

Self-Roughening Concrete for Mass Concrete and Modular Construction (#6997)

The use of a small percent of lightweight aggregate in the concrete mix to produce a clean, self-roughing surface

Inventors at Georgia Tech have proposed the use of a small percent of lightweight aggregate in the concrete mix to produce a clean, self-roughing surface. The lightweight aggregate floats to the surface and creates the roughened surface needed for bonding to the subsequent concrete placements. This self-roughening eliminates labor, safety concerns, and costs of manually roughing the cold joint surface. They have developed a concrete mix using lightweight aggregate which will satisfy code requirements for the construction of large concrete structures.

Benefits/Advantages

- Less time
- Less cost
- Reduced safety concerns
- No need for continuous concrete placements in 3rd generation modular construction
- Lightweight aggregates rise to surface producing a roughened surface
- Self-roughened concrete enhances bond between concrete lifts

Potential Commercial Applications

- Vertical concrete construction
- Building and bridge construction
- Industrial facilities
- Underwater construction
- Precast concrete industry

Background/Context for This Invention

Self-consolidating concrete (SCC) has been used in the construction industry for over 15 years. It is now being used in the construction of nuclear structures where concrete placements may be as high as 90 feet. The use of SCC allows the concrete placements to be made without internal vibration, which saves costs and time. Multiple placements ease construction but result in cold joints, which are commonly and successfully used in concrete construction. The bond between the placements depends on the surface roughness. The hardened surface of normal and self-consolidating concrete is typically smooth, which requires the surface to be roughened prior to the next placement. Raking the fresh surface to create

roughness is typical for normal concrete but does not work with SCC. Jack hammering the hardened surface is required, which is expensive and may pose safety concerns.

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More Information

Publications

For more information about this technology, please visit:

<https://licensing.research.gatech.edu/technology/self-roughening-concrete-mass-concrete-and-modular-construction>

Images:

The automated sequential delivery of multiple fluids. A varying number of delay gates imprinted in the branches are shown in the figure.

COVID-19 and flu saliva test on paper: (A) The automatic sequential delivery of multiple reagents required for virus test; (B) Water pouring into the device triggers the virus assay, allowing the presence of SARS-CoV-2 and influenza A & B viruses to be visually identified by the color changes in the corresponding detection spot

