

Bendable concrete invented by NTU-JTC could cut road-construction time

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THE time taken for construction and resurfacing of roads could be cut by half in the future, when they are paved with a bendable concrete invented in Singapore.

Called ConFlexPave, this material is stronger and more durable than conventional concrete, which is now a substitute for asphalt in heavily-used roads.

And with each ConFlexPave slab being thinner and lighter than typical concrete slabs, it means installation of worn-out pieces can be done more quickly, effectively cutting down the time needed for road works and construction.

The material is the result of four years of work by scientists from the NTU-JTC Industrial Infrastructure Innovation Centre, Nanyang Technological University and JTC said on Wednesday.

The properties of the new concrete are such that when it is subjected to overloading, it flexes, unlike regular concrete, which fractures without prior warning.

ConFlexPave can take loads up to three times that of regular concrete, said Assistant Professor Yang En-Hua of NTU's School of Civil and Environmental Engineering.

It is made up of cement, sand, water and two key ingredients – polymer microfibers and another hard material he did not name. The synthetic fibres enable the concrete to bend under tension and enhances its skid-resistance.

The precast ConFlexPave slabs, at between 50 and 120mm in thickness, are 50 per cent lighter and thinner than the 225mm-thick conventional concrete slabs.

Koh Chwee, the director of the Technical Services Division of JTC, said thinner slabs reduce the labour-intensiveness of on-site work. They also make the work safer for workers and reduce construction time.

Installation of ConFlexPave slabs can be completed within a day, compared to the weeks it would take to lay regular concrete. This also means that the inconvenience caused to the public during road works is minimised, he added.

The new concrete has another quality going for it - its durability. It is expected to last about 40 years, compared to regular concrete, which needs to be replaced after 20 years, or earlier in areas of heavy usage.

ConFlexPave does cost more to make in the initial stages because of its composition, but its longer lifespan and the savings on manpower required for installation mean that the costs of using it are lower in the long run, said Asst Prof Yang.

He did, however, cite one challenge, and that is in the area of quality control, when production of this new concrete is scaled up. Where industrial mixers are used in its production, care has to be taken to ensure that the synthetic fibres are evenly dispersed throughout the concrete mixture.

Asst Prof Yang said the bendable concrete can potentially be put to use in earthquake-prone areas such as Japan, where the enhanced resistance of ConFlexPave could mitigate the damage from earthquakes.

Tablet-sized slabs measuring 250mm by 70mm by 12mm in thickness have been tested in NTU laboratories.

Test-bedding of the industrial-sized ConFlexPave slabs will take place over the next year in JTC's industrial estates and over two years in NTU.

One key criteria for the test sites is that they be high-traffic areas, to ascertain the loading capabilities of the new concrete.

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