

From Liquid to Solid: Transitions in Concrete Behavior

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Concrete begins life as a liquid (or liquid-like) and quickly takes on the solid properties associated with solid rock. (*The study of concrete's mechanical properties begins with fluid mechanics, then to soil mechanics, and ends with rock mechanics.*) This transition, which we generally take for granted, allows us to pre-place internal reinforcing and other embeddings, and to cast concrete to the size and shape desired. This is all made possible by the dual nature of portland cement paste: fresh cement paste is a lubricant, while hardened cement paste is an adhesive! Contractors are most directly influenced by the nature and rate of the liquid to solid transition since it governs placement, finishing, curing, and jointing or saw-cutting operations. Researchers are also intensely interested in this transition as it is the direct result of the hydration of cement and related reactions of cementitious materials.