



Transparent Structures – Bolted Glass

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Overview | *This project investigated the strength of a bolted connections in in glass plates. A bolted glass connection offers more architectural opportunities to achieve transparent facades. The current practise is to use finite element analysis (FEA) to design these connections, which is time consuming. Furthermore the flaws induced by the drilling process and the distorted thermal toughening profile lead to uncertainties on what the actual strength of glass is close to the edge of the hole. This project focussed on the former uncertainty i.e. the effect of the induced flaws on the strength of glass. annealed glass was therefore used throughout the testing. Ring-on-ring tests were used to assess the effect of flaws on the strength around a hole in a glass plate. Numerical analysis was subsequently used to predict the strength of bolted glass connections that were in turn validated by experimental investigations.*

Main Outcome | *The maximum principal stress approach used to characterise glass strength provides a good prediction for the mean failure loads of annealed glass. The influences by hole diameter are affected by drilling techniques. The hole edge conditions affects the glass strength and origin of cracks much more than the surface roughness through the thickness.*

Further Work | *The ultimate objective of this research is to devise a simple method for determining the strengths of bolted glass connections. The research should therefore be extended to thermally toughened glass. The plate tested should be resized to comply with the data provided in "Peterson's Stress Concentration Factors" so that the hand calculation method can be evaluated.*

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