STRUCTURAL BEHAVIOUR OF GLASS/IONOMER LAMINATES

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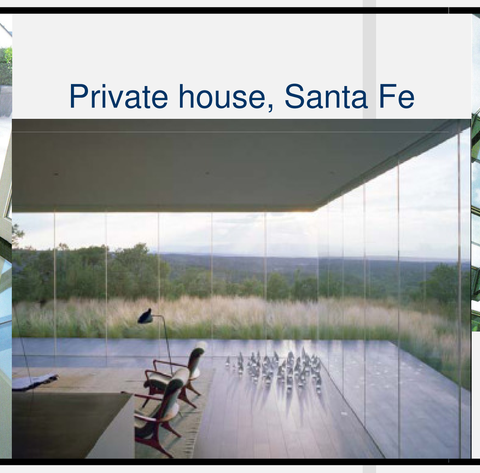
Structural glass

The all transparent pavilion, Delft

Private house, Antwerp



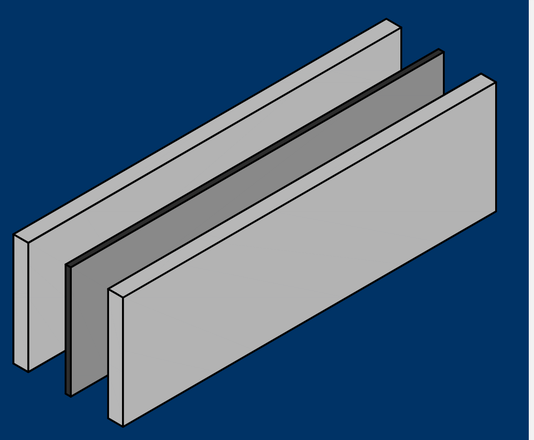
Private house, Santa Fe

Alte Mensa, Dresden

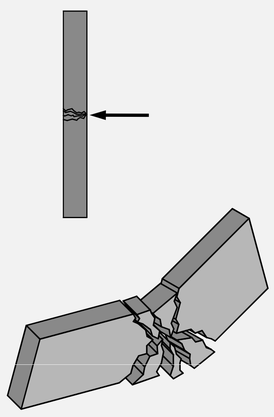
Glassbridge, Rotterdam

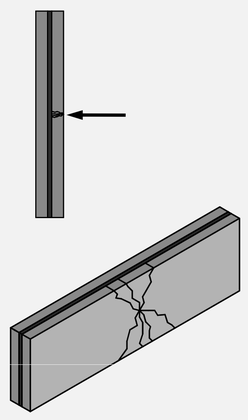
Maximilianmuseum,Ausburg

Laminated glass



In order to increase the **post-failure behaviour** of load-bearing, transparent glass elements, almost always **laminated glass** is used. For this, several brittle glass sheets are connected across their entire surface to a **soft interlayer**.
If the element is subjected to an impact, this material absorbs the impact energy, so not all glass sheets break. Additionally, the glass fragments remain bonded to this interlayer, preventing them to fall down.

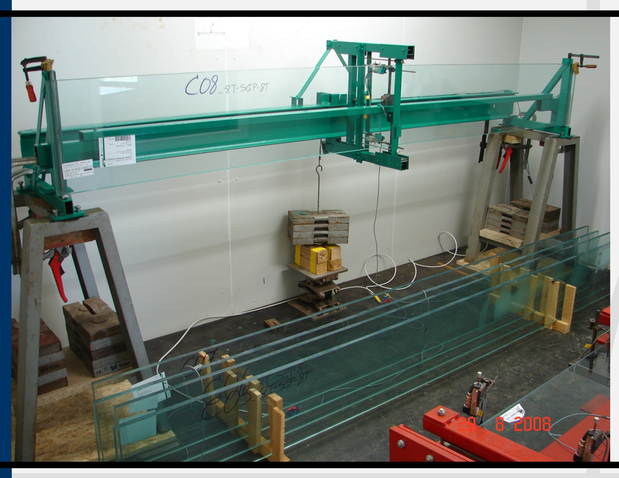




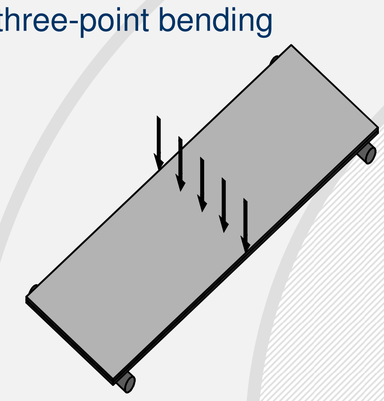
Recently, **SentryGlas® Plus** (SGP) was developed as an alternative for the existing softer interlayer material **Polyvinyl Butyral** (PVB). With this, also the pre-failure stiffness of the laminate could be increased significantly.
Because this is a relatively new, **complex visco-elastic material**, there exists only little knowledge of its exact material properties. This PhD-research tries to improve this.

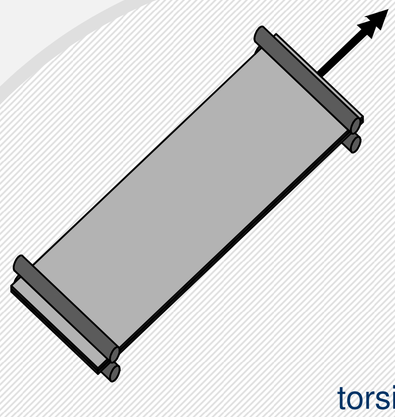
Test programme

By doing tests at **elevated temperatures**, the stiffness behaviour of the laminate at **long loading durations** is simulated.
Because of the complexity of realistic loading conditions for structural glass elements, the test programme focuses on two simplified test setups. One for **three-point bending** and one for pure **torsion**.



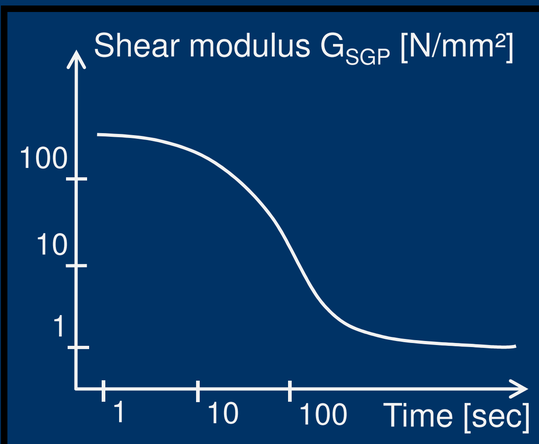
three-point bending



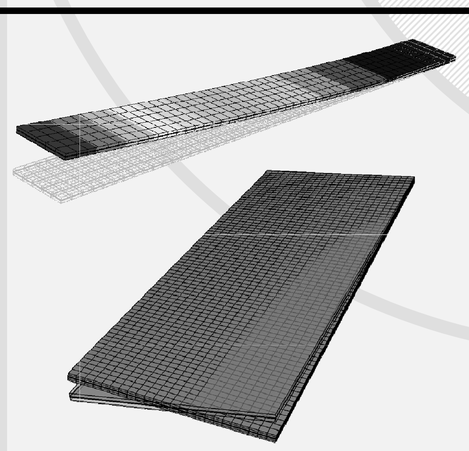


torsion

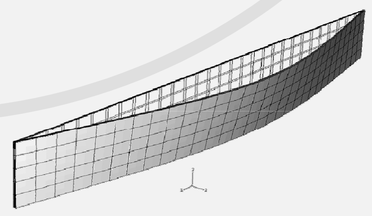
Visco-elastic behaviour



Out of the two different test series, the **function between the load duration and the shear modulus** for the SGP interlayer is deduced through analytic models.
With the **finite element analyses** (FEA) programme Abaqus©, these results will be evaluated. This way, the **applicability** of the utilized test programme and the available calculation theories is verified.



After the FE-Model validated the chosen test method, **also more complex loading situations** can be calculated, e.g. the second order lateral torsional buckling of slender glass beams.



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