approach/analysis

Starting point was an extensive research in the field of generative growth processes, cellular structures and their specific parameters. Different examples from biology and mineralogy were examined under the criteria of formation principles, geometry, spatial effect and construction such as foams, sponges, bone structures and crystals. The possibility to produce different degrees of density within a system following a set of rules was an important criterion. Various analogies to natural constructions in architecture were found, particularly in the research and work of Frei Otto and Toyo Ito.

The research on spatial construction systems led to Fritz Haller’s work about modularity and geometrical coordination of system blocks which served as basis for constructional considerations. Among others, Buckminster Fullers geodesic domes and tensegrity structures were examined regarding their construction principles.

The investigations of crystals, soap skins, foams and their minimal surfaces served as a foundation for the development of the software for the generation of the underlying geometry. Voronoi diagrams – a method to describe neighbouring relations of polygonal cells - were integrated into the software through algorithms. By using Voronoi algorithms, optimal cellular structures like foam could be calculated and analyzed as well as displayed three-dimensionally.

The final concept use these algorithms to generate a structure alterable in form, dimension and density. It can be created at “any“ place as “many” times as necessary. (m.any) The developing principle of each individual structure is the same but different parameters affect their generation and therefore their final form.