MONASH
ENGINEERING

MONASH University

Faculty of Engineering
Summer Research Program 2023-2024

Project Title: Experimental study on Glass fibre reinforced polymer (GFRP) Laminates subjected to Eccentric Compressive Loading at elevated Temperature

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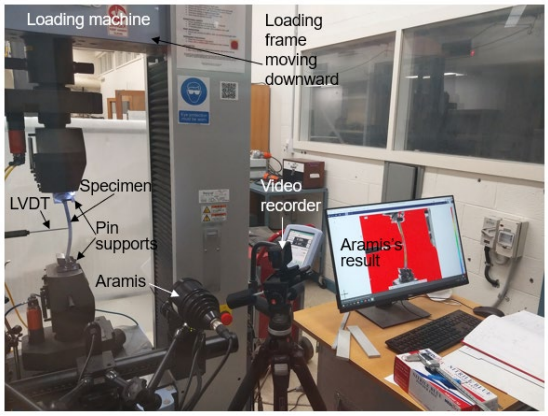
Objective

This project aims to investigate the capacity and failure of pultruded Glass fibre reinforced polymer (GFRP) laminates under eccentric compressive loading at elevated temperatures

Project Details



GFRP composites have been increasingly used in engineering projects, such as wall systems and column designs. This study aims to investigate the mechanical behaviour of pultruded GFRP laminates subjected to eccentric compressive loading at different temperatures. We aim to consider the second-order effect caused by the eccentric loading, which induces extra bending moment and shear force to the GFRP laminates. The shear and compressive strength can decrease with elevated temperature, resulting in a lower compressive capacity of the GFRP laminate. The aim is to find the effect of geometric, loading and temperature conditions of GFRP laminates on their failure modes and capacity.

In this project, a series of experimental tests will be conducted to achieve the above-mentioned aim and investigate the effect of temperature on the failure mode and compressive capacity of GFRP laminates. These experiments have already been done at room temperature (see Figure 1). For this project, the specimens will be tested inside an environmental chamber which can simulate fire conditions. Specimens with different lengths and eccentricities will be tested under elevated temperatures of 50°C, 100°C and 150°C. The outcome of these tests will be 3D curves linking the capacity, eccentricity, slenderness of specimens and temperature. We can also determine the failure modes based on the values of these parameters.

In addition to the experimental tests, this project also aims to perform a simplified finite element (FE) analysis using the ABAQUS FE software package, which will be validated using the experimental results.

Prerequisites

Students with civil engineering and mechanical engineering backgrounds are preferred for this project. Expertise in FE analysis is preferred but not essential.