

ABSTRACT

Composite design has become increasingly popular in today's construction industry as it combines multiple materials to take advantage of each material's strengths to optimize a structural member's design. While new materials are constantly being introduced to the construction industry, there are current materials being used that could serve new purposes for designers. Concrete-filled tube (CFT) construction combines the compressive strength of concrete with a tube made from materials with high tensile strengths. The tubes are not only longitudinal reinforcement, reducing or even negating the need for internal reinforcement, but also lateral reinforcement for the concrete, acting as a confining medium for the concrete core and increasing the concrete compressive strength. Steel tubes have been used extensively in this manner, however the shortcomings of steel including its lack of resistance to the elements and its cost have opened the door for alternative materials to be researched for CFT use.

Polyvinyl chloride (PVC) has been used in the construction industry since the 1960s mainly for piping. Its fire resistant and waterproof properties make it perfect for an exterior shell product for both indoor and outdoor use, including marine environments, and its tensile properties make it an excellent material for structural use. This thesis explores the ability of standard PVC pipes to provide a measurable amount of confinement of a concrete core to raise the concrete compressive strength. Through experimentation it was found that concrete-filled PVC tubes (CFPT) are indeed stronger than unconfined concrete cores in axial compression. This thesis also outlines future research that should be done to further understand the structural capabilities of CFPTs.