

Circular reuse of Concrete Columns

Proving the potential for direct re-use of concrete structural columns.

The building sector is responsible for a large share of society's negative climate impact. For a long time, the focus for reducing this impact has been on the energy use of buildings. Today, however, material use and waste drive most of the remaining carbon impact. Furthermore, the extraction of raw materials to produce building materials has a significant impact on biodiversity, pollution and depletion of non-renewable resources.

A key method to cut waste and material use is to reuse materials from existing buildings. This can happen through renovation or transformation of buildings. But where that isn't possible, we should reuse building elements at the highest value possible. For example, concrete is often crushed for road filling. But what if we could reuse whole columns, beams, or floors? This would save the resources already spent to make them.

The structural frame represents a large part of a building's embodied carbon and material. When a building is demolished, directly reusing the structural parts could therefore have a big impact on the embodied carbon of the new building. This is, however, difficult for concrete structures, because it is not possible to tell the concrete strength, steel reinforcement, or internal damage just by visual inspection.

At the same time, concrete has one of the largest carbon footprints in buildings. The Technical University of Denmark (DTU) has developed a non-destructive assessment methodology to document the properties of structural concrete elements intended for reuse. The C3 project will use this methodology on a large project for the first time. In collaboration with HOFOR, a donor project with many columns has been found. The first phase will assess the strength and quality of these columns and identify the potential for re-use.

If the potential for these columns is confirmed, the project will continue in a new phase, where it will be strived for directly reusing a number of the columns in a new office building.