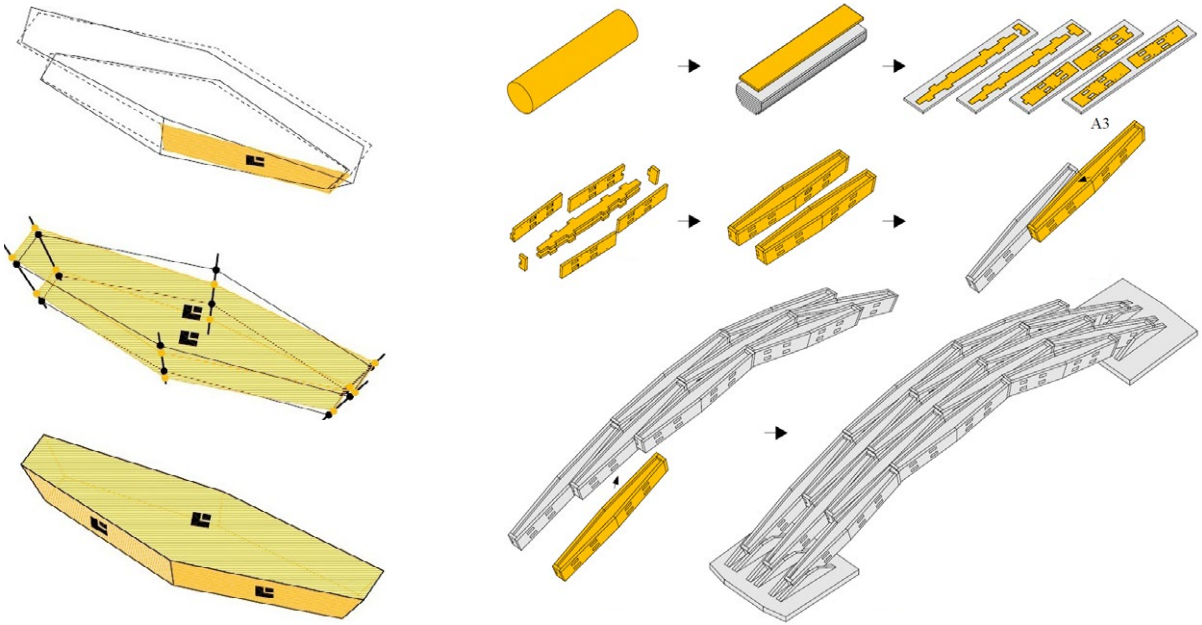


Fig. 2 Geometry generation of the hexagonal prototype made from 27 mm timber boards.

Fig. 3 Photos of the prototype.

Petras Vestartas Portfolio | www.petrasvestartas.com | petrasvestartas@gmail.com

TYPE

RESEARCH

TITLE

Hex-box in raw timber.

TEAM

Petras Vestartas

DESCRIPTION

The prototype from raw timber is an exhibit for the exhibition in ZAZ gallery in Zurich, Switzerland. The material was supplied by the Lausanne forest. Each timber was scanned for the design and fabrication. The prototype forms an arch made hexagonal elements as seen in **figure 1**. Conic joints were used to interlock the surfaced raw beams. 5-axis CNC and a lathe system was used to fabricate each timber. Timbers were assembled sequentially from the two ends of the structure. The assembly sequence is following the joint orientation of the conic joints.

Fig.1 Raw timber prototype using conical side joints and the hexagonal surface subdivision.

Petras Vestartas Portfolio | www.petrasvestartas.com | petrasvestartas@gmail.com

TYPE

RESEARCH

TITLE

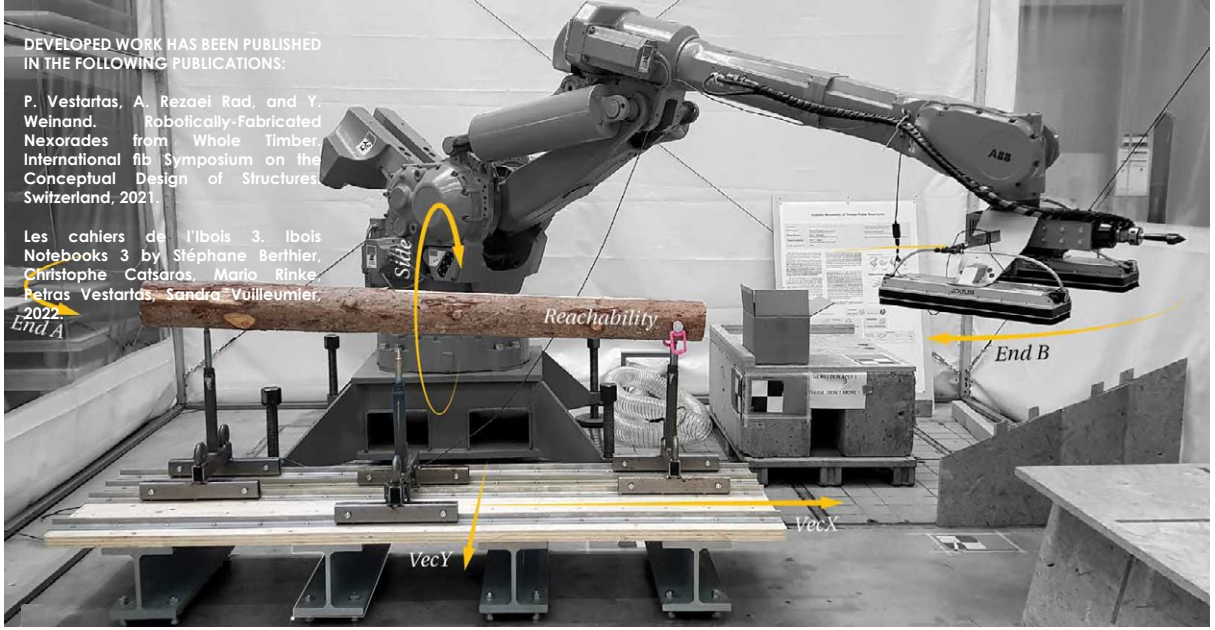
Nexorade using cross joints

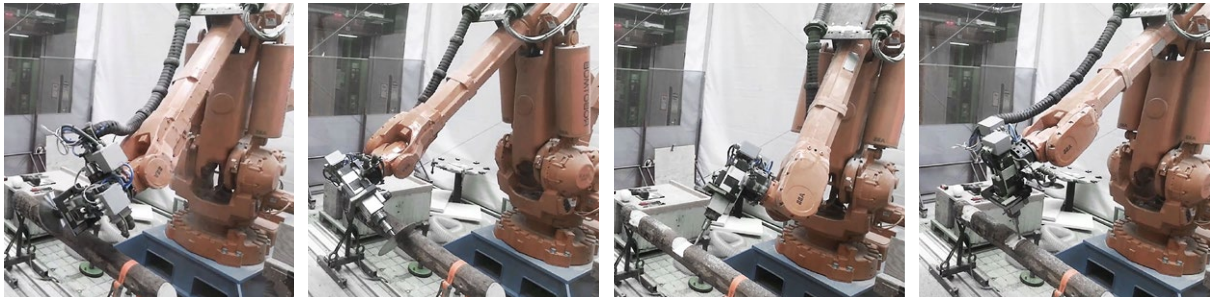
TEAM

Petras Vestartas

DESCRIPTION

Robotic fabrication of cross joints is interconnected with the form-finding methods. It is necessary to obtain an optimal distance between beams approximately to 2/3 of the section as seen **figure 1**. The fabrication is made using saw-blade cutting, slicing and milling. The tool-path planning algorithm is custom made while collaborating with industrial robotics company ImaxPro. Robot 6th axis is incrementally rotated within 45 degrees until reachable position is found as seen in **figure 2**. Each tree element is pre-scanned to know its position before the fabrication starts.





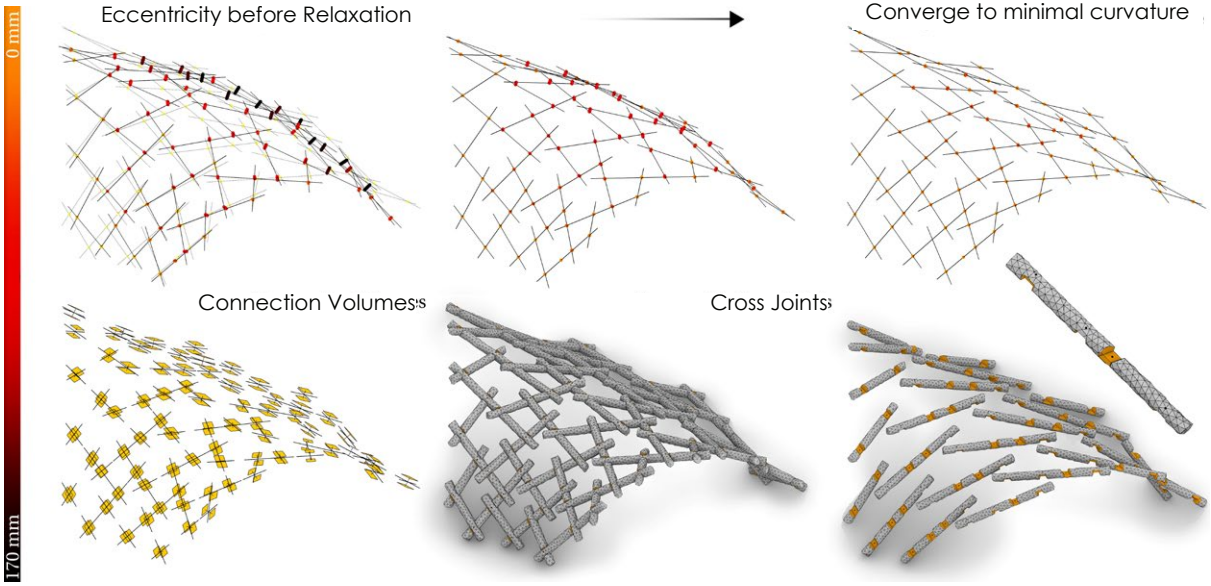
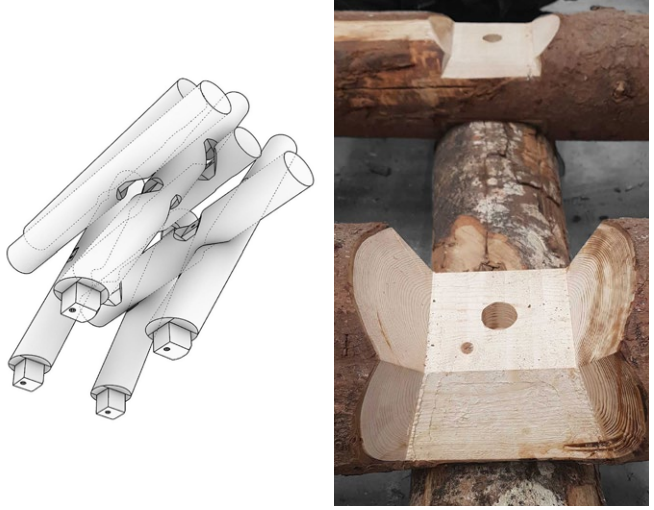
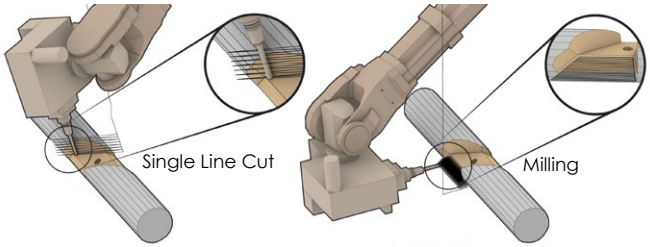


Fig. 1 Fabrication and form finding methods are intertwined together to get the optimal overall within connections.





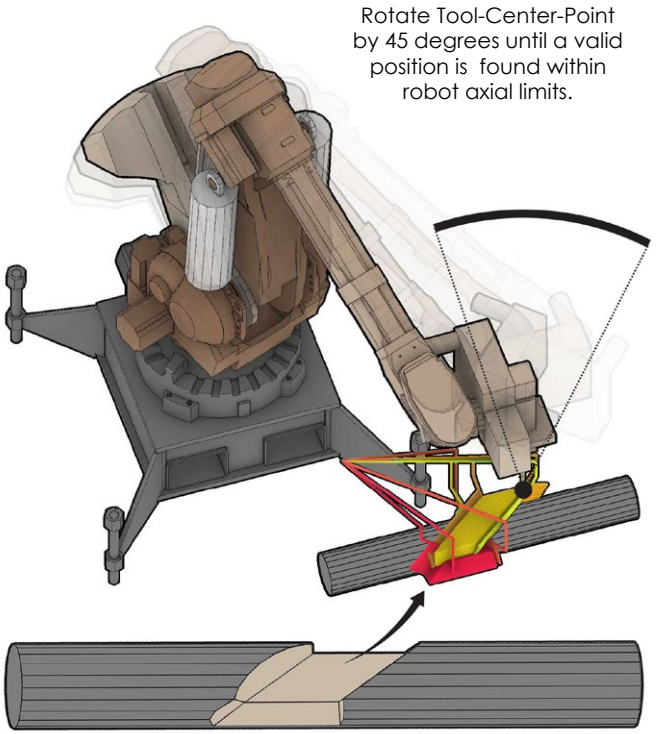


Fig. 2 Robotic tool-path generation using iterative rotations.

Petras Vestartas Portfolio | www.petrasvestartas.com | petrasvestartas@gmail.com

TYPE

RESEARCH

TITLE

Nexorade using cross joints and panels

TEAM

Petras Vestartas, Tissot Olivier Jean Charles

DESCRIPTION

Cross joints can be linked together using panels to ensure a rigid system. A small prototype was fabricated using 5-axis CNC machine and a lathe system that enables cuts from all sides of a beam. Each beam contains a two-fold joinery: a) conical cross joints and b) surfacing for positioning engineered timber panels as seen **in figure 1**. Two inclined dowels are used to for the connection between a pair of beams. The prototype is made in 1:5 scale for studying a raw wood sytem for a competition project in Brussels won by the BEL architects and IBOIS, EPFL.

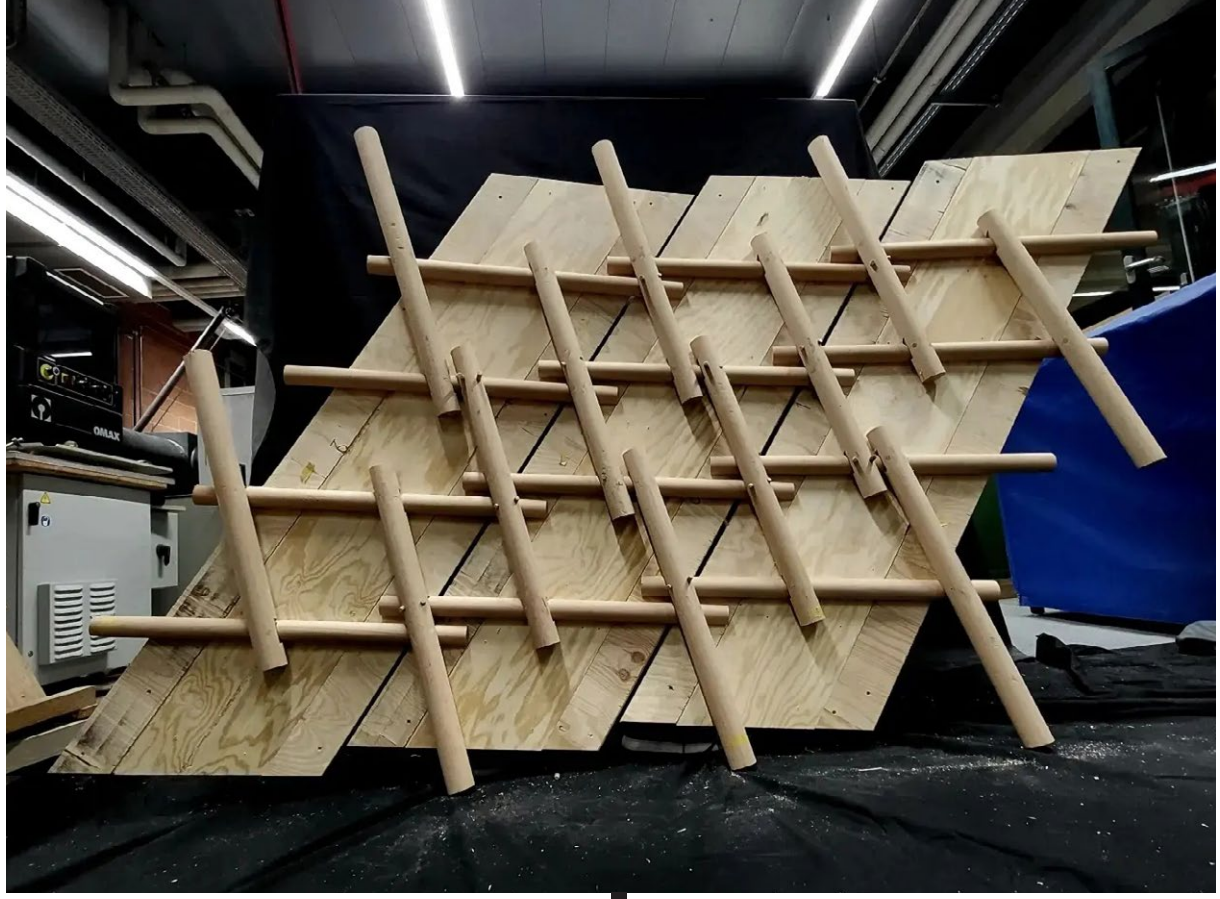


Fig. 1 Panel and beam hybrid using cross connections. The connections are fixed using two inclined dowels.

Petras Vestartas Portfolio | www.petrasvestartas.com | petrasvestartas@gmail.com

TYPE

RESEARCH

TITLE

Nexorade and timber plate hybrid

TEAM

Petras Vestartas

DESCRIPTION

The in-plane Nexorade system is made using timber panels and raw wood. This system can be found in quad subdivided meshes and hexagon tessellations as seen in **figure 2**. The quad edges are translated along each face while forming Nexorade pattern. The panels are connected with beam elements using screws whereas the frame assembly is made using wood-wood connections and dowels as seen in **figure 1**. The prototype is made using NGon plugin (**https://www.food4rhino.com/en/app/ngon**) and CNC fabrication (**https://github.com/ibois-epfl/Raccoon**).

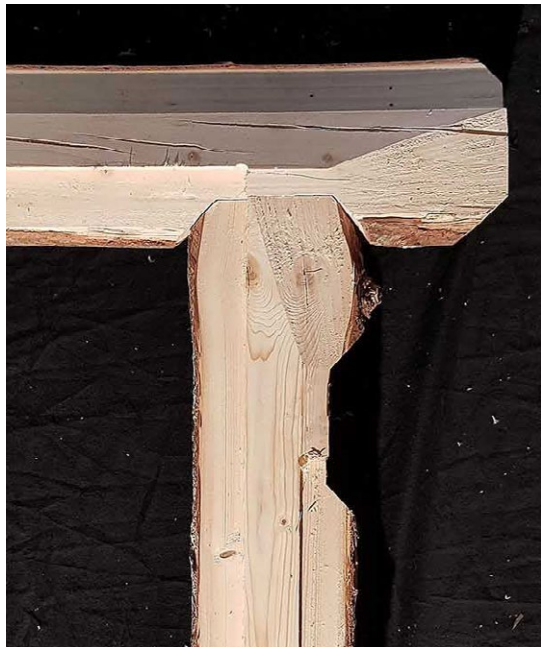


Fig. 1 The hybrid panel and beam system forms an in-plane Nexorade system using t-type connections.

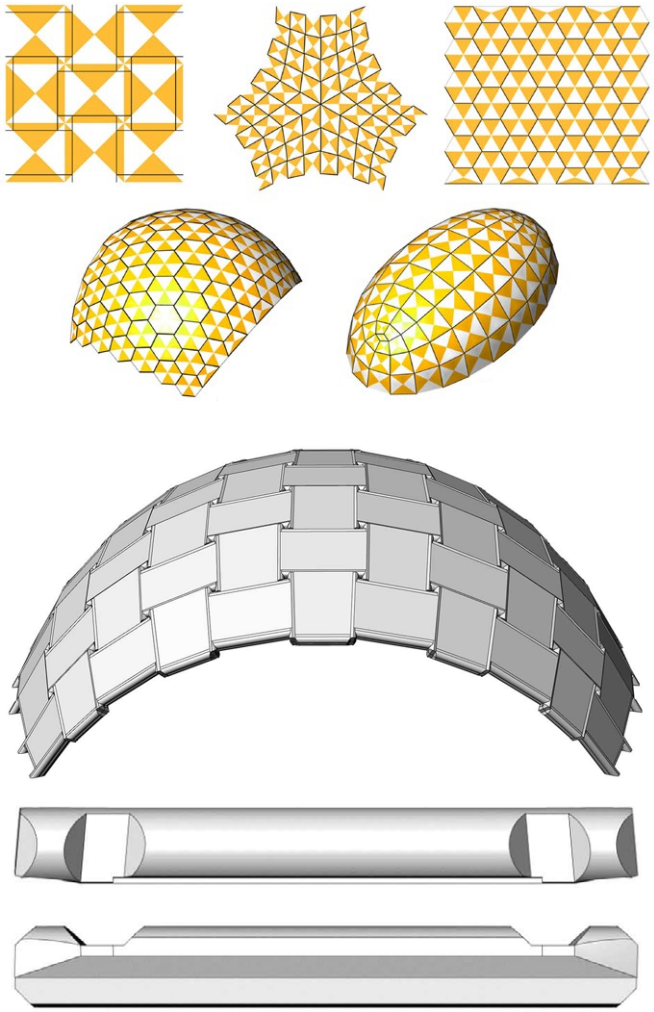


Fig. 2 Geometry generation of the in-plane Nexorade

TYPE

RESEARCH

TITLE

Inflated Restraint

TEAM

Phil Ayres, Petras Vestartas, Mateusz Zwierzycki.

DESCRIPTION

This **figure 1** presents design workflows for the representation, analysis and fabrication of braided structures. The workflows employ a braid pattern and simulation method which extends the state-of-the-art in the following ways: by supporting the braid design of both pre-determined target shapes and exploratory, generative, or evolved designs; by incorporating material and fabrication constraints generalised for both hand and machine; by providing a greater degree of design agency and supporting real-time modification of braid topologies.

DEVELOPED WORK HAS BEEN PUBLISHED IN THE FOLLOWING PUBLICATIONS:

Petras Vestartas, Mary Katherine Heinrich, Mateusz Zwierzycki, David Andres Leon, Ashkan Cheheltan, Riccardo La Magna, Phil Ayres Design Tools and Workflows for Braided Structures. Design Modelling Symposium (DMS) Paris 2017.

Mateusz Zwierzycki, Petras Vestartas, Mary Katherine Heinrich, Phil Ayres. High Resolution Representation and Simulation of Braiding Patterns. Conference: Disciplines & Disruption, ACADIA 2017

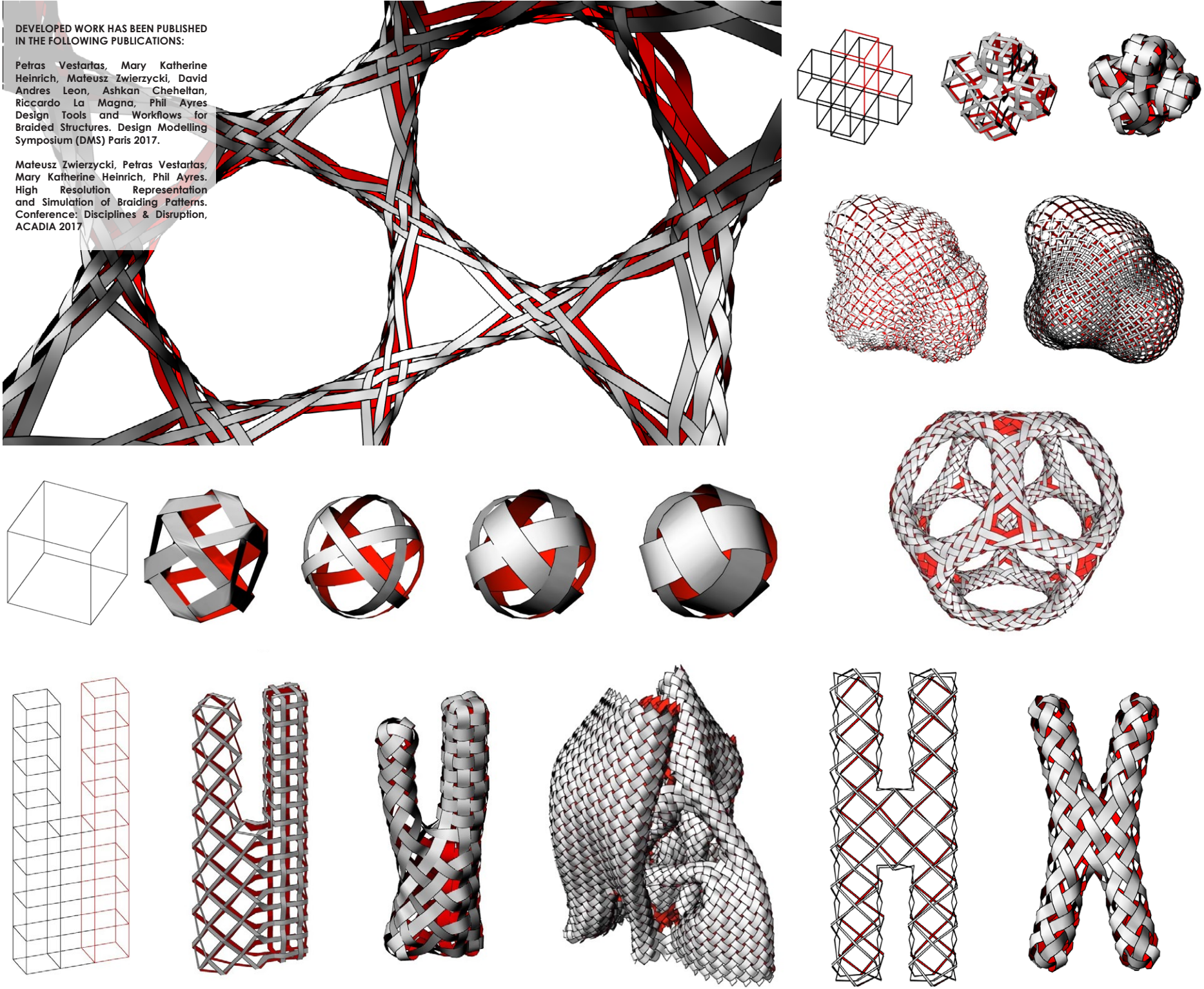


Fig. 1 Geometry generation for woven patterns using the tile generation and mesh dynamic relaxation method.

Petras Vestartas Portfolio | www.petrasvestartas.com | petrasvestartas@gmail.com

TYPE

RESEARCH

TITLE

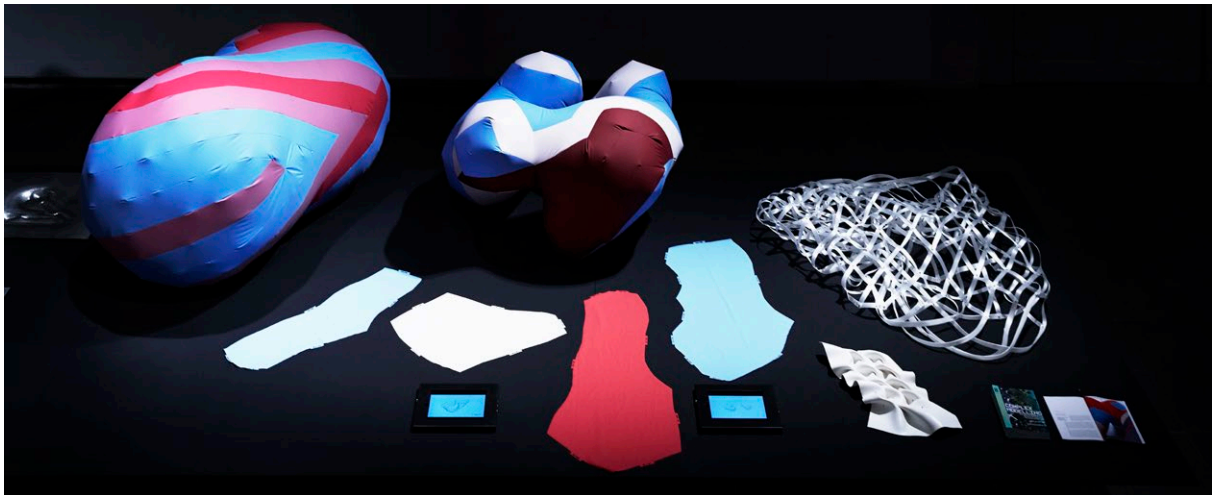
Inflated Restraint

TEAM

Phil Ayres, Petras Vestartas, Danica Pistekova, Maria Teudt

DESCRIPTION

The project was part of CITA - Complex Modelling research. Inflated Restraint investigates how computational techniques of clustering and graph traversal can be applied in the context of cable stiffened pneumatic structures to produce new forms of expression as seen in **figure 1**. Inflated Restraint demonstrates that complex computationally derived cutting patterns, that appear to be arbitrary, can be efficiently combined to minimize waste and produce membranes that approximate a design target with complex curvature.



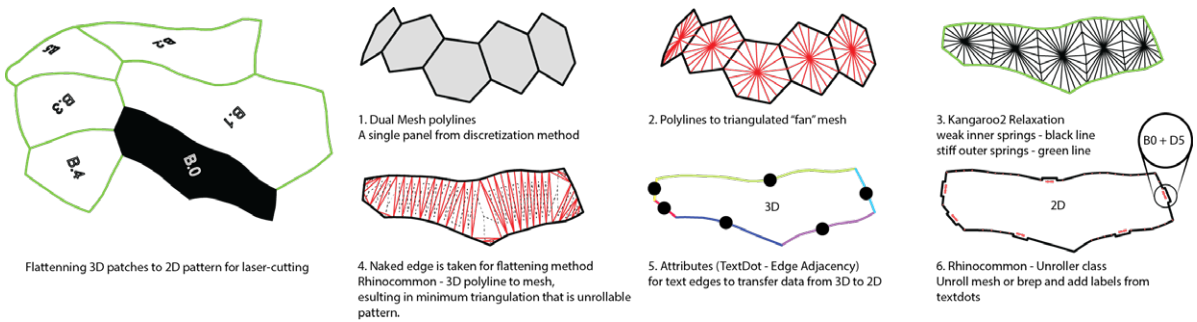
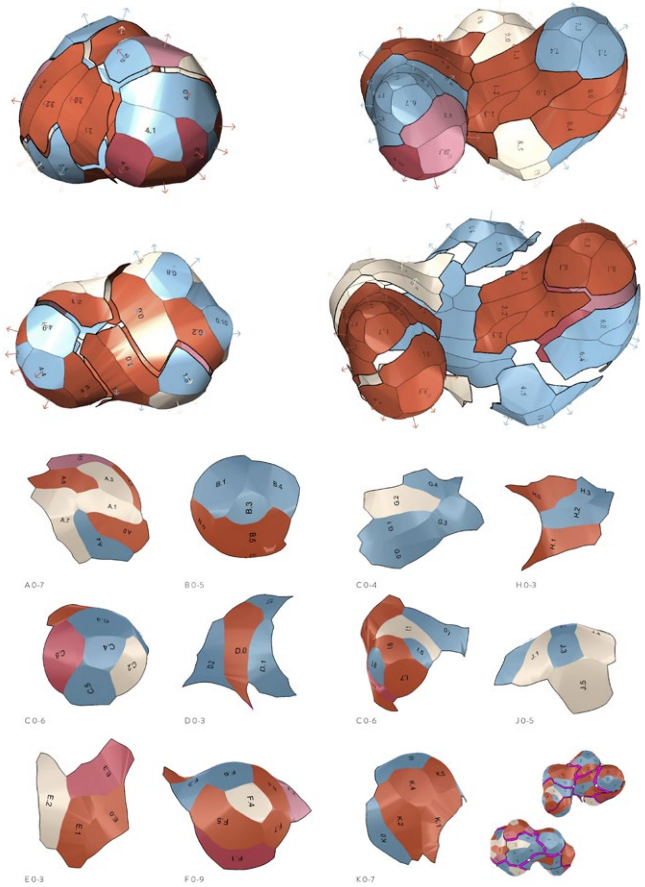


Fig. 1 Mesh discretization methods for unrolling and flattening the positive and negative curvatures.



Petras Vestartas Portfolio | www.petrasvestartas.com | petrasvestartas@gmail.com

TEACHING

TYPE

TEACHING

TITLE

"Corrugated Cardboard Shell", Art Vilnius 19, Lithuania

TEAM

Lina Vestarte, Petras Vestartas, Romualdas Kucinskas, Students from Vilnius Academy of Arts.

DESCRIPTION

The 1:1 scale pavilion, **as seen in figure 1,** is a result of an architectural workshop organized at The Vilnius Academy of Arts, department of Architecture. This shell structure is more than 3m height and spans up to 6m in diameter. The structure is built of two layered 3mm corrugated cardboard sheets, consisting of 391 sets of elements (more than 1500 total count of unique pieces). It was assembled without using heavy scaffolding or any adhesives, thus relying on material tensile strength and friction provided by the connection method. The assembly method are seen in **figure 2**.

Fig. 1 Photos of the corrugated cardboard pavilion made with the students of Vilnius Academy of Arts.

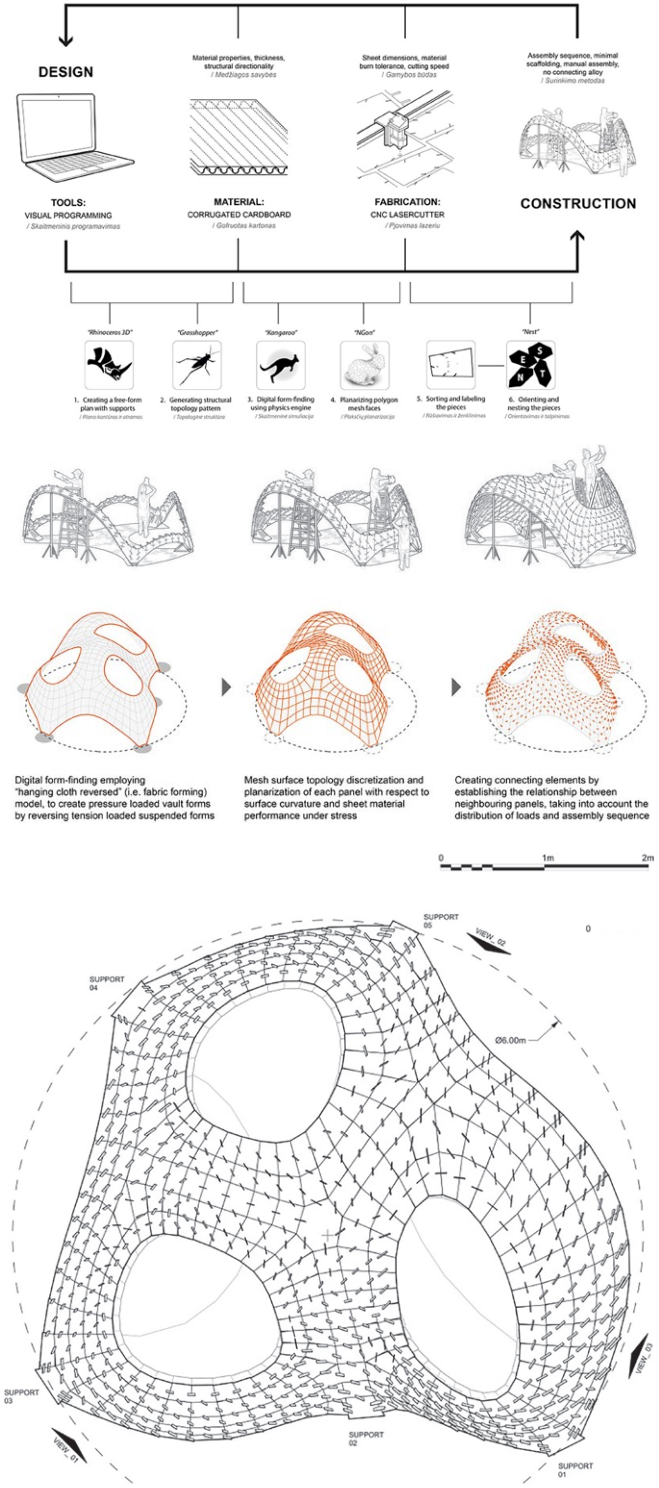


Fig. 2 Modeling methods and assembly techniques.

TYPE

TEACHING

TITLE

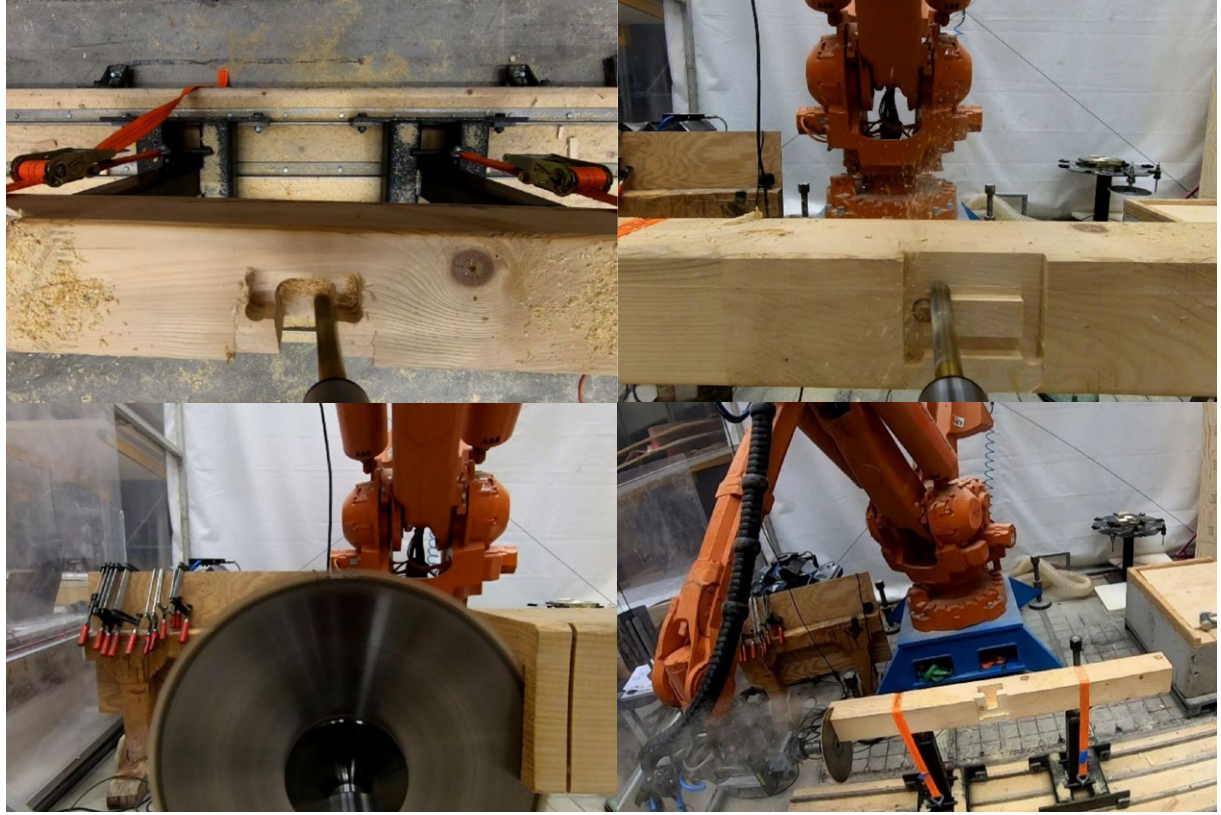
PDM student Maxim Andrist. Theoretical and conceptual part of the thesis.

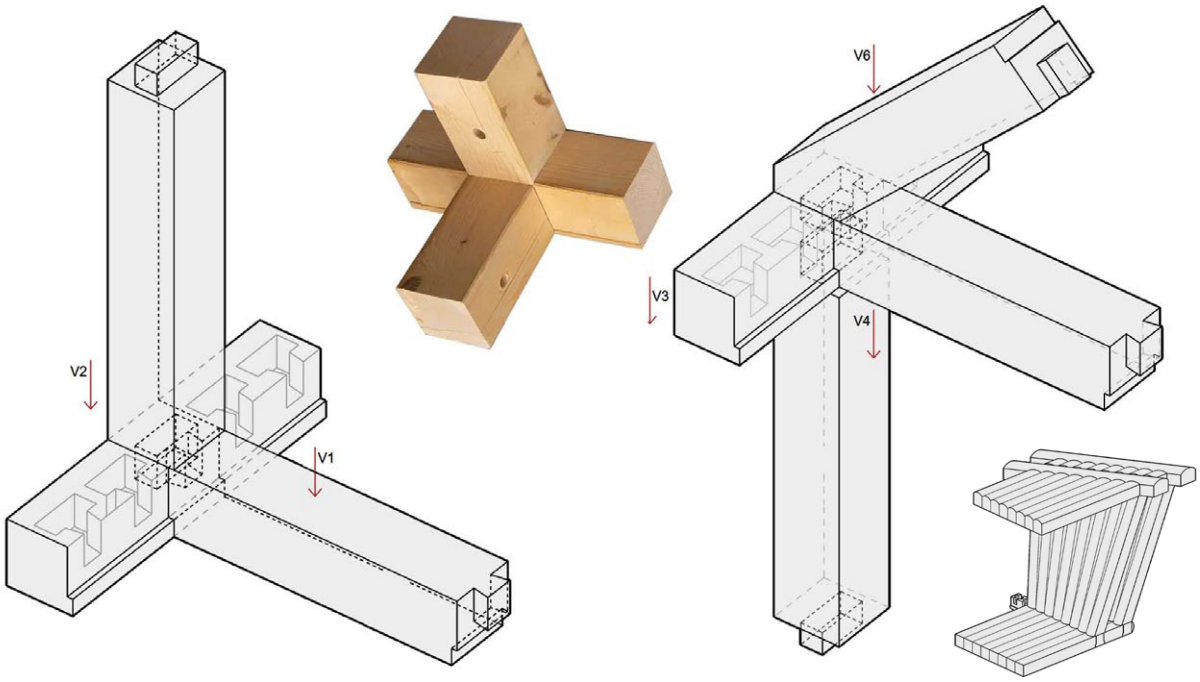
TEAM

tutor: Petras Vestartas
student: Maxim Andrist

DESCRIPTION

Master student Maxim Andrist was taught robotic fabrication techniques to investigate Arikake joint. This is a three-valence joint made from a tenon-mortise and a dovetail connections, The Japanese joinery is invisible after beams are assembled as seen in **figure 1**. The geometrical algorithm adapts to various sections of beams. Also, it is possible to use different angles between beams, that are applicable to non-orthogonal assembly too. The fabrication employs saw-blade and milling operations. The experiment continued to a larger scale architectural project.





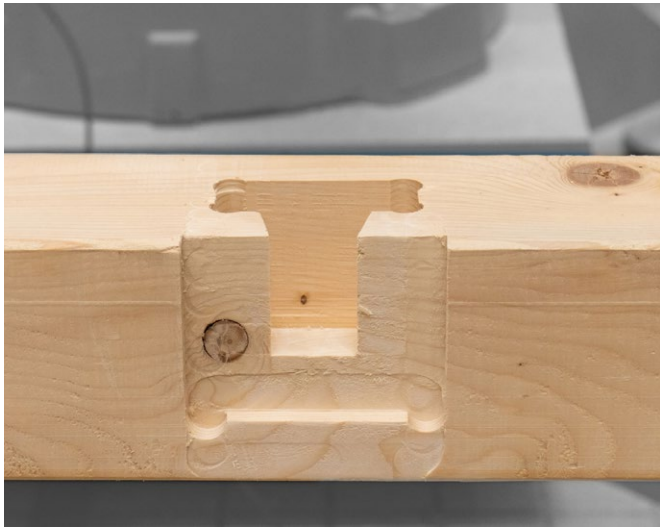


Fig. 1 Teaching master student Maxim Andrist how to use ABB 6400R spindle setup for the Ari-kake joint including geometry generation, robot kinematics and fabrication.

Petras Vestartas Portfolio | www.petrasvestartas.com | petrasvestartas@gmail.com

TYPE

TEACHING

TITLE

PDM student Maxim Andrist. Architectural project

TEAM

tutor: Petras Vestartas
student: Maxim Andrist

DESCRIPTION

Student project that investigates raw timber resources near the village of Saint-Georges, Switzerland. It is above all a typological demonstration of architecture in harmony with the forest as seen in **figure 1**. It is a collective habitat that is organized into private housing modules and shared service and leisure spaces. The built complex develops organically by following the natural aspects of the site, the geometry of the terrain and the sunshine filtered by the trees. The inhabited spaces are installed on a continuous platform followed by the natural terrain.

Fig. 1 Teaching student Maxim Andrist for the master project that employs raw timber in the follow-up semester.

Petras Vestartas Portfolio | www.petrasvestartas.com | petrasvestartas@gmail.com

TYPE

RESEARCH

TITLE

Tree fork truss

TEAM

tutor: Petras Vestartas
student: Maxim Andrist

DESCRIPTION

Tree fork truss is an experiment for testing the robotic scanning fabrication setup for highly irregular objects as seen in **figure 1**. Tree forks were gathered from a forest of the Rossiniere village in Switzerland. Each of the tree fork was scanned first for a design phase and then just before the fabrication start to know the position of the work-object. Two types of joints were: a) plain scarf joint and b) tenon-mortise connection. Stationary robotic setup was used as seen in **figure 2** using ABB IRB 6400R and a custom made linear track.

Fig. 1 Fabrication of tree forks using ABB IRB 6400R and a custom made linear track system.

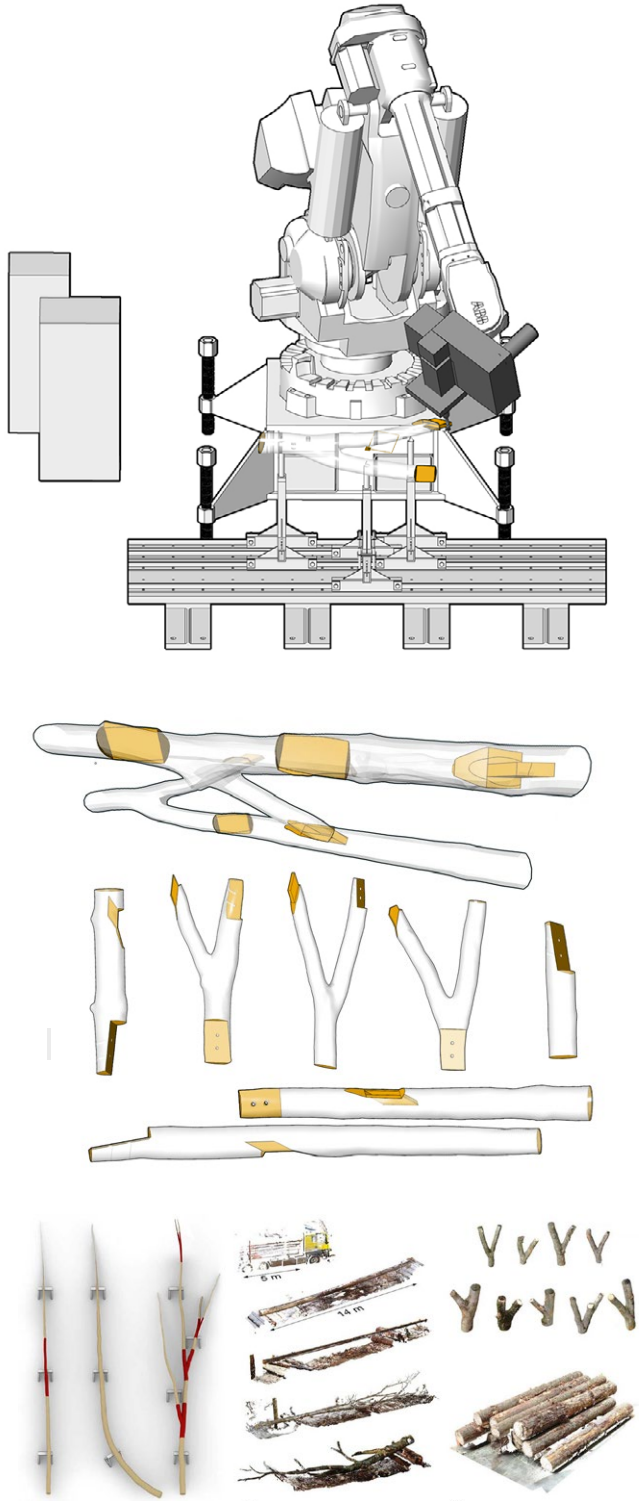


Fig. 2 Raw fork scans and joinery geometry for fabrication.

TYPE

TEACHING

TITLE

Land of Thousand Dances. Prendre-soin. ALICE+IBOIS / Semain Enac

TEAM

Fauvel Camille
Julien Lafontaine
Camille Fréchou
Petras Vestartas
Nicolas Rogeau
Julien Gamerro

DESCRIPTION

This is a week course where architecture and engineering students worked together for constructing timber structures from standard timber profiles. One the main tasks was to reuse timber from previous structure seen in **Figure 1**, partially dismantle it and re-employ the material for small scale furniture around the site. Teachers and students were staying in the Avion city of France for a daily outdoor design and construction process. The site was 3d scanned to obtain the overall landscape map for planning the student group project arrangement.

Fig. 1 Photos from the site where timber projects was dis-assembled and re-assembled as outdoor structures.

TYPE

TEACHING

TITLE

Aggregations
and Graph-Based
Modelling

TEAM

Petras Vestartas
Gediminas Kirdeikis
Romualdas Kucinskas

DESCRIPTION

This is a two week workshop in Vilnius Academy of Arts. The aim of the workshop was to teach students digital modeling skills using Rhino and Grasshopper. A grasshopper plug-in called "Fox" was developed to automate the process of aggregation. The figures were generated within closed volumes. Both volumes and aggregations were then fabricated using triangular mesh unrolling technique and a 2D laser cutter. Finally the experiments were shown in the exposition of Lithuanian Architecture Association in Vilnius.

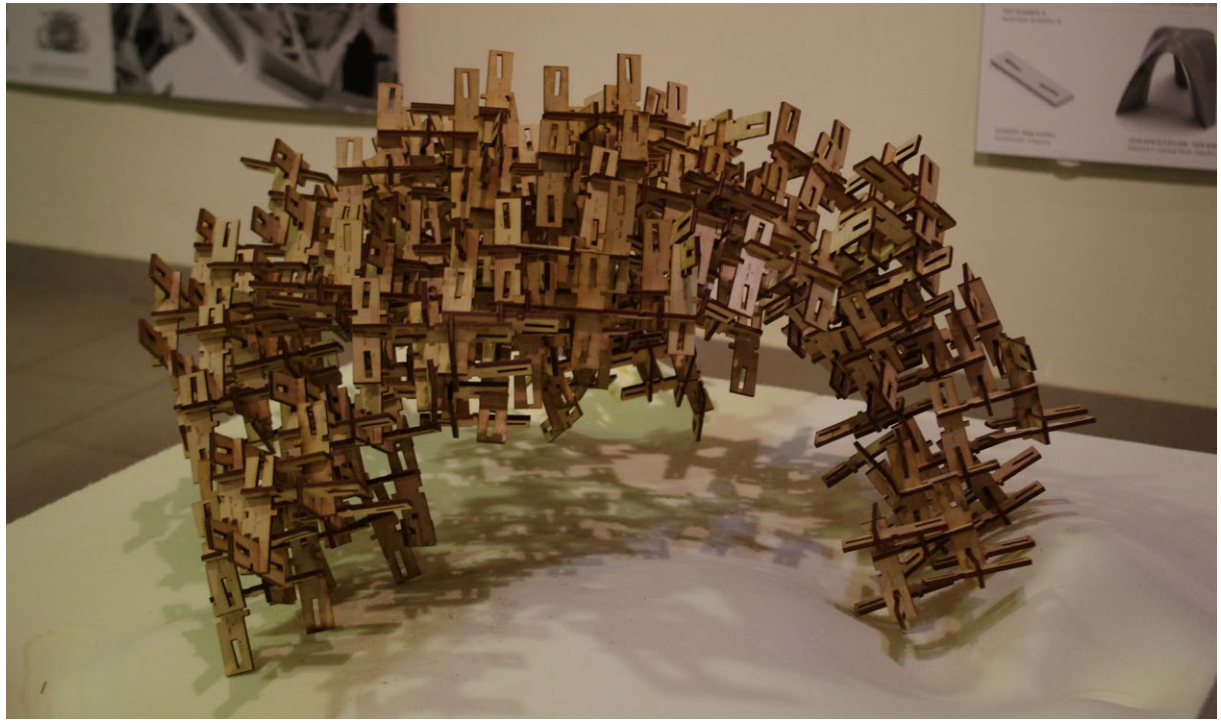


Fig. 1 Photos and images from the workshop exhibition "Aggregations and Graph-Based Modelling", VAA.

TYPE

TEACHING

TITLE

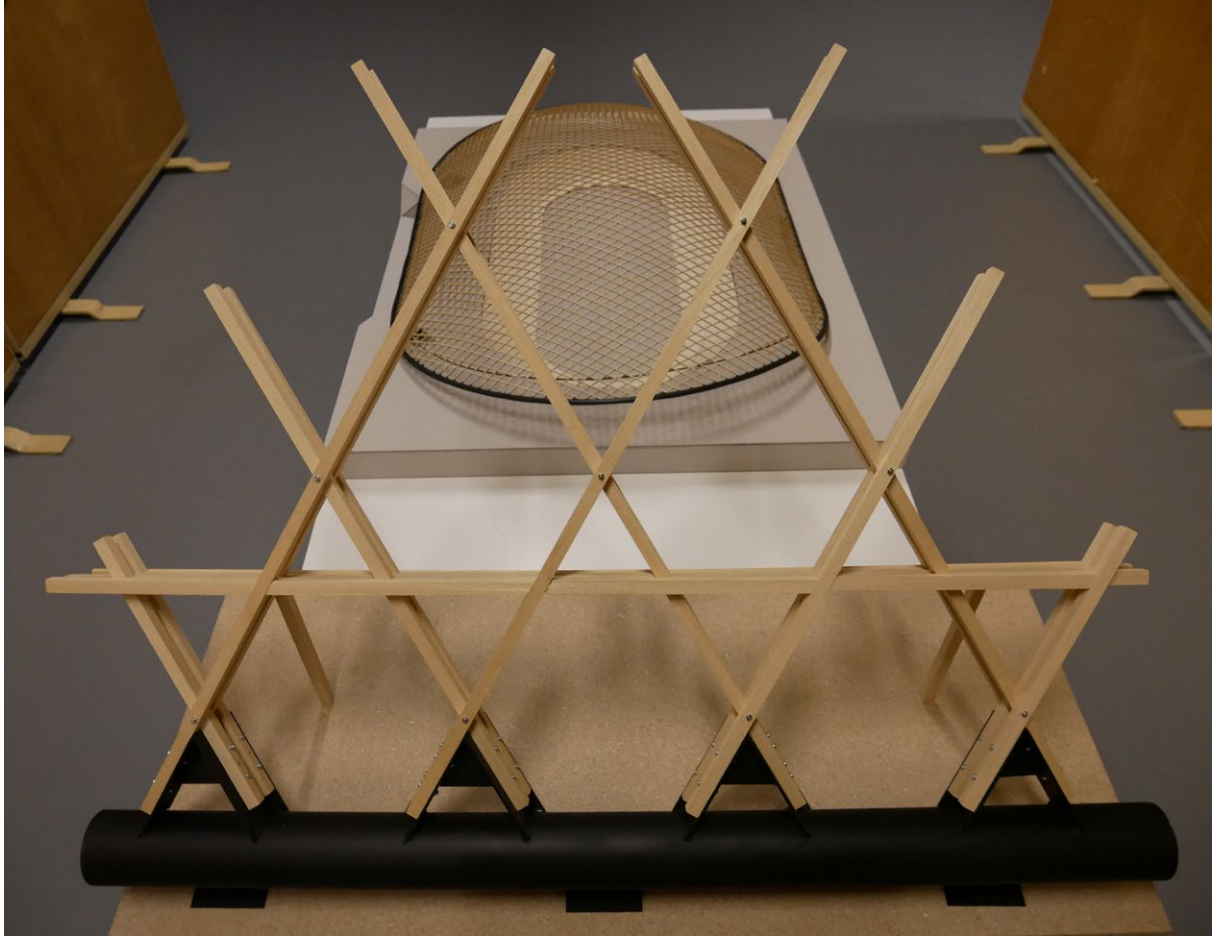
Atelier Weinand
2018 Autumn

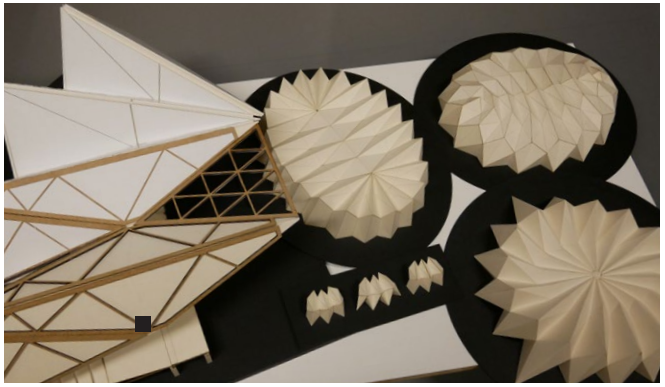
TEAM

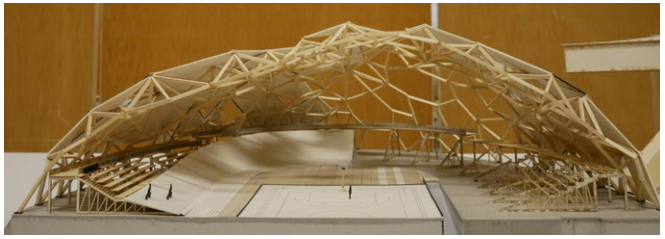
Petras Vestartas
Nicolas Rogeau
prof. Yves Weinand

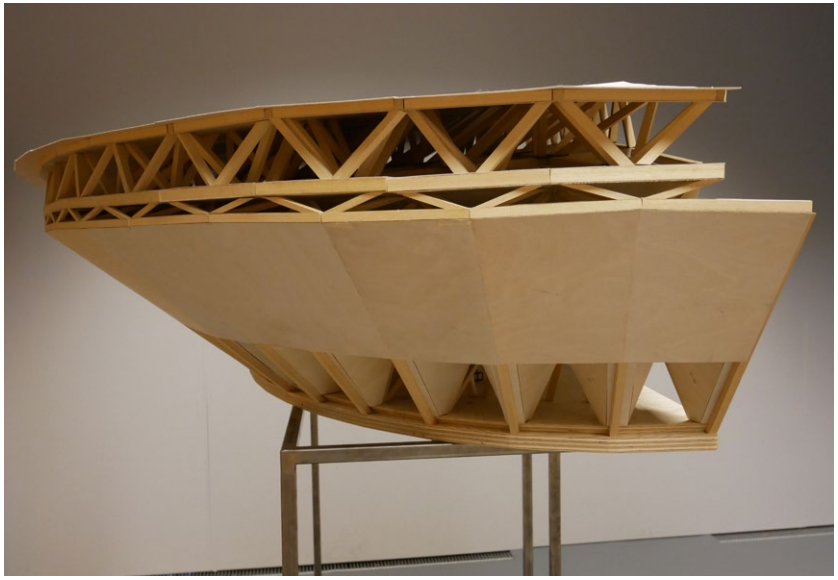
DESCRIPTION

In 2018 the topic presented to students was to propose a new innovative spatial structure for the skating rink of Davos. The relatively large dimensions of the building were a good learning experience to appreciate the proportion of a structure and understand the importance of details and materials that were used. Students worked with physical by addressing the scale of a detail as seen in **figure 1**. A software for interactive learning by manipulating structural forms was presented this year to add new teaching contents and methods.









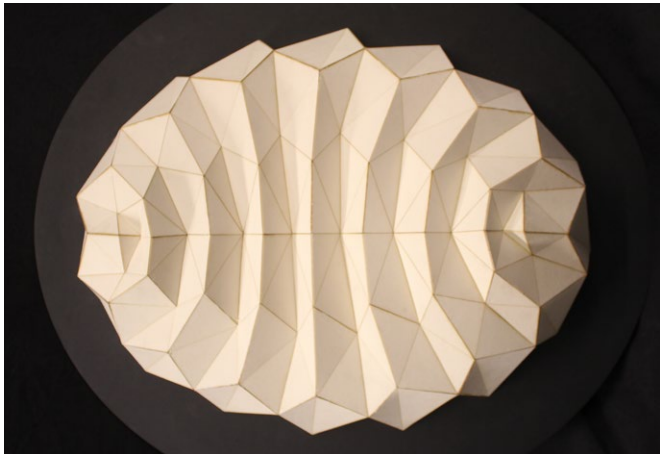


Fig. 1 Student models from Atelier Weinand "Back on Track" 2018 Autumn

TYPE

TEACHING

TITLE

Atelier Weinand
2019 Spring

TEAM

Petras Vestartas
Nicolas Rogeau
prof. Yves Weinand

DESCRIPTION

This semester was formulated as experimental studio for reciprocal frames. The goal is to design a spatial structure for a theater in Vidy, near the lakeside, using raw timber. The studio aims to encourage students to develop an integral design using digital tools to master all stages of the project from sketch to completion with a particular focus on automated manufacturing as seen in **figure 1**. Students were intvited to collaborated with each other as a team while developing their own research axis while sharing their part of the project with the rest of the students.

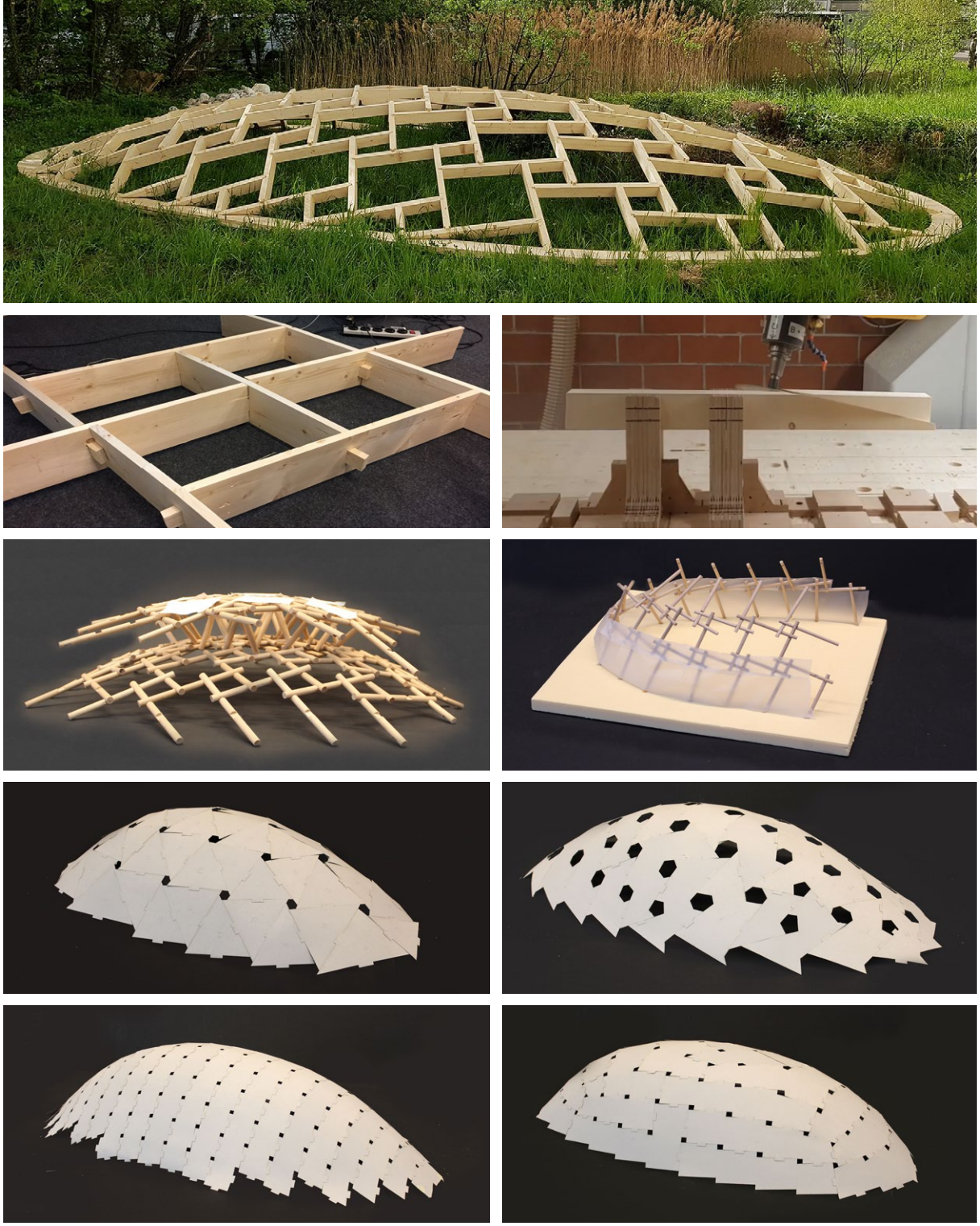


Fig. 1 Student models from Atelier Weinand "Back on Track" 2019 Spring

TYPE

TEACHING

TITLE

Atelier Weinand
2020 Spring

TEAM

Petras Vestartas
Nicolas Rogeau
prof. Yves Weinand

DESCRIPTION

The following items are part of the program: scanning tectonics, round wood operations, robotic assembly process, parametric design, development of wood-wood connections, reuse of cultural heritage, experimentation on numerical and physical models. This semester focused on the reuse of cultural heritage: a Valais mansion dating from the 17th century. Students were asked to perform a full exterior and interior scan using advanced laser scanning techniques. This technological base served both as an inspirational description but also as a scientific survey of the existing.

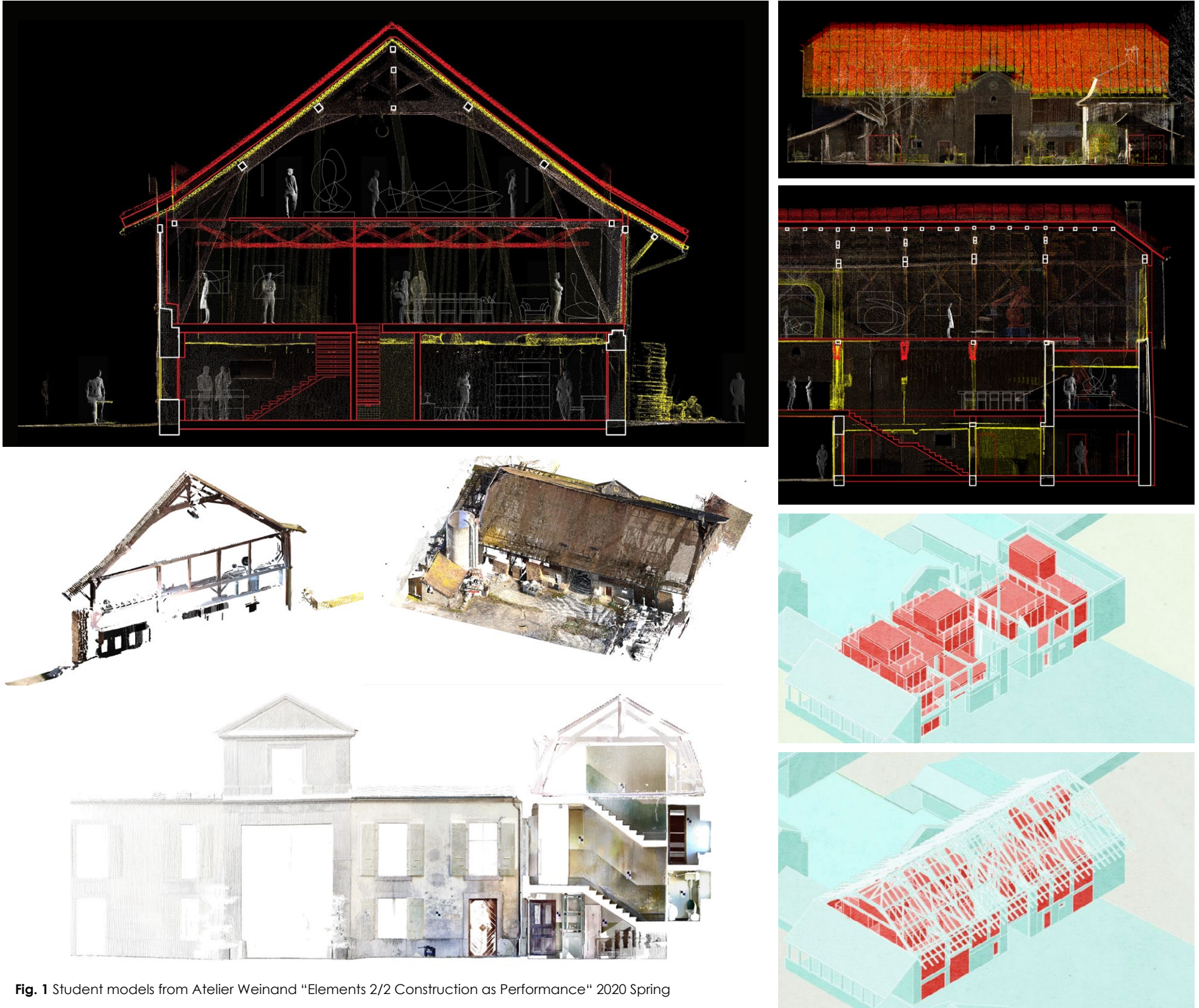


Fig. 1 Student models from Atelier Weinand "Elements 2/2 Construction as Performance" 2020 Spring

Petras Vestartas Portfolio | www.petrasvestartas.com | petrasvestartas@gmail.com

TYPE

TEACHING

TITLE

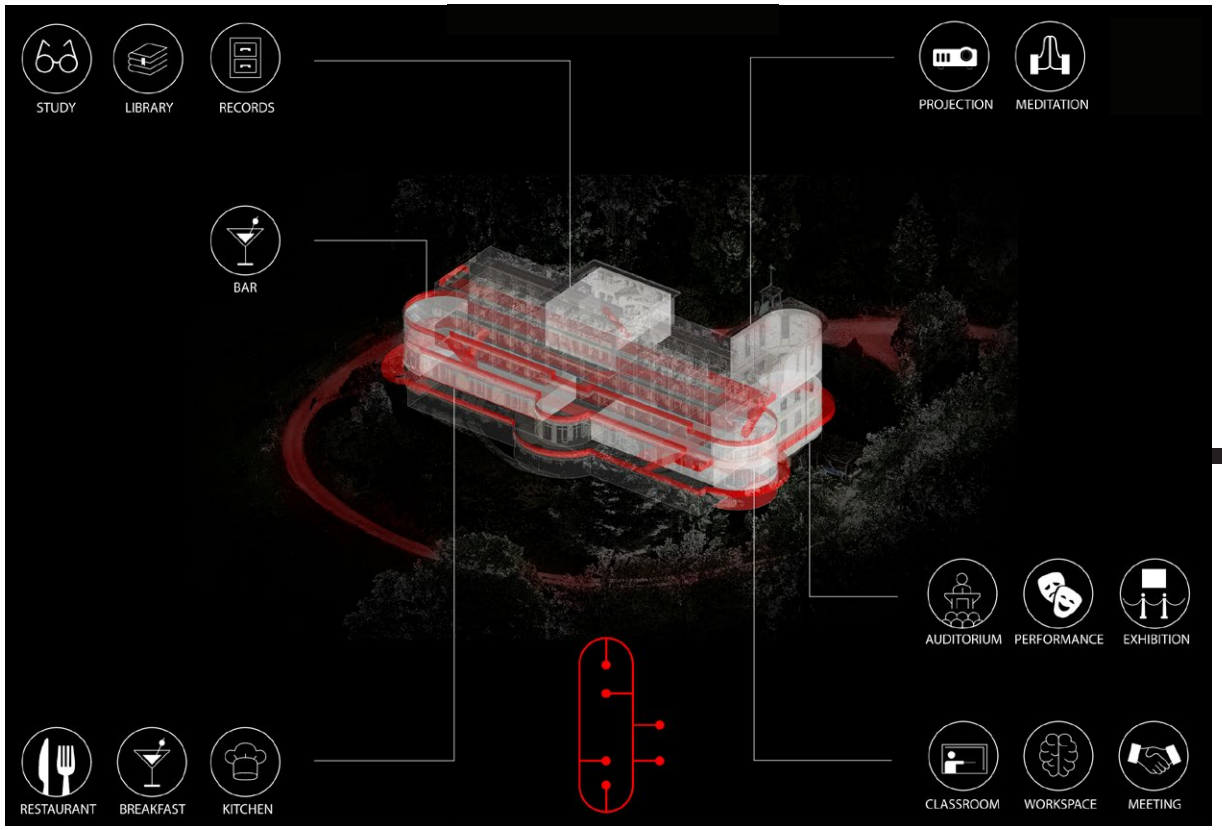
Atelier Weinand
2020 Autumn

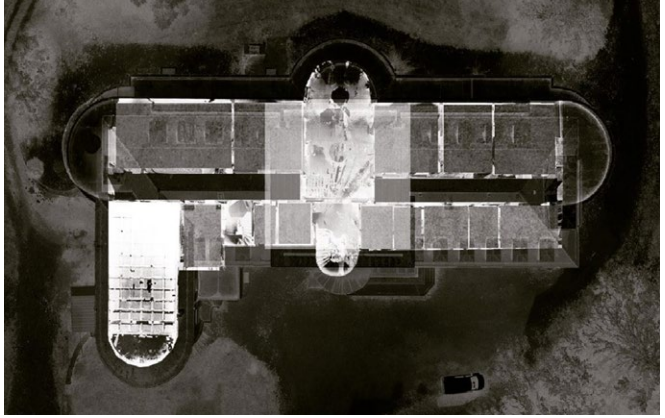
TEAM

Petras Vestartas
Nicolas Rogeau
prof. Yves Weinand

DESCRIPTION

The atelier proposed to investigate of the currently abandoned, the preventorium Le Rosaire, as seen in **figure 1**. Relating to the potential of the site and the reuse of built heritage, "Le Rosaire" is thought to host a convention center, benefiting from an important accessibility by train and peaceful surroundings. Alternative programs can be envisioned if adequately motivated. Through different workshops, students were introduced to digital fabrication tools, parametric interfaces and holistic thinking. Laser scanning was also used to get a detailed site and classical project representations.





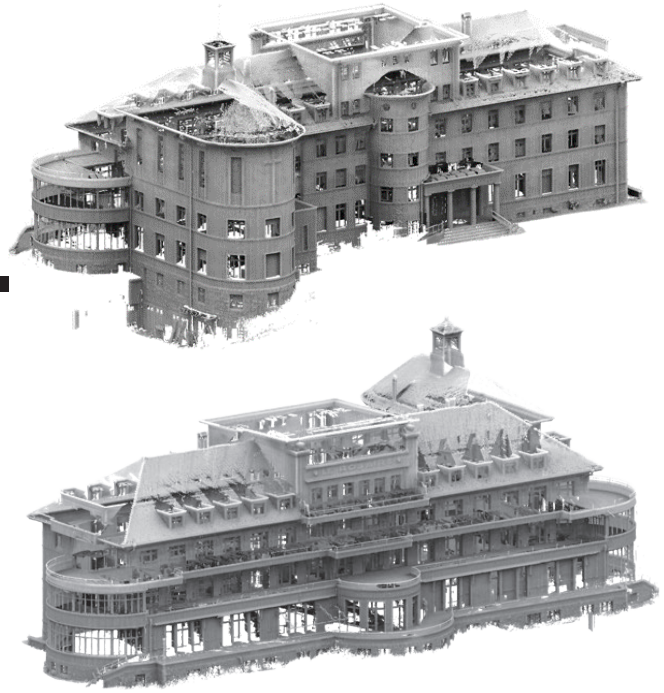


Fig. 1 Student models from Atelier Weinand "Reuse of the Cultural Heritage" 2020 Autmun

Petras Vestartas Portfolio | www.petrasvestartas.com | petrasvestartas@gmail.com

TYPE

TEACHING

TITLE

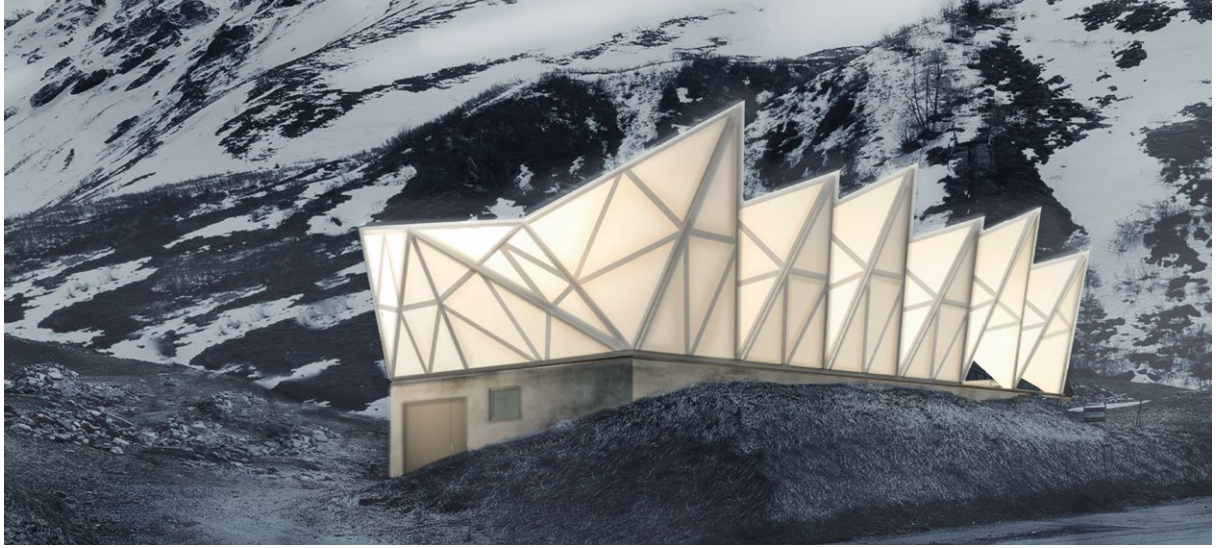
Atelier Weinand
2021 Spring

TEAM

Petras Vestartas
Nicolas Rogeau
prof. Yves Weinand

DESCRIPTION

The studio moved to the Great St Bernard Pass, near Italian border to study the refection of an abandoned ski station. The challenge is twofold. On one hand, students must question the future of the station and propose a program that will allow the site to be reactivated in a sustainable manner. On the other hand, they were asked to minimize the environmental impact of their project by developing a constructive system from local resources. The **figure 1** right demonstrates the existing steel infrastructure that inspired some of the student projects.



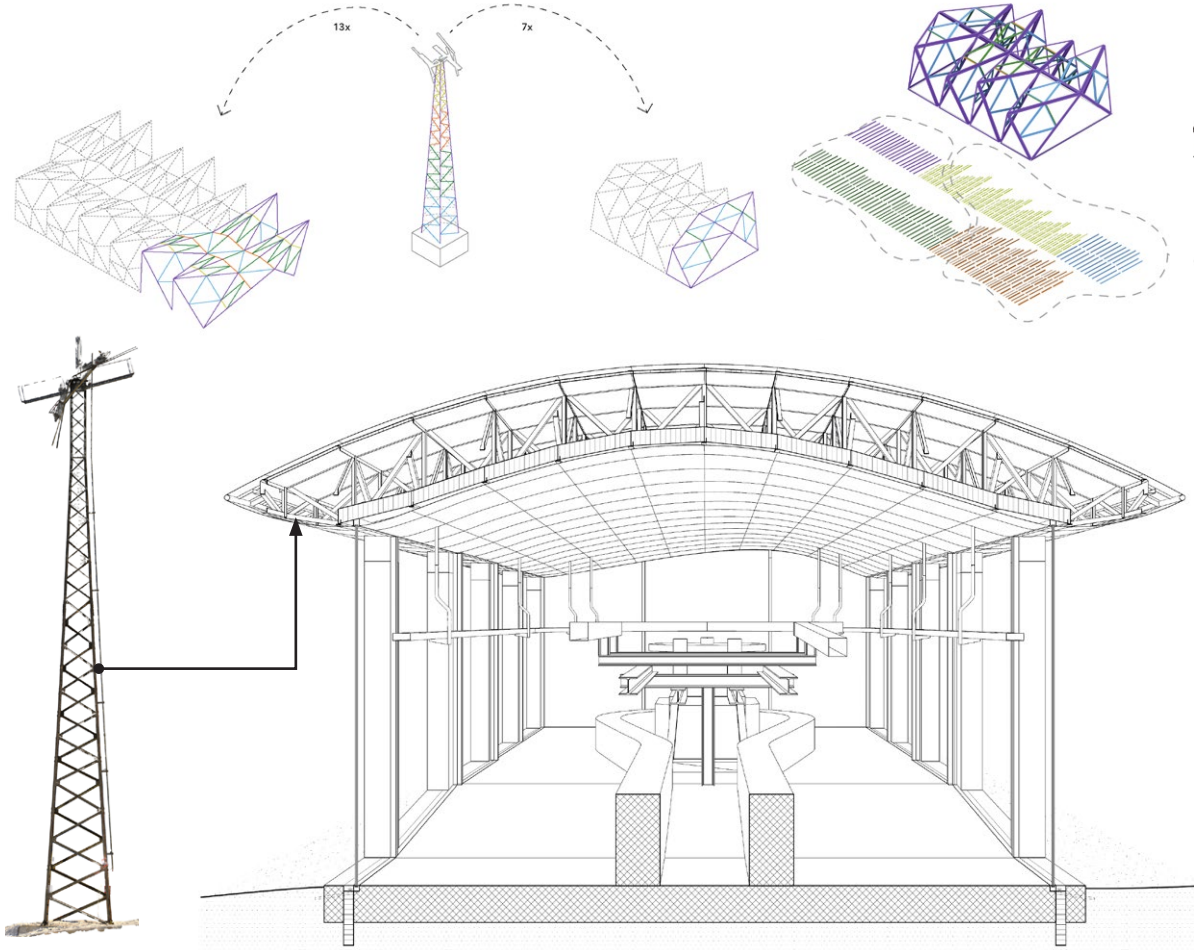
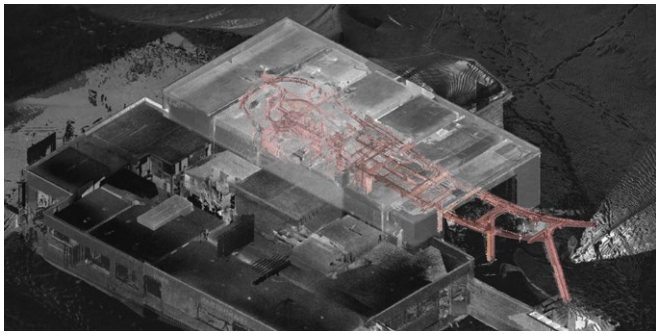


Fig. 1 Student models from Atelier Weinand "Ski Station Metamorphosis" 2021 Spring



Petras Vestartas Portfolio | www.petrasvestartas.com | petrasvestartas@gmail.com

TYPE

TEACHING

TITLE

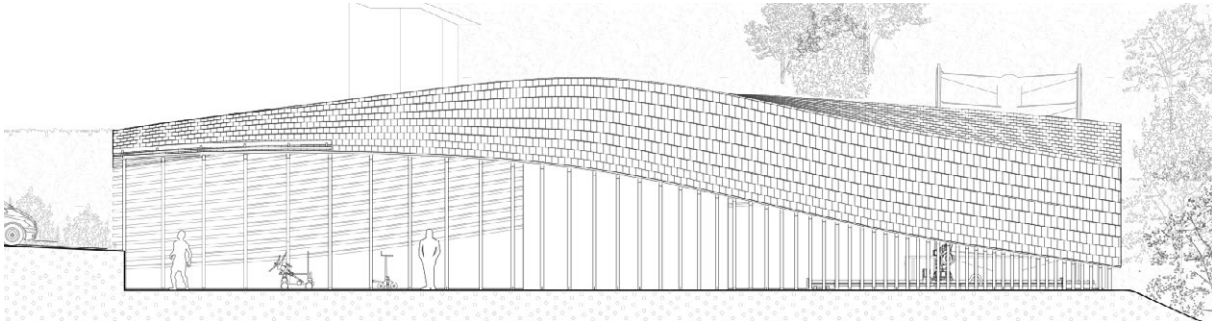
Atelier Weinand
2021 Autumn

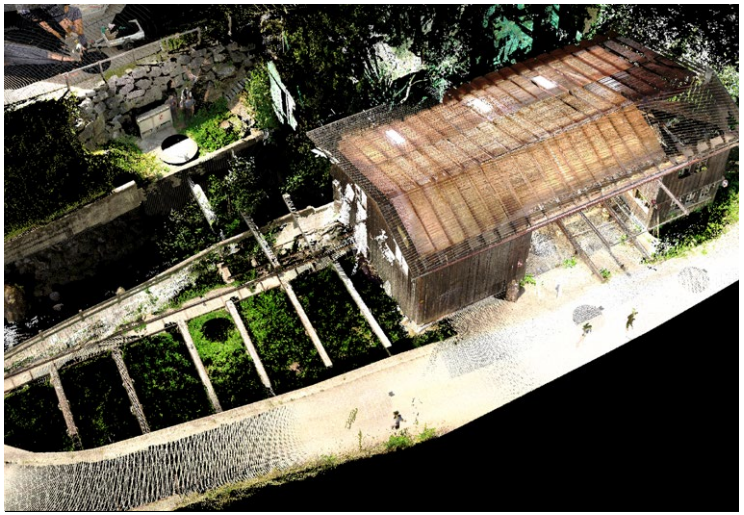
TEAM

Petras Vestartas
Nicolas Rogeau
prof. Yves Weinand

DESCRIPTION

In Autumn 2021 students studied the conversion of the existing sawmill near Rossinière, Switzerland and how it could be adapted for robotisation. A total of seventeen students formed groups to develop and present their own vision of how the sawmill could be transformed as seen in **figure 1**. There are many different aspects to be taken into consideration, such as whether the existing structure should be integrated into the new design proposal, historical and ecological concerns, and site topography.





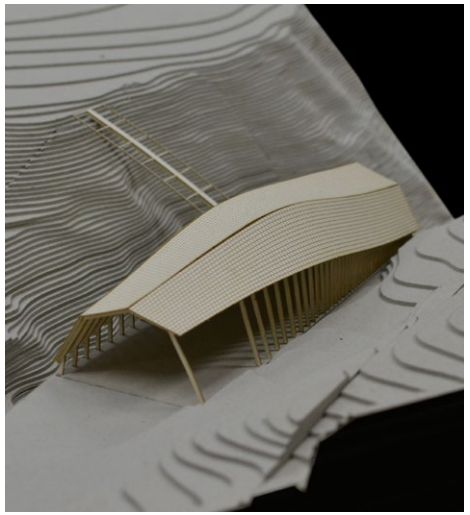
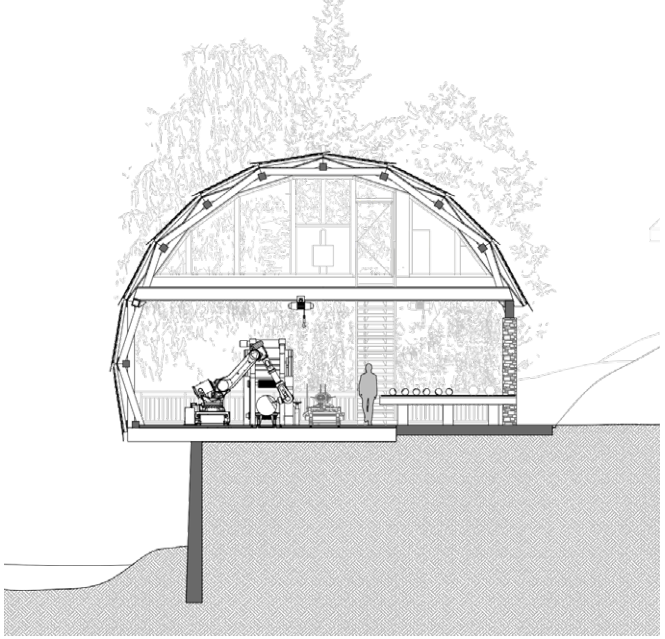
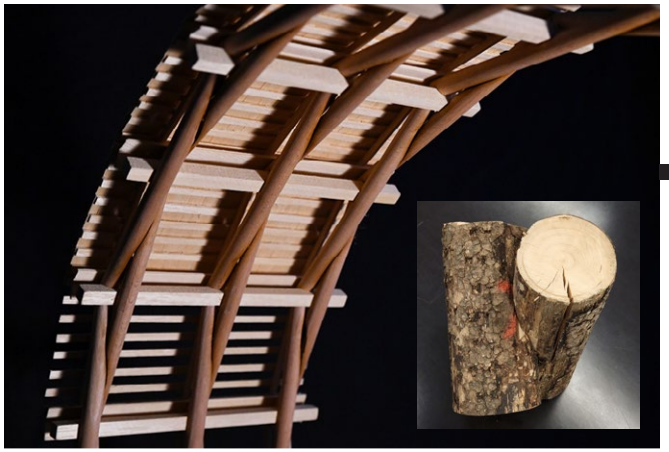


Fig. 1 Student models from Atelier Weinand "Rethinking local timber" 2021 Autumn





TYPE

TEACHING

TITLE

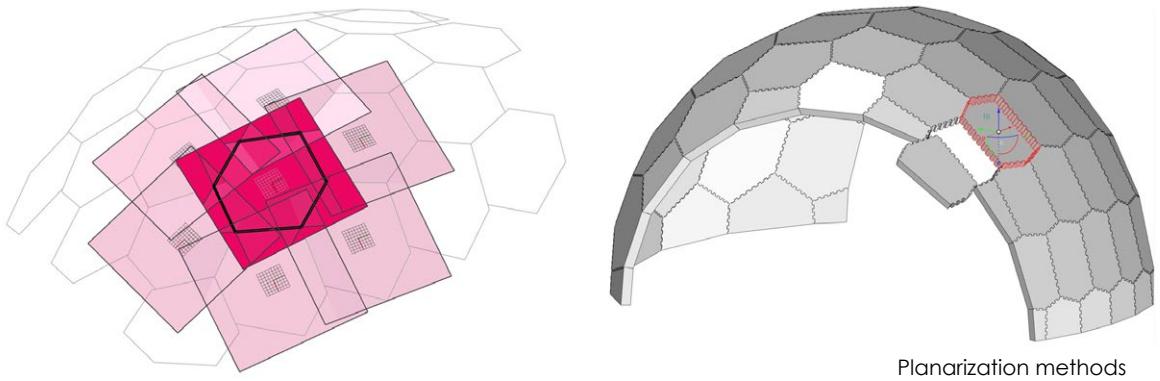
Introduction to computational architecture (AR-327)

TEAM

Petras Vestartas
Andrea Settimi
Nicolas Rogeau
Julien Gamerro

DESCRIPTION

This course is composed of 3 modules:
3D modeling (CAD) where the fundamentals of geometry are reviewed and advanced techniques of 3D modeling are covered (2 weeks).
Parametric modeling (visual scripting, Grasshopper) where the parameterization of basic and advanced geometric elements is studied (5 weeks).
Computational modeling (scripting) where an introduction to coding is given (5 weeks). Course contains a large set of different geometrical examples as seen in **Figure 1**.



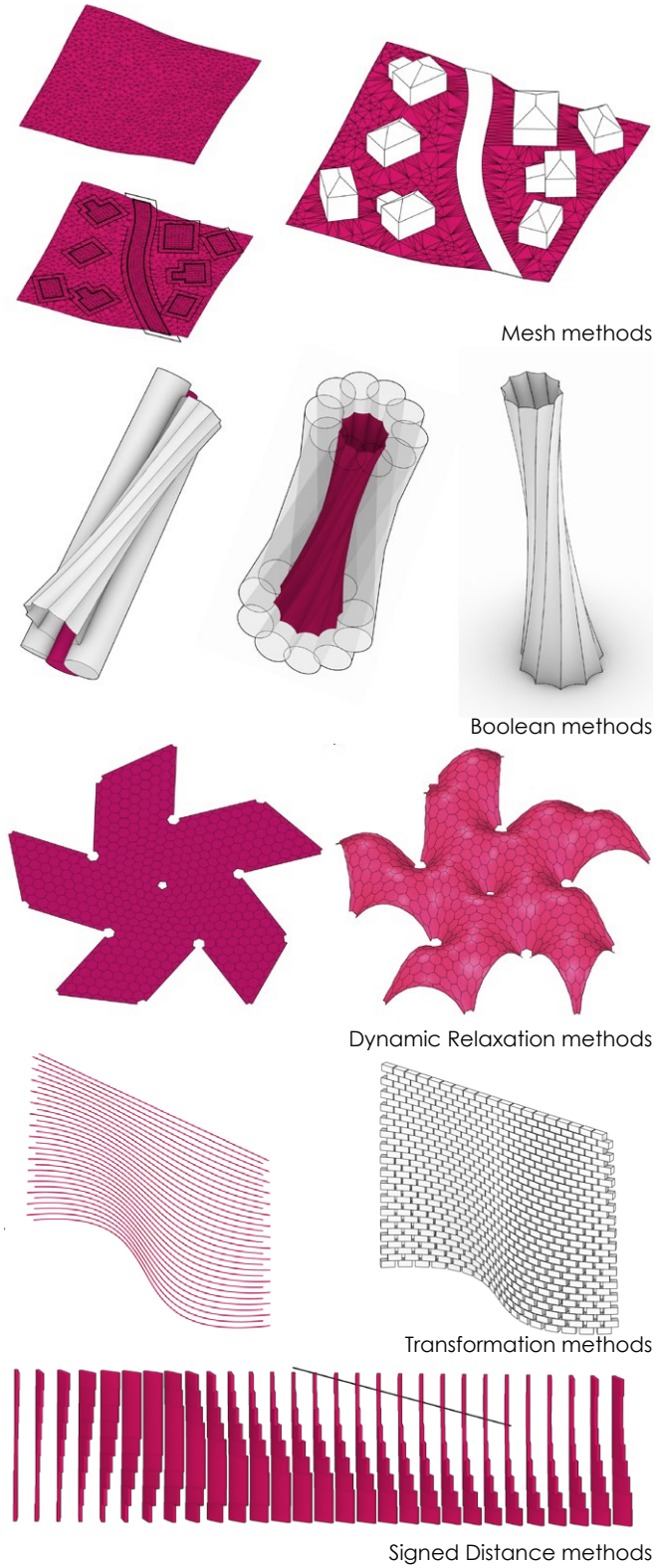


Fig. 1 Rhino and Grasshopper examples presented in the course "Introduction to Computational Architecture".

Petras Vestartas Portfolio | www.petrasvestartas.com | petrasvestartas@gmail.com

THANK YOU

PETRAS VESTARTAS
PhD, MA, BA (hons)
www.petrasvestartas.com
petrasvestartas@gmail.com