What's New in LUSAS Version 13.5

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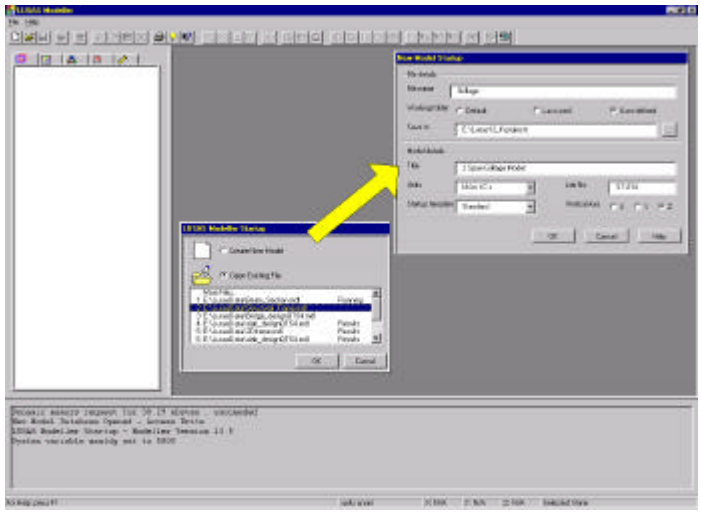
Introduction

This presentation will show some of the new and improved features added to LUSAS Version 13.5 with particular attention to the Bridge and Civil facilities. It will cover such topics as the enhanced model generation wizards, section property calculator and the updated vehicle load optimisation facility and how to use them to best effect.

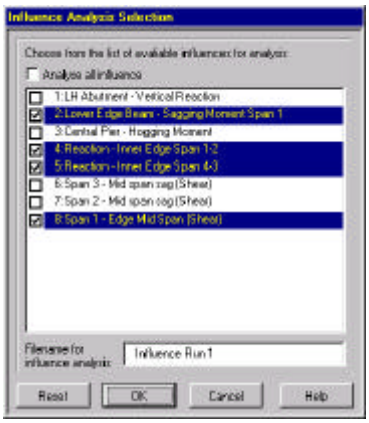
Summary of Generic New Features

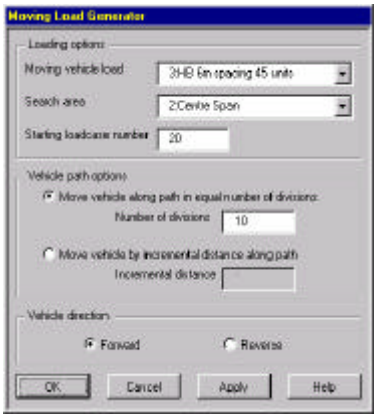
1. An improved Modeller Startup Wizard allows the creation of new models or the ability to browse and open recently used files. The file list reports the status of each file i.e. whether it is in use, indicates the presence of associated results or if model crash recovery is possible. The option to load an associated result file on top of the selected model is also given if any are present. The Model Startup form eases the definition of generic information required for the creation of new models. Information such as the model title, templates, vertical axis and units can be specified.



2. An enhanced vehicle load optimisation facility simplifies the use of Autoloader. The loading codes supported have been extended and include AASHTO (USA), BD21/97 and BD21/01 (UK), BD37/88 and BD37/01 (UK), BRO94 (Sweden), Denmark, Finland, Norway, Eurocode (ENV 1991-3:1995 Part 3), Korean, JKR (Malaysia) and HK (Hong Kong).

3. A fully selectable influence analysis function allows the choice of influence definitions to be analysed.



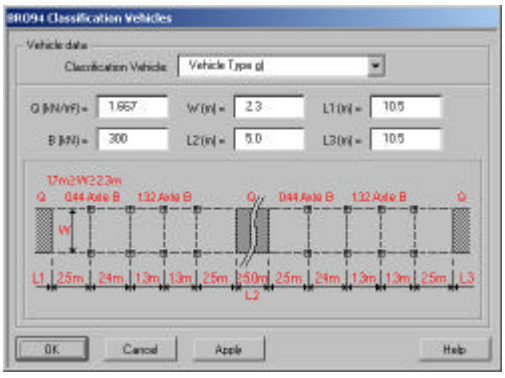


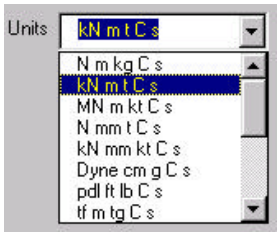
4. An enhanced moving load generator provides the ability to move vehicle loads along predefined lines. In Version 13.5 this has been enhanced to orientate vehicles on inclined lines, arcs and recognised search areas.

5. An automatic backup facility gives the ability to save a copy of a model, in any supported format (*.mdl, *.cmd), to an alternative location during saving. This is useful for backing up to network drives whilst working on a local hard disk drive.

6. Version 13.5 has increased Visual Basic Scripting functionality. This allows greater flexibility within the LUSAS programmable Interface.

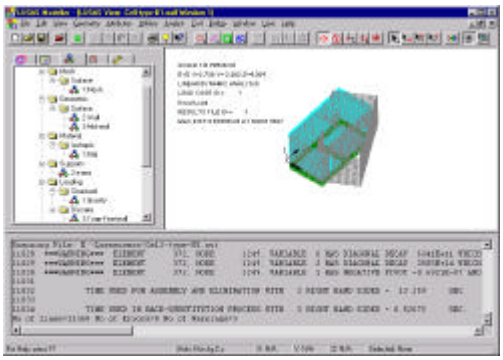
7. Increased vehicle and train load generation wizards allow easy definition of standard loads. These additions include AASHTO (LFD), AASHTO (LRFD), BD21/01 (UK), BRO94 Classification loads, Finland, Norway and Eurocode (ENV 1991-3:1995 Part 3).



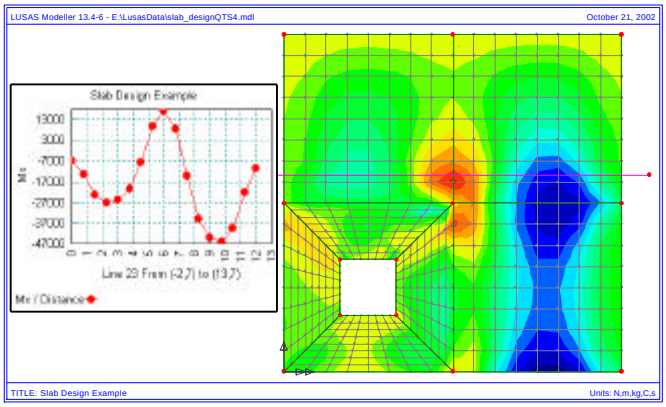


8. Increased supported unit systems. These range from SI to empirical based systems. All of the unit systems are consistent, therefore can be sed for linear, nonlinear and dynamic analyses.

9. The option to scan Solver output files (*.out) for errors and warnings and display the findings in the text output window gives better checking ability during the solving process.



10. The ability to save graphs generated by Modeller as image files (bmp, jpeg, wmf, etc.). This allows graphs to be added to the model view area as annotations. This is useful for QA purposes and presentation of results.



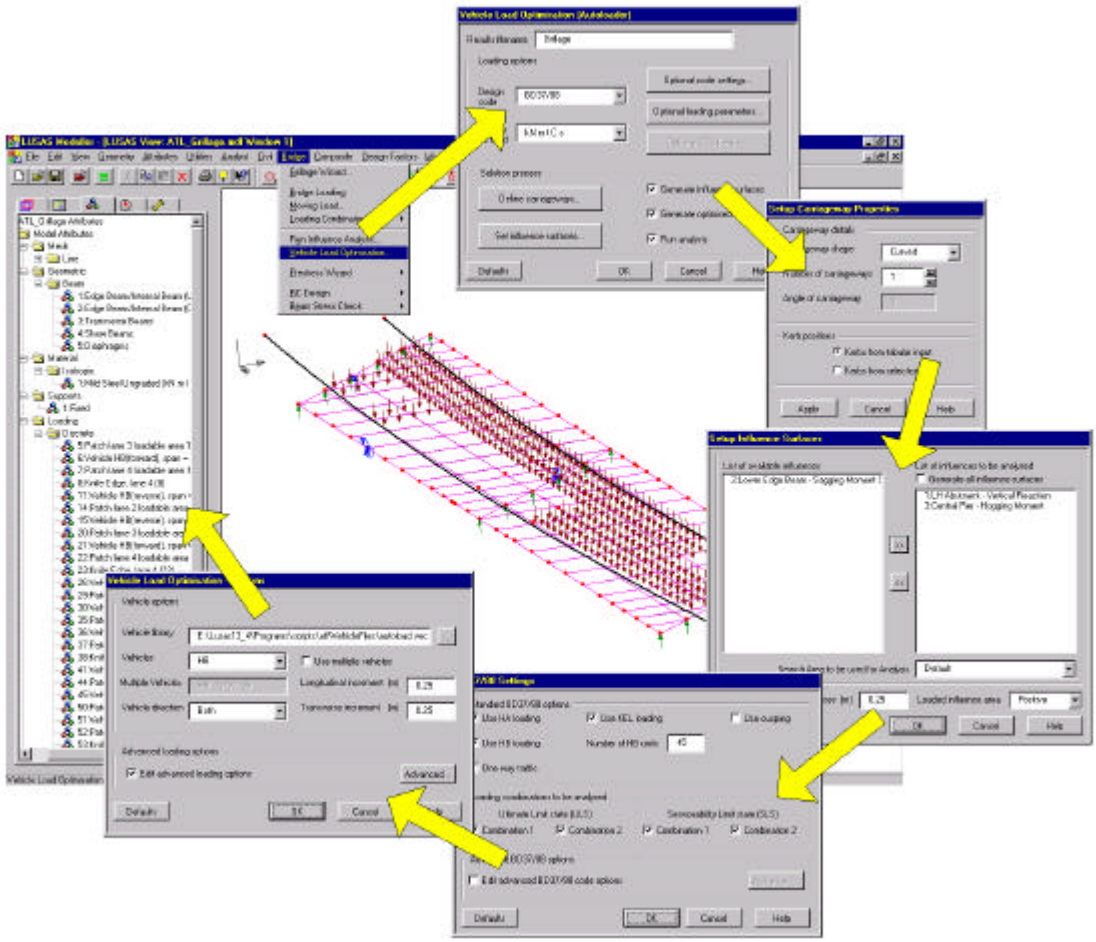
11. Ability to graph using the slice technique with defined features such as points and lines. The advantages are that the same slice can be used for different result types and the graph can be traced back to its location in the model.

12. LUSAS Solver's result and restart files (*.mys and *.rst) have been significantly reduced in file size. The reduction in file size is up to 70-80%, significantly saving in disk space.

13. Full support of international locale settings. This has been extended to the LUSAS Programmable Interface (LPI) for Version 13.5. A locale is a set of user preference information related to the user's language, country/region, and cultural conventions. The locale determines such things as keyboard layout, alphabetic sort order, as well as date, time, number, and currency formats.

14. Wood-Armer components from smart combinations.

Vehicle Load Optimisation



The Vehicle Load Optimisation wizard has been significantly improved from Version 13.4. In addition to the increase in supported loading design codes the improvements give the user more control over their analysis. More options are given to simplify and speed up the use of Autoloader for the generation of the most adverse loading for each influence surface.

Some of these improvements include:-

1. Full audit trail of the Autoloader analysis. Summary file (*.sum) gives information of carriageway and lane length intensity, load factors and total applied load. The input file (*.inp) gives a full statement of all parameters used for load generation. The log file (*.log) echos the analysis information.

2. The ability to apply load to user defined parts of a model using search areas. This is useful if particular spans are to be loaded with live load. Full 3D models can be analysed (box culverts, retaining/wing walls, 3D deck cross sections) with only the deck specified for loading analysis.

3. Multiple KEL application for loading code that support this concept e.g. AASHTO (Load Factor Design - LFD), AASHTO (Load-and-Resistance Factor Design - LRFD) and Korea.

4. The option to use the partial load factor $?_{f3}$ parameter for loading codes BD37/88, BD37/01, BD21/97, BD21/01. For example, if a steel element is being considered, $?_{f3}$ is not applied to the load effect. It is instead used when deriving section capacity. However, if a concrete element is being considered, $?_{f3}$ is applied to the load effect.
5. The ability to select particular load combinations for analysis e.g. BD37/01 Combinations 1 / 2 ultimate (ULS) and serviceability (SLS) limit states.
6. Fully selectable influence analysis list allows Autoloader to analyse a user define selection.

In order to use the Vehicle Load Optimisation facility the locations at which the optimised loads are to be calculated and the parameter to be computed must be chosen. An influence surface must be generated for each of the chosen locations and parameters. LUSAS can calculate the influence surfaces for any specified position in the structure using the Muller-Breslau principle whereby the mesh is "broken" at each specified point and constrained to act in the required manner.

CEB-FIP Creep and Shrinkage Model

The concrete material properties to CEB-FIP Model Code 90 are accessed via the Specialised materials option on the Material drop down menu. It is only available for BTS3, BM3, BS3, BS4, BSL3, BSL4 elements.

The input units must in N and mm to comply with the empirical formulae in the CEB-FIP Code 1990.