

Thesis title:

Investigation on enhancing fire performance of Carbon Fibre Reinforced Polymer (CFRP) strengthened concrete columns

Abstract:

An experimental study was carried out to develop a thermal resisting adhesive for CFRP-Concrete bond. The commercially available epoxy adhesives used in bonding CFRP with concrete are experimentally proved to have a low glass transition temperature at which the adhesives lose its adhering properties. As an initial approach, Engineered Cementitious Composite (ECC) mortar was developed as a cementitious adhesive to resist high temperature. Locally available materials were used in the cementitious adhesive development process. The effective bond length and corresponding bond strength of the developed ECC adhesive were found. The obtained bond strength of 224.9 N/mm^2 was enhanced up to 570.28 N/mm^2 by implementing CFRP-ECC adhesive interface roughening technique. The bond strength was reduced by 5.21% when the bond temperature was increased up to 100°C . Another approach was taken to enhance the thermal performance of a commercially available epoxy adhesive by mixing a specific proportion of Polyethylene terephthalate (PET) fibres with it. The modification incremented the glass transition temperature of the adhesive. The modified epoxy adhesive was used in column confinement with CFRP wraps. The modification yielded a strength enhancement of 7% when compared with the application of pure epoxy as the adhesive.