

Thanks to technological advancement in computer-aided design, digital fabrication, and engineered timber materials, the current lesson focus is to demonstrate different timber structures that emerged from the transdisciplinary design philosophy widely discussed within the introduction. Wood is experiencing a second chance in modern building technology by reinventing its possibilities. From prototype and pavilion scale to large buildings to wide applications clearly prove the resurgence of such sustainable construction materials in the AEC sector holistically. Reflecting our design methodology in the state-of-the-art of construction and building technology offers tectonic designs in which the art of building is a poetic combination between construction, structure, and architecture. By offering a series of sustainable timber structures, the role of wood/wood connections as creators of complex structures is explored, and the architectural connections in wood are equally explored. Accordingly, a critical approach to recent technical developments in design, fabrication, and material science is addressed, and new doors for zero carbon footprint construction are opened.

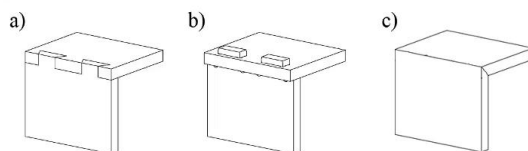
Notes

Summary

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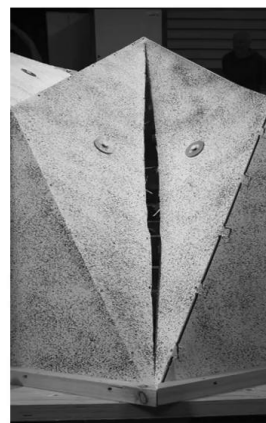
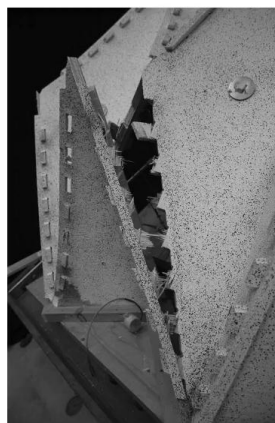
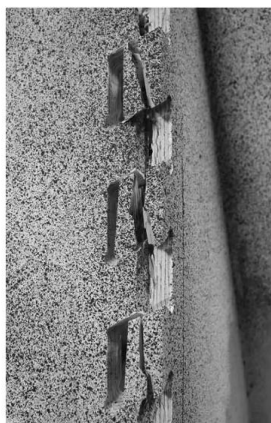
Failure modes



with open slots

with closed slots

Adhesively bonded connections



■ Advanced Timber Plate Structural Design

I would shortly remind three major aspects which have been identified within the first lesson. First, by observing the type of structure we're looking at, we realised that failure occurs along the connections as can be seen in this slide.

Notes

Summary



1m 32s

Wood/wood connection: Dovetails blocking 5-degrees of displacement



Parameter Studies:

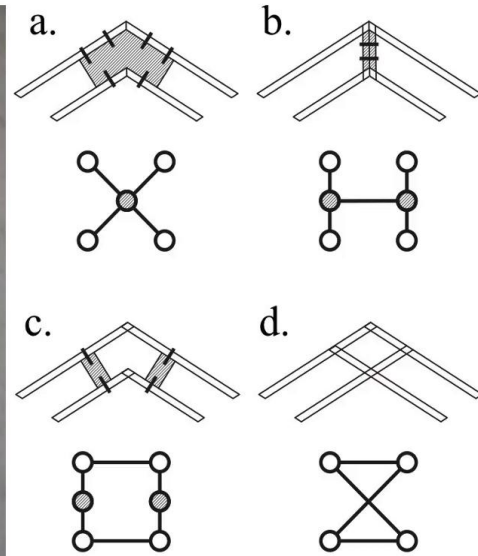
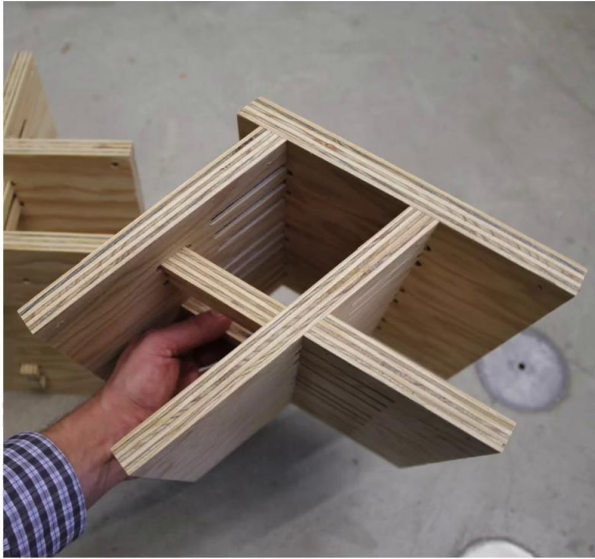
Panel Thickness, Number and spacing of dents, Angle of the dovetail, Amount of cut over

We also realised that wood/wood connections rely on automated fabrication constraints. Those constraints may also affect the geometry of wood/wood connections. The automatic cutting procedure of panels is intertwined with the cutting of wood/wood connections, and both should be included in the same process.

Notes

Summary





Third, montage sequences may condition the way panels are connected with each other. This advantage should be taken into consideration while designing the overall structure.

Notes

Summary



References

A. Stitic, A. Nguyen, A. Rezaei Rad, Y. Weinand, Numerical Simulation of the Semi-Rigid Behaviour of Integrally Attached Timber Folded Surface Structures, *Buildings*, 9 (2019) 55. <https://doi.org/10.3390/buildings9020055>.

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>.

Notes

Summary



2m 31s