GENT WASTE BRICK: REDUCING THE CONSTRUCTION EMBODIED CARBON

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Categories: Carmody Groarke, Contributors, Densities, Formats, No Density, Project, Technology and fabrication, Topics

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As part of a masterplan to transform the Design Museum Gent, the museum is undertaking a major renovation project to extend its existing buildings. Due to start on site later in the year, the new wing will house galleries and event spaces to broaden the museum's cultural programming and visitor outreach.

To reduce the embodied carbon used in the project's construction and meet the client's brief for the new extension, a lime-cured, local waste brick was developed and certified for use on the building's façade. The project was funded through a generous grant from Circular Flanders and sogent, on behalf of the city of Gent, and researched in collaboration with Design Museum Gent, sogent, Carmody Groarke, BC Materials, Local Works Studio and TRANS architects.

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Design Challenges and Environmental Impact

The building's façade was designed to reference the light-toned civic buildings in Gent. The pale colored brick and white mortar is composed of aggregate from locally sourced municipal waste streams, including crushed concrete and white glass with lime as the primary binding agent. All composite materials were carefully selected to create a white tone. The waste materials are meticulously filtered and sorted at a production center in the center of Gent before being pressed into their specified shape and size.

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The Gent Waste Brick is cured rather than fired, gaining strength from carbonation. The hydraulic lime captures CO_2 from the atmosphere as the bricks cure, sequestering carbon over the life of the building. The design team worked in close collaboration to specify a unique material composition that is low in embodied carbon and will deliver the required strength and resilience for use in external conditions. This fabrication process, coupled with the use of recycled composites, results in a brick with 0.17 kg CO_2e/kg – just 1/3 the embodied carbon of a Belgian clay-fired brick.

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The team worked closely alongside the Design Museum Gent to produce a highly crafted, bespoke material object that embodies the culture and ethos of the institution, challenging the material qualities and aesthetic properties of a traditional brick and adding to the lineage of design objects displayed and cared for by the museum. As part of the museum's progressive engagement program, residents and those visiting the city will be given the unique opportunity to help make a brick that will go on to build the new museum wing. The bricks will be manufactured on a brownfield site in Gent, using a clean simple production process that could easily be replicated in other urban settings; there are no resultant emissions, by-products or waste.

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Research and Development

The bricks have undergone a robust development process that includes testing against European Norms and consultation with the certification body for the construction sector BCCA (Belgian Construction Certification Association). By rethinking traditional manufacturing processes, the project addresses complex issues surrounding the circular economy in construction including the viability of localized construction, availability of local resources and the testing of recycled materials.

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