INFINITE MINING *for* STRUCTURAL COMPOSITES

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REFLECTION P4

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This project aims to comprehend the complete process of producing a structural composite made of uniform and consistent waste streams, abundantly available in or close to the Parkstad region. The starting point for development of this novel building material constitutes of using bacterial alginate (ALE) as a binder. ALE is retrieved from the Nereda wastewater treatment process.

The goal is to design a building, which functions as a *cyclifier*, connecting local physical flows, such as waste and water, and local flows of value, such as knowledge, identity and culture. This architectural design of a *cyclifier* ought to function as a business model (generating multiple revenues) rather than a static object that requires investments for maintenance. Therefore a building will be designed made of the composites, which are developed in the research phase and are sourced from local overabundant waste streams.

Hence the overall design question at the P2 was: How to design a factory in Iba Parkstad next to a Nereada Wastewater treatment plant, for a structural composite made of wastewater derived materials and other local waste streams, which functions as a *cyclifier* and illustrates the architectural possibilities of this new local building material?

The relationship between the project and the wider social context

The subject of investigation in the proposed project stems from the need to be independent of finite fossil and mineral resources, the issue of excessive waste and the need for a new industry in IBA Parkstad Limburg.

The relationship between research and design

Methodical line of approach of the graduation lab and method chosen by the student in this framework

The graduation lab prescribes that research mainly occurs in the Msc3 and that at the start of Msc4 a shift in focus is made to design. The student however has performed extended research in the Msc4 phase due to difficulty retrieving all the necessary information to continue with the design, which is implicated by the chosen research method (and nature of the student itself). This research method is derived from industrial ecology and implicates a holistic approach, since it takes into account the total functioning of a system rather than particular parts. This 'system perspective' and 'system analyses' aim to prevent limited and incomplete studies, which might lead to poor designs with negative effects (2012 architecten and Goossens, 2009, p. 10).

The extended research provided new insights, resulting in a change of location and program for the building. Both changes remained within the scope of the research, i.e. within the boundaries of IBA Parkstad and within the Material Flow Analysis of the composed building material.

Moreover the extended research included material tests and scale models. The material tests were performed in order to certify the mix design for different variations of the composite. The scale models were made in order to explore the architectural possibilities (or intrinsic architectural language) of the material.

Graduation lab theme and subject/case study chosen by student within this framework (location/object)

The initial argument for choosing the studio of Architectural Engineering is twofold: firstly the option to select a personal subject and secondly the possibility to combine a technical approach in design with extensive aesthetic explorations. This first option is offered since the students start graduation with a 'technical fascination'.

The second possibility has proven to be valid. However, prolongation of the project was necessary for extensive aesthetic explorations. The progress of the project might be compared with the search for the correct mix design and production procedure of a structural composite: once the main components are set (or location, program and construction techniques), then the composite can be optimized by means of trial and error in making samples (or design by means of models and drawings).