ABSTRACT
The use of Glass Fibre Reinforced Polymer (GFRP) bars is considered an alternative option in reinforcing concrete structures instead of conventional steel bars especially in harsh severe environments, due to their mechanical properties and physical characteristics. GFRP bars offer many advantages over steel counterparts such as corrosion resistance, high tensile strength, low weight and electromagnetic isolating characteristics. However, the compression performance of GFRP bars has not been fully understood. Besides, the behaviour of GFRP reinforced normal strength concrete columns in general and high strength concrete columns in particular have not been well addressed. Hence, standard design codes and guidelines do not recommend using GFRP bars in reinforcing concrete compression members, because of their low Young’s modulus and compressive strength compared with the conventional steel reinforcing bars. Twenty circular specimens were tested under different loading conditions in order to investigate the performance of high strength concrete circular specimens reinforced longitudinally and transversely with GFRP bars and helices, respectively. This study provides experimental data for the failure mode of the GFRP reinforced HSC circular specimens, the compressive strength as well as the axial and lateral deformation of the specimens. Results of the experimental programme of this study show that increases in the strength and ductility of the specimens are attributed to GFRP bars and helices as well as steel fibres. In addition, the stress-strain relationships of GFRP bars under compression loads are studied and a mathematical model for this relationship is proposed.

ASSOCIATE PROFESSOR MUHAMMAD NS HADI
University of Wollongong
Muhammad Hadi is an Associate Professor in structural engineering at the University of Wollongong. His research interests are in concrete structures and FRP. He has supervised 11 PhD students and is currently supervising 19 PhD students. He has attracted more than $1M of research funding. He is Fellow of Engineers Australia and American Society of Civil Engineers.