# Abstract

To protect structural timber from the effects of fire encapsulation is commonly adopted, which involves cladding the timber in non-combustible material. However, several large-scale experimental studies have reported occurrences where structural timber has been seen to continue smouldering for a significant duration of time, post fire extinguishment. However, no insight or discussion is given, as this problem was out with their scope and not expected.

Building on the limited current research into this problem, 17 small scale experiments were conducted utilising a cone calorimeter to establish the effect a variation in exposure heat flux has on 1 layer of plasterboard encapsulation. Also, how varying encapsulation build ups will affect the smouldering dynamics, with mineral wool and multiple layers of plasterboard tested. The samples were exposed to a heat flux for a defined period of time, after which it was removed, to simulate fire extinguishment. The mass and combustion gases were analysed to characterise the smouldering dynamics.

The experimental testing highlighted that, with an increased exposure heat flux, a higher mass loss rate can be expected after heat flux removal. Additionally, that differing encapsulation materials and varying layers of plasterboard all affected the observed smouldering.

All but one sample showed signs of self-sustained smouldering, surpassing the expected outcome, highlighting that observations in previous research are not an isolated occurrence, instead this represents a serious hazard that needs to be further investigated to allow for the safe adoption of structural timber in tall structures.