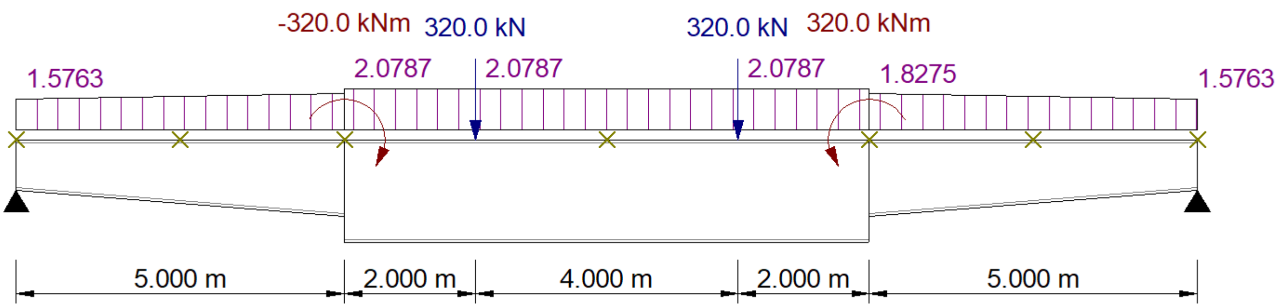
PLATE GIRDER

Built-up plate girders

Design | S06

Summary

Plate Girder designs I-shaped sections with identical or different top and bottom flanges. The program also allows the user to model tapered elements. The program checks the behaviour of girders under specified loading and gives guidance regarding bearing and intermediate stiffeners. The analysis output can be viewed graphically, or detailed design calculations can be shown.



What makes this module special?

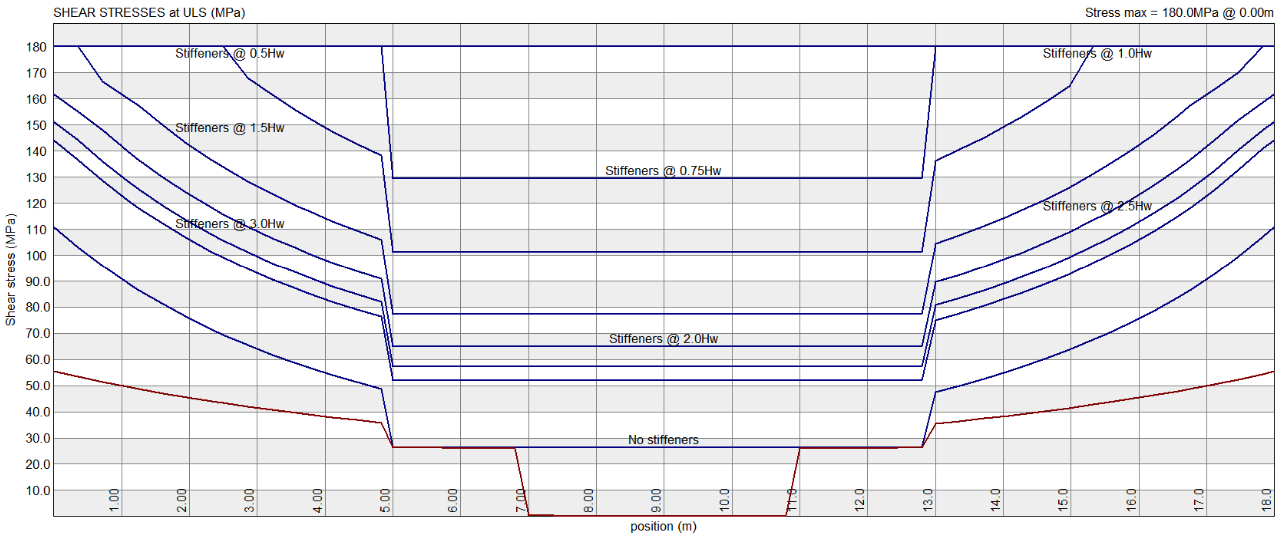
- Ability to model tapered sections
- Unsymmetrical I-sections can be used within design
- Graphical and detailed output given

Detailed Description

Welded plate girders can often be effectively and economically used as flexural sections. Modern mechanised manufacturing and automated welding techniques have simplified the production of plate girders greatly, boosting their popularity.

Plate Girder can design I-shaped sections with identical or different top and bottom flanges. The program also allows you to vary the section properties along the length of the girder to model a tapered element.

The program checks the behaviour of girders under specified loading and gives guidance regarding bearing and intermediate stiffeners.



Bi-axial bending moment

Plate girders are normally used to resist high bending moments and vertical shear forces. The program correspondingly assumes that these effects would govern the design and does not explicitly perform the checks for bi-axial bending moment.

The design output shows the complete interaction formulae, with the zero values for bending moments about the minor axis.

If required, the output formulae can be manually adjusted to include bending about the minor axis.

BS 5950 : Part 1 : 1990 4.8.3
Design approach: Moment taken by flanges, shear taken by web: 4.4.4.2 a)

Value of m used = 1.00
Value of n used = 1.00

a) Local Capacity check
Critical position at 2.50 m from left hand support

$$L_{cap} = \frac{F}{A_g \cdot P_y} + \frac{M_x}{M_{cx}} + \frac{M_y}{M_{cy}}$$

$$= \frac{0}{21680 \times 0.3} + \frac{836.987}{2\,226.999} + \frac{0}{227.561}$$

$$= 0.376$$

Buckling under axial compression

The program assumes that the effect of axial compression is small and therefore uses the full moment capacity for bending about the major axis. No capacity reduction is made on account of buckling about the major axis.

The analysis output can be viewed graphically, or you can view the detailed design calculations. Diagrams of the following results are given:

- The deflected shape of the plate girder.
- Ultimate limit state bending moment diagram. The bending moment diagram is drawn on the tension face of the girder.
- Ultimate limit state shear force diagrams.
- Bending stresses at ultimate limit state. The stresses in the top and bottom flanges are shown in red and yellow respectively.
- The shear stresses at ultimate limit state together with the shear capacity for various web stiffener spacing. The actual stresses are shown in red and the shear capacities in blue.

Supported Design Codes

Design Codes

- BS 5950 – 1990
- BS 5950 – 2000
- CAN / CSA-S16.1-94
- SABS 0162 - 1984
- SABS 0162 - 1993