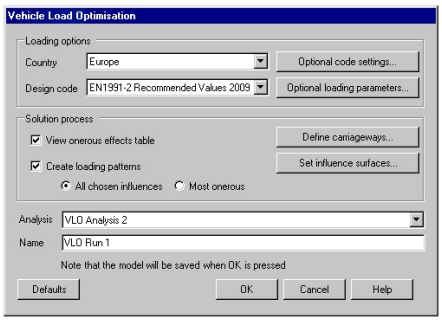
product option

LUSAS Bridge

LUSAS Traffic Load Optimisation

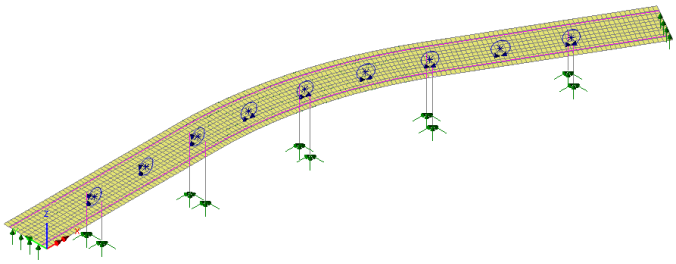
The LUSAS Traffic Load Optimisation (TLO) software option complements and extends the static and moving vehicle loading capabilities of LUSAS *Bridge.* LUSAS TLO identifies critical vehicle loading patterns on bridges and applies these loading patterns to LUSAS models.



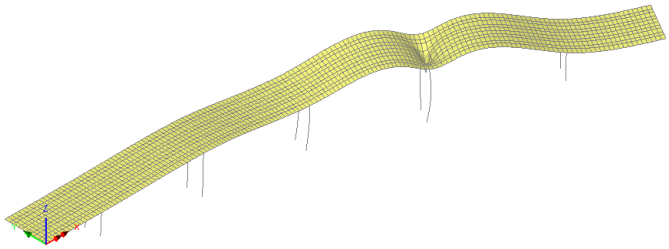
Its use helps to simplify the evaluation of worst load position, greatly reduces the amount of time spent generating models, and leads to more efficient and economic design, assessment or load rating of bridge structures.

How does traffic load optimisation work?

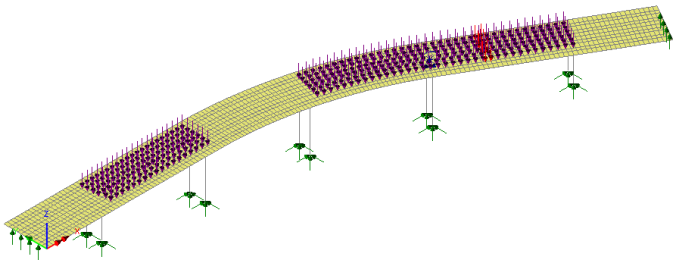
1 One or more positions on the LUSAS model that are to be used for loading evaluation are selected and assigned influence attributes. Kerb lines representing the extent of the carriageway are defined.



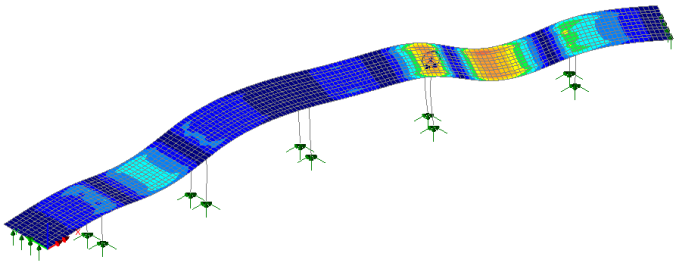
2 An influence surface for each position is automatically calculated (using a Direct or a Reciprocal Method) and can be optionally displayed.



3 The vehicle load optimisation facility interrogates each influence surface and calculates the critical loading pattern. The critical loading pattern can be optionally displayed prior to calculating loading effects.



4 The critical loading patterns are then used to calculate the loading effects on the model. Critical loading patterns can be optionally superimposed on deformed or undeformed results plots.



Onerous results

An onerous effects table can also be optionally displayed to show sorted results for all chosen influences at nodes that are visible, with the most onerous results listed first in the table. For Direct Method Influences these values are due to traffic loading for the specified load effect of interest at specified locations on the model. That is, a single value direct from the LUSAS Traffic Load Optimisation facility, without the need for a further static solution.

Additional traffic load patterns can be created on a case-by-case basis, if not already chosen as part of the initial solution.

LUSAS View: VLO Run 1 Inf1 (Mx) - Positive - StrengthI

	Influence Assignment	Node	Mx	Caused by	Create loading
1	Point 8 - (Surface 1)	127	224.859	HL93	Loading created
2	Point 8 - (Surface 2)	127	224.775	HL93	Create loading
3	Point 11 - (Surface 3)	113	224.15	HL93	Create loading
4	Point 11 - (Surface 2)	113	224.112	HL93	Create loading
5	Point 12 - (Surface 3)	10	206.304	HL93	Create loading
6	Point 12 - (Surface 2)	10	206.037	HL93	Create loading
7	Point 7 - (Surface 1)	23	205.848	HL93	Create loading
8	Point 7 - (Surface 2)	23	205.667	HL93	Create loading
9	(10.5074, 79.8113, 0.0) - (Element 57)	82	189.14	HL93	Create loading
10	(10.5074, 79.8113, 0.0) - (Element 77)	82	189.139	HL93	Create loading
11	(10.5074, 79.8113, 0.0) - (Element 75)	82	188.912	HL93	Create loading
12	(10.5074, 79.8113, 0.0) - (Element 60)	82	188.8	HL93	Create loading

Inf1 (Mx) - Positive - ServiceIII | Inf1 (Mx) - Positive - StrengthI | Inf1 (Mx) - Positive

... continued

Traffic Load Optimisation

SUMMARY OF USE AND BENEFITS

LUSAS Bridge

Requires:

- An influence surface, this can be from a shell, plate or grillage model
- Carriageway geometry - multiple straight lines, arcs or any combined sequence of these two feature types can be selected to define the extent of the carriageway
- Loading types to be specified for a particular design or country code

Produces:

- A critical loading pattern
- Load combinations to the chosen design or country code where both ultimate and serviceability limit states are considered in a single run
- An audit trail where the text files produced for each run can be printed out for Quality Assurance purposes

Design codes supported

- Australia: AS5100-2: 2004, AS5100-7: 2004 (Austroads)
- Canada CAN/CSA-S6-06 (Design)
- China: JTG D62-2015
- Denmark: DS/EN 1991:2 DK NA:2015
- Europe: EN1991-2 Recommended values
- Finland: LO 24/2014
- Ireland: EN1991-2
- Italy: EN1991-2
- New Zealand (Transit New Zealand Bridge Manual)
- Norway: NS EN1991-2.2004 NA 2010 + NA-rundsskiv 07-2015
- Poland: EN1991-2
- Saudi Arabia: MOMRA Bridges Design Specifications
- Sweden: EN1991-2 (2009), EN1991-2 (2011), TDOK 2013:0267 Version 3.0
- South Africa: TMH7
- United Kingdom: EN1991-2, BA34/90, BD21/01 including Annexes D and E, BD37/01 (Road+Rail), BD86/11, BS5400 Rail Railtrack document RT/CE/025
- United States of America: AASHTO LRFD (7th and 6th Edition) and AASHTO Standard Specifications (17th Edition)

Calculates:

- Lane widths within carriageway geometry
- Number of lanes to be considered
- Length of adverse areas of influence
- Load intensity and load position
- Cumulative effects of loading more than one adverse area
- Onerous results for all or selected influences

Flexible in operation:

- Straight or curved, or straight and curved carriageways accommodated
- Non-planar decks supported
- User defined vehicle loads e.g. tank transporters, abnormal loads
- Multiple trains of vehicles can be considered in a single run
- Multiple carriageways
- Loading options can be manipulated to meet client requirements

By using LUSAS *Bridge* with the Traffic Load Optimisation software option, guesswork is taken out of bridge loading and a much faster evaluation and more accurate appraisal of worst-case loading patterns is obtained.

LUSAS
Forge House,
66 High Street,
Kingston upon Thames,
Surrey, KT1 1HN, UK.

Tel: +44 (0)20 8541 1999
Fax: +44 (0)20 8549 9399
Email: info@lusas.com
http://www.lusas.com

PS7c - Issue 4