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## ANALYSIS OF THE FILAMENT-WOUND GLASS REINFORCED RECTANGULAR CROSS SECTION COMPOSITE PIPES IN ANSYS

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### ABSTRACT

Fiber Reinforced Polymer (FRP) composites can be defined as a combination of fiber glass or carbon and a polymer matrix which provides reinforcement in one or more directions. Composite materials have been widely used in the ship-building, aerospace and construction industries because of their distinct advantages of low weight, high stiffness, and high strength to weight ratios. These properties are due to the low weight of the epoxy core matrix and high strengths of the glass/carbon fibers. Composite pipes used in various applications are traditionally spherical in cross-section. In this study, non-conventional cross-sectioned composite pipe [i.e. rectangular cross-sections] have been proposed, fabricated, tested and analyzed because of their ability to be bundled without loss of space. This research essentially consisted of the following major categories which encompass,

- i) The analysis of rectangular shaped pipes by ANSYS. (Adaptive Filament Winder machine)
- ii) Analysis of the samples pipes with required fiber orientations and volume fractions.
- iii) Internal pressure and Flexure testing of the pipes.

This research was largely aimed at gaining a basic understanding and better overview of the fundamental structural behavior of non-conventional cross-sectioned fiber reinforced composite pipes under practical loading conditions.