Material Properties of Ultra High Performance Conference (UHPC)

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Ultra High Performance Concrete (UHPC) is a class of concrete that achieves a high compressive strength and improved durability outcomes when compared to conventional concrete currently used in Australia. UHPC is accompanied by fibre reinforcement and has a high binder content, and minimal and small aggregate in the form of fine sands and ground quartz.

In order to allow UHPC to be used within Australia, the development of both a technical specification and design standard is underway. A Victorian version of the technical specification is being developed by The Department of Transport and Planning, and the Australian Standards AS5100 Part 10 committee has been established. Together, these two documents will define the various technical requirements necessary for engineers to enable design, supply and construction UHPC structures. The technical requirements will include material properties, material quality assurance (including a testing regime), and design requirements.

This paper will outline the various material properties that have been adopted in the technical specification and design standard to be used for UHPC. This includes design properties and material models necessary to provide sufficient design guidance for engineers. The paper will describe why the various material properties for UHPC have been adopted including the tensile and compression behaviour, modulus of elasticity, density, poisson's ratio, coefficient of thermal expansion and shrinkage strain.

The establishment of a technical specification and design standard for UHPC is a significant and important step to enable the material to be more widely used within Australia, with the aim of enabling more innovative bridge design solutions.