

# The effect of joint width on stresses in a single lap adhesive shear joint

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**Overview** | In glass-to-steel and glass-to-glass lap joints using high strength (and high-stiffness) adhesives, glass failure tends to failure of the adhesive. Moreover the origin of failure in the glass is often located close to one of the two corners of the lap joint, indicating that a stress concentrations occur at these locations. The aim of this project was to verify this observation and to identify the underlying causes. This was undertaken by means of a detailed literature review on the topic followed by a series of experiments on lap joints.

**Main Outcomes** | From the literature review it was found that most classical analysis assume that the longitudinal stress in an adhesive lap joint is constant across the width, but photo-elastic investigations by Hahn have shown that the adhesive is more highly stressed in the corners than anywhere else in the adhesive. Adams & Peppiatt suggest that this is due to significant transverse variation in stress due to Poisson's strain in the adherends. The maximum magnitude of this stress is reportedly around half of the magnitude of the maximum shear stress in the adhesive. Although this may not cause failure directly, it will have a significant effect on the strength of the joints. The experimental results showed good agreement with that of Adams & Peppiatt's, furthermore the results imply that the transverse shear stress increases the strength of a joint.

**Future Work** | Further experiments are required to validate these results due to the large variation in the quality of the joints. From these further test it may be possible to find an optimum width of joint. Digital Image Correlation could be used to determine the strain across the adhesive lap joints in glass.

