Getting Started Guide

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Getting Started Guide

Introduction

LUSAS is one of the world's leading structural analysis systems. By choosing to use LUSAS you are joining a large worldwide community of engineers who use LUSAS everyday to solve a wide range of engineering analysis problems.

Before starting to use LUSAS it is strongly recommended that you read this Getting Started Guide in its entirety. It provides an essential overview of the LUSAS Modeller user interface and of the processes involved in creating models, running analyses and viewing results. The guide also lists the LUSAS documentation available for you to use and provides information on additional resources including how to obtain technical support.

About LUSAS

The LUSAS system uses finite element analysis techniques to provide accurate solutions for all types of linear and nonlinear stress, dynamic, and thermal/field problems. The two main components of the system are:

- **LUSAS Modeller** - a fully interactive graphical user interface for model building and viewing of results from an analysis.
- **LUSAS Solver** - a powerful finite element analysis engine that carries out the analysis of the problem defined in LUSAS Modeller.

The Application Products

LUSAS is made available as different application products with the user interface tailored specially to the needs of a particular application. For example bridge engineers will see facilities provided specifically for the analysis of bridge structures. Such facilities are normally conveniently grouped together inside a product application menu, such as Bridge, Civil, Composite etc, that is loaded between the Utilities and Window menu items in the main menu.

Academic users have the choice of which application product they would like to use. When starting LUSAS Modeller an additional dialog offers this choice.

The application products include:

- **LUSAS Bridge** – for bridge engineering analysis, design and assessment.
- **LUSAS Civil & Structural** – for civil, structural, nuclear, seismic, geotechnical and offshore engineering.
- **LUSAS Analyst** – for automotive, aerospace, defence, manufacturing, and general engineering analysis.
- **LUSAS Composite** – for engineers designing composite products or components.
- **LUSAS Academic** – available to academic establishments for teaching and research use and allows use of all of the above products together with most of the options available for those products.

What's New

When you run LUSAS Modeller for the first time you will be presented with information that links to a 'What's new' page. This will tell you what has changed since the last major version and cover any interim releases. It will be of particular interest to existing users upgrading from an earlier version of LUSAS.

Contact Information

LUSAS is the trading name of Finite Element Analysis Ltd whose headquarters is located in the UK. LUSAS is supported around the world by a number of LUSAS regional offices as well as by a network of LUSAS Distributors. See the LUSAS website for details.

LUSAS Headquarters

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LUSAS Contact Email Addresses:

General Enquires : **info@lusas.com**

Sales Enquires : **sales@lusas.com**

Technical Support : **support@lusas.com**

Training Services : **training@lusas.com**

Engineering Consultancy Services : **consultancy@lusas.com**

Your LUSAS Installation

Your LUSAS software is provided to work with either a standalone licence or a network licence. A security key code is also required to use the software. Full details

on how to install, modify or configure LUSAS are provided in a separate *Installation Guide* which is available in print form or in PDF format on the installation CD.

Teaching and Training Version

Your LUSAS software can be used for teaching and training purposes, and when done so the software runs with limitations on problem size. Please refer to the *Installation Guide* for further information or contact your LUSAS supplier if you wish to use LUSAS for teaching or training.

Hardware Requirements

For the latest information on the recommended and minimum system requirements for LUSAS please refer to **http://www.lusas.com/pcspec.html**

Using LUSAS - An overview

Carrying out an analysis with LUSAS will involve three main stages:

- **Modelling**
- **Running the analysis**
- **Viewing the results**

Modelling is sometimes referred to as 'pre-processing' and viewing and manipulating the the results is sometimes referred to as 'post-processing'. Further details of these stages are provided below.

Model Types

Two types of model can be created in LUSAS:

- **Feature-based geometry models** these are based on features (such as points, lines, surfaces and volumes) that are defined inside LUSAS, or are created from imported geometry and require the definition of mesh objects such as elements with their associated nodes.
- **Mesh-only models** - these comprise only mesh objects (elements and their associated nodes, edges and faces) and are created by importing only those types of LUSAS model data, or third party data that are supported.

With very few exceptions the majority of LUSAS models are featured-based.

Modelling

Modelling involves creating a geometric representation of a structure and defining its characteristic behaviour in terms of its physical properties such as material, loading, and support.

- **Geometry**

  Within LUSAS Modeller the geometry of the model is defined using points, lines, surfaces and volumes. A volume needs surfaces to enclose it and to define its boundary. Similarly a surface needs lines to form its perimeter and lines need points to define their ends. The shape of a surface between its boundary lines, and the shape of a line between its end points can be simple (straight lines, flat surfaces) or complex, depending on the manner in which it was created.

  Many different tools exist within LUSAS Modeller to aid the creation of geometry. In particular the geometry can be entered numerically, in terms of coordinates, by cursor (using the mouse) or by copying, splitting, intersecting and transforming previously existing parts of the model. Geometry can also be imported from third-party interface files.

- **Meshing attributes**

  Whilst points, lines, surfaces and volumes allow the geometry of the problem to be represented or imported, to solve the problem, the geometric features must be broken down into discrete nodes and elements. This process is known as meshing and the collective term for all the elements and nodes, once created, is the mesh. Special attributes, called mesh attributes, are created and assigned to relevant geometry features to define the type and number of nodes and elements that will be used to represent each part of the geometry.

  A significant advantage of this approach is that the density of the mesh can easily be changed without rebuilding the geometry or reassigning any attributes. Simply modifying a mesh attribute automatically changes the mesh density in any part of the model where it is assigned.

  Similarly, the element type can be changed in exactly the same way. Different element types are suitable for different kinds of analysis, and the system provides an easy way to change from one to another.

  Generally LUSAS Modeller automatically and incrementally updates the mesh whenever a change is made to any part of the geometry or any mesh attributes. However these automatic updates are not allowed when results are being displayed, and they can also be switched off if at other times if required, for example to save time. This is known as locking the mesh. When the mesh is locked it will only be updated when specifically requested.

- **Other attributes**

  Other attributes are used to define aspects of the behaviour of parts of the model, or the external factors which are imposed on it. Within LUSAS Modeller, there are several types of attribute such as materials, loading and supports. Within each attribute type there may be further sub-divisions, for

example there are isotropic materials, anisotropic materials, and orthotropic materials, among others.

In each case an attribute is first created, and then subsequently attached to all or selected parts of the model. This attachment process is known as assigning. Thus a material can be assigned to a line. Once assigned, the line takes on the properties of the material until further notice. Assignment often involves specification of additional information that does not define the attribute or the geometry, but rather defines how one is applied to the other. This includes directions, scale factors and similar.

A special attribute, called a geometric attribute, is used when some or all of a model is comprised of lines or surfaces. In this situation, LUSAS Modeller needs to know the cross-sectional appearance and behaviour of lines, and also how thick the surfaces are. Geometric attribute assignments provide this information, and therefore form part of the model's appearance. Models comprised entirely of volumes do not need geometric assignments.

Many different tools exist within LUSAS Modeller to give interactive feedback on the nature of assigned attributes. This process is generally termed visualisation. Visualisation usually takes the form of coloured infills, arrows, textual labels or similar.

- **Analyses**

Within a single model file any number of analyses may be defined. Each analysis will inherit most of the assignments, options and settings of what is called the base analysis for the model. Use of the multiple analyses facility does away with the need to create separate models, or maintain "clone" copies of a model, in order to switch between and create results from linear static analysis and other analysis types.

- **Loadcases**

In a linear analysis, it is convenient to gather certain types of applied loading together, if it is applied at the same. for example gravity and wind loading which are applied at the same time. A loadcase is the term for such a collection of loading. Each loadcase is solved separately and the results are available separately. Results can be combined together during the results viewing stage if required.

In a nonlinear analysis, LUSAS loadcases are equivalent to analysis stages. Within each loadcase, the loading, supports, or type of analysis can be changed. Control parameters can be set for each loadcase.

- **Utilities**

Some kinds of analysis require or create extra data that is similar to attributes, but cannot be assigned to geometry. LUSAS Modeller refers to such data as utilities. Tendon profiles, reference paths and the settings made or entered to plot a graph or produce a report, for instance, are all examples of utilities.

- **Controls**

Finally, for analyses other than simple linear static, it is sometimes necessary to control the analysis process itself. LUSAS Modeller uses controls for this purpose. Controls are either nonlinear, transient, eigenvalue or fourier in nature.

- **Further Modelling Information**

Browse the LUSAS Modeller interactive online help system, or see the *Modeller Reference Manual* for detailed information about any of the above.

Running the Analysis

Once the modelling process is complete, the model is passed to LUSAS Solver for analysis. LUSAS Solver will then create results that are automatically loaded back into modeller for viewing and optional post-processing.

Viewing the Results

Results are available to be viewed in many different ways, and the results can, if desired, be combined with attribute visualisation to make a plot, for example, that shows the applied loading and the resulting deformations.

This is just a selection of some of the results facilities that are available:

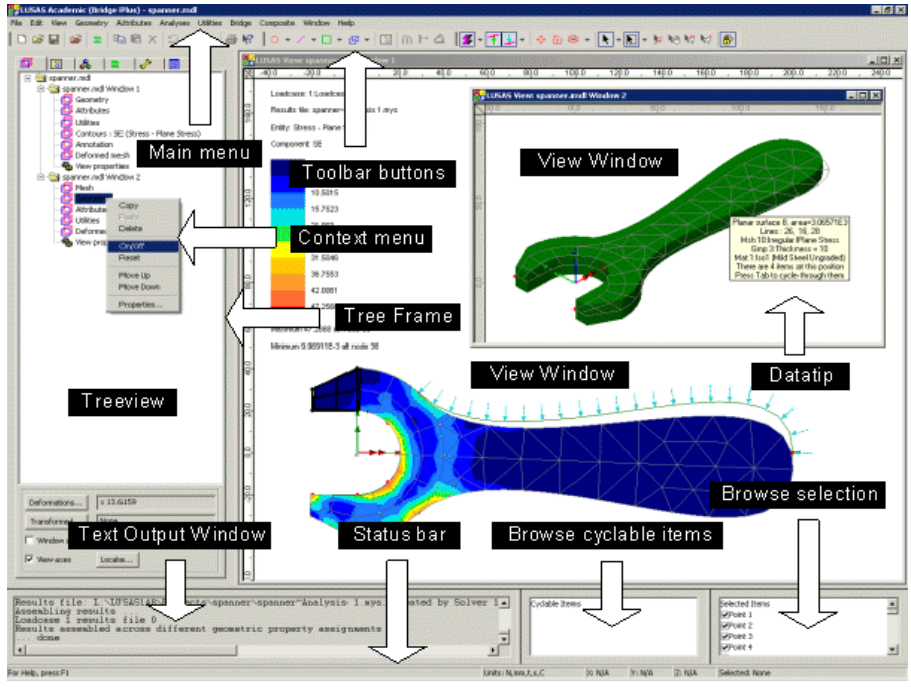
- **Averaged (also known as smoothed) contours**
- **Unaveraged (also known as unsmoothed) contours**
- **Deformed mesh**
- **Wood-Armer reinforcement calculations**
- **Slicing a plane through a solid**
- **Slicing a line across a surface**
- **Yield markers**
- **Graphs**
- **Vectors of stress, displacement, reactions, etc.**
- **Animations of the above, either through time or in response to excitation.**
- **Combinations and envelopes of results.**

Worked examples

A large selection of tutorial examples are available to help you to get up to speed with LUSAS and it is strongly recommended that you work your way through a selection of the examples to get a feel for the system before starting on your particular problem. See the *Examples Manual* and/or the *Application Examples Manual(LUSAS Bridge and LUSAS Civil & Structural).*

The LUSAS Modeller User Interface

The image below shows the principal user interface components of LUSAS Modeller.



The **View Window** shows the model itself. Each view window is completely independent and may show the model from a different angle, using different visualization options, with or without results. The image in a view window is built up from several drawing layers as listed in the layers panel in the Tree Frame. Each draws over the top of the one before it. In the example shown, Window 2 draws geometry first, then contours, then mesh, then annotation.

The **Tree Frame** has several tabbed panels each with its own **Treeview** showing a list of objects of a particular type. In the example shown the attributes panel is front-most.

Additionally there are panels of layers, groups, loadcases, utilities and reports. Each object in a Treeview has its own functionality. This can be invoked using its own context menu, the main menu or the toolbar buttons. In summary:

- The **Layers**  Treeview controls the display of selective model data and results data to a view window.
- The **Groups**  Treeview is used to store selected user-defined collections of objects (geometry, nodes or elements) under a collective name.
- The **Attributes**  Treeview contains information relating to the model; the element type and discretisation on the geometry; section properties and thicknesses; the materials used; how the model is supported or restrained; and how the model is loaded.
- The **Analyses**  Treeview shows all analyses defined; loadcases defined including analysis control loadcases defined during the modelling stage; results loadcases containing solutions for results processing; loadcase combinations and envelopes; and IMD and Fatigue calculations.
- The **Utilities**  Treeview contains utility items used in the definition of model geometry or attributes, or to control an analysis, or to provide a particular functionality, such as to define a load combination or produce a report for example.
- The **Reports**  Treeview contains a user-defined folder structure of reports, chapter and image entries to allow a report to be generated in a variety of formats.

Datatips provide basic model information about whatever is under the cursor. Tool tips report on uses of toolbar buttons or expected input for grid cells etc.

LUSAS provides continuous feedback in the **Text Output Window**. This includes errors, warnings and progress messages. The contents of the Text Window should be continuously monitored.

The **Status Bar** displays progress messages and help text during a modelling session, the model units, the current cursor position in model units (if the model is displayed in an orthogonal plane) and the item or number of items in the current selection.

The **Browse Cyclable Items** and **Browse Selection** windows (which can be optionally added to the interface) are populated with feature names of a selection.

Pressing the right-hand mouse button with an object selected in the View Window usually displays a **Context menu** which provides access to relevant operations. In addition, most items in the various Treeview panels also have a context menu which provides access to additional functionality such as editing of data, control of visibility, visualisation of assignments, and selective control of results plotting on selected attributes.

General notes

Within each View window, and within each Treeview, there is a current selection. In a Treeview there can only be one object selected at a time, and all commands are assumed to apply to it. In a View window several objects can be selected at the same time. Main menu and toolbar commands apply to whichever window was most recently clicked, either a View window or a Treeview panel.

Selected items support drag and drop functionality. Typically this will move them, copy them or connect them together. For example, dragging an attribute from the Treeview onto a View window assigns the selected attribute to the selected object in that window.

All the menus, toolbars, tree frame, text window, status bar and other similar windows can be resized, moved, made visible or invisible, and docked or separated from the main program window. LUSAS Modeller will remember their new location for the next time the program is run. Additional customization is possible - see the *Modeller Reference Manual* for details.

Documentation Available

Comprehensive documentation is provided with LUSAS. Some is available in the form of printed manuals, whilst some is only available in electronic format.

The documentation includes:

- **Installation Guide**
- **Getting Started Guide**
- **Modeller Reference Manual**
- **Examples Manual**
- **Application Examples Manual (Bridge, Civil & Structural)**
- **Application Manual (Bridge, Civil & Structural)**
- **Autoloader Reference Manual**
- **IMDPlus User Manual**
- **Rail Track Analysis User Manual**
- **Element Reference Manual**
- **Solver Reference Manual**
- **Theory Manual (Volume 1 and 2)**
- **Verification Manual**
- **CAD Toolkit User Manual**
- **Glossary**

Installation Guide

Details of installing LUSAS software for various licensing options.

- Available in PDF and printed form.

Getting Started Guide

Contains a brief overview of LUSAS.

- Available in PDF and printed form.

Modeller Reference Manual

Provides detailed reference material for modelling and results viewing with LUSAS Modeller.

- Provided in on-line help format and also available in PDF and printed form.

Examples Manual

Contains general worked examples to help you get up to speed with modelling, analysis and viewing of results for a range of different analysis types.

- Available in PDF and printed form.

Application Examples Manual (Bridge, Civil & Structural)

Contains application specific worked examples to help you get up to speed with modelling, analysis and viewing of results for a range of different analysis types.

- Available in PDF and printed form.

Application Manual (Bridge, Civil & Structural)

Describes the bridge, civil and structural application specific features of LUSAS and their uses.

- Available in PDF and printed form.

Autoloader Reference Manual

Provides detailed reference material for Autoloader, a bridge loading optimisation module for use with LUSAS.

- Available in PDF form.

IMDPlus User Manual

Contains details of how to carry out multiple loading events with advanced loading conditions for three main uses:

- ❑ Seismic response analysis of structures subjected to acceleration time histories of support motion.
- ❑ Moving load analysis of structures, such as bridges, subjected to moving vehicle or train loads, where the magnitude and configuration of the loading remains constant throughout the analysis.
- ❑ Moving mass analysis of structures, such as bridges, subjected to moving vehicle or train loads, where spring-mass systems are used at the axle/bogie positions of a vehicle.
- IMDPlus help is provided in on-line help format and also available in PDF and printed form.

Rail Track Analysis User Manual

Provides detailed reference material for the Rail Track Analysis option which permits track/bridge interaction analysis to the International Union of Railways Code UIC 774-3.

- Available in PDF form.

Element Reference Manual

Contains full element specifications. This is the place to go to find out which functionality your elements support and what output you will obtain from your element selection.

- Provided in on-line help format and also available in PDF and printed form.

Solver Reference Manual

This manual contains full details of the data syntax supported by LUSAS Solver. The data files required by the LUSAS Solver can be edited directly with a text editor.

- Available in PDF and printed form.

Theory Manuals (Volume 1 and 2)

These contain more detailed theoretical information for the more experienced user. They cover topics specific to LUSAS and where appropriate list references to other publications.

Theory Manual 1 topics include:

- ❑ Analysis procedures including: linear, nonlinear, dynamics, eigenvalue extraction, modal analysis, all forms of field analysis, fourier analysis and superelement analysis.
- ❑ Geometric nonlinearity.
- ❑ Constitutive material model formulations.
- ❑ Loads and boundary conditions with particular reference to general load types, constraint equations, slidelines and thermal surfaces.
- ❑ More complex post processing calculations, including nodal extrapolation and calculation of Wood Armer reinforcement moments

- Available in PDF form only.

Theory Manual 2 topics include:

- ❑ Element formulation theory.

- Available in PDF form only.

Verification Manual

A manual of LUSAS testcase examples benchmarked against known solutions.

- Available in PDF form only.

CAD Toolkit User Manual

Describes interfaces to LUSAS involving the use of external pre- and post-processing packages.

- Provided in PDF form only.

Glossary

Contains definitions of general terms used in all manuals.

- Provided in on-line help format. Included in the *Modeller Reference Manual*.

LUSAS Product Options

In addition to LUSAS software being provided as particular individual application products, product options are also available which extend the analysis capabilities of these products. Product options can be made available for use by the supply of an

appropriate security key that 'unlocks' the product option, allowing immediate access to the extended facilities in your currently installed software. If your current license doesn't support these product options then please contact your LUSAS supplier to find out how you can gain access to them.

The following software options are available for all products:

- **Fast Solvers** - This option includes additional solvers. The Fast Multifrontal Direct Solver can provide solutions several times faster than the standard Frontal Direct Solver for certain analysis problems. The Fast Multifrontal Block Lanczos Eigensolver can, similarly, return results several times faster than the standard Frontal Eigensolvers for certain problems. The complex eigensolver provides efficient solutions for large-scale damped natural frequency problems.
- **Nonlinear** - Nonlinear stress analysis is becoming increasingly important with designers employing a wider variety of materials in a multitude of different applications. The Nonlinear option, rightly regarded as the leader in nonlinear analysis, provides the very latest powerful techniques for solving problems having either material, geometric or boundary nonlinearity.
- **Dynamics** - Straightforward modal dynamics problems can be solved using Interactive Modal dynamics (IMD) techniques provided in all LUSAS products. The Dynamics Option contains the facilities required to solve a wider range of dynamic problems in both the time and frequency domains. By combining the Dynamics and Nonlinear options both high and low velocity nonlinear impact problems can be solved using either implicit or explicit solution techniques.
- **Thermal/Field** - The Thermal / Field option contains extensive facilities for both simple and advanced steady state, and transient thermal / field analyses. By combining the Thermal / Field option with other appropriate options, heat transfer due to conduction, convection and radiation can be analysed. In addition, the effects due to phase change of material may also be included.
- **Heat of Hydration** - Allows modelling the heat of hydration of concrete. The heat of concrete hydration can be computed during a thermo-mechanical coupled analysis and the temperatures and degree of hydration can be read into a structural analysis.
- **IMDPlus** - The IMDPlus option extends the Interactive Modal Dynamics (IMD) techniques provided in all LUSAS products. Whilst IMD models a single loading event in a single direction, IMDPlus allows multiple loading events with more advanced loading conditions to be solved. IMDPlus is used for three primary uses: Seismic response analysis of structures subjected to acceleration time histories of support motion; moving load analysis of structures, such as bridges, subjected to moving vehicle or train loads, where the magnitude and configuration of the loading remains constant throughout the analysis; and moving mass analysis of structures, such as bridges, subjected to moving vehicle or train loads, where spring-mass systems are used at the axle/bogie positions of a vehicle.

The following options are available for LUSAS Bridge only:

- **Vehicle Load Optimisation** - The Vehicle Load Optimisation facility incorporating the well-known Autoloader software complements and extends the vehicle loading capabilities of LUSAS Bridge and helps to simplify the evaluation of worst load position for various load configurations. Vehicle load optimisation is used to identify critical vehicle loading patterns on bridges and apply these loading patterns to analysis models. It reduces the amount of time spent generating models and leads to more efficient and economic design, assessment or load rating of bridge structures.
- **Steel and Composite Deck Designer** - carries out comprehensive calculations for multiple sections on steel or steel/composite bridge decks to the Eurocodes
- **Rail Track Analysis** - The Rail Track Analysis option permits track/bridge interaction analysis to the International Union of Railways Code UIC 774-3. It allows you to automatically build models from data defined in MS Excel spreadsheets, run an analysis, and quickly produce results in spreadsheet or results file formats.

Useful Publications

As a LUSAS user two useful and interesting publications are occasionally sent to you:

- **LUSAS eNews** - keeps you informed by email of latest developments, new software versions and updates etc. Also contains links to new case studies, tips and tricks etc on the LUSAS website. **Click here** to subscribe, or email enews@lusas.com.
- **LUSAS News** - a printed newsletter, sent occasionally, contains news and recent case studies showing interesting uses of LUSAS from around the world.

Keeping Up To Date

In addition to the above methods of keeping you informed about LUSAS you can also check on the latest news and events yourself by visiting the LUSAS website at **http://www.lusas.com/news.html**

Technical Support

Avoiding and Identifying Problems

A team of engineers in LUSAS Technical Support is available to all clients who have a current support and maintenance contract, to provide modelling advice and assistance with any problems that may be encountered. However, to identify the cause of a problem may take time, especially if the analysis is large. Therefore preventative measures should always be taken in an effort to avoid problems in the first place.

1. Your analysis model should be thoroughly checked against intended data input to verify that all geometry, attributes and assignments have actually been input correctly.
2. Read and follow the advice in the *Pre-Analysis Checks* and *Post-Analysis Checks* sections of the Running an Analysis Chapter of the *Modeller Reference Manual.* It is always good practice to systematically carry out these checks as a matter of course whether or not problems are encountered.
3. Contact your local LUSAS office or LUSAS distributor, preferably by email including the relevant information suggested above.

   Details for local offices and distributors can be found at **http://www.lusas.com/distributors**

Contacting the Help Desk

With the aim of producing a more efficient service, some general guidance is given as to what information should be prepared before calling the Help Desk.

Please note that if LUSAS was supplied to you by a LUSAS distributor then they should be your first point of contact for support. Your local distributor will have access to the main LUSAS Technical Support Centre for assistance if required.

This information will help the LUSAS support engineers understand your problem more quickly:

- The exact text of any warning or error message(s). Preferably copied and pasted or in the form of a screen dump.
- Machine specification - operating system, physical memory, virtual memory and available disk space.
- A copy of the model or data file causing problems.
- A list of the last commands used in LUSAS Modeller or a copy of the session file.
- The contents of the last LUSAS Modeller error log, LUSASM_x.ERR
- Full details of the LUSAS Modeller/LUSAS Solver version numbers in use, the LUSAS Solver version number is written to the header section of the output file and the LUSAS Modeller version number is obtained from the **Help> About LUSAS Modeller** menu item.
- For complex or difficult to describe problems, email or fax a simple diagrammatic representation before calling to aid any discussion.

- If telephoning the Help Desk try to be logged onto the computer when calling or be close enough to the computer to try any suggestions provided by the support engineer.
- A support tool is available to help ensure that if a support query is raised all relevant model files can be submitted to LUSAS Technical Support to aid with the resolution of the query. It is accessed using the **Help > Support Tool** menu item.

LUSAS Technical Support

Contact details for the main LUSAS Technical Support Centre are:

LUSAS Technical Support

Forge House,
66 High Street,
Kingston upon Thames,
Surrey,
UK

Tel: +44 20 8541 1999
Fax: +44 20 8549 9399

Email: **support@lusas.com**

Web Resources

A number of resources are also available via the main LUSAS website, regional LUSAS Websites and distributors' own websites.

Main LUSAS website

http://www.lusas.com

General support services

http://www.lusas.com/support

LUSAS User Area

http://www.lusas.com/usrcheck.html

Note that the User Area requires a username and password for access. This will be provided initially to the named LUSAS contact within your organization who should be consulted if necessary. It can also be requested by and sent to registered users of LUSAS. The User Area contains:

- Frequently asked questions (FAQs)
- Downloads (Software updates, latest examples etc.)
- Knowledge base
- And much more …

Training Services

Comprehensive training services are available to help get you up-to-speed quickly and ensure that you have sufficient knowledge of the relevant facilities in LUSAS to tackle the types of analysis that you want to do. The structured courses cover all aspects of LUSAS and run regularly throughout the year at designated venues. They can also be run at your site at a time to suit you. In addition we can also provide bespoke training to satisfy any particular requirements.

For further information see **http://www.lusas.com/support/training.html** or contact us at **training@lusas.com**

Engineering Consultancy Services

If you need greater assistance than that available through Technical Support then our team of engineering consultants is here to help. Whether you have a difficult analysis to carry out or need help with a peak workload, our rapid and cost-effective service will ensure that you get the best out of your designs.

For further information see **http://www.lusas.com/consultancy** or contact us at **consultancy@lusas.com**

Where Do I Go Next?

Two worked examples manuals are available either in PDF or printed form to help you start to use LUSAS. These are:

- ❑ **Worked Examples (General)**
- ❑ **Application Worked Examples (Bridge, Civil & Structural)**

The first example in either manual contains detailed information to guide you through the procedures involved in building a LUSAS model, running an analysis and viewing the results. This fully worked example details the contents of each dialog box opened and the necessary text entry and mouse clicks involved. The remaining examples

assume that you have completed the fully worked example and may not necessarily contain the same level of information.

The examples in these manuals are of varying complexity and cover different modelling and analysis procedures using LUSAS. It will benefit you to work through as many as possible, even if they have no direct bearing on your immediate analysis interests.

Additional examples may also be made available from the Support area of the LUSAS web site.