

Buildings – Concrete on the double

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ORNL researchers used fiber reinforcements made of steel, glass and carbon to develop a concrete mix that demonstrated high early strength within six hours of production, which is needed for the precast concrete industry. Credit: ORNL/U.S. Dept. of Energy

A team of researchers at Oak Ridge National Laboratory and the University of Tennessee have developed a concrete mix that demonstrated high early strength within six hours of mixing, potentially

doubling the production capacity for the precast industry.

Quick performing concrete shortens manufacturing time for prefabricated assemblies such as walls, beams and floor slabs. However, early-strength mixes have short setting times and require specific curing methods.

In a study, researchers evaluated commercially available components including steel, glass and carbon fibers. The result was a self-compacting mix that not only showed early strength but also maintained its workability for 30 minutes.

"We followed a practical, cost-effective process easily implemented with typical mixing procedures," ORNL's Diana Hun said. "This could enable precast plants to cast twice per day."

Future research includes decreasing the amount of carbon embodied in the mix. The study was conducted in collaboration with the Precast/Prestressed Concrete Institute.



Researchers from ORNL and the University of Tennessee collaborated to perform lab-scale evaluations on the high early strength fiber-reinforced self-compacting concrete mix. Credit: University of Tennessee

More information: Debalina Ghosh et al, Development of high-early-strength fiber-reinforced self-compacting concrete, *Construction and Building Materials* (2020). [DOI: 10.1016/j.conbuildmat.2020.121051](https://doi.org/10.1016/j.conbuildmat.2020.121051)

Provided by Oak Ridge National Laboratory

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