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JCU researchers reinforce concrete with plastic

By Isaac Egan

Researchers at James Cook University have successfully replaced steel reinforcing in concrete with recycled plastic in a bid to reduce the environmental impact of concrete production.

James Cook University's Dr Rabin Tuladhar led a team of JCU researchers who, in collaboration with industry partners, found that small plastic fibres are an effective replacement for steel reinforcement in concrete.

Dr Tuladhar says plastic reinforcement cannot be used in building construction, but will have a huge environmental impact just replacing steel in footpaths and pre-cast drainage elements.

"Columns and beams and slabs on buildings would still need steel, because it is taking such a structural load," he said.

"What these plastic fibres do is prevent the shrinkage cracks that you often see in the concrete footpaths, so that is where the plastic comes into the picture."

Dr Tuladhar says the project was driven by a need to reduce the energy consumption and emissions produced in the production of the steel reinforcement.

"There is nothing bad about steel, steel is a very versatile construction material and together with concrete it forms one of the most used construction materials," he said.

"But the production of steel is of course very energy intensive, it requires a lot of energy and it produces a lot of carbon dioxide, so it has a large carbon footprint.

"Compared with the production of steel, the plastic fibres have 90 per cent less carbon footprint mainly because steel requires so much energy for production."

He says the new concrete is also more efficient in the construction process.

"These recycled plastic fibres can specifically be mixed with concrete and poured straight into the moulds, so it is saving on the labour costs as well," he said.

Dr Tuladhar says the team has been working with the concrete industry to make sure it is a realistic replacement for steel reinforcement.

"We did a number of trials in improving the strength of the plastic fibres, because it needs to meet the required strength to be used in the concrete," he said.

"We made a number of improvements there and finally we got a plastic fibre that is strong enough to replace steel."

He says the plastic fibres are also resistant to corrosion, whereas steel will rust in high moisture environments.

"In the drainage pits the corrosion of the steel can be a big issue, but there is no

corrosion with the plastic fibres so that is a big advantage," he said.

Dr Tuladhar says their goal now is to get the word out and have the product used widely in the concrete industry.

"It is quite exciting and the only thing we want to see now is to translate it into reality and have it used in the industry," he said.



Plastic reinforced concrete has been developed by a team of James Cook University researchers and engineers. (Steve Moraga - James Cook University)

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