

Components for Local Load Transfer at Glass Compression Layers

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Summary

The TU Dresden is decisively involved in the development of a sustainable and transparent glazed roof structure. The designed transparent space grid structure is based on a conventional steel space grid, in which all steel members of the compression layer are replaced by glass panes. The glazing transfers large in-plane forces and serves as roof covering. Prerequisite for these structures is the load application of significant compression forces into brittle glass edges. The intended detail design requires a contact material, which is softer than glass while providing a high compressive strength, low creeping and a large working temperature range. Different metal alloys and polymers were tested with regard to their compressive strength. Tests on their creeping behaviour started in 2008.

Keywords: contact material, glass edge, thermoplastics, load application, creeping, glass layer, in-plane load

1. Introduction and concept of transparent double layer grids

The TU Dresden is decisively involved in the development of a glazed roof structure. In contrast to the most transparent but curved glass roofs this development is a plain, support-independent structure on the basis of a bending system. Using the principle of a steel space grid structure, the replacement of all bar members in the compression layer by glass panes increases the transparency and sustainability. This is achieved by the activation of the glass panes as primary load bearing element.



Figures 1: Concept of a transparent double layer grid

2. Mock-up and knots

The structure is completely modularized. Therefore equal modules build the mock-up. Each module is a stable, statically determined structure in the shape of a half-octahedron. Each module consists of a square glass pane, four quarters of a knot at each pane corner, four tension rods in the joints, four diagonal bars and one knot in the lower layer. The dimensions of the glass panes are 1.25 m square. The panes consist of laminated glass made of two layers of 10 mm heat-strengthened glass