

A versatile modular structural system for buildings

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Abstract

This paper presents a novel, reusable structural system, which can be adapted to unpredictable future needs through a rearrangement of its inherent elements. Its reuse over multiple building life cycles avoids demolition and new manufacturing, reducing waste, energy demands, and resource extraction.

The construction industry is currently responsible for about 32% of the energy consumption and 25% of the CO₂ emissions worldwide. About 30% of the global waste is attributed to construction and demolition. In addition, it is projected that two thirds of the world population will live in urban areas by 2050 [1]. On the one hand, the value of land within cities is increasing constantly, putting economic pressure on existing building stock. On the other hand, functional requirements for buildings evolve constantly, both in nature (e.g. reconversion from office building to apartment building) and scale (e.g. needs for more open spaces or larger apartments). Ultimately, these conditions lead to the premature demolition of buildings, when their load-bearing elements still fulfil all structural requirements.

To avoid future demolitions of newly constructed buildings, their load bearing systems should be more durable, versatile, modular, reversible, and transformable in order to allow as much unpredicted reuse as possible [2]. However, current construction solutions do not embrace all these criteria. Conventional modular systems for instance, do not allow change of spans between supports or imply superfluous oversizing [3].

By putting environmental aspects and open-ended reusability at the core of the design, we aim at overcoming these concerns with the proposed structural system. The modular system is made of

[Note to organizers and chairs of the scientific committee: the concept that will be described in this talk is currently in the process of being patented. We expect to be allowed to disclose it by the end of June this year. In which case we will update this abstract with all necessary details. Thank you very much for your understanding]

References

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