



A Report on the Innovation of Reciprocal Panel System

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Professor**

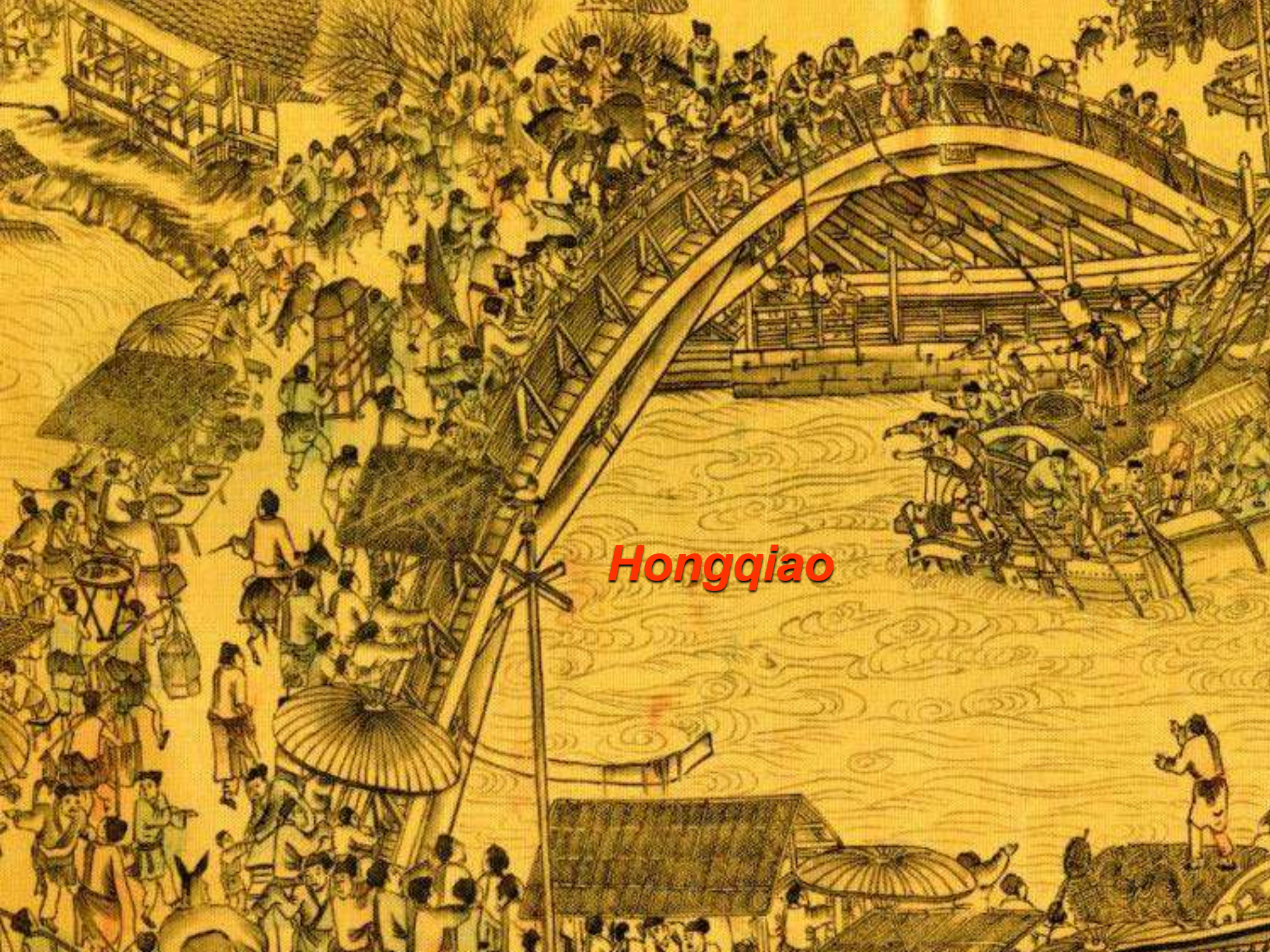
**Department of Civil Engineering
and Architecture
Graduate School**

**Hachinohe Institute of
Technology**

Qingming Shanghe Tu

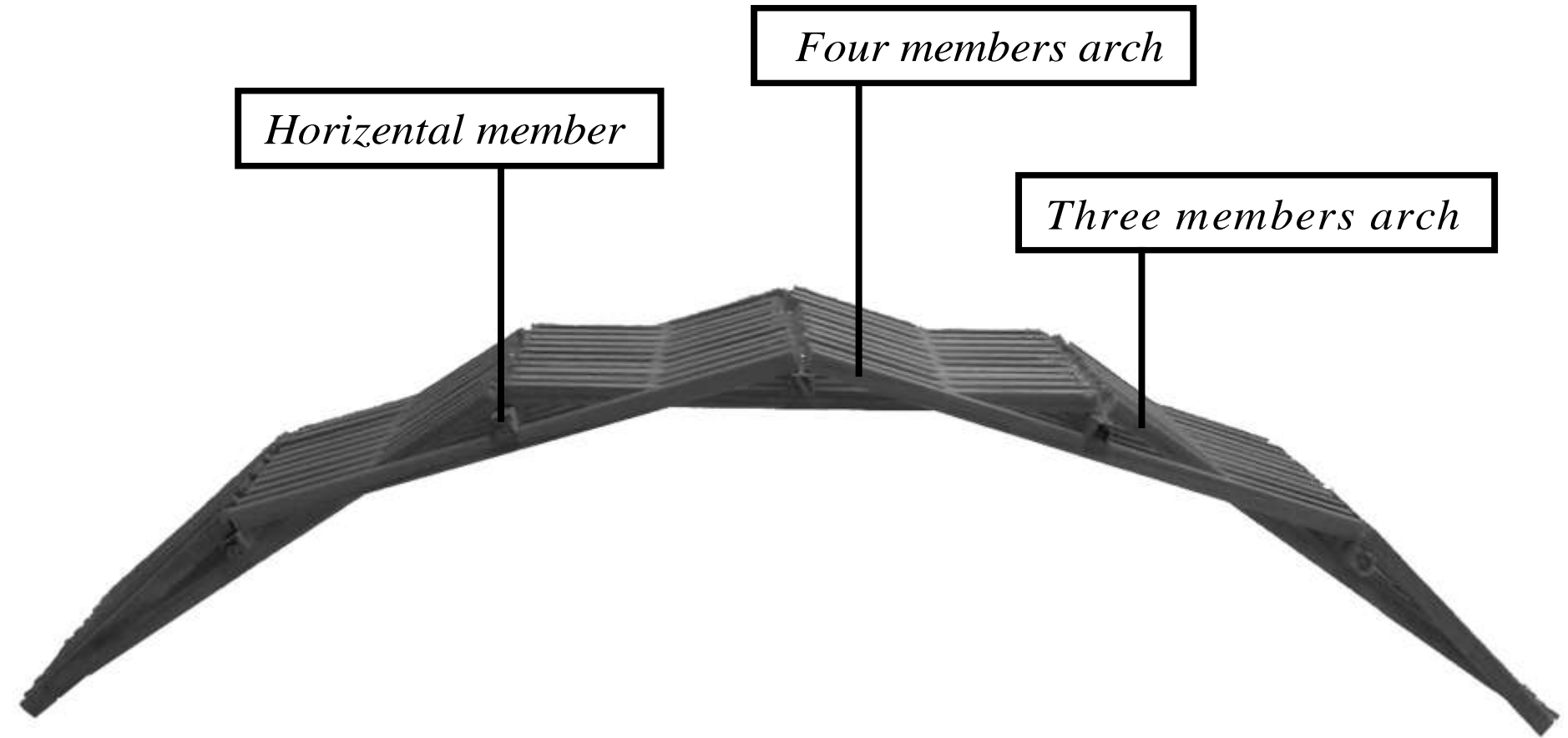


528cm in length , 24.8cm in width
Northern Song Dynasty (A.D. 960-1127)

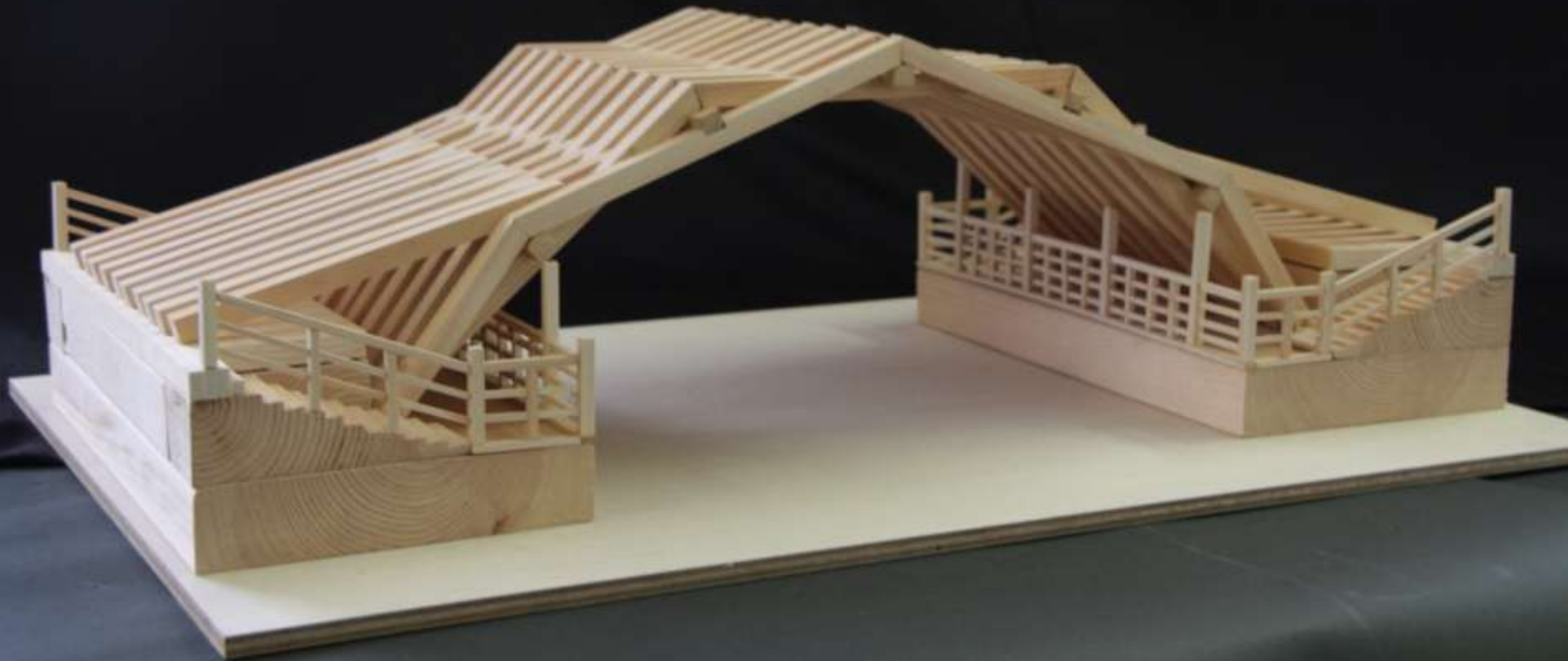


Hongqiao

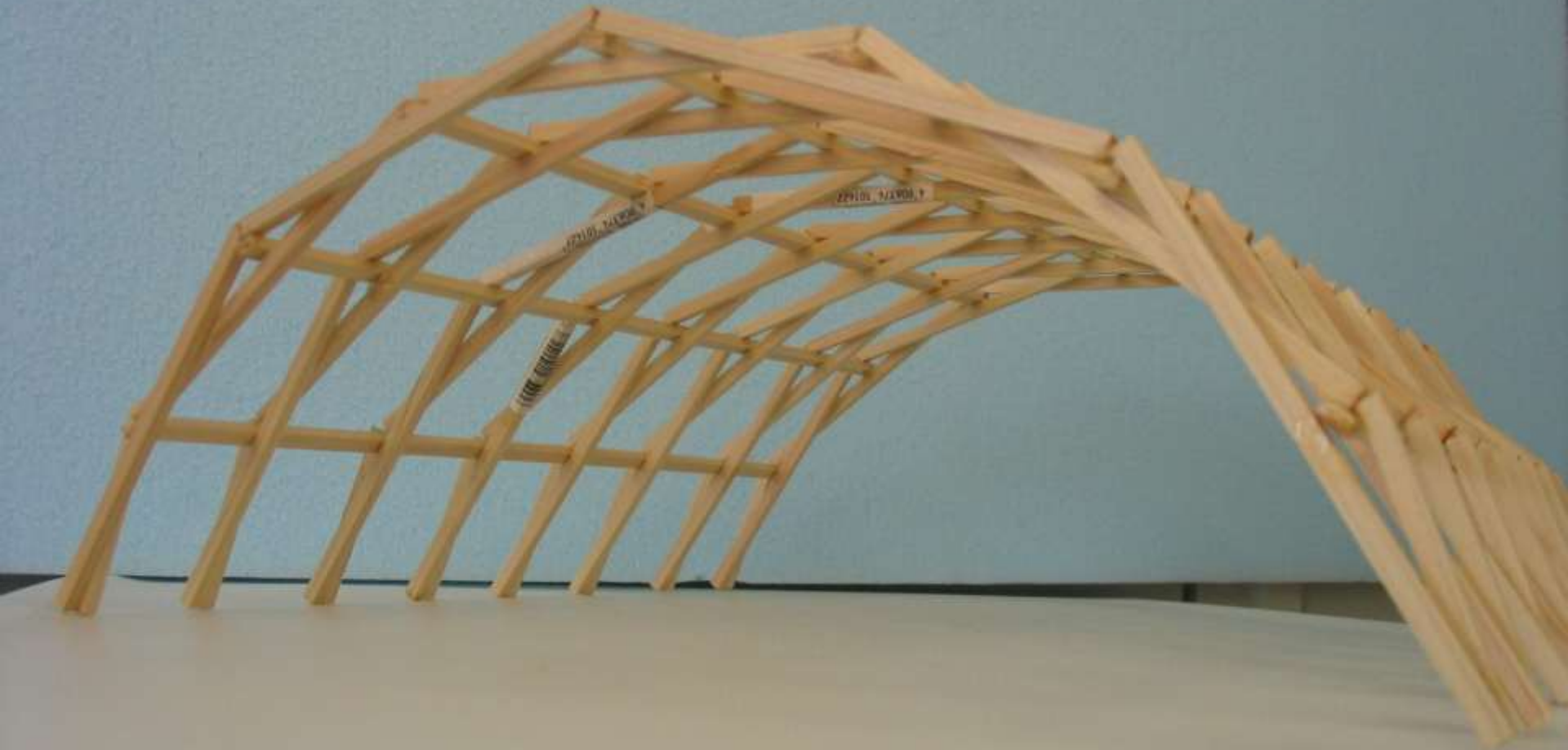
The Study Model



Model of Hongqiqao



Application to Modern Structural Design



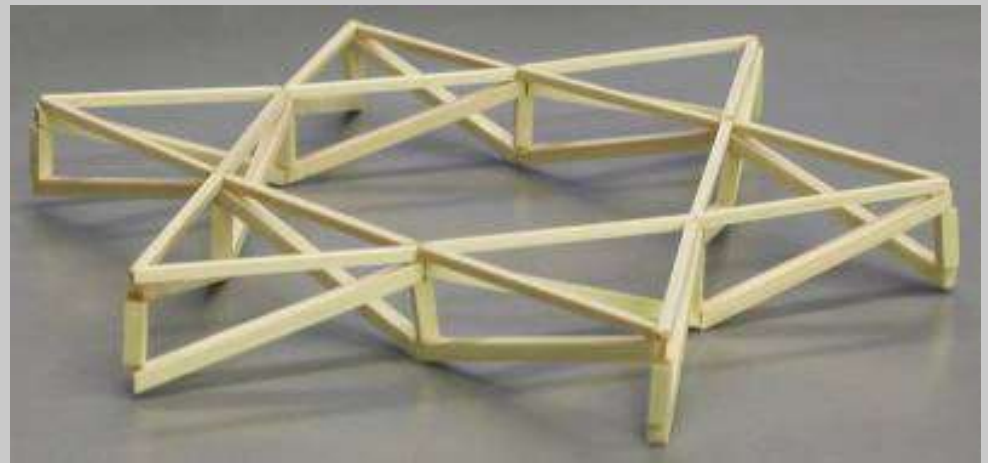
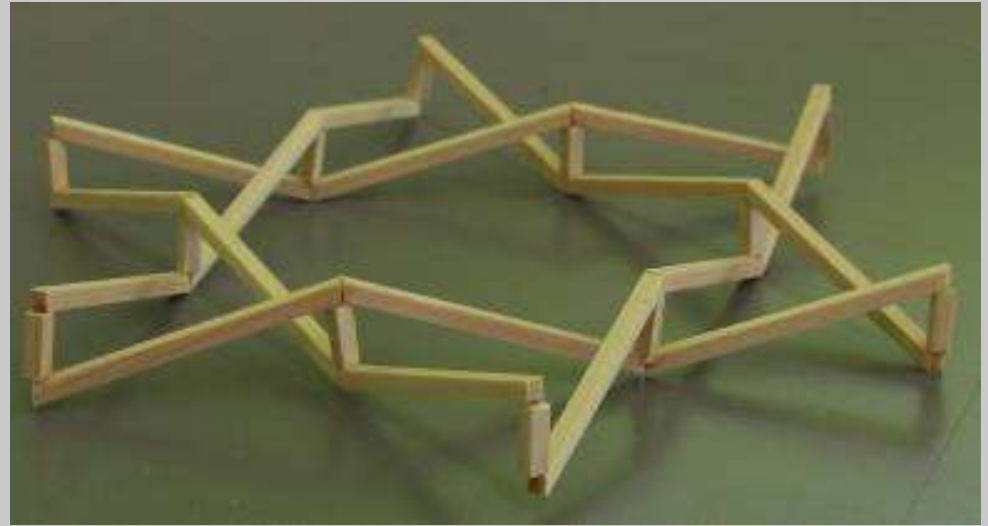
A cylindrical frame with Lap-Beams

Application to Modern Structural Design

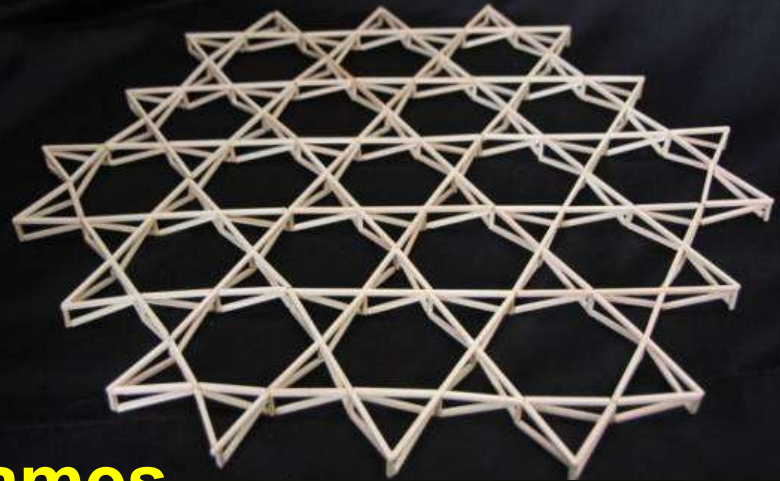
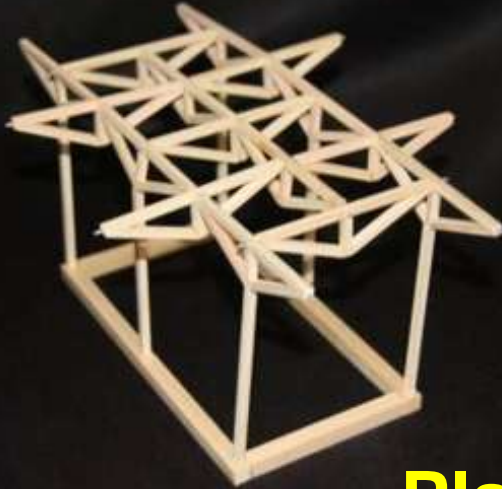


Lap-Beam Dome (Zaru Dome)

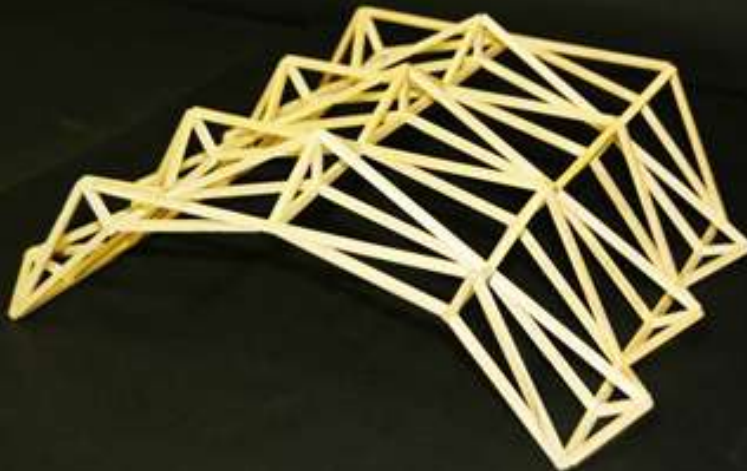
From Basket Meshing to Space Frame



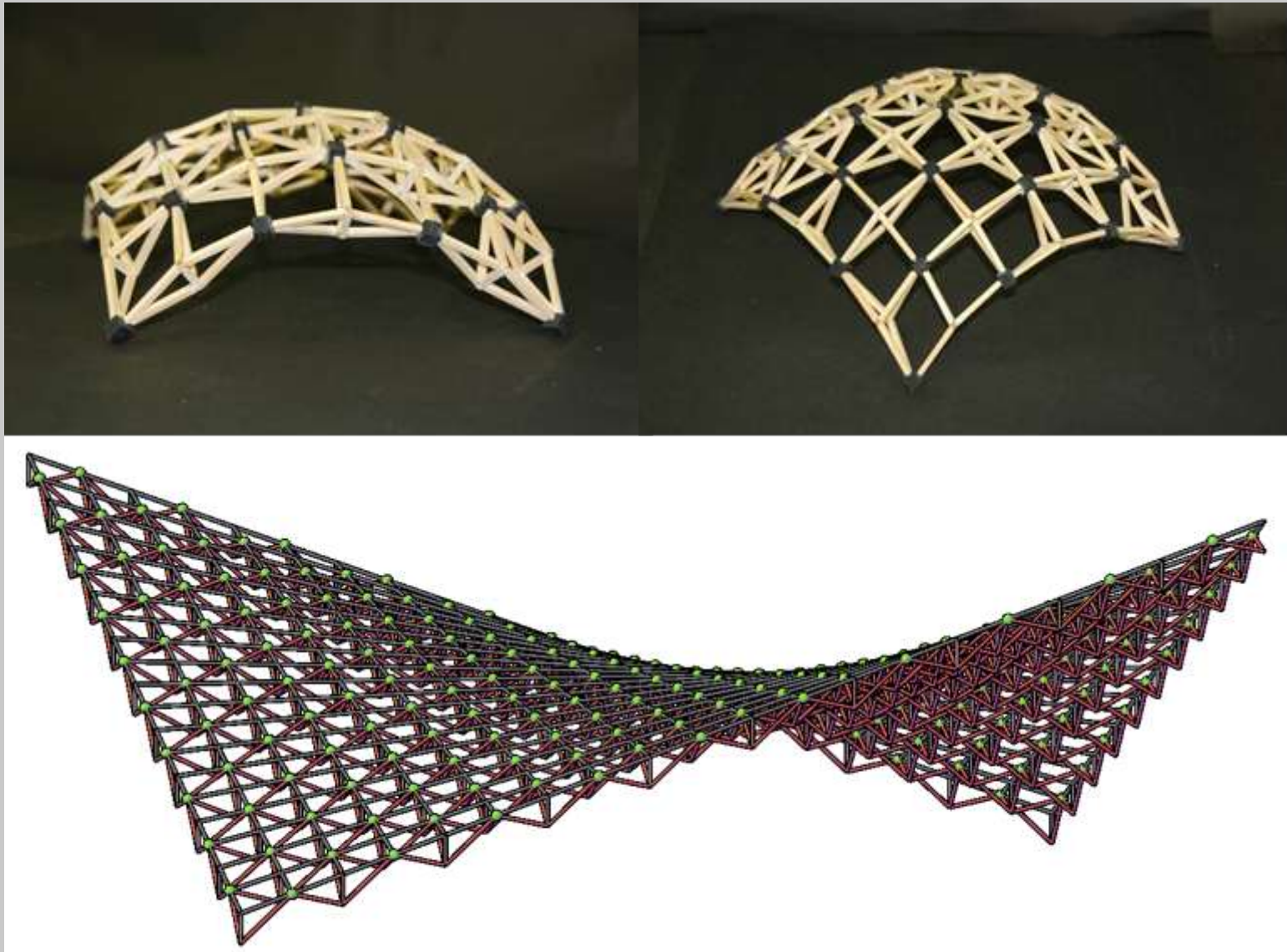
Versatility for Form Design



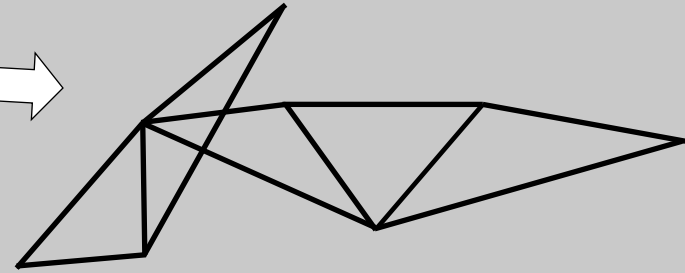
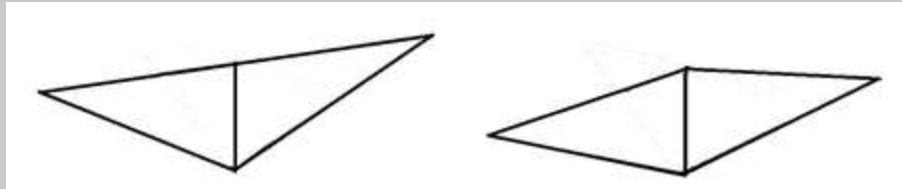
Plane frames



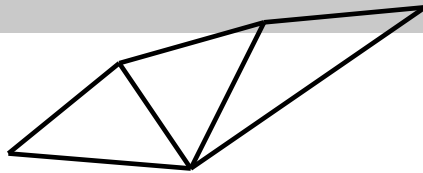
Versatility for Form Design



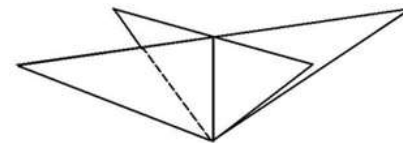
The key parts and basic units



(b) Lap- units

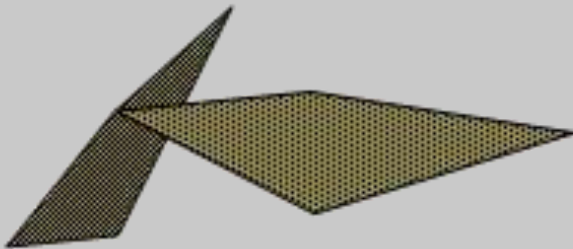
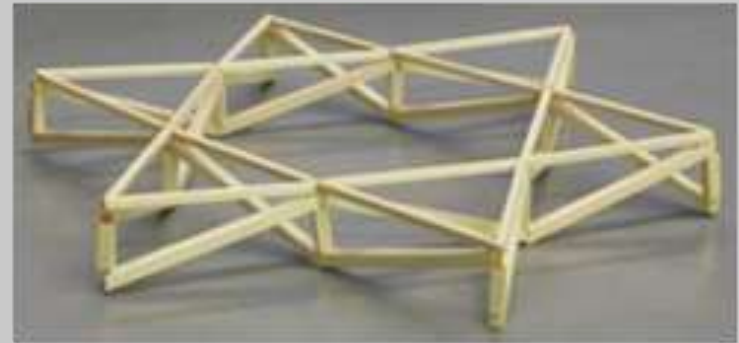
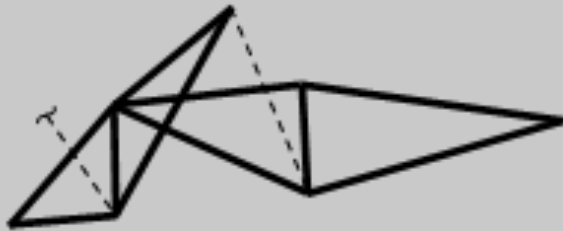


(a) Key parts

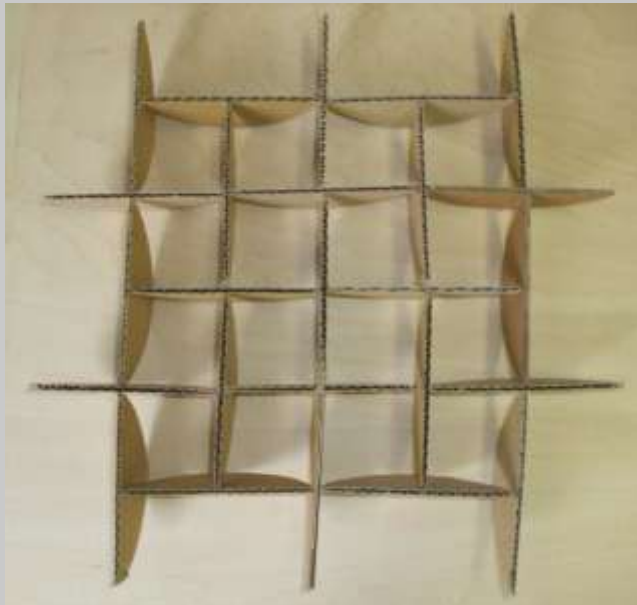
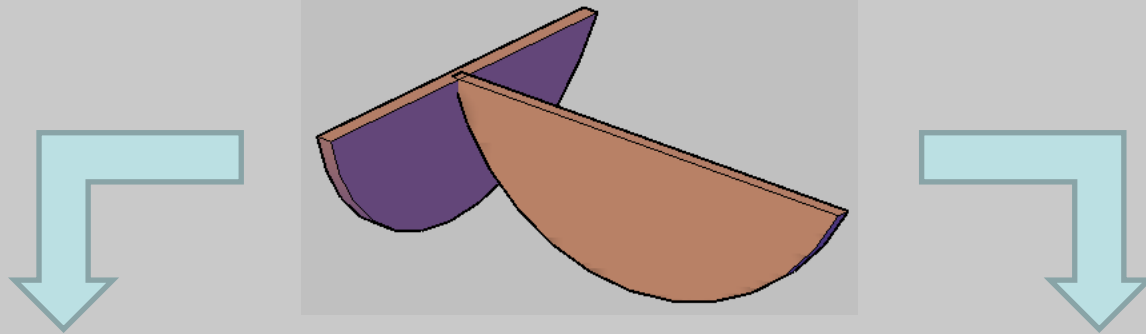


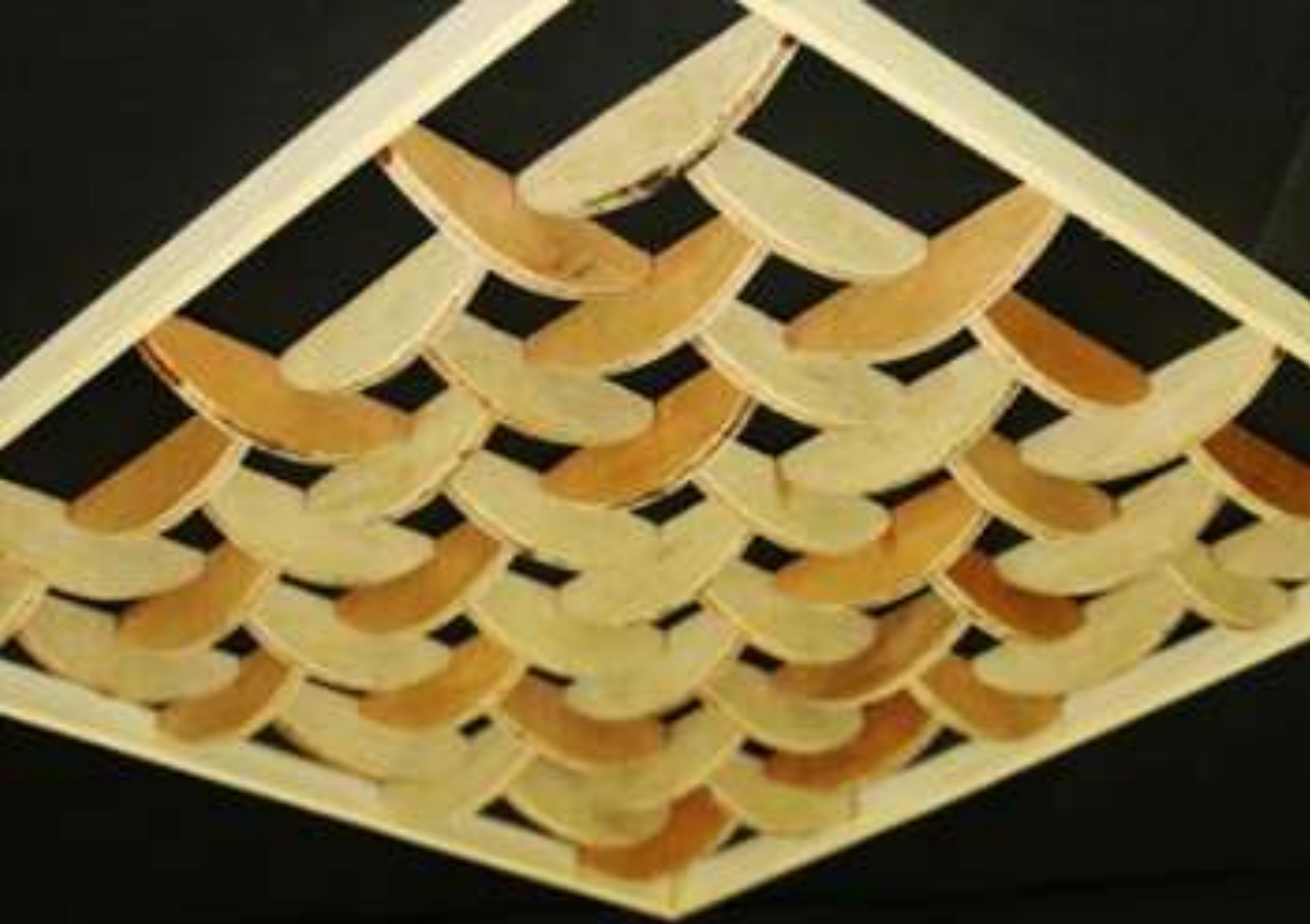
(c) Crossing- units

Inspiring the Reciprocal Panel

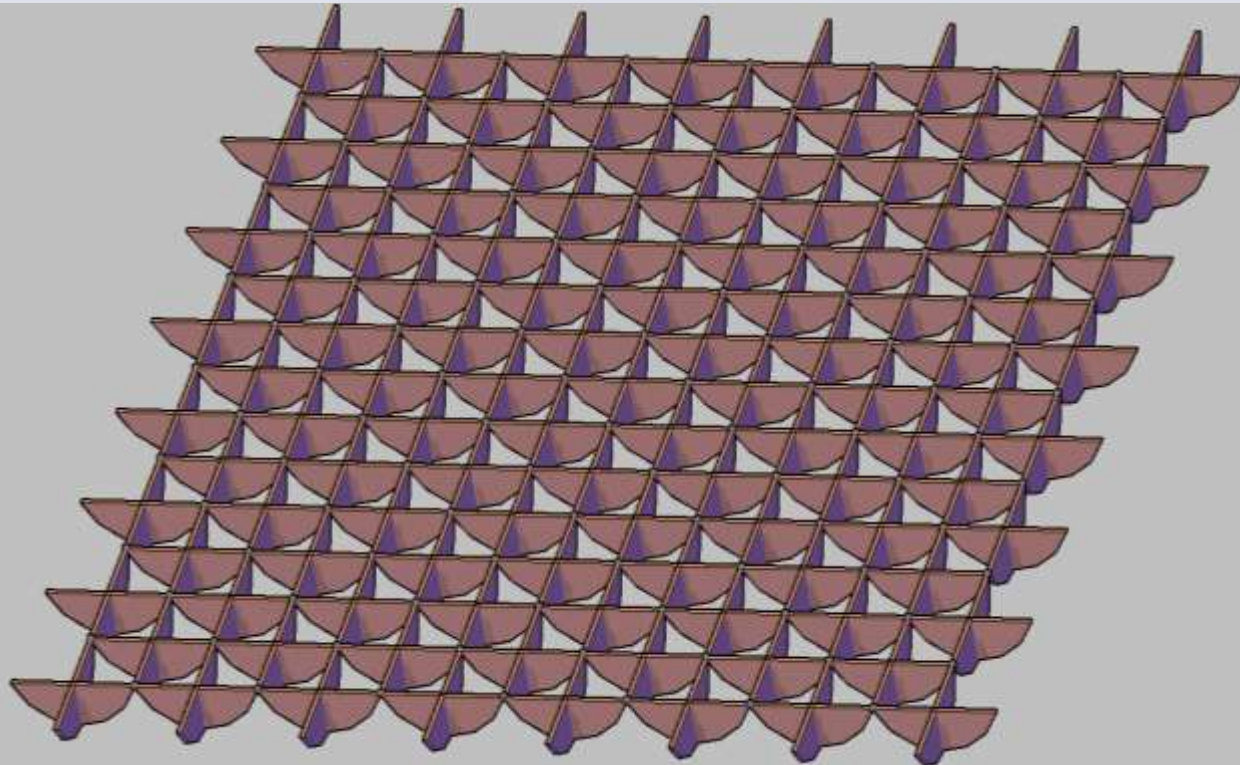
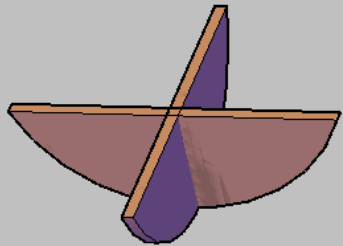
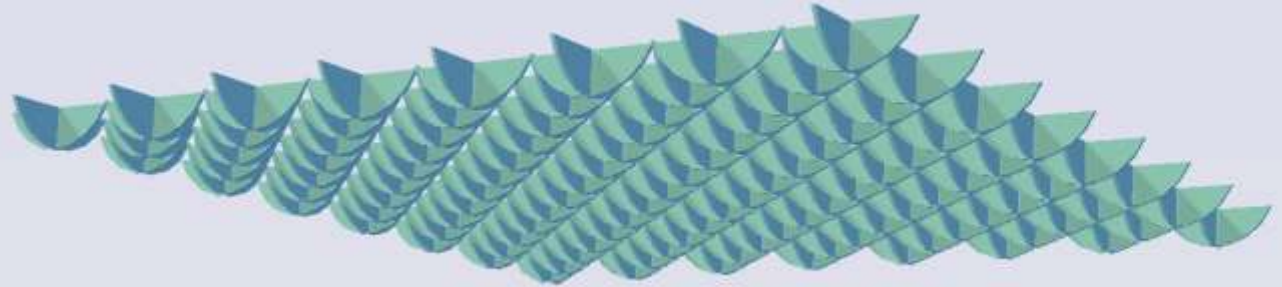


Link Panels

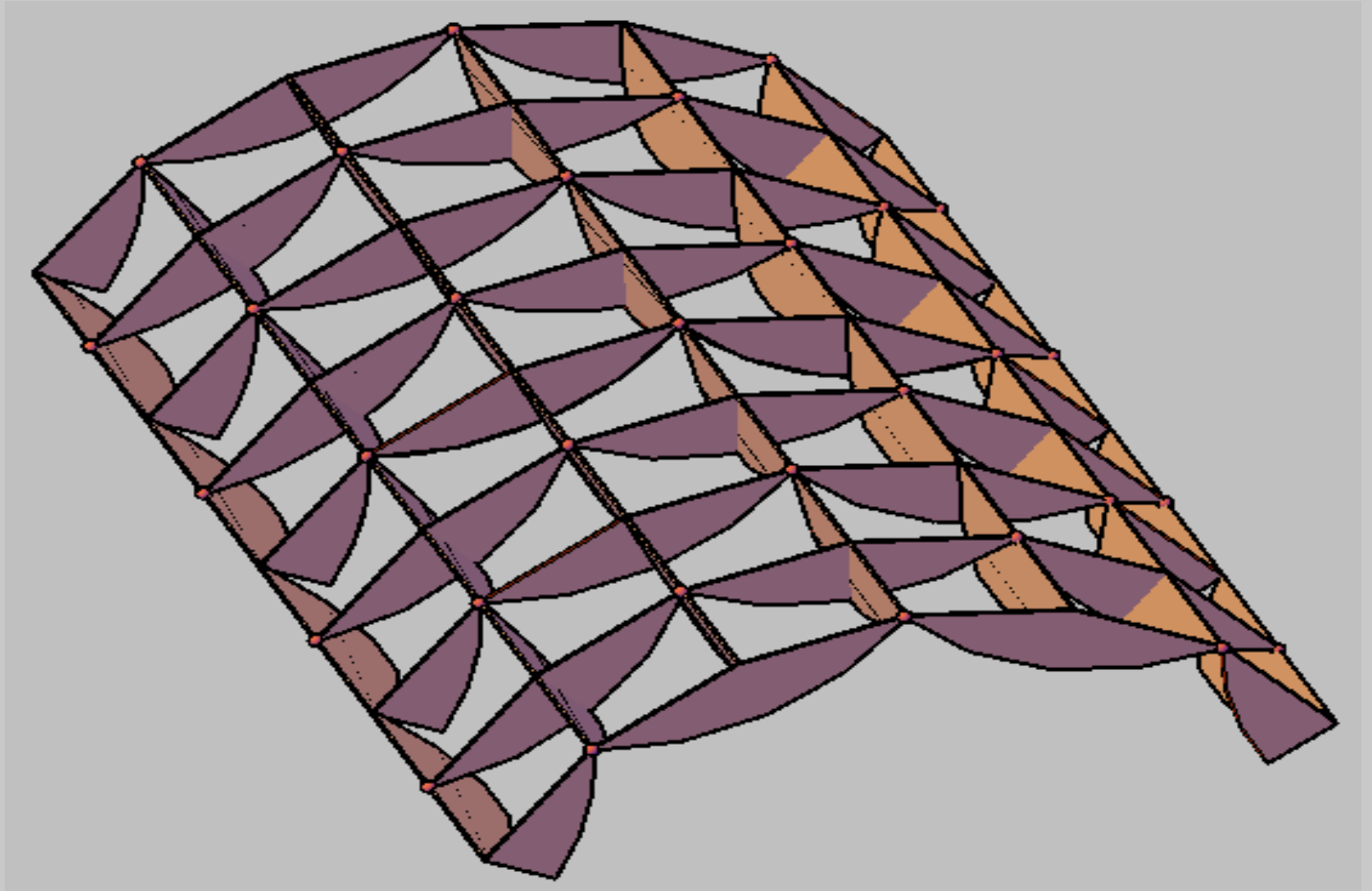
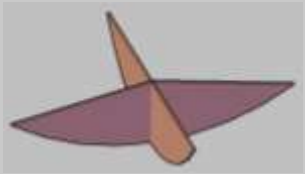




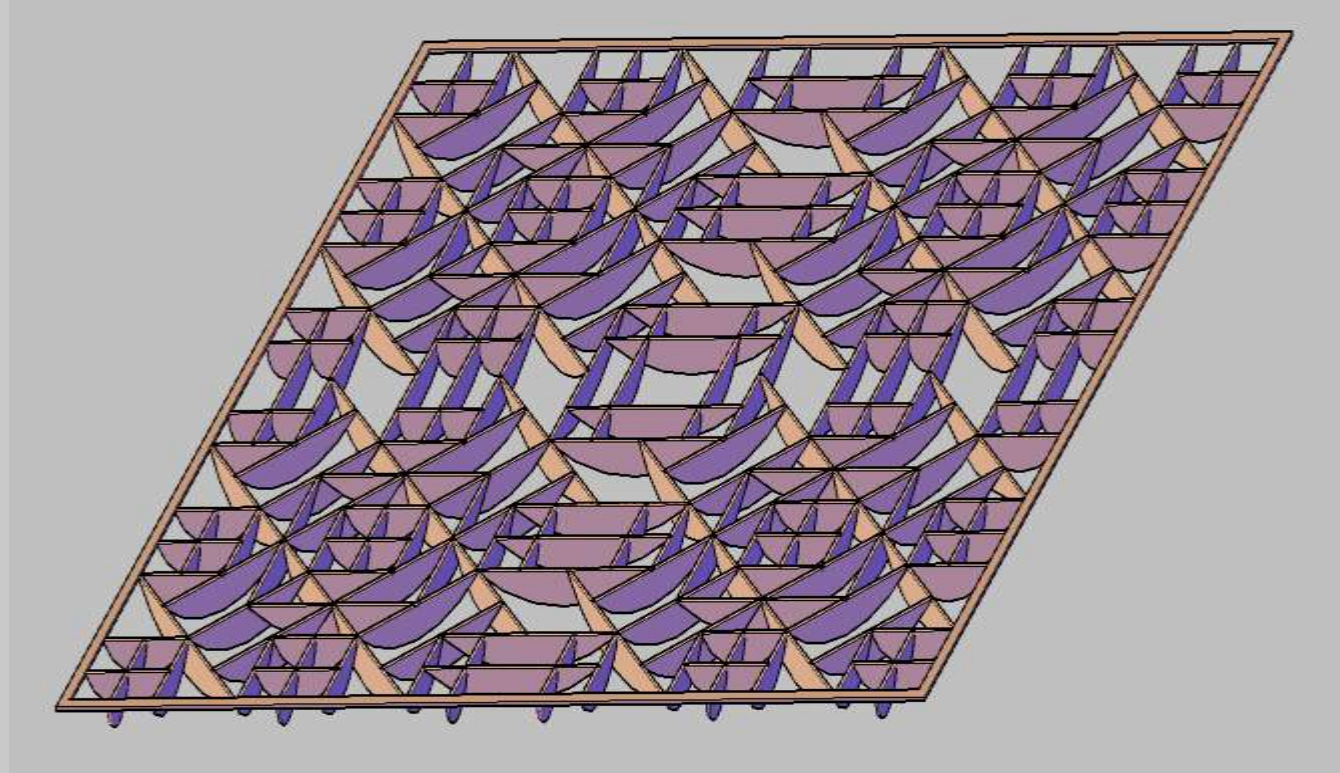
Crossing-Panels

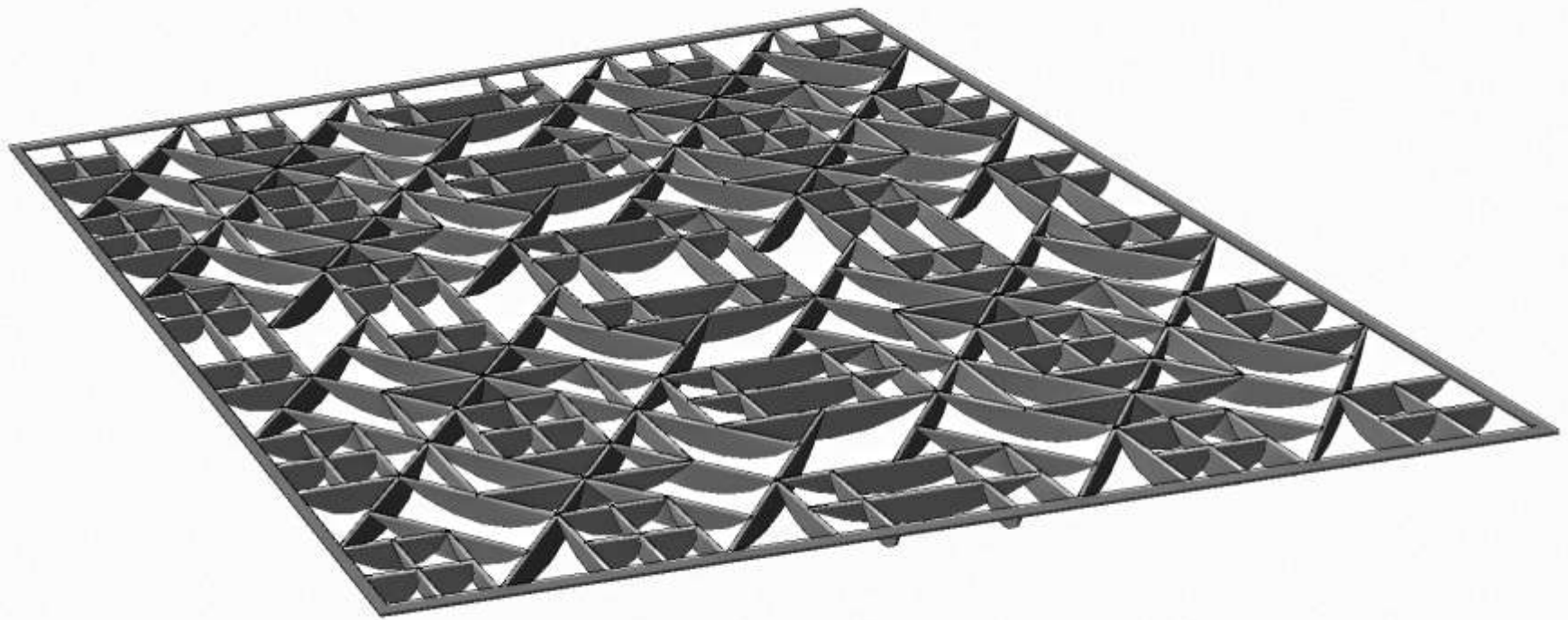


Reciprocal Panel in Cylindrical Form

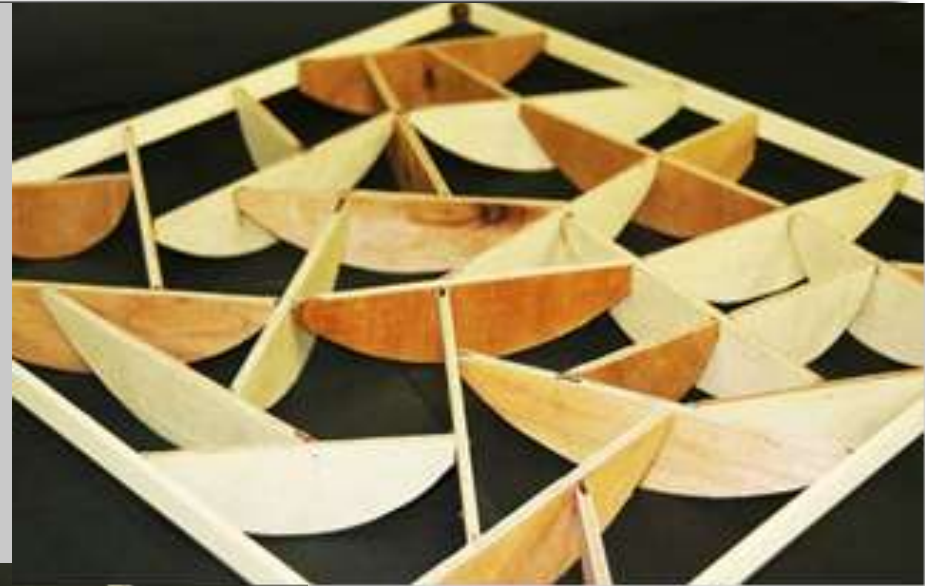


Design from Hirosaki Kokin

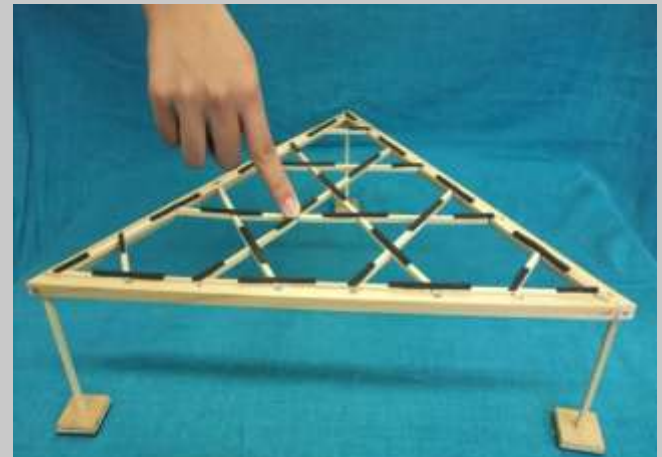
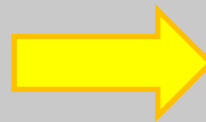
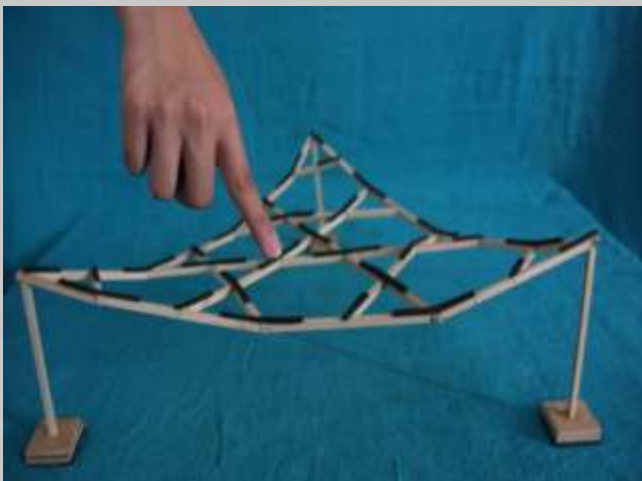
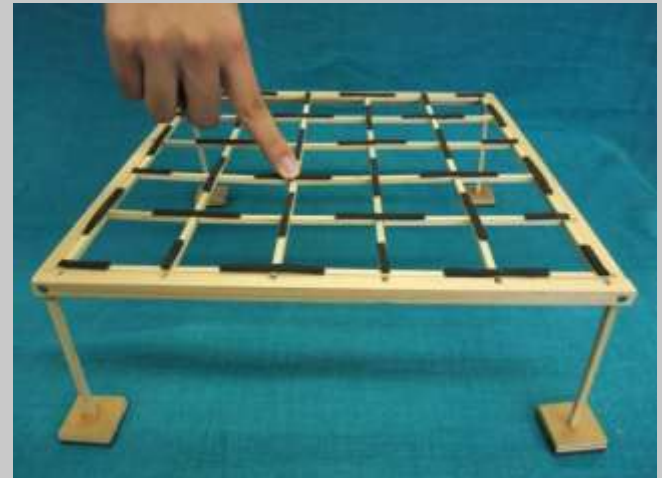
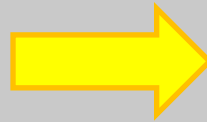
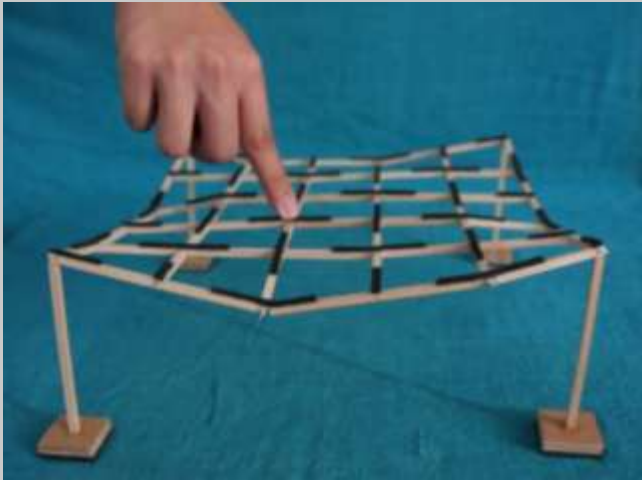




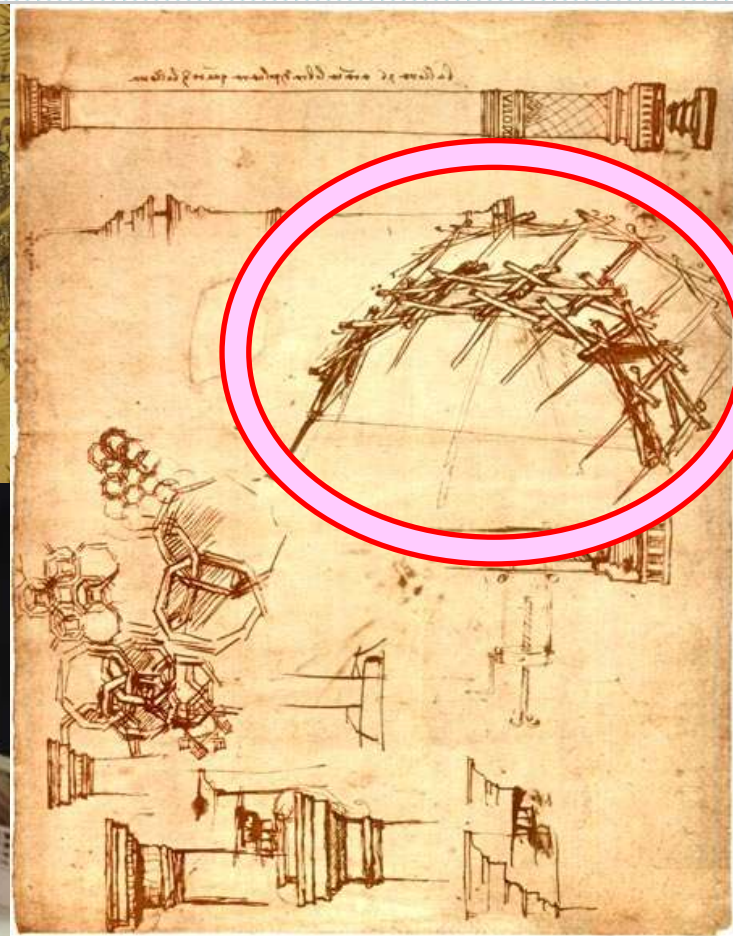
Reciprocal panels emerged from traditional Chinese window grilles



On the stability



Similar Ideas



*Temple bridge proposed by
Leonardo da Vinci: 1478-1518*

Similar Ideas



<http://www.spiro.arch.ethz.ch/de/research/reciprocal-frame/workshop.html>

<http://eat-a-bug.blogspot.com/2011/08/experimental-wood-structures-at-eth.html>







Conclusion

- Structural system of the Reciprocal Panel is inspired from the idea of 1.5-Layer space frame.
- The Reciprocal Panel System has versatility for form design.
- The techniques of interlocking and/or the connections at joints, mechanical characteristics and the ontology of the structural design are remained as subjects for further researches.



Let's S-Art

Thank you !!