UNIVERSITY OF STUTTGART
(USTUTT), Stuttgart, Germany

USTUTT Pilot Line: Advanced Concrete & Bio-Concrete 3D Printing

Products

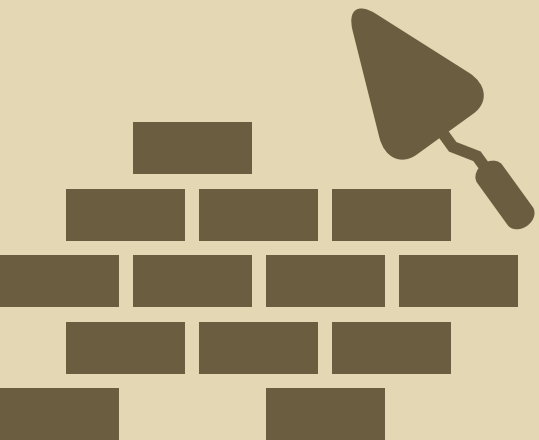
Cement and cement substitute structures: Load-bearing components and external cladding systems from FGC, 3D-printed Bio-concrete façade panels and external cladding.

The Pilot Line of USTUTT is divided into two innovative units:

✅ **Functionally Graded Concrete (FGC) Hybrid Manipulator**

✅ **Bio-Concrete 3D Printing Unit**

Both developed at the Institute for Lightweight Structures and Conceptual Design (ILEK), these systems offer groundbreaking solutions in construction materials!



Pilot Line 7: Functionally Graded Concrete (FGC) for load bearing structures and façade elements. 3D-printed Bio-concrete façade element

Part 1: Functionally Graded Concrete (FGC) Hybrid Manipulator

A hybrid system for **precise material application** & **concrete mixing** using a **gantry-type structure** and a **Stewart-Gough platform** for nozzle positioning

Key Features

✅ **Customizable Material Gradation – Adjusts internal porous structure for optimized properties**

✅ **High Precision 3D Printing – Enables seamless structural variations, including hollow components**

✅ **Capacity: ~1.0 m³ of concrete per day**

Advantages

✅ **Lightweight & Sustainable – Uses micro- & meso-gradation to reduce material waste**

✅ **Enhanced Thermal & Acoustic Insulation – Improves building performance**

✅ **Fully Characterized & Tested – Ensuring quality & durability.**

🎯 Ideal For:

Companies in mineral construction materials and building envelopes

Applications

✓ **Load-bearing structures with optimized physical properties**

✓ **External cladding systems for lightweight facades**

Part 2: Bio-Concrete 3D Printing Unit

This unit pioneers **cement-free construction** by utilizing **biomineralization** to bind mineral aggregates

Ideal For:

Research-based companies & industries developing porous, lightweight façade panels

Sustainable architecture & renovation projects

How it works

1.Powder bed additive manufacturing deposits layers of sand & bacteria

2.Bacterial process (MICP) converts calcium chloride & urea into CaCO3, solidifying the structure in 3-4 days

Final Product: Quartz sand & CaCO3 – fully recyclable

Applications

- **Eco-friendly façade elements with customizable, lightweight designs**
- **3D-printed modular structures for research & exhibition spaces**

Why Choose Bio-Concrete?

- **Zero Cement = Massive CO2 Reduction**
- **Fully Recyclable – No waste, reusable materials**
- **Optimized Material Use – 3D printing enables efficient & precise structuring**

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