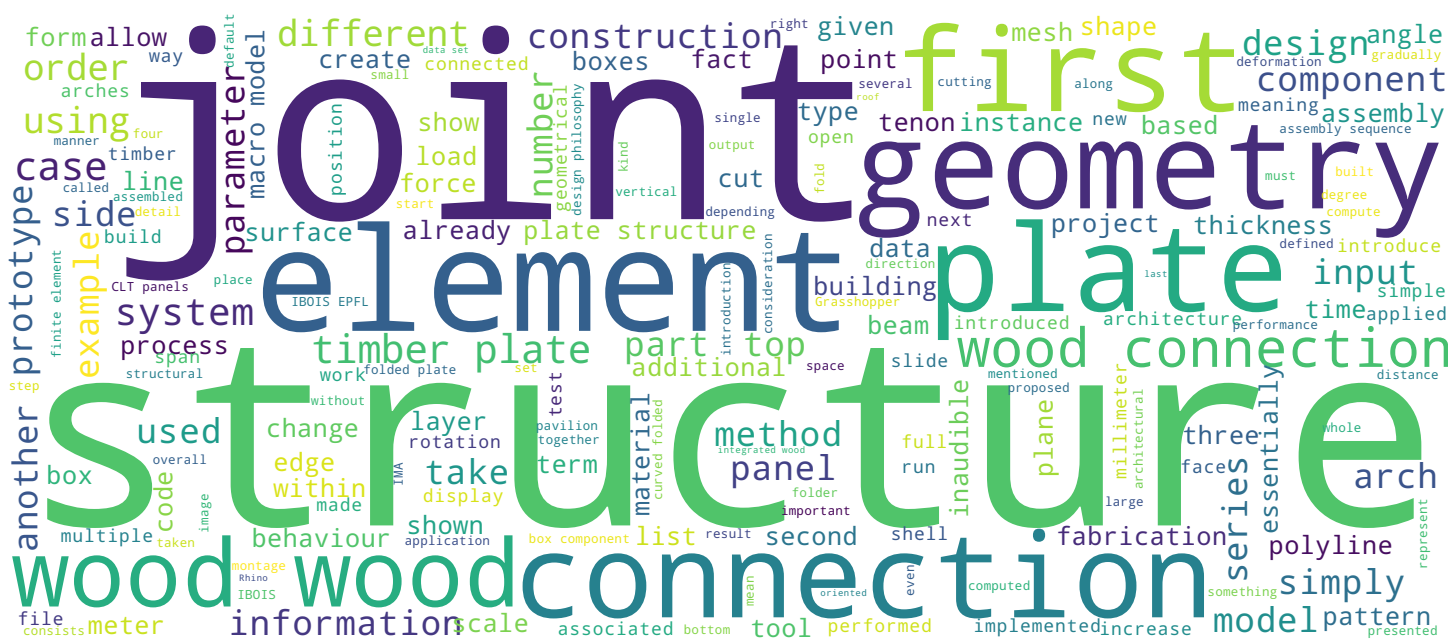
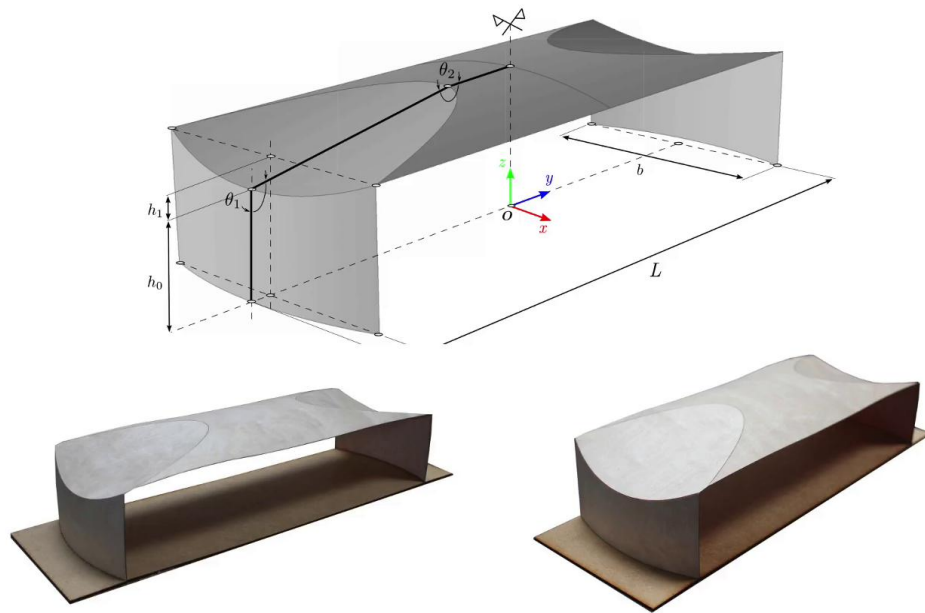


Prof. Dr. Yves Weinand



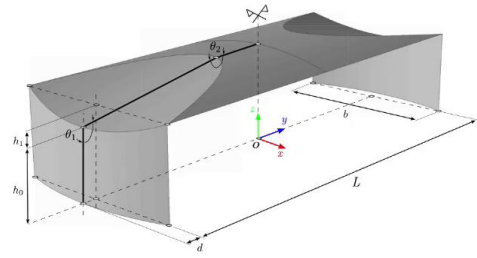


I would like now to introduce the first pavilion where we used curved folded plate structures with digital fabrication. The curved folded pavilion was the first case study using prefabricated, curved, cross-laminated timber, CLT panels, inspired by origami folded geometries. The pavilion was presented in an exhibition at the Academy of Architecture in Mendrisio in Switzerland. And the architectural design methodology was based on curved folding techniques and integrated wood-wood connections developed at IBOIS, EPFL. In fact, the increase in the popularity of wood-wood connections can be attributed to the introduction of the [inaudible 00:00:53] technique in light white structures with irregular geometries investigated at IBOIS. In this prototype, concave and convex curvatures was employed and the structural elements were positioned in such a manner to create mechanical stability in terms of rotation on the corners. Within this context, the design philosophy helped us to employ the concepts of integrated wood-wood connections. In light of the design philosophy developed for full fledged structures made out of plan elements, curved timber panels were implemented in design fabrication and construction while also satisfying structural stability.

Notes

Summary





■ Advanced Timber Plate Structural Design

The structure had a span of 13.5 meter with CLT panels and a thickness of 7 millimeter. We introduced a number of different wood-wood connections here. On those image, you see the first prototype we built in order to build the large one. Wood-wood connections are firstly improved on a span of 2.2 meters.

Notes

Summary



1m 38s



Jointed Roof Elements



Dovetail Joints fit precisely

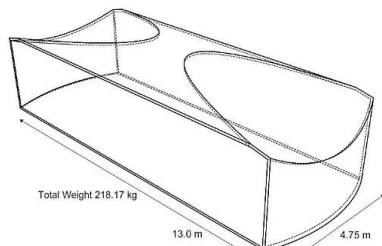
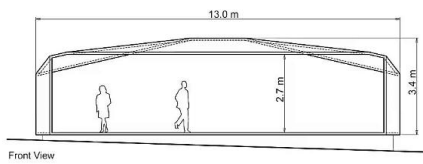
Those connections are then realized at the workshop, IBOIS, EPFL.

Notes

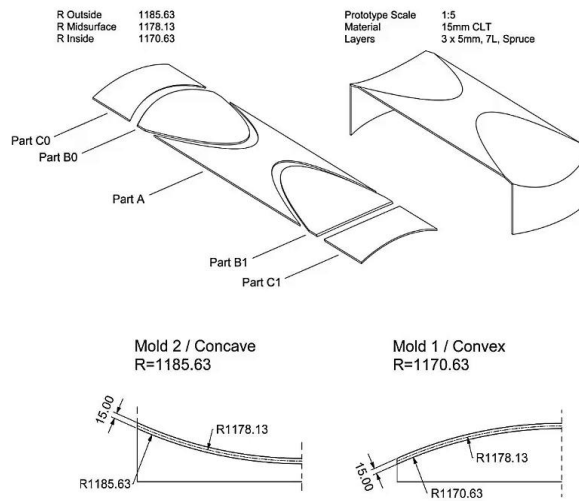
Summary



2m 03s



**Curved Folding Pavilion
Concept and Dimensions**

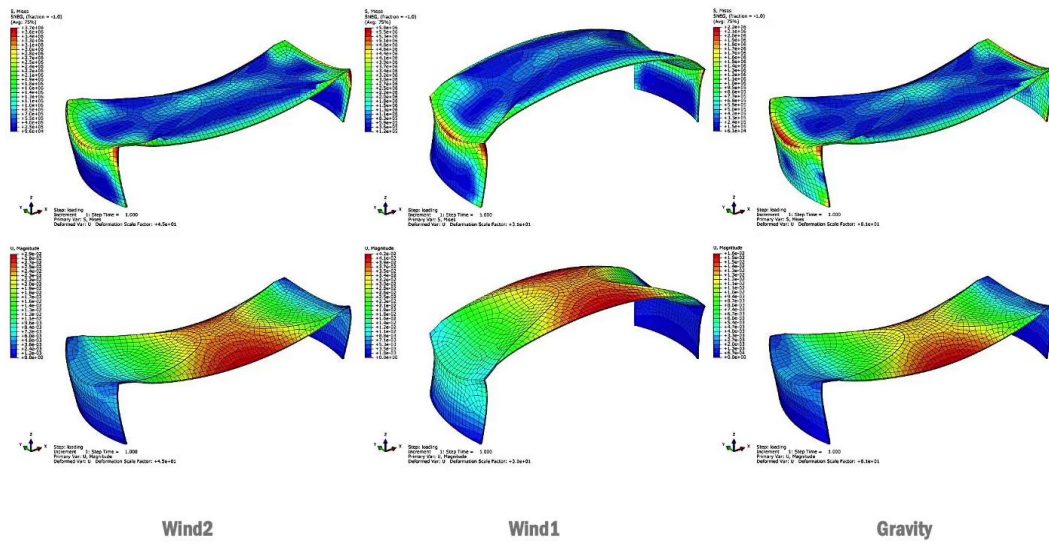


Further on, execution drawings are implemented to build the largescale structure.

Notes

Summary



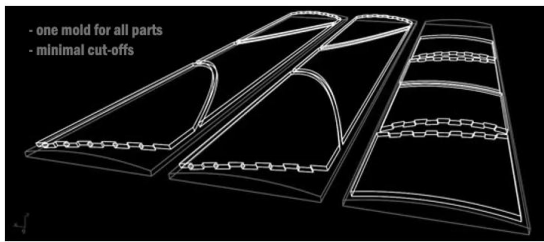


A structural assessment has been performed in order to control the stability and the deformation of the wood structure.

Notes

Summary





3x Curved CLT Panel, length = 15m, radius = 5.9m, thickness = 77mm



Spruce boards with stress cuts



Lamination on mold



Panels ready for cutting

■ Advanced Timber Plate Structural Design

A production process of curved panels has been implemented, reaching, as mentioned, a thickness of 77 millimeters, and only three panels of 16 meters have been produced.

Notes

Summary



2m 26s



Wood-wood connections are implemented on those edges, taking up bending moments, and the pavilion has been cut into two parts because half of it had to be transported twice towards Mendrisio.

Notes

Summary



References

H.U. Buri, *Origami - Folded Plate Structures*, EPFL PP - Lausanne, n.d. <https://doi.org/10.5075/epfl-thesis-4714>.

C.W.M. Robeller, *Integral Mechanical Attachment for Timber Folded Plate Structures*, École Polytechnique Fédérale de Lausanne (EPFL), 2015. <https://doi.org/10.5075/epfl-thesis-6564>.

C. Robeller, S.S. Nabaee, Y. Weinand, *Design and Fabrication of Robot-Manufactured Joints for a curved-folded thin-shell structure made from CLT*, in: *Robot. Fabr. Archit. Art Des.* 2014, Springer International Publishing, Vienna / New York, 2014: pp. 67–81. <https://doi.org/10.1007/978-3-319-04663-1>.

Notes

Summary



2m 52s