

Prefabricated in-situ concrete: Documentation framework for reuse of in-situ concrete in new load-bearing structures

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*On-site testing
of the in-situ
concrete. Picture
provided by Sirkulær
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This project attempts to address one of the most technically and logistically challenging questions in circular construction: Can in-situ cast concrete be cut out, documented, and integrated as load-bearing elements in new structures? The project's ambition has been to develop a documentation framework and verification method that would document cut-out in-situ concrete elements to meet structural criteria for reuse. This would accelerate practical solutions for circularity, by seeking to demonstrate and de-risk emerging circular approaches by validating them in real-world conditions.

The framework was advanced through a structured, six-month work-flow, beginning with method drafting, followed by a physical pilot extraction and testing phase, expert reviews, broader industry feedback, refinement, and ultimately preparation for dissemination. The approach drew upon existing practices for re-documenting building components, with particular emphasis on structural integrity, traceability, and the need for consistent assessment and verification procedures.

Opportunities, Challenges, and Key Learnings

A major opportunity identified through the project was the high level of industry interest in structural concrete reuse, reflected in broad engagement from demolition contractors, engineers, architects, academia, and testing institutions. Stakeholders across the value chain contributed reviews, pilot opportunities, technical knowledge, and context-specific expertise.

Academic partners such as EPFL/McGill and the University of Luxembourg supported by sharing research and reviewing the method; Kiwa performed the tests, structural engineers and concrete technologists from Norconsult, Multiconsult and SKALA contributed to validating the testing pathway; and demolition and construction actors including HENT, Bevar, AF Decom engaged through pilot projects or exploratory collaboration. Together, these contributions strengthened the method's relevance and practical grounding.

However, the project encountered significant challenges. Pilot projects depended on structures being available for extraction at the right time, and with concrete of suitable age, condition, and composition. Several potential pilots fell outside project timelines or yielded concrete that did not meet structural reuse criteria. In the pilot project, test results

ultimately showed that the extracted elements did not satisfy performance thresholds for load-bearing reuse—an outcome that, while limiting in immediate application, provided critical empirical data and clarified technical boundaries.

Unexpected delays among collaborators, variability in material conditions, and difficulty aligning demolition schedules with testing needs further highlighted systemic barriers. These challenges exemplify the central finding of the project: there is strong potential for structural reuse of in-situ concrete, but only when supported by rigorous planning and practical assessment methods.

Next Steps

With a method now developed, reviewed, and tested, the next steps involve continued refinement, further pilot testing, and integration with industry and regulations. Stakeholder interest remains high, and several applications are already underway for funding and scaling initiatives. As the sector faces increasing legislative and market pressure to reduce emissions and material waste, the Prefabricated in-situ concrete project forms an important contribution to emerging pathways for structural reuse—laying the groundwork for future standards, improved documentation practices, and the eventual normalization of in-situ concrete reuse within the built environment.