



ACADIA 2012

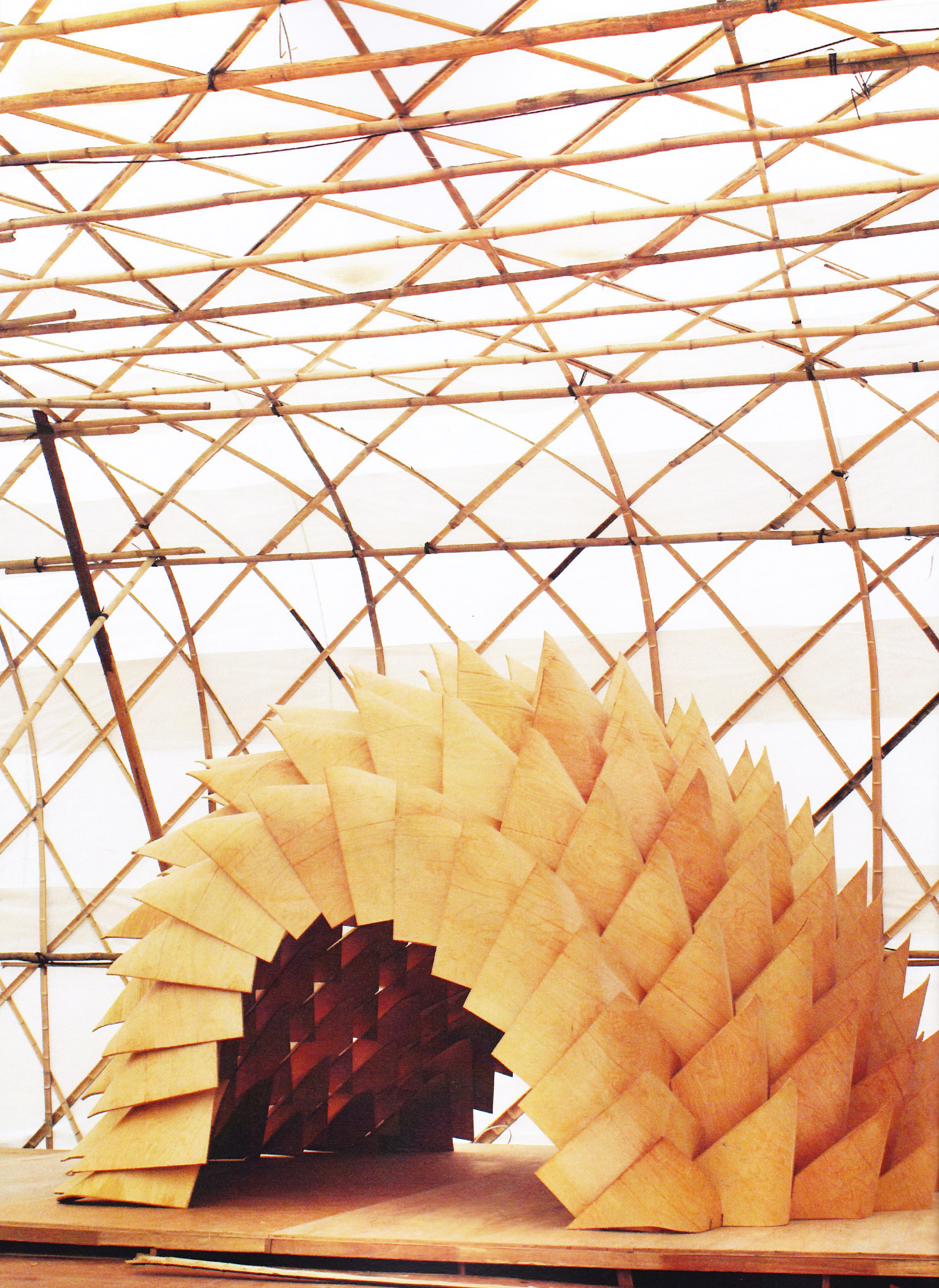
SYNTHETIC DIGITAL ECOLOGIES

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DRAGON SKIN PAVILION

The Dragon Skin Pavilion is an architectural art installation that challenges and explores the spatial, tactile, and material possibilities that architecture is offered today by revolutions in digital fabrication and manufacturing technology. The pavilion, built in winter 2012, is a study in how architects can reassert control over parts of the construction process that were previously surrendered to manufacturers and contractors, and how this enables architects to materialize discoveries from the digital into the built environment.

The pavilion is a non-ruled, double-curved, freeform structure that uses gravity as a driver for its shape and combines its geometric considerations with mechanical aspects of its fabrication and assembly. The structure starts from an equilibrium surface derived from two catenary lines that form the intersection with the ground plane. Within the constrained working space of this surface, wooden shells are distributed. Their location and orientation is iteratively fine-tuned to allow for a rigid interlocking with a simple sliding joint. The shells are made from a new, environmentally friendly "post-formable" plywood, which incorporates layers of adhesive film to allow easy single-curved bending without the need for steam or extreme heat. The dimensions of the shells are selected to avoid material loss: a CNC mill divides 21' 8" x 4' plywood sheets into eight identical square panels and accurately cuts the unique connection slots that are programmed into the pavilion's geometry. Using a single mold, all panels are bent into the same single-

Kristof Crolla

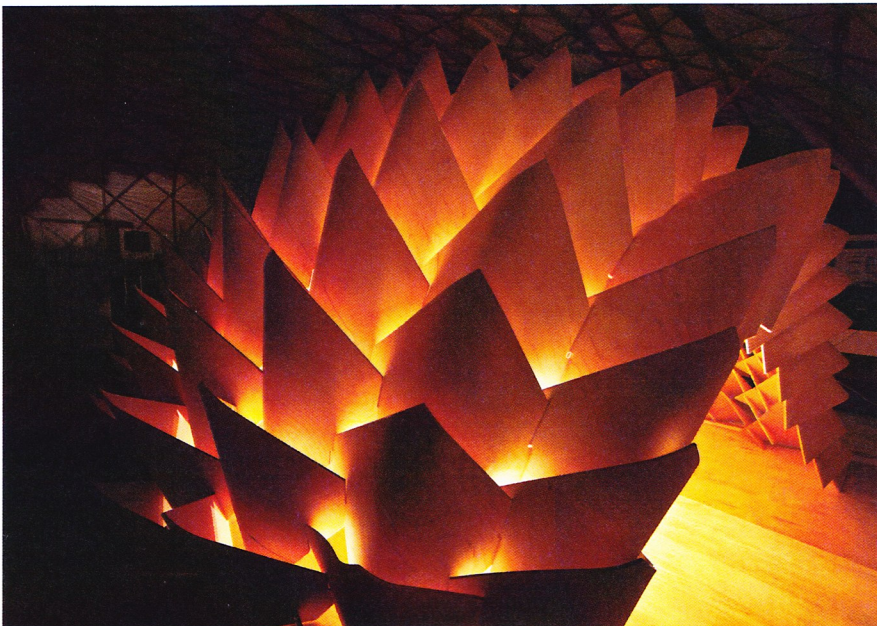
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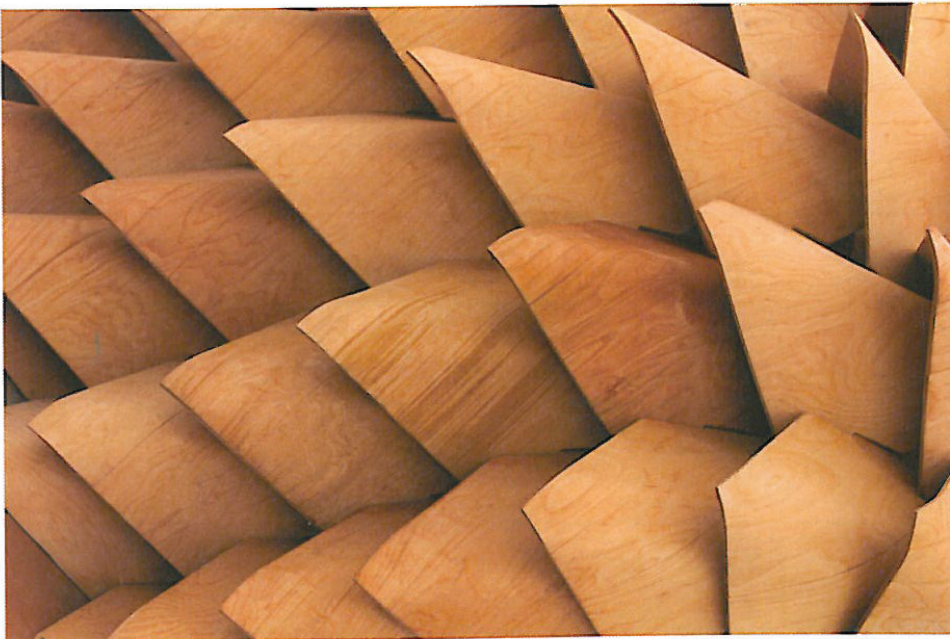
EDGE Laboratory for Architectural
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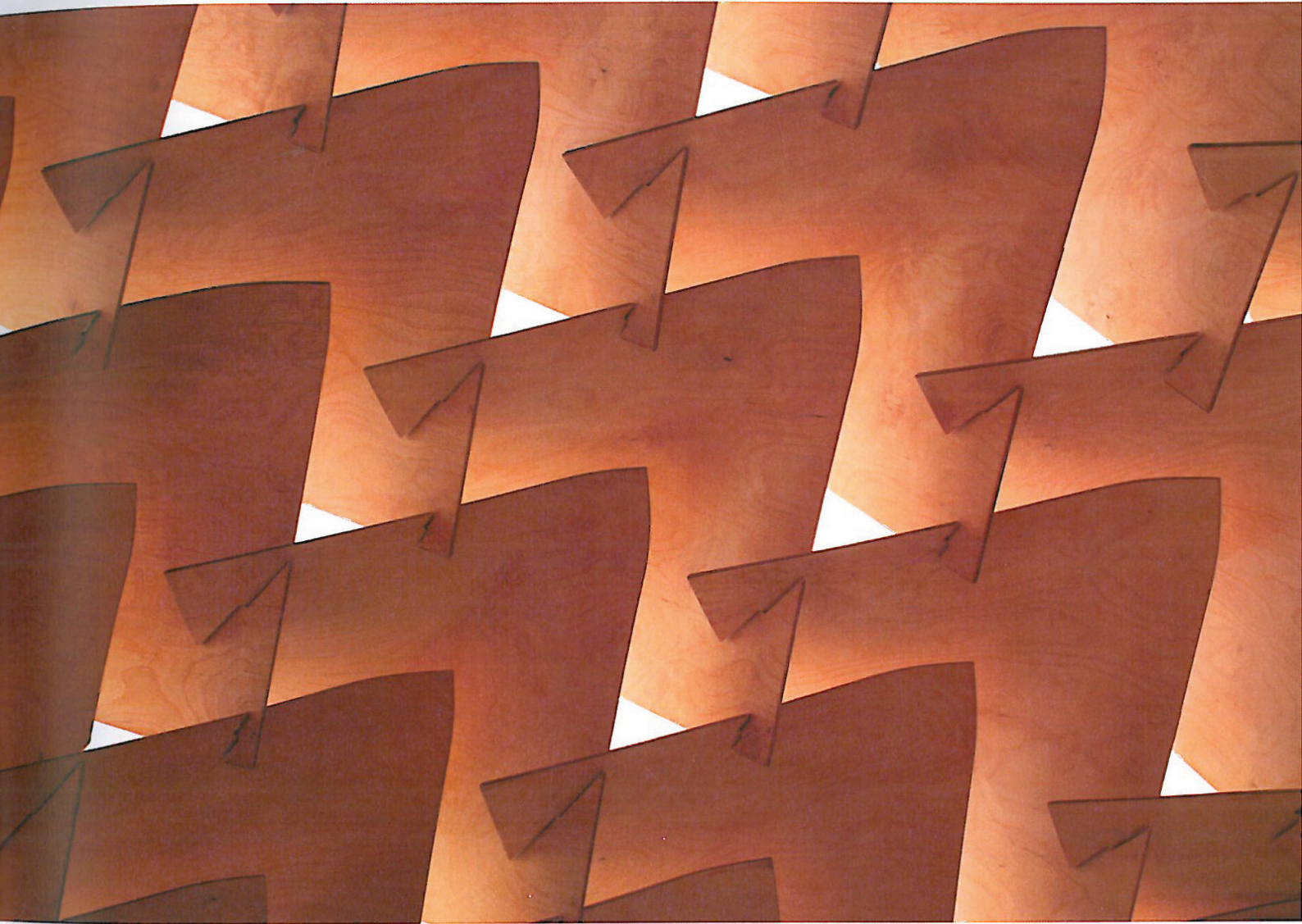


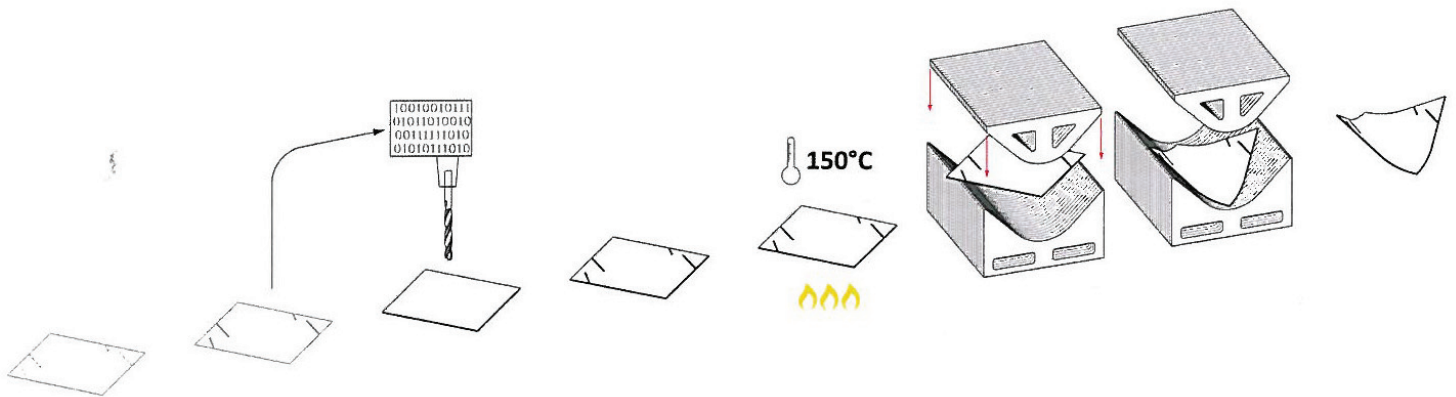
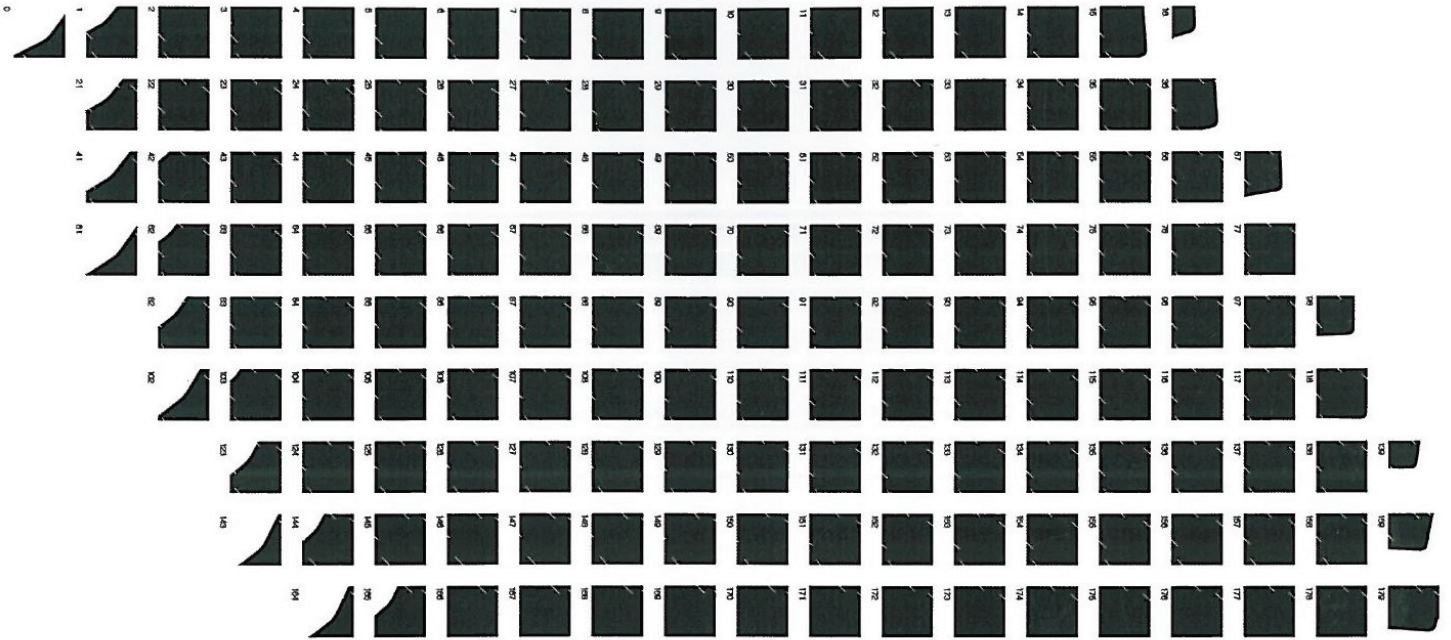
curved shape. Within six hours, these numbered shells are assembled by slotting them into place without using any plan drawings, glue, or screws. The underlying equilibrium surface geometry removes all internal forces and deformations from the pavilion, which becomes a self-supporting, freestanding, lightweight skin.

By radically disintegrating the enclosing shell, the feature one counts on for structural stability dissolves, making the whole feel pleasantly risky. The simplicity of the components and the familiarity of the single material contradict the scale and visual complexity of the project, which lacks any additional support. The resulting exhilarating confusion is complemented with caution evoked by the aggressive, animal-like exterior skin, which is full of spikes—a design feature that followed gratis from the fabrication concept. Upon entering the space one feels a thrill from the discomfort of needing to solve the structural puzzle before feeling safe enough to absorb the twisting perspectives and the light bouncing off the rich, natural textures.

By actively working with plywood's high structural performance, and by connecting geometry with mechanics into a single integrated system, the unlimited design freedom we experience digitally can be grounded and materialized in a sustainable way. By combining fully controllable, scripted environments, engineering-driven geometries, and real-time performance evaluation tools with developments in digital fabrication, the door is opened for architects to incorporate the efficiencies, low cost, and sustainability of conventional mass production into their formally liberated digital world. In addition, the inherent aesthetic values and effects of informed computational processes open the door to a challenging new architectural design language.









**KRISTOF CROLLA, SEBASTIEN DELAGRANGE,
EMMI KESKISARJA, PEKKA TYNKKYNYN**

The Dragon Skin Pavilion was built for the 2011-12 Hong Kong & Shenzhen Bi-City Biennale of Urbanism/Architecture and is the product of collaboration between the Laboratory for Explorative Architecture & Design Ltd. (LEAD) and EDGE Laboratory for Architectural and Urban Research (Tampere University of Technology, Finland). It was designed by Kristof Crolla (LEAD), Sebastien Delagrane (LEAD), Emmi Keskisarja (EDGE), and Pekka Tynkkynen (EDGE) and builds upon expertise from a first prototype constructed during workshop "Material Design & Digital Fabrication" at the Tampere University of Technology. LEAD is a Hong Kong - Antwerp based architectural design and research practice that explores the potential of contemporary design techniques and fabrication technology within architecture (www.l-e-a-d.pro). Emmi Keskisarja and Pekka Tynkkynen (www.pekkatynkkynen.com) are independent architects working through EDGE, the laboratory for urban and architectural research of Tampere University of Technology School of Architecture. (www.tut.fi)

