Innovative use of FRP for Sustainable Precast Concrete Structures

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This paper presents several advancements in the use of fiber reinforced polymer (FRP) materials for the precast concrete industry. Precast concrete members are commonly selected for reasons such as the high level of quality control used in their production, the durability of the finished structure, reduced labor costs and shorter construction schedules, and the economics of scale achieved with mass-production of components. The environmental durability, high strength to weight ratio, and ease of installation of FRP reinforcements makes them an attractive alternative material for the precast industry. This paper presents several advancements in the use of FRP grid as flange reinforcement for precast double-tee members, as a shear transfer mechanism for thermally efficient composite and partially-composite load bearing wall panels, and reinforcement for precast architectural cladding panels. Each of these applications highlights the advantages of using FRP materials to achieve significant enhancement of the structural, thermal and architectural performance. The innovative use of the FRP materials and the unique construction techniques described has resulted in the development of safe and functional structures, which is demonstrated by the research conducted by the authors and others in collaboration with the precast industry.