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# Honors thesis

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Master of Science in Sustainable Architecture

*Abstract*

**“Precast concrete panels for the Chinese market: the application of the Performance-Based Building Design approach to define a database of technological solutions”**

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*by*

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Nowadays the sector of prefabricated constructions is subjected to continuous progress and it is moving towards high quality design solutions, all developed following more sustainable approaches. At the base of this method there is the conviction that the construction must be born entirely in the factory. Once out of the plant, prefab components are already completed with finishes, windows and they require only operations of assembly and sealing. It represents one of the most employed buildings' technologies and every year it creates an enormous amount of incomes and employments worldwide. By now, thousands of housing, public and industrial buildings have been built with this method, especially in Asia, North America, Oceania and United Kingdom.

Within the wide range of prefabricated components, prefab claddings and in particular precast concrete panels are playing a stunning role as innovative solution of building's envelope. There are many researches which have been carried out over the years to transform the prefabricated envelope into an ingenious and satisfactory interface. Compared to on-site claddings, emerge some indisputable advantages such as flexibility, long-term life cycle, strict controls of manufacturing quality, vast possibility of aesthetic customisation, low production and assembly costs. Precast concrete claddings are especially appreciated in high-rising constructions thanks to the speed of all constructing operations and contained employment of workforce. Considering an international prospective, China has demonstrated outstanding expertise in the use of this cladding technology triggered by the swift in urban development which has taken place since 1980s. However, despite the remarkable expansion, China is facing with the harsh environmental pollution and resources exploitation added to inherent issues such as seismic activities and demographic increase. In order to tackle these problems, the reply from the construction sector is to strive for elaborating more advanced technologies which in cladding field deal with the enhance of traditional precast concrete claddings' performances. In this regard, this Thesis aims to take stock of the contemporary applications of precast concrete cladding and, following performance-based building design (PBD) approach, propose a database for precast panels technical solutions. The PBD method has been selected as an indispensable guide for the elaboration of Thesis' different steps. Thanks to the principles of this method, it has been possible to follow precise stages, from the collection of the stakeholders' needs to the definition of the related performance requirements, which have brought to the design of PANdwich, the database for precast panels technical solutions. It stands as a practical tool proposed to lead the professionals towards the most suitable technical solutions which can fit their projects, optimising also their workflow and inspiration.

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