

Transdisciplinary prototype development *Cloud 001*- Hybrid form-active construction assembled by bending straight timber and plane aluminium in a self-stressing configuration structurally working as a composite shell.

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ABSTRACT

This paper describes the hybrid form-active construction “Cloud 001” based on the concept to use self-formation processes of active bending wood for the assembling of the six primary trusses as well as for the installation of the four minimal surface membranes of the spherical tetrahedron of the prototype.

After two years of snow-research with the first outdoor laboratory “Cloud for fresh snow” in Obergurgl by the Austrian Start-Up Neuschnee-GmbH (1) a holistically functional prototype is conceptually developed in an interdisciplinary team out of the designer, the structural engineers and the snow-technicians. The structure meets the following requirements: Firstly sculptural aesthetics in the landscape with an ecological footprint. Secondly integrated insulation to slightly cool down the inner volume by using flexible photovoltaic-foil on the surface and thirdly to be produced and assembled easily and cost-efficiently. The solution is found in using the benefit of self-formation processes of active bending wood. The software K2-Engineering (2) is further developed and used to optimize the form, the grid-system and the dimensions of the structure. A bendable insulation material of the thickness - adapted to the statically requirements - is glued to the bent aluminium sheets producing a self-formed anticlastic composite shell. Summarizing the façade-membranes out of pre-stressed bent stripes and on-site bent panels work structurally in the final configuration as composite-shells in order to fulfil the different load cases of the product in praxis (3).

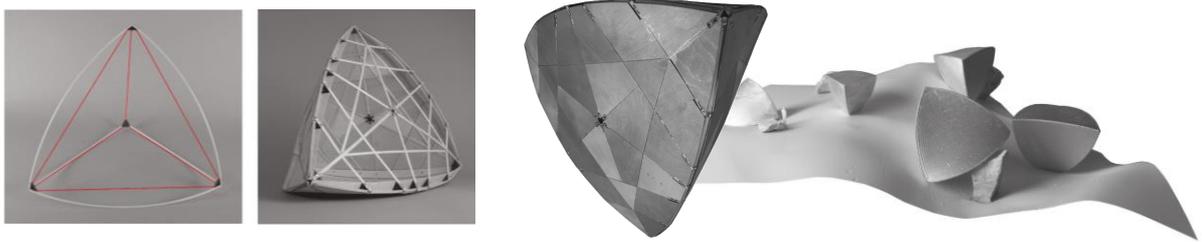


Fig.01: Models of the *Cloud 001* from the assembling to the application (Klasz, Seyrling)

REFERENCES

- [1] Klasz W., Greiner S.: Active Bending to facilitate the installation process of membranes in statically self-locking spatial structures; Structural Membranes, Barcelona, Oct. 2015; In 2016 this snow-technique was awarded as the most relevant Austrian patent of the year.
- [2] Cecilie Brandt-Olsen develops the software K2E in close collaboration with Daniel Piker and Anders Holden Deleuran. The structural concept for this prototype-development is done in close collaboration with Stephen Melville.