

Mechanically Pre-Stressed Glass Elements

Research Student | *Philippe Willareth*

Supervisors | *Dr. Mauro Overend*



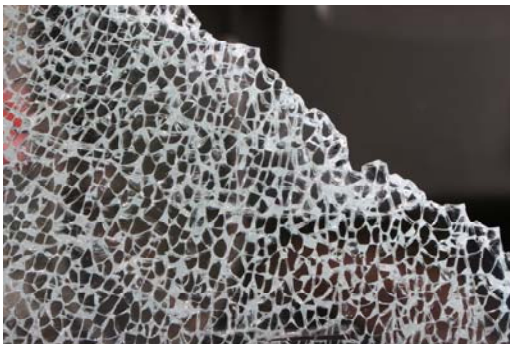
Overview | *Glass is a perfectly linear elastic material and has a high compression resistance; however, shortcomings such as brittleness and a relatively low tensile strength limit the structural use of glass. Secondary processing of glass such as heat strengthening and laminating alleviate some of these shortcomings. Despite these improvements, tensile strength of glass resistance remains relatively low and the post breakage performance of laminated glass units is often uncertain due to the creep deformation of the interlayer. This project therefore focuses on alternative methods for improving the structural performance of glass elements.*



Outcomes & Impact | *The project will provide a better understanding of composite glass elements, glass connections and pre-stressing in glass and will ultimately lead to a new generation of more efficient and safer glass components.*

Work involved | *This project will endeavour to develop structural glass products with enhanced tensile performance by exploiting the very high compressive strength of glass. This will be achieved by employing mechanical pre-stressing techniques that do not affect the desirable transparency of glass. The research work is carried out within three interlinked and overlapping stages:*

- *Identification of strengthening materials and generation of appropriate systems*
- *Analytical and numerical investigations, using recent advances in finite element analysis and fracture mechanics, in order to develop a design methodology for pre-stressed glass elements.*
- *Experimental investigations on pre-stressed glass elements leading to the verification of the methodology.*



Industrial & Academic Partners | *whitbybird, HTA Luzern*