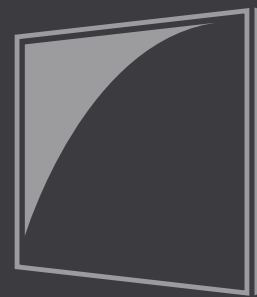


CADS Structural Glass Designer

Analysis, Modelling & Design

ENGINEERING SOFTWARE



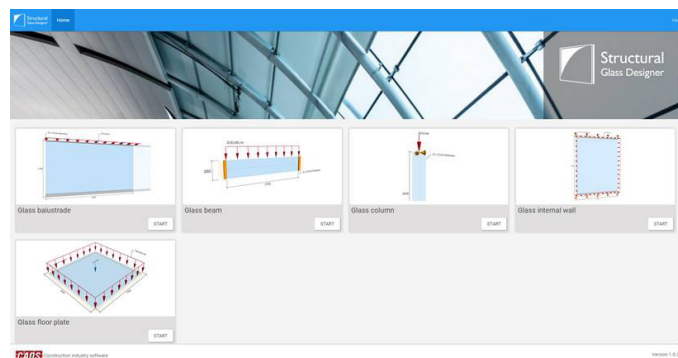
“The use of glass as a structural material within buildings has become increasingly common over recent years”

Overview

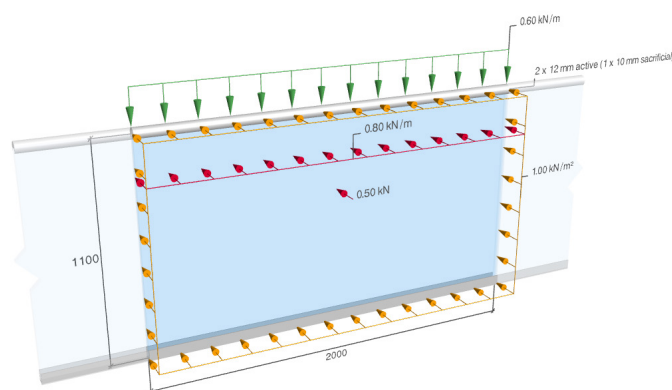
CADS Structural Glass Designer is a set of calculation templates specifically developed to allow structural calculation checks of glass elements to be carried out. These includes checks for different structural elements, such as beams, columns, slabs, walls and/or balustrade panels that are subject to different types of permanent and/or variable actions.

Solution

The use of glass as a structural material within buildings has become increasingly common over recent years. Using a simple and intuitive interface, this CADS software aims at assisting the Structural Engineer to carry out quick and reliable design checks of the structural glass elements. It provides a particularly useful tool when iterative checks are required.



Main window



Applied loads on 3D balustrade model

Benefits

- Allows the Engineer to assess the capacity of simple or laminated glass elements;
- Increases productivity by automating repetitive design procedures or where different design options need to be quickly compared;
- Improves checking and communication with other Engineers by producing simple calculation reports including formulae;
- Reduces errors by standardising the design process for varying elements;
- Documentation can be standardised and printed directly or exported to Word/PDF.

Features

Calculation

- The checking is carried out based on the calculation framework presented in the Structural use of glass in buildings (2nd edition), published by the IStructE;
- The strength of glass required is evaluated in accordance with the type of action applied to the glass element;
- The effective thickness of the element required is evaluated in accordance with the type and duration of the loading;
- Post-failure checks of glass elements.

Design strength

$$\text{Design strength of glass } f_{gd} = \frac{k_{mod} \cdot k_{sp} \cdot 45}{\gamma_{ma}} + \frac{k_v \cdot (f_{bk} - 45)}{\gamma_{mv}} = 83.31 \text{ N/mm}^2$$

Bending resistance

Bending resistance check

Applied bending moment	$BM_{ult} = M = 1.72 \text{ kNm}$
Number of active plies	$n_{active} = n - n_s = 2$
Effective thickness	$t_{ef} = (n - n_s) \cdot t = 20 \text{ mm}$
Elastic modulus	$W = \frac{t_{ef} \cdot (10^3 \cdot h)^2}{6} = 408333 \text{ mm}^3$
Moment of inertia	$I = \frac{t_{ef} \cdot (10^3 \cdot h)^3}{12} = 71458333 \text{ mm}^4$
Bending resistance of glass	$BM_{res} = \frac{W \cdot f_{gd}}{10^6} = 34.019 \text{ kNm}$

✓ The check has passed: The bending resistance of the glass is greater than the applied bending moment.

Deflection check

Deflection of the beam	$\delta = \frac{5 \cdot q \cdot L^4}{384 \cdot E \cdot I} \cdot 10^{12} = 0.07 \text{ mm}$
Allowable deflection	$\delta_{allowable} = \frac{L \cdot 10^3}{\delta_{ratio}} = 3.50 \text{ mm}$

✓ The check has passed: The deflection on the beam is less than the allowable.

Calculation report output ▲

Input

- Allows for laminated glass elements to be checked;
- Sacrificial layers with different thickness may be specified;
- Allows for inputting glass material properties;
- Interlayer properties from library or manufacturer test sheets may be specified;
- Input custom bending strength for glass based on the manufacturer specification;
- Customisable ratio limits, depending on the type of element;
- Choice of different load types and support conditions for the elements.

Output

- 3D and 2D preview of the glass elements;
- Customisable output with 3 levels of output details;
- Numerical and/or formulae output for easy checking and presentation;
- Clear output summary with Pass/Fail limit for each individual check performed;
- Easy sharing option by printing, exporting to file or individual calculation file sharing.

Geometry properties Loading details Material properties

Loading

Load duration: Five minutes (e.g. public balustrade) ▼

Horizontal line load

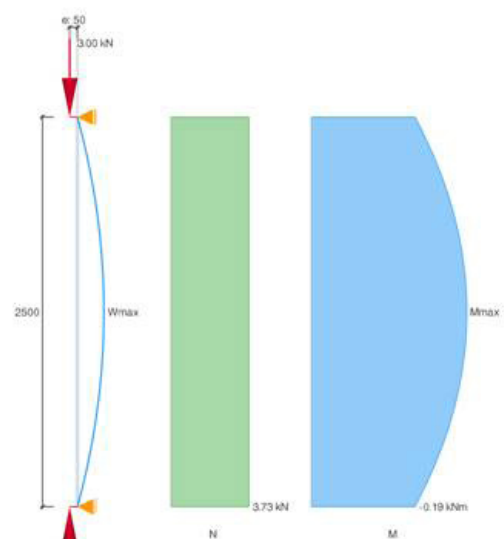
Line load: 0.8 kN/m

Line load height: 0.9 m

Area load

Area load: 1 kN/m²

Load input menu ▲



Internal forces in glass column ▲