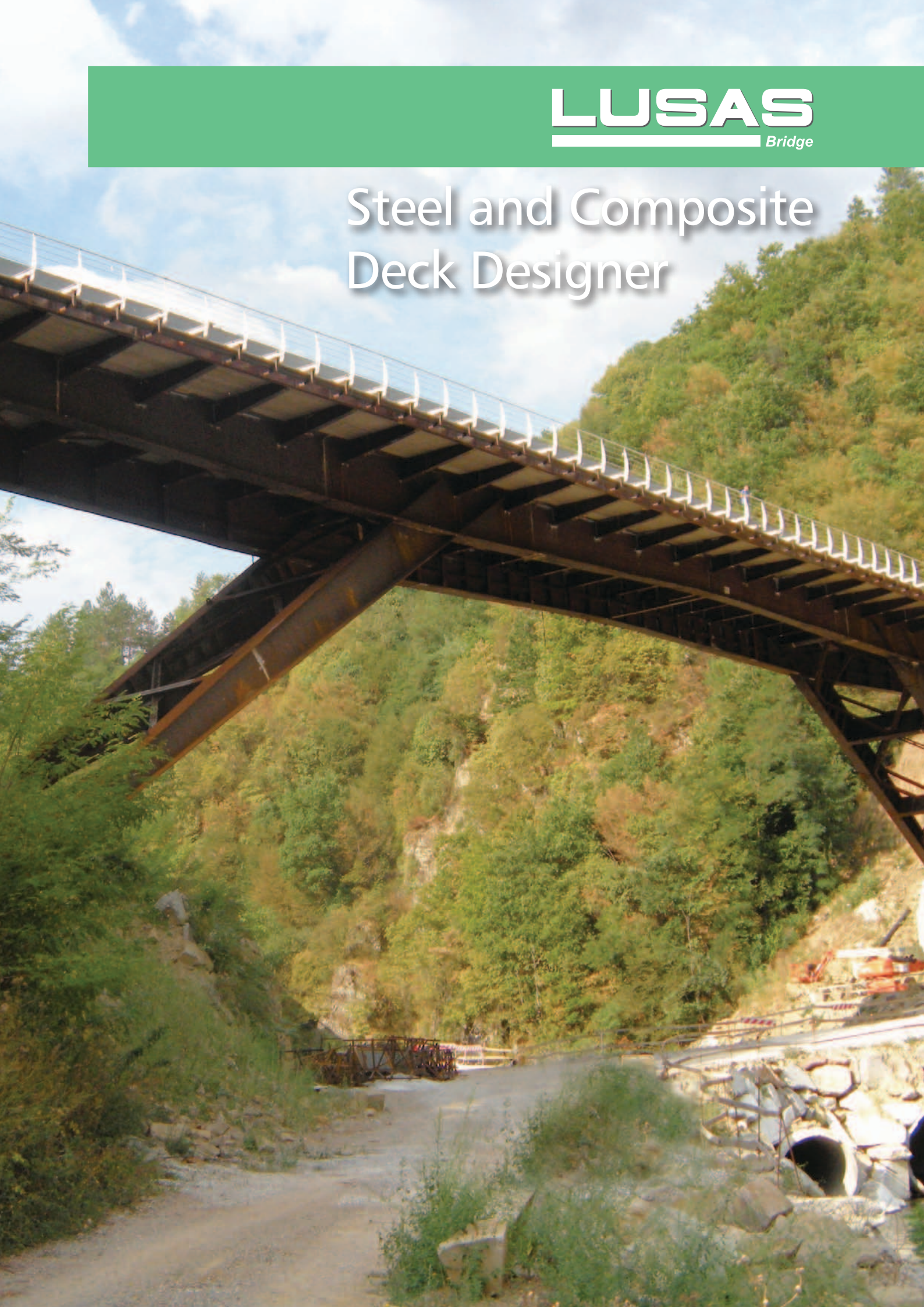
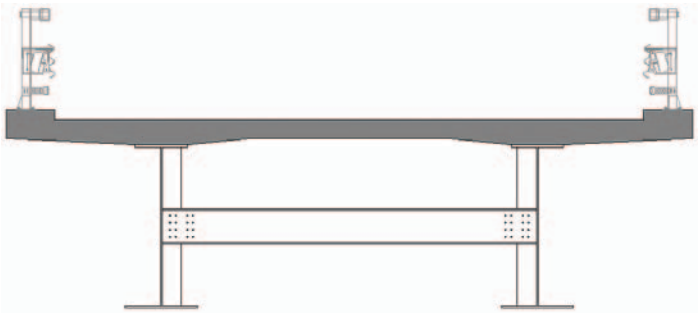
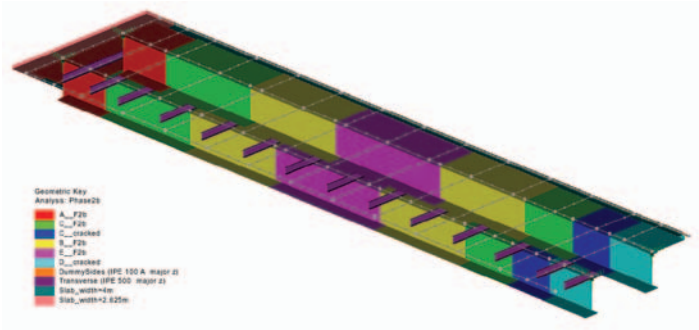
LUSAS
Bridge

Steel and Composite Deck Designer







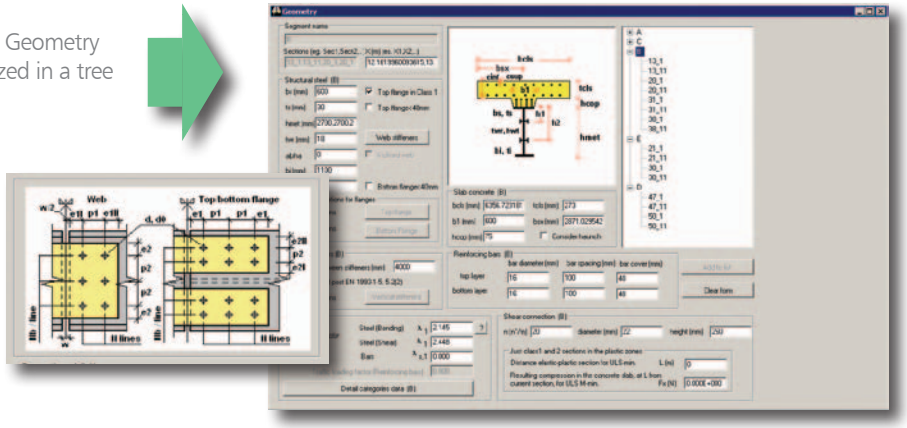
Steel and Composite Deck Designer

The Steel and Composite Deck Designer is a software option that carries out comprehensive calculations for multiple sections on steel or steel/composite bridge decks to the Eurocodes, allowing otherwise time-consuming and error-prone design calculations to be carried out efficiently. Force and moment results for specific bridge deck elements are provided by LUSAS, and loadcase combinations defined within LUSAS are associated with design limit states and phases defined in the Deck Designer.

Section definition

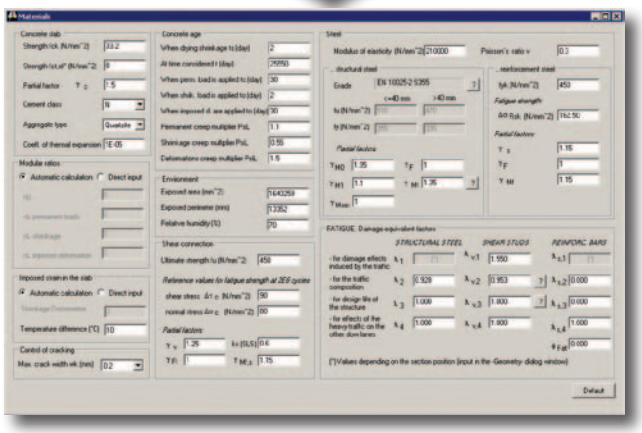
Deck section information is defined in the Geometry dialog of the Deck Designer and is organized in a tree structure.

Additional dialogs assist with the calculation of effective widths and shear lag; the setting of codified parameters such as fatigue damage equivalent factors for shear studs, structural steel and reinforcing bars; the specification of web and flange stiffeners, and for defining bolted connections.



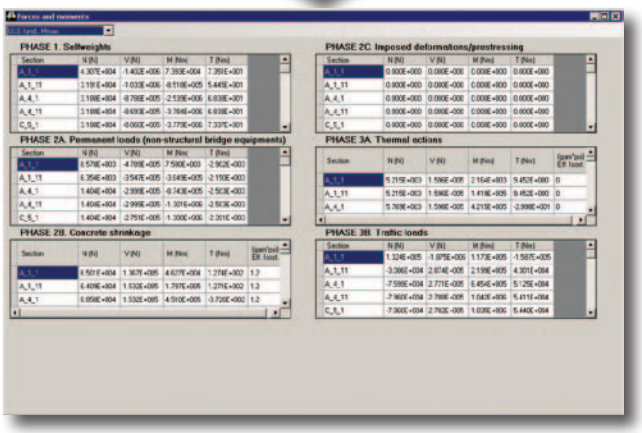
Material definition

Input of material properties is straightforward and can be adjusted to suit project requirements.



Force and moment data

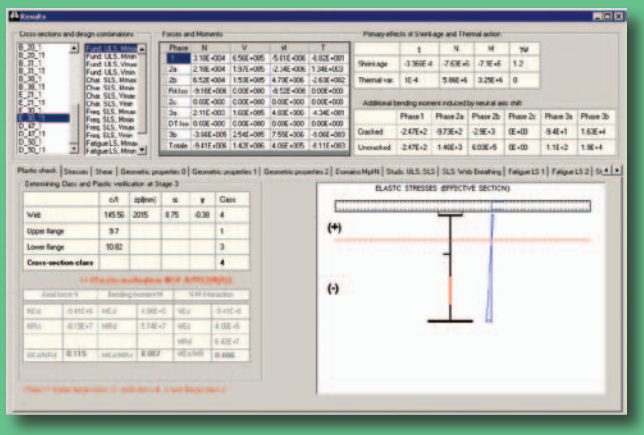
Construction stages and in-service conditions are assimilated, and design combinations organised in groups. Load effects for the various sections to be checked are displayed in a spreadsheet style.



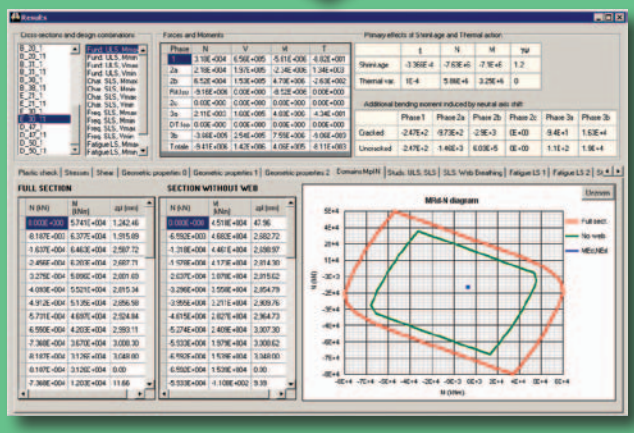
Design calculations and results output

Design calculations covering ULS bending, stress, shear and interaction; SLS stress, web breathing and fatigue checks for main members and connectors are carried out rapidly. Multiple sections with different properties (haunches, stiffeners, etc) can be considered, as can bolted connections. Results, output in tabbed dialogs, visually show values that pass or fail. Graphs and a report containing all input data and output with references to the Eurocode clauses can be easily created.

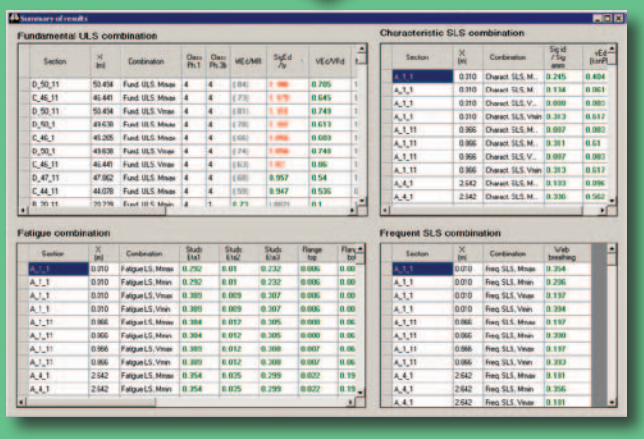
Easy-to-access results
A multi-tabbed results dialog gives access to the results for each of the design checks made for each deck section.



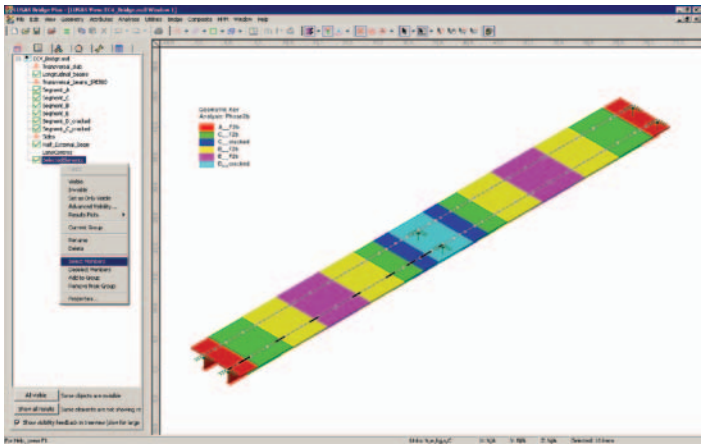
Descriptive graphics
Emphasis is on descriptive graphics as, for example, shown by a bending-shear interaction diagram showing web contribution included or excluded.



At-a-glance viewing of pass / fail values
Results summary tables values show (as do other results tables) colour coded values for those sections that pass or fail a particular design check.



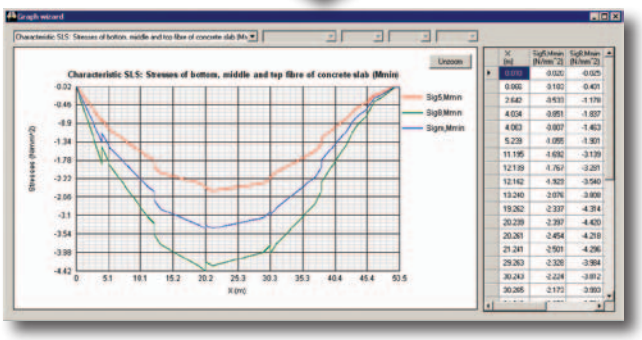
Crack checking
Where required, reinforced concrete crack width limitation can be carried out using the indirect method according to EN 1994-2 7.4 (3).



Results output (cont.)

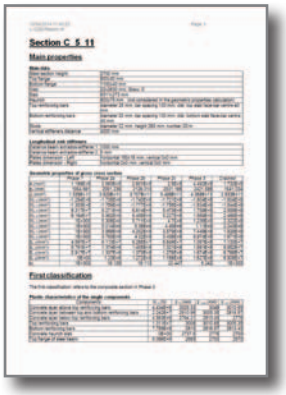
Graphing of results

Pre-defined graphs of utilisation factors, stresses, longitudinal shear per unit length, force and moments, etc. are easily plotted. User-defined graphs can also be created.



Reports

Reports, containing all or selected input and results data, are created with references to Eurocode clauses.



Bridge types supported

- Composite I-girders
- Composite tub girders
- Composite box girders
- Orthotropic steel decks
- Half-through girder bridges

The Steel and Composite Deck Designer provides automated ULS, SLS, fatigue and other calculations:

- Section properties
- Primary (isostatic) effects of shrinkage and temperature change
- Creep and shrinkage coefficients (EN1992-1-1, App B)
- Classification of sections (EN1993-1-1, Table 5.2)
- Ultimate bending check for Class 1 and 2 sections (EN1993-1-1, 6.2.5)
- Stress checks for Class 3 and Class 4 sections (EN1993-1-5, Section 4)
- Ultimate shear and web buckling (EN1993-1-5, Section 5)
- Shear lag and /or the buckling of longitudinally stiffened flanges is considered
- Bending-shear interaction (EN1993-1-5, Section 7)
- SLS stress checks (EN1994-2, 7.2.2 (5) and EN1993-2, 7.3)
- SLS web breathing check (EN1993-2, 7.4)
- Reinforced concrete cracking checks (EN1994-2, 7.4 (3))
- ULS, SLS and fatigue checks for connectors (EN1994-2, 6.6 and 6.8)
- ULS, SLS bolted connections (EN 1993-1-8)
- Fatigue checks for both structural steel and reinforcement components (EN 1993-1-9, EN 1994-2, EN 1993-2)
- Transverse and longitudinal stiffener checks (EN 1993-1-5, 9.2.1 and 9.3.3)

LUSAS

All bridge images are of structures designed or assessed using LUSAS Bridge software / options.
Issue 1.

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