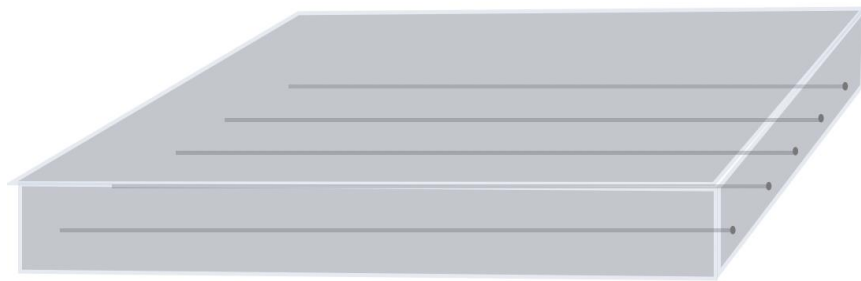

Reuse of Saw-Cut Concrete Slabs Using UHPFRC

Research Project Proposal



Why reusing sawn concrete slabs is challenging?

- Large numbers of concrete slabs from deconstruction are still structurally sound, but rarely reused.
- Sawing makes reuse possible, but breaks structural continuity.
- The main challenge is therefore the design of a reliable joint between reused slabs and the surrounding structure.

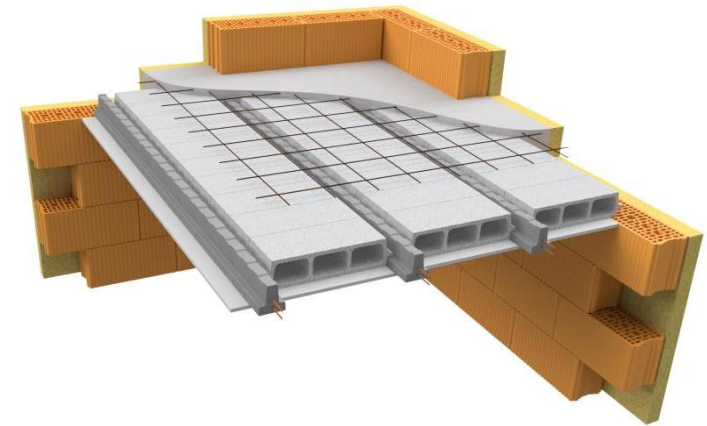
Objective

To develop a practical and replicable solution for the reuse of sawn concrete slabs, using a UHPFRC joint that is compatible with real on-site construction conditions.

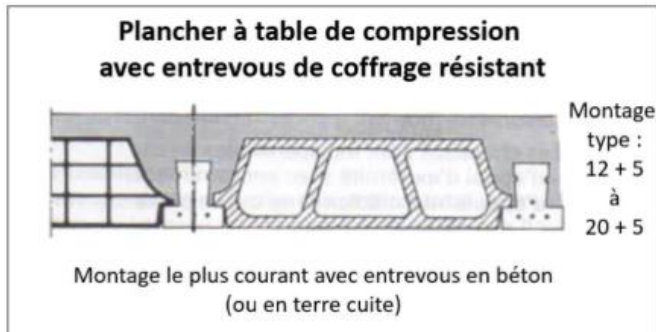
Why Reuse Concrete Slabs?

- Concrete slabs are standardized structural elements, well suited for reuse.
- Reuse preserves embodied energy and reduces CO₂ emissions.
- The main challenge is how to connect reused slabs to new structures.

Key idea: *The challenge is no longer producing concrete, but integrating existing concrete into new structures.*



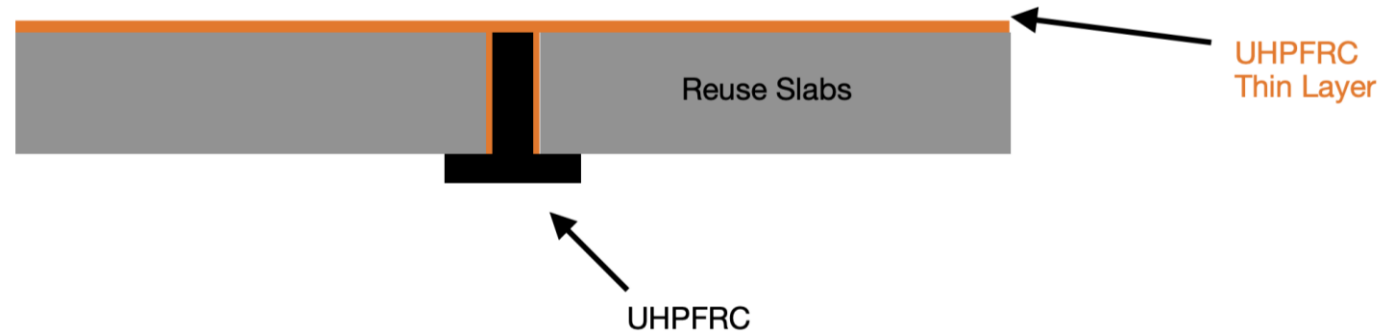
Inspire by the traditional beam-and-block floor system



Brick size: 50*20*15 cm

Key idea: It's too expensive to produce small-sized elements because of the sawing.

A scale effect



Reuse Concrete slabs: 300*250*20 cm

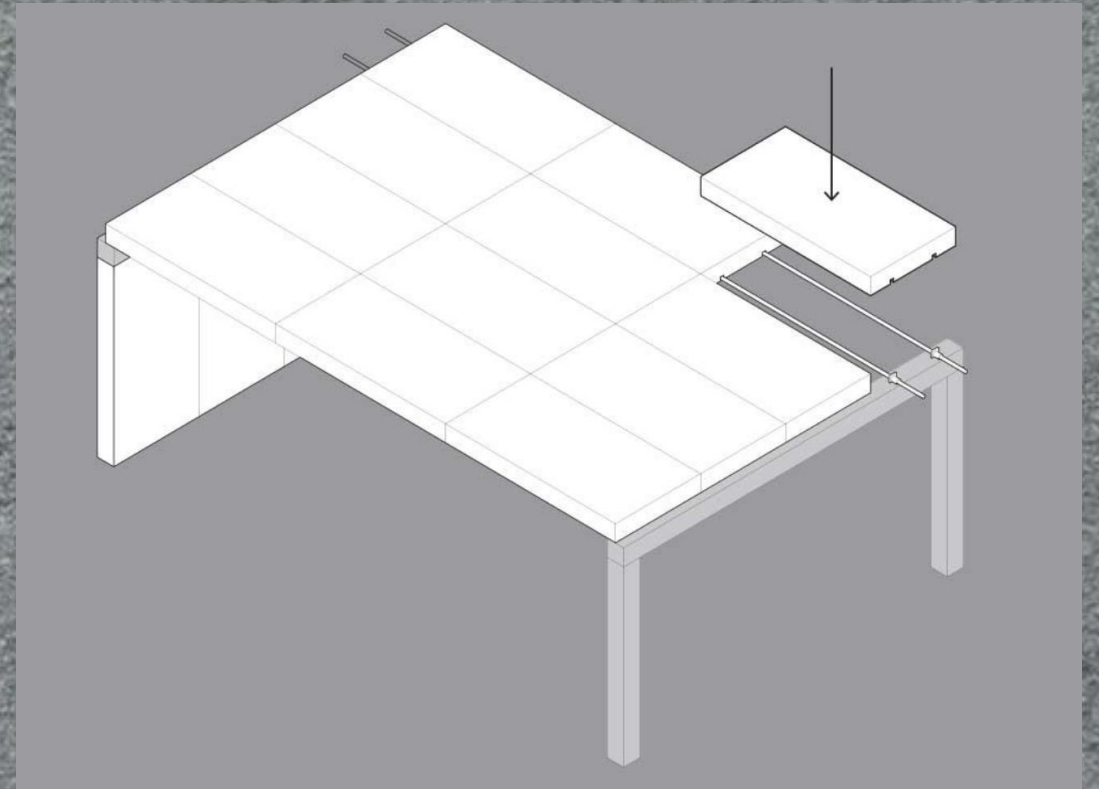
Key idea: Produce a small-cross-section beam capable of carrying the loads from the slabs. (UHPFRC)

A site-compatible component



- **Site compatibility**
- Real construction conditions (saw-cutting tolerances)
- Assembly sequence

Key idea: produce a detail that is buildable, repeatable, and industrializable





- **WP1 — Connection details (slab–beam / slab-wall):** propose and compare joint concepts; select the most relevant based on real geometry, load transfer, and buildability.
- **WP2 — Reclaimed slab assessment protocol:** define selection criteria, testing methods, decision rules, and acceptable saw-cutting tolerances for reliable grading.
- **WP3 — Testing & modelling:** run material/connection tests and calibrate numerical models to validate performance and derive design parameters.
- **WP4 — Operational deliverables:** develop a practical tool (design chart or mini-calculator) with an environmental indicator, and build a full-scale demonstrator to validate constructability and QA/QC.



Duration: ~4 years (with possible extension)

Engineer + 2 Technicians

48 months | 100%

Concrete production and handling (incl. UHPFRC casting)

Rheological and mechanical testing

On-site and laboratory experience to ensure constructability and robustness

Postdoctoral Researcher

36 months | 100%

Structural assessment of reused concrete slabs

Definition of performance criteria and boundary conditions

Development of design guidelines for slab reuse and UHPFRC joints

PhD Candidate

48 months | 100%

Design and optimization of UHPFRC slab-to-slab joints

Parametric studies and development of a design-oriented tool

Environmental and techno-economic assessment

👉 *Delivers the technical solution and its validation*

Master student

6 months | 100%

Work on one well-defined technical sub-task, such as:

- anchorage detail of the UHPFRC joint,
- definition and execution of a specific test,
- formatting and validation of design charts

👉 *Supports the PhD with targeted, hands-on contributions*

Indicative project budget: 1000–1200 kCHF

Personnel

- Postdoctoral researcher
- PhD candidate
- Master student
- Engineer + technicians

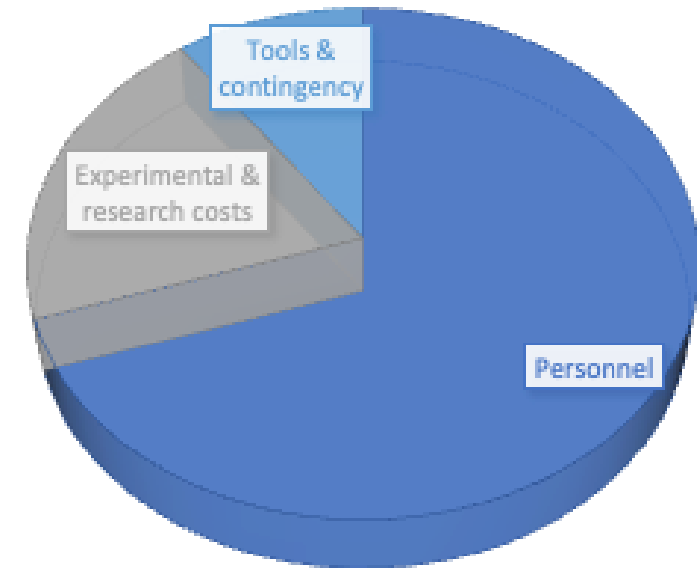
Experimental & research costs

- UHPFRC materials
- Sawing and preparation of reused slabs
- Formwork, molds, lifting and casting equipment
- Rheological and mechanical testing (lab & full-scale)
- Instrumentation and monitoring

Tools & contingency

- Design tool development
- Software and computation
- Conferences, publications, workshops
- Experimental contingency

Indicative distribution



Recommended industrial partners

Precast concrete manufacturer, Structural engineering consultancy, Reuse construction stakeholders

→ Strong link to real-site conditions



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How to manage uncertainties associated with reused concrete slabs?

- Variability in geometry and material properties
- Condition of existing reinforcement
- Inspection, documentation, and traceability

?

How can reused concrete slabs be standardized using UHPFRC joints?

- Alignment with SN EN 206 and SIA 262
- Definition of clear design rules and acceptance criteria
- Standardized quality control and testing procedures

?

What is the environmental benefit of reusing concrete slabs?

- Reduction in CO₂ emissions compared to new construction
- Preservation of embodied energy
- Quantification based on Life Cycle Assessment (LCA)