

# Single-curved shell

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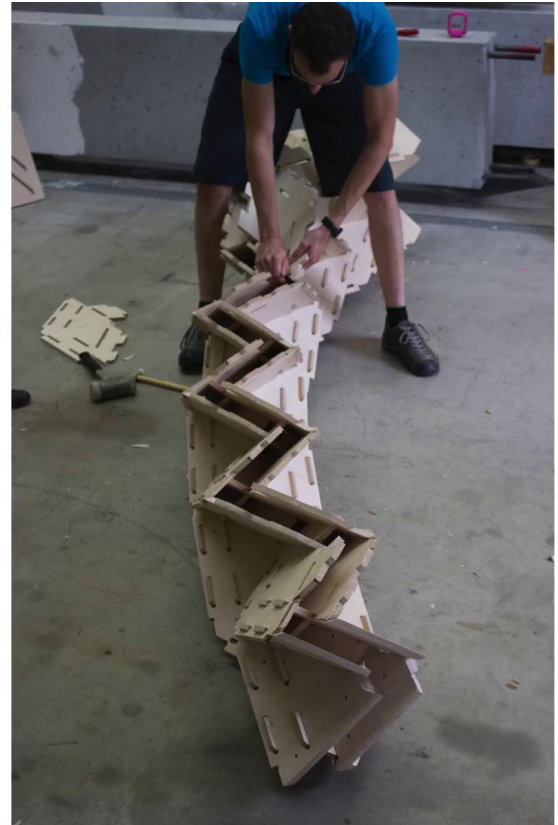
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test box scale define code timber place small next used assembly proposed sequence whole folder shown display line assembled behaviour  
wood fabrication case using another research process taken macro model single kind within full Miura ori order beam  
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construction output

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Video





The next prototype is a single-curved, two-layer timber shell, expanding the design space from origami in folded geometries to single, low curved arches. We designed the prototype with a three-point 25-meter span that consists of two layers of timber plates equipped with two tenon wood-wood connections. Nine veneer birch plywood panels with twelve millimetre thickness were employed for the fabrication. The static height between the top and bottom plate was said to be 48 millimetres, which was four times the plate thickness. In this prototype, the Miura-ori pattern was selected over other patterns such as the Yoshimura type, mainly because it is geometrically compatible with roofs with low coverage.

Notes

Summary





Using a quad grid, the initial double curved surface was defined to obtain the Miura-ori pattern with curved elements. The triangulation technique was then employed to apply the planarization of the target surface. Next, Shape-Up, an algorithm originally developed by [inaudible 00:01:08] was used to homogenize the dihedral angles and figure out the final form of the structure and the local geometry of each timber plate.

Notes

Summary







With respect to the forceful mechanism, the structural system offers optimized mechanical performances, especially near the wood-wood connections. In particular, the joint between plates could transfer sheer and tensile forces and flexural moments without any additional connectors.

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>.

Notes

Summary



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