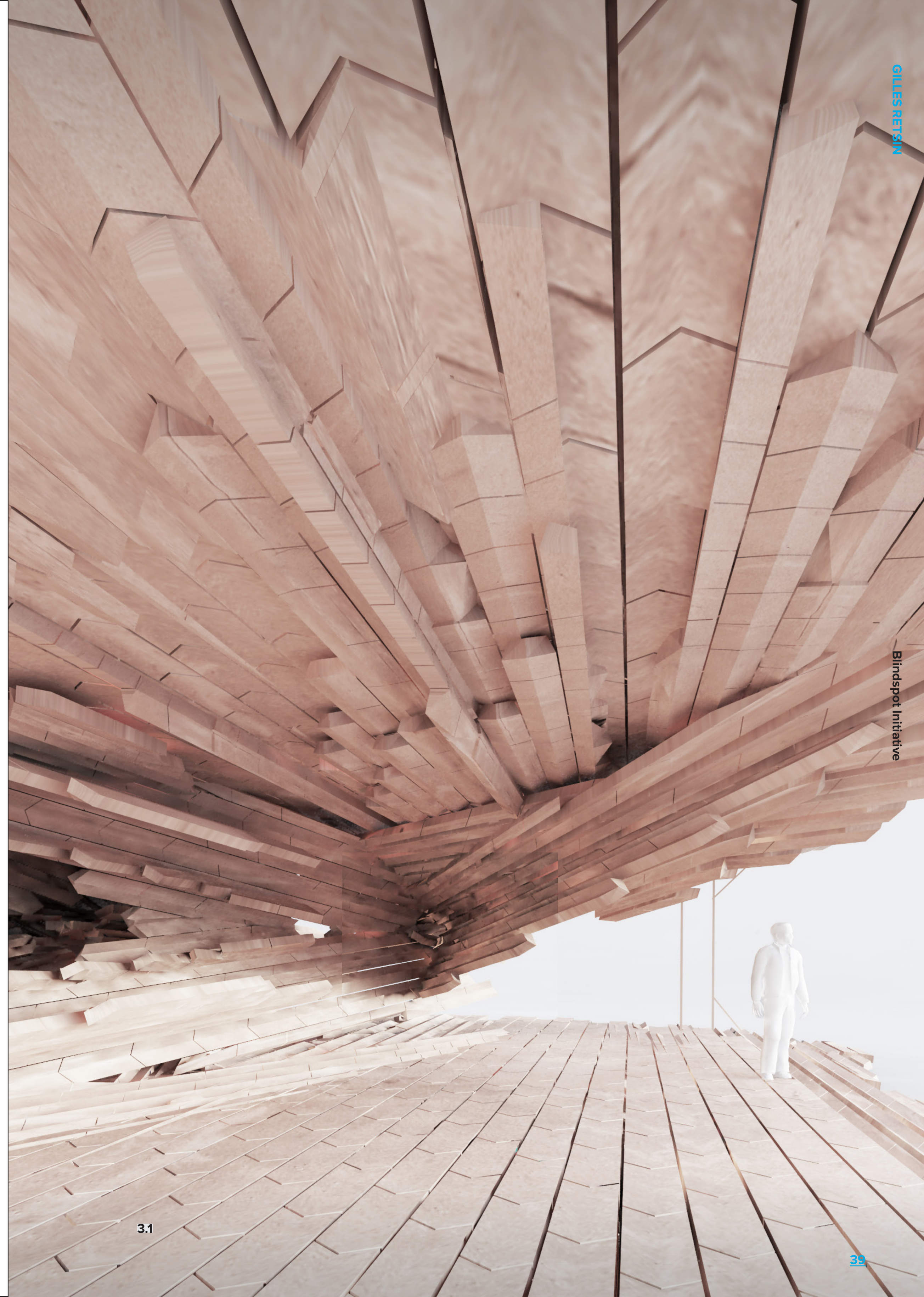
GILLES RETSIN

Gilles Retsin is the founder of Gilles Retsin Architecture, a young awardwinning London based architecture and design practice investigating new architectural models which engage with the potential of increased computational power and fabrication to generate buildings and objects with a previously unseen structure, detail and materiality. The studio is interested in the impact of computation and new fabrication methods on the core principles of architecture – the bones rather than the skin. The practice has developed numerous provocative proposals for international competitions, qualifying most recently as one of the finalists for the international competition for the New National Gallery in Budapest. His work has been acquired by the Centre Pompidou in Paris, and has been exhibited internationally in museums such as the Museum of Art and Design in New York.
Gilles graduated from the Architectural Association in London. Prior to founding his own practice, he worked in Switzerland as a project architect with Christian Kerez, and in London with Kokkugia. He also co founded SoftKill Design, a collective design studio investigating generative design methodologies for additive manufacturing and 3Dprinting, credited with the first design for a 3D printed house. Alongside his practice, Gilles directs a research cluster at UCL/ the Bartlett school of Architecture investigating robotic manufacturing and largescale 3D printing.



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BLOKHUT

Blokhut: Dutch for Log Cabin. A hut built of whole or split logs.[1]

What does it actually mean for buildings or material organisations to be discrete and digital? Can material be organised in the same way as data? Analog fabrication is based on continuously aggregating material with an infinite connection scheme. Whereas digital or discrete fabrication is based on assembling parts, which the geometry provides metrics and constraints, limiting the connection scheme to a precise digit: yes or no.[2] 3D printing, just as CNC milling, is fundamentally a continuous fabrication process, which may leave us with an interesting form at the end, but fundamentally produces objects which are completely analog. A 3D printed vase, which may have been generated with a complex algorithm, is still going to be analogue once printed. The organization of material is in all cases the same: it is a continuous extrusion of material, sintered or stuck together with a binder, and it has no relation to the underlying computational process. As a continuous method, 3D Printing fundamentally suffers from scalability, structural problems such as cantilevers, and more importantly, it has a big problem with multi-materiality.[3] For example, a process which can print at the same time glass and concrete, is hard to imagine, as both materials require different printing techniques. This means that even if a building would be printed out of concrete, one would still have to rely to ideas of assemblage to incorporate insulation, transparency, finishes etc. On the other hand, it is easy to imagine a prefabricated brick consisting of multiple layers of materials, such as a structural layer, a layer of insulation, waterproofing, finishing and so on.

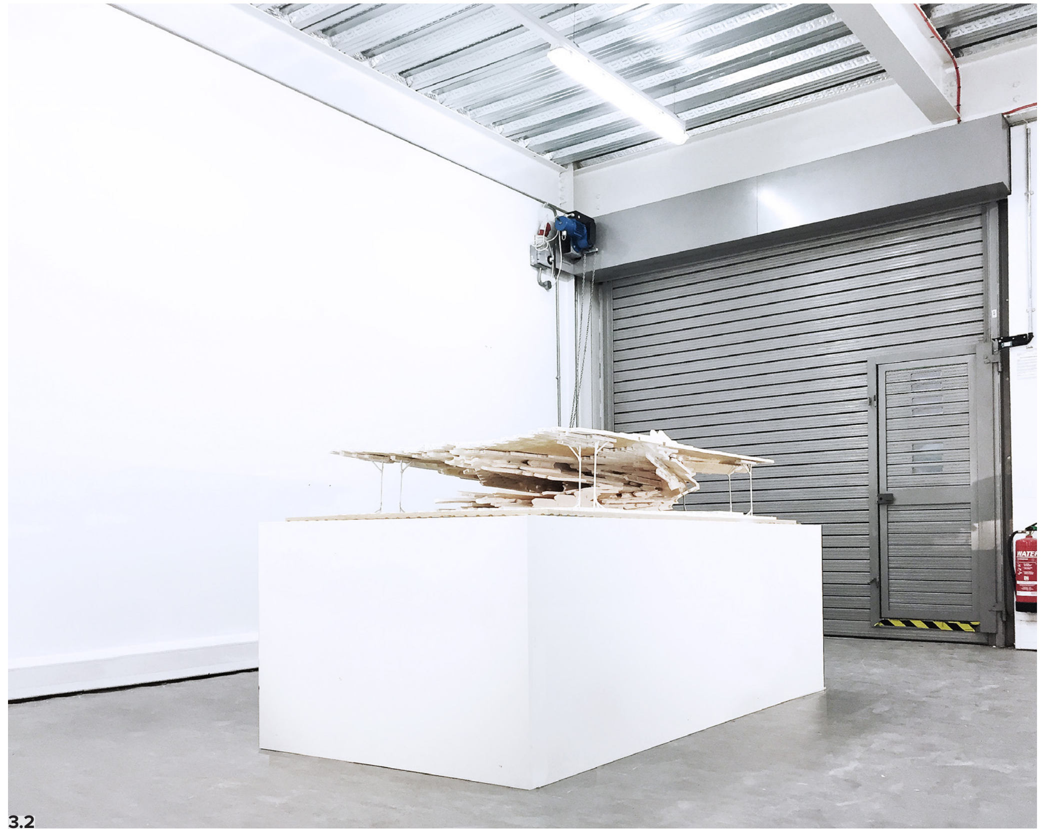
An assembly based process has the potential to differentiate the materiality of parts and particles, introducing transparency, electrical conductivity, channels for air or water flow, all on different recursive scales. With discrete fabrication, the part computed digitally is also the part assembled physically. The organization of physical parts is the same as the organization of the digital data.

The “Blokhut” (2014) was developed as a case study of aligning discrete computation and discrete fabrication. Initially a study for a villa in a Belgian suburb, the design became an independent research project prototypical for a new approach towards computational design. The prototype started out with a given: due to a limited budget, a large part of the structure would have to be standardised and made out of cheap elements. The large model of 2x1.5x0.3m, weights over 150 kg and is built using 4000+ pre-cast plaster components, intersecting and joining around a limited number of customized, 3D printed zones. The plaster component is designed as an arrow-shaped brick, with a male and female connection. The arrow-like connection is able to interlock two bricks together in a fixed position. This discrete arrow-shaped building element can be understood as a digital material. *The design possibility, or the way how elements can combine and aggregate is defined by the geometry of the element itself - which leads to a “tool-less” assembly.* (Cheung 2012) The Blokhut prototype establishes a differentiated and adaptive architectural system which consists for 90% of serially repeated, discrete, prefabricated concrete elements, and for 10% of unique,

[1] Oxford Dictionaries [online][accessed 22.10.2015] Available from: http://www.oxforddictionaries.com/definition/english/log-cabin

[2] Kenneth Cheung, Neil Gerschenfeld T*he geometry of the parts being assembled provides the dimensional constraints required to precisely achieve complex forms. (Cheung)*

[3] The Objet printer gradually differentiates stiffness and color within one material.



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customized 3D-printed pieces. The argument shifts from a system where everything is mass customized, with a labor intensive assembly process, to a limited number of super intensive, rule-changing customized zones or glitches and a large number of serially repeated, cheap material. The finished state of the model is undetermined. It can be extended or contracted at any time. The final geometry is messy, redundant and un-simplified. The Blokhut prototype can be constructed without the need for micro-managing thousands of unique, numbered pieces. Instead, the 3D printed components and bricks set out the instructions for assembly. The assembly is “plan-less” and “tool-less”, as the geometry of the pieces defines the aggregation. The Blokhut prototype proves that serial repetition of very simple, cheap, prefabricated digital materials is a feasible and accessible method to achieve detailed and adaptable spaces. After the initial prototype for the Blokhut, several more test cases were developed. In a speculative proposal for a building at the Karlsplatz in Vienna, the bricks construct a series of horizontal strata which develop into large, column-like elements. Another abstract atrium-like model was developed which shows how an entirely different spatial structure can be achieved with the same method.

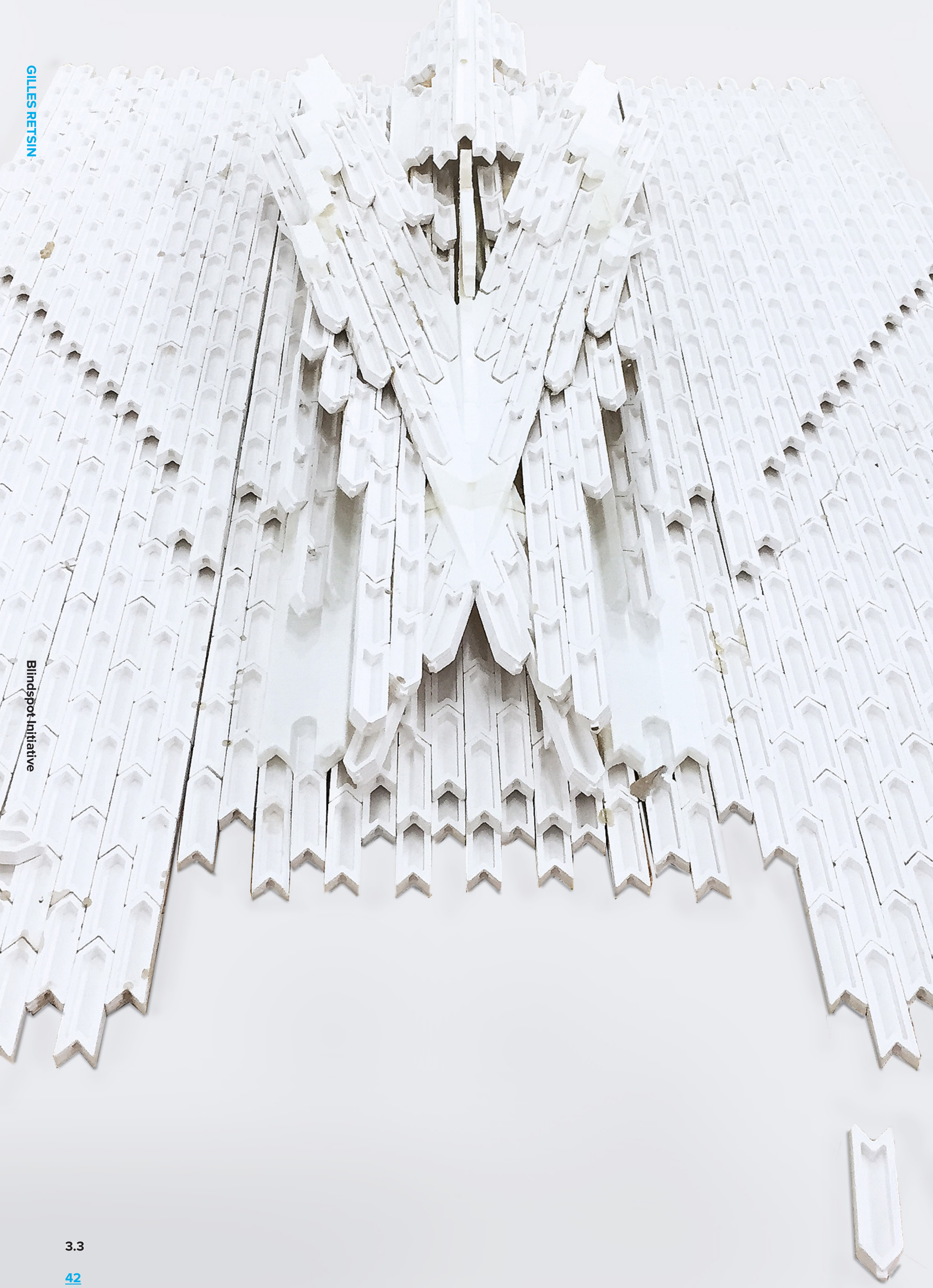

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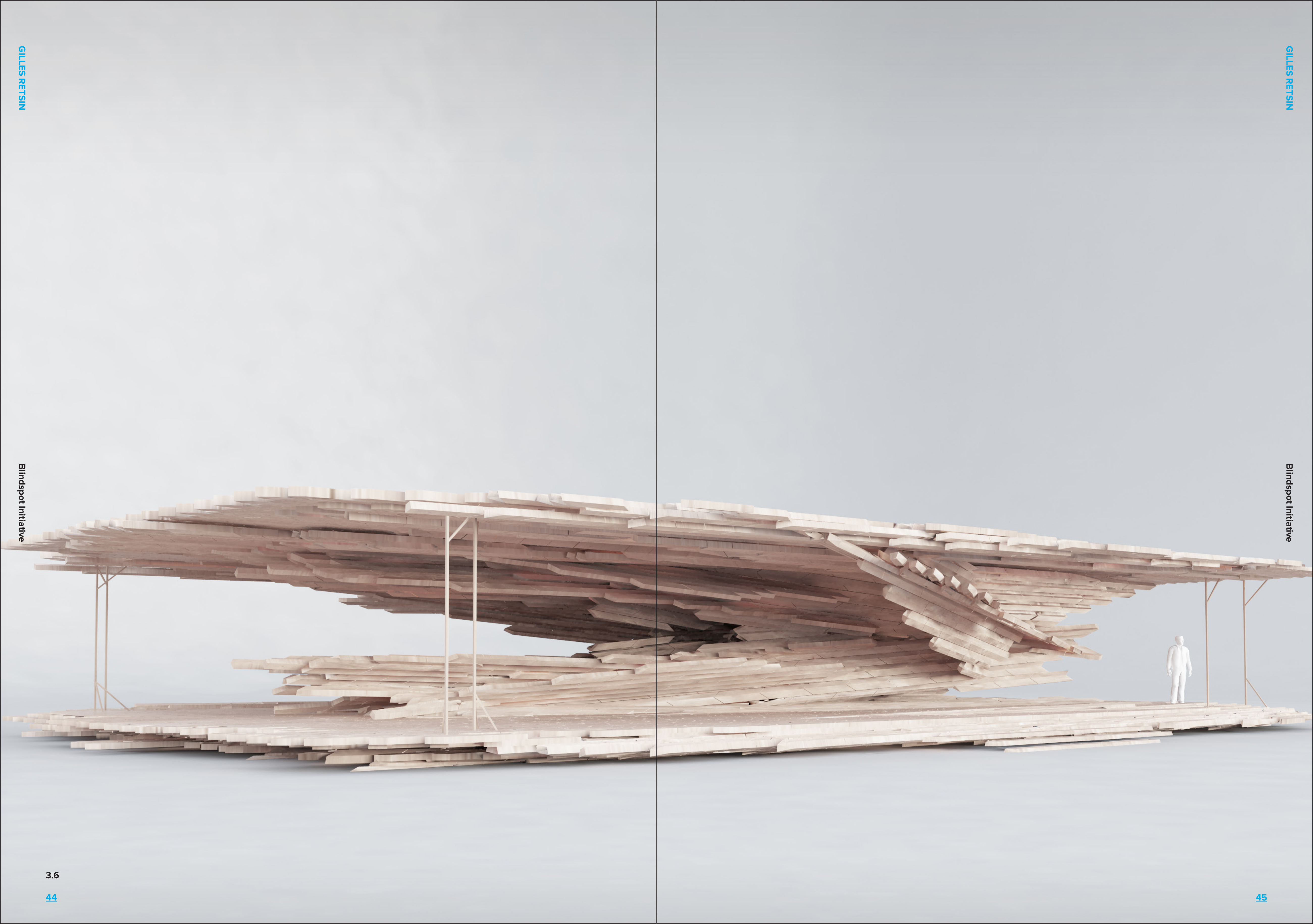
Fig. 3.3 – 3.6 Sets of both mutated and normalized triple periodic minimal surfaces aggregated into a cluster. Base condition houses 8 handles. Samples were taken at 4, 8, 12, 24, 48 and 100 handle counts with multiple aggregation sequences. Mutations occurred at all levels with new clusters of aggregations consisting of varying handle densities. Once the new base clusters were generated, a sequence of 4 was chosen for mutations. These initial geometry studies remained “pure” and unaltered throughout the entire process.



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