

Intelligent modularization for scalable concrete construction by adaptation of the methods for modular construction development

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Motivation

Mechanical engineering

Modular and platform design

Civil engineering

High-performance materials

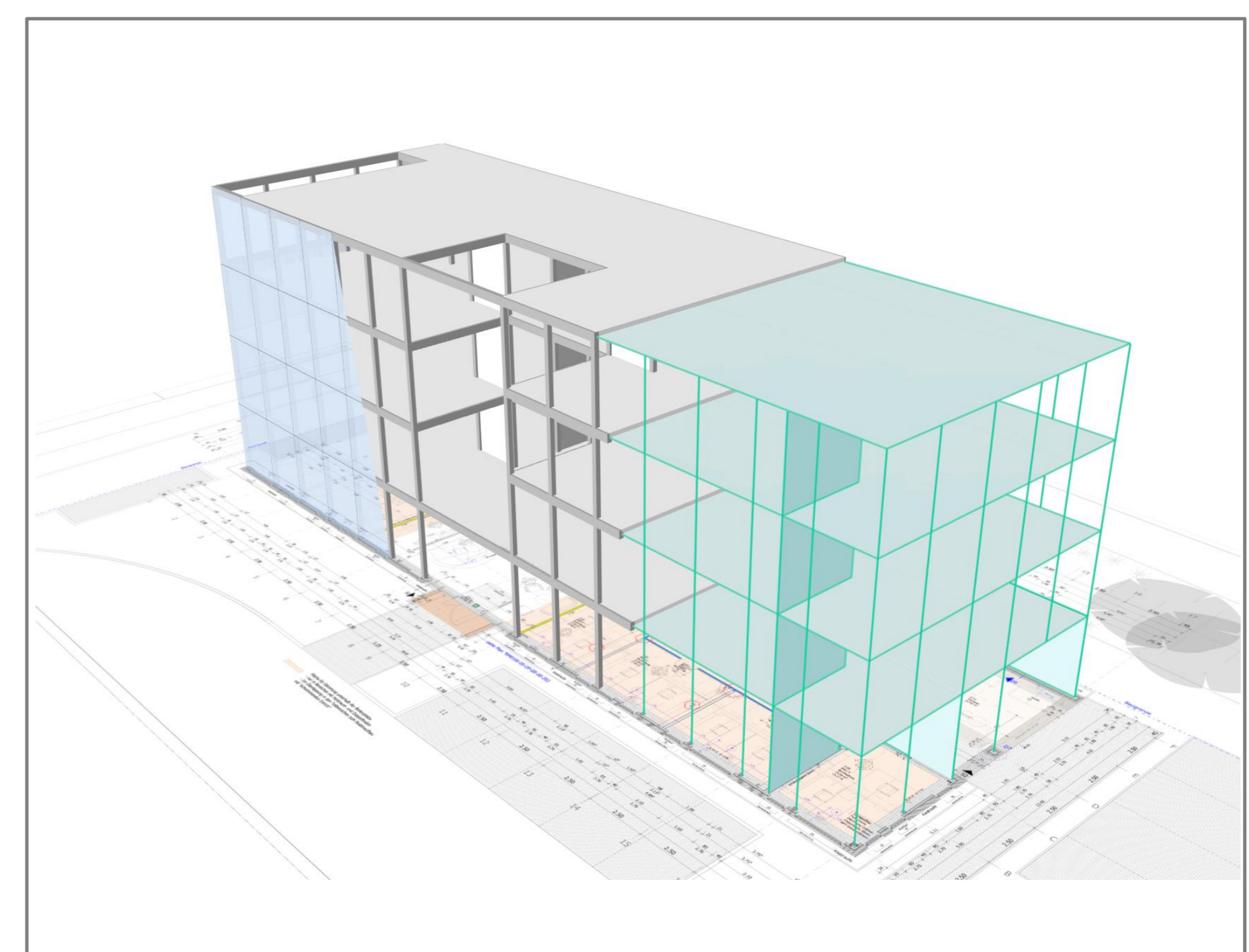
- Increase of efficiency and effectiveness

Modular construction method

- Standardized products and processes

Ultra-high performance concretes (UHPC)

- More durable, slimmer components, lighter constructions



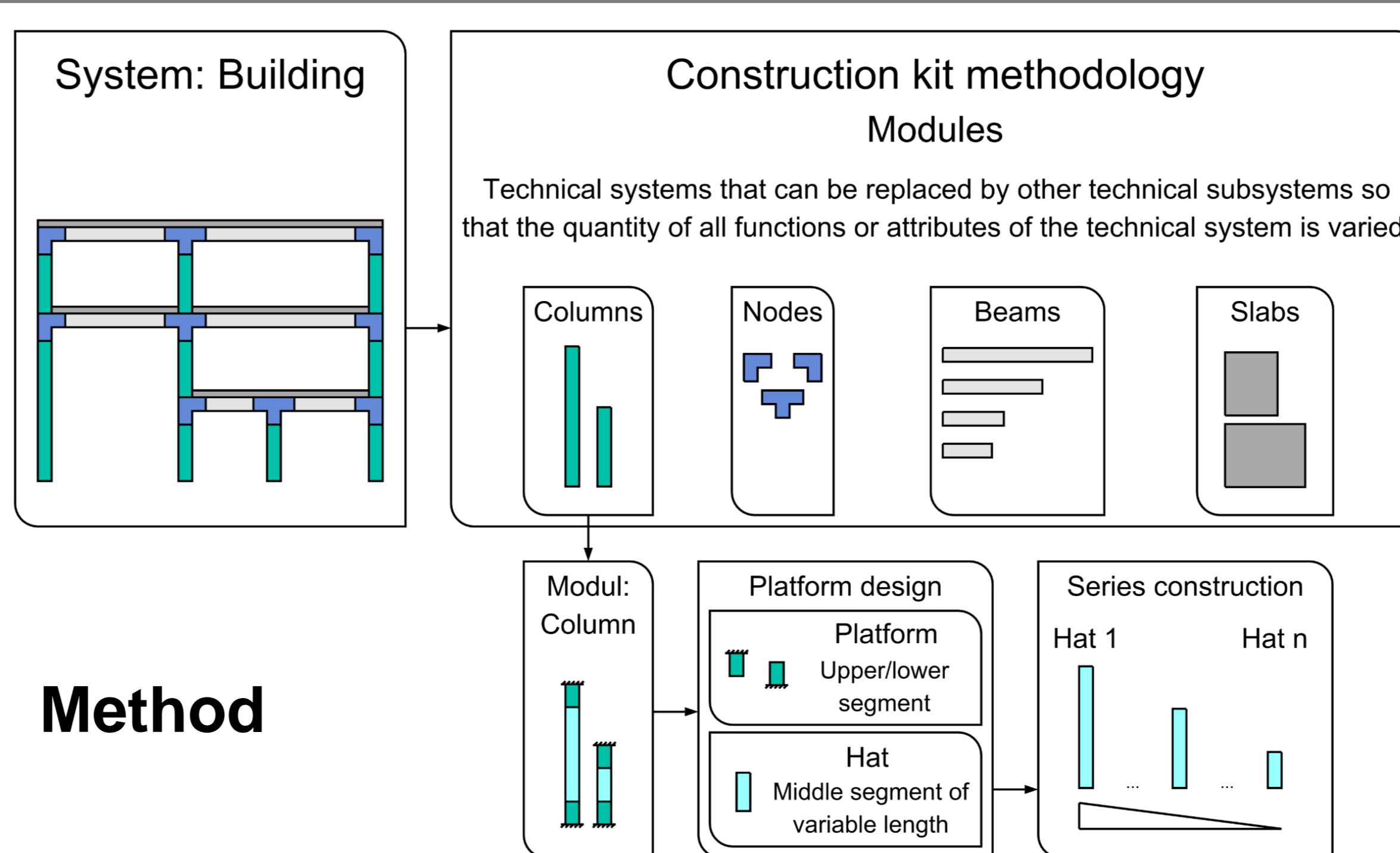
Methods and Aims

Optimization of the construction kit architecture

- Minimal internal diversity, maximal external diversity

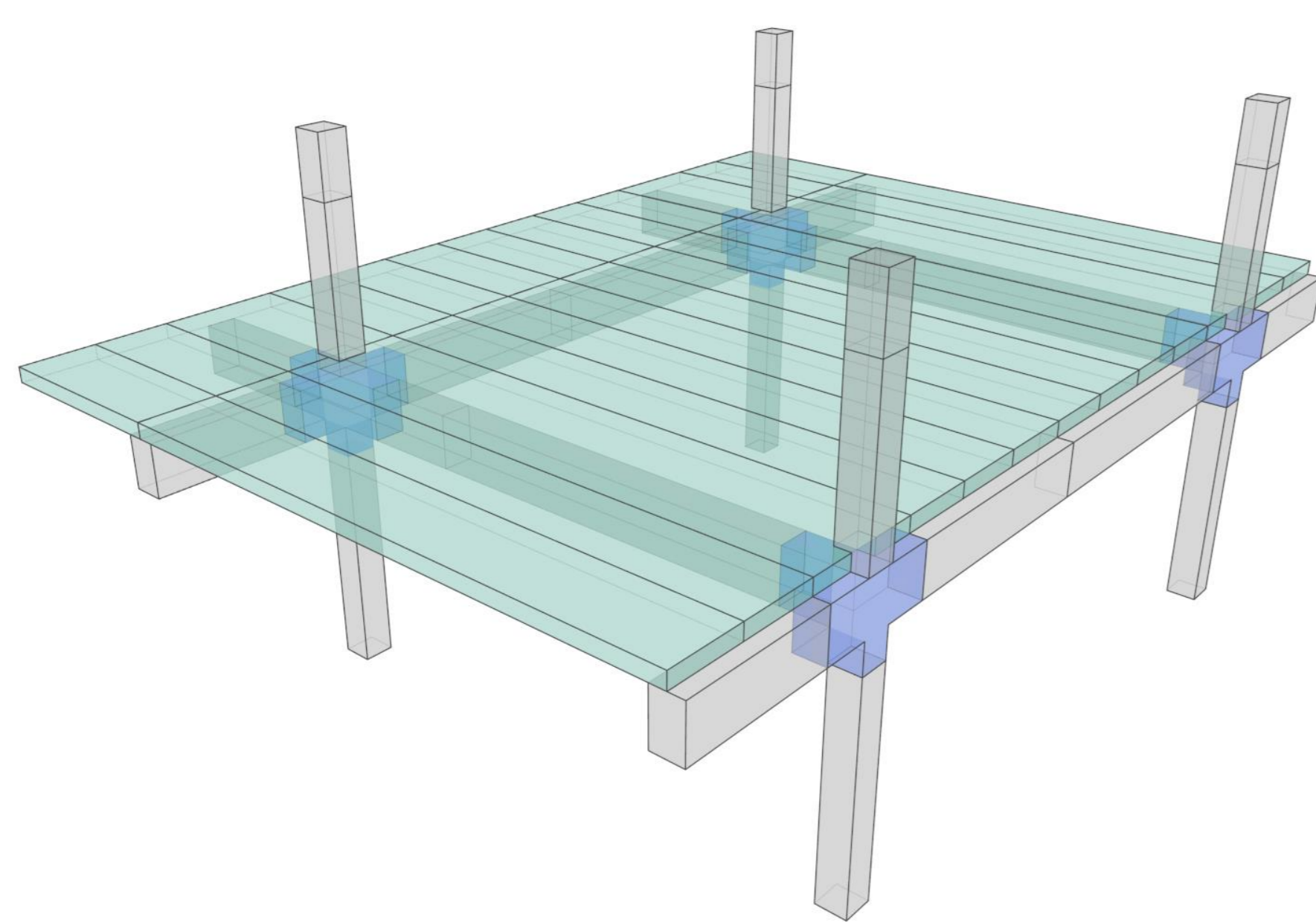
Optimization of the joint design

- Rapid assembly, high capacity, simple design



Results

Initial construction kit design



Developed dry joints

- Time-efficient and precise assembly
- Economic design
- Controlled disassembly, reuse and replacement of damaged components



Publications

- [1] ALBERS, A.; KEMPF, C.; RENZ, R.; SPADINGER, M.; STEMPNIEWSKI, L.; MANNY, A.: Intelligente Modularisierung für den skalierbaren Betonbau durch Adaption der Methoden zur Baukastenentwicklung. *Betonwerk international*, (3), 2020, S. 27.
- [2] MARK, P.; LANZA, G.; LORDICK, D.; ALBERS, A.; KÖNIG, M.; BORRMANN, A.; STEMPNIEWSKI, L.; FORMAN, P.; FREY, A.; RENZ, R.; MANNY, A.: Vom Handwerk zur individualisierten Serienfertigung - Schwerpunkt adaptive Modulbauweisen mit Fließfertigungsverfahren. *Bautechnik* 98(3), 2021, S. 243-256.
- [3] MARK, P.; LANZA, G.; LORDICK, D.; ALBERS, A.; KÖNIG, M.; BORRMANN, A.; STEMPNIEWSKI, L.; FORMAN, P.; FREY, A.; RENZ, R.; MANNY, A.; STINDT, J.: Industrializing precast production - adaptive modularized constructions made in a flux. *Civil Engineering Design* 3(3), 2021, pp. 87-98.
- [4] MANNY, A.; STEMPNIEWSKI, L.; ALBERS, A.; SIMONS, K.: Conceptual Design and Investigation of an Innovative Joint for the Rapid and Precise Assembly of Precast UHPC Segments. *Engineering Structures* [Submitted].

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