



Strand7 R3.1 Quick Start Guide for R24 Users

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CONTENTS

Introduction.....1

Installation .....1

Material and Section Libraries .....1

ST7 Files .....1

Startup Screen .....1

    Interface font and icon sizes.....2

The VISUAL tab .....2

    Rotate, pan and zoom.....3

    Right-click in model window.....5

    Selecting entities .....6

    Show/Hide Selected/Unselected.....7

    Hotkeys / Keystrokes.....7

    Inserting elements .....8

    Defining material properties.....8

    Tool locations .....8

    Equations and formulas .....10

    Utilities.....10

    Defining stages .....11

    Detecting free ends, edges and faces .....11

    Lock and unlock editable grids .....12

The CASES tab.....12

    Load and freedom cases .....12

    Seismic load case.....13

    Assign standard gravity value .....14

    Combine harmonic time history with linear static results .....14

    Envelopes and averaging of element results.....14

The TEXT Tab .....15

The LAYOUTS tab.....15

    Creating tables.....15

    Temperature vs Time .....15

    Plate RC.....15

    Cavities.....16

The SOLVERS tab .....17

    Solver scheme and node ordering .....17

    Results and filtering.....18

    Solver parameters.....19

    Reset nonlinear static load combinations.....19

    Append to existing spectral response results file.....19

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Retrieve effective modal damping from natural frequency solution .....	20
Results Icons .....	20
Extracting results .....	20
Results Settings .....	21
Brick cutting planes .....	21
Results combinations and envelopes .....	22
Results listings .....	22
Link results .....	22
Peek node reaction summation .....	22
Quick Reference .....	23

## Introduction

This quick start guide is intended to help Strand7 R2.4 (R24) users become familiar with the Strand7 R3.1 (R3) interface and new features. It assumes that the user is reasonably familiar with the R24 interface and workflow.

## Installation

As R3 and R24 are completely separate applications, they can both be installed on the same PC at the same time. They can even be running at the same time on the same PC while consuming only one Strand7 licence.

## Material and Section Libraries

R3 comes with a new and expanded set of material and section libraries, which it installs in **C:\ProgramData\Strand7 R31\Data**. If you have created your own material and/or section libraries in R24 and would like to use those with R3, you can copy the files to the appropriate sub-folder (for example, material files, which have the extension .MAT, are copied to **C:\ProgramData\Strand7 R31\Data\MAT**, and so on).

## ST7 Files

The model file name in R3 retains the ST7 extension. R3 opens ST7 files from all previous Strand7 releases. Upon opening, older files are converted to the R3 format. This process is relatively fast except for models that contain a large number of beam cross sections. Beam cross sections need to be rebuilt for use in R3.

When saving an ST7 file from a previous Strand7 release as an R3 file, the suffix “\_R3” is automatically appended to the file name (e.g., after opening the R24 file, Building.ST7, the first attempt to save that file in R3 will be suggested as Building\_R3.ST7). Although the suffix can be removed and the file saved using the previous name, keeping the suffix avoids losing the old version file, allowing for both versions of the file to be kept.

R3 stores much more information in the ST7 file compared with previous Strand7 releases. Consequently, the R3 version of an ST7 file will be larger than the R24 version. This is particularly the case for models that contain many beam cross sections; R3 stores an array of coefficients that relate shear forces and torque to shear stress on the cross section, and this will increase the ST7 file size considerably.

As the ST7 file format has changed, once saved in R3 the ST7 file cannot be opened in previous Strand7 releases. To convert an R3 ST7 file to a previous Strand7 release, R3 offers a text file export option. New features in R3 that are not directly supported by a previous release are converted to equivalent features, where possible. If it is not possible to do that, some data may be lost, in which case a warning message is given on export.

## Startup Screen

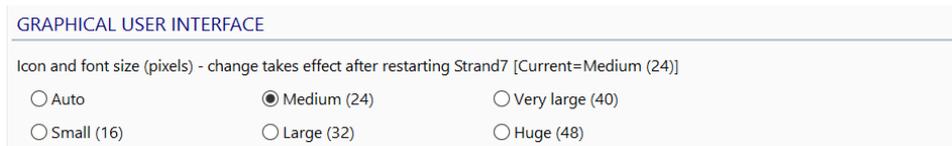
When you launch R3, you will notice that the R24 toolbar at the top of the screen is no longer present. Instead, you will see the Strand7 startup screen shown below. The startup screen allows you to access the Strand7 menu, create a new model, open an existing model, change preferences and launch the online help.



You can also drag-and-drop Strand7-supported files such as .ST7, .LTA, .TXT, etc., or CAD files such as .3DM, .IGS, .DXF, etc., onto the startup screen to open or import them. You can also drag-and-drop files onto an open model window to open or import them. The startup screen disappears once a model window is open but will reappear when all model windows are closed.

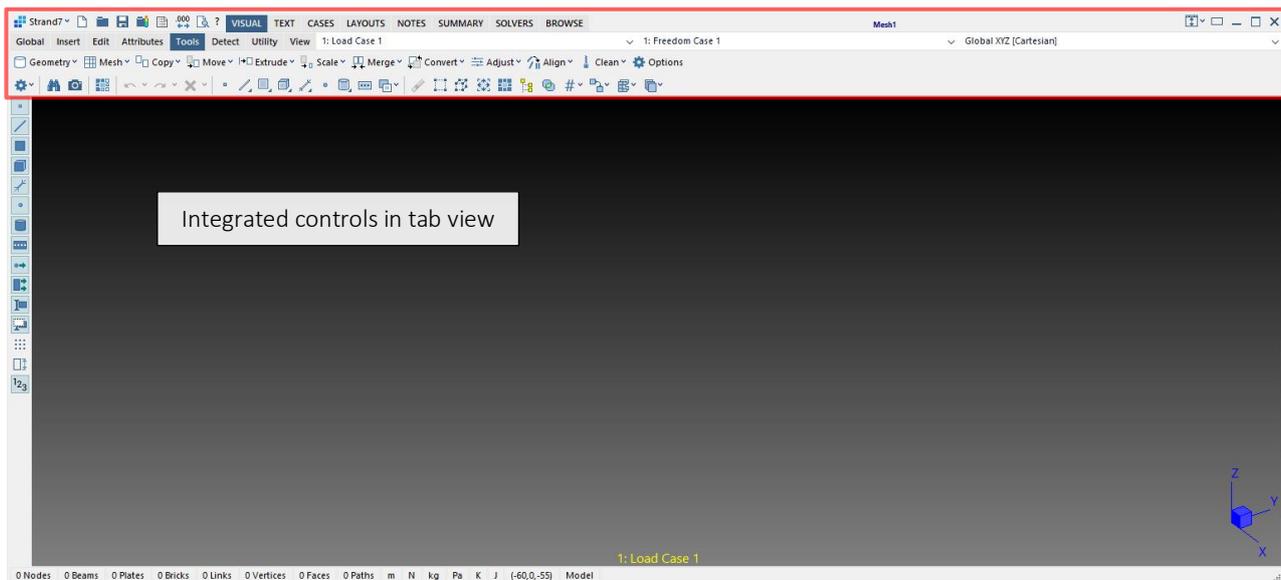
## Interface font and icon sizes

If the graphical user interface fonts and icons are too small to read or see comfortably, especially on screens with high resolutions, you can click  **Preferences**, or press **Alt+O**, to select larger sizes.

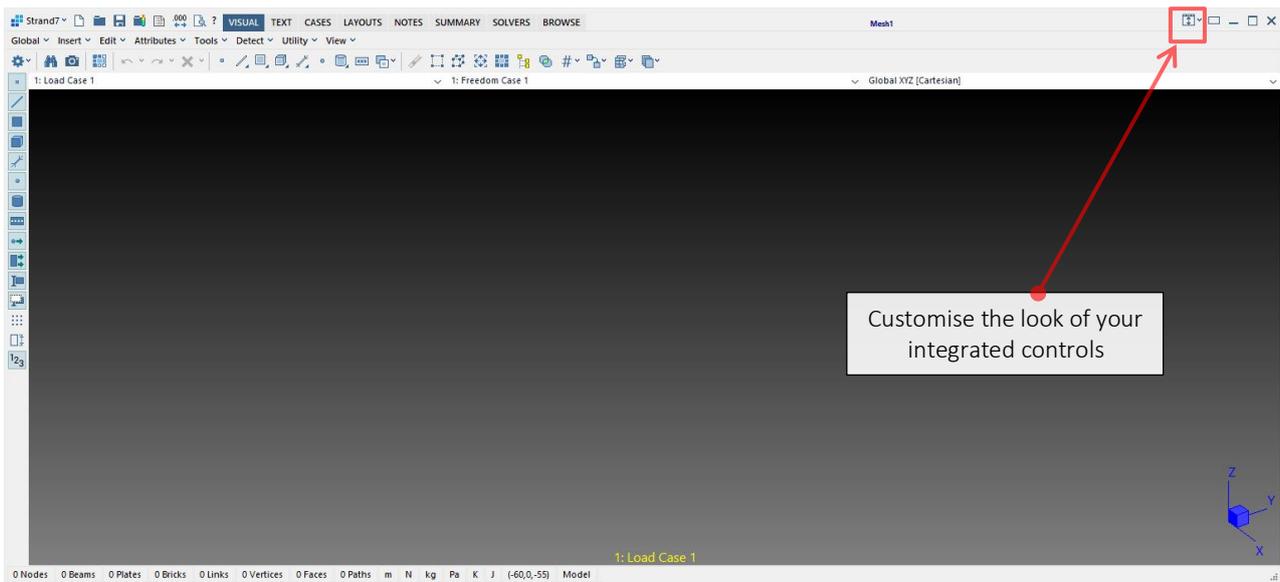


## The VISUAL tab

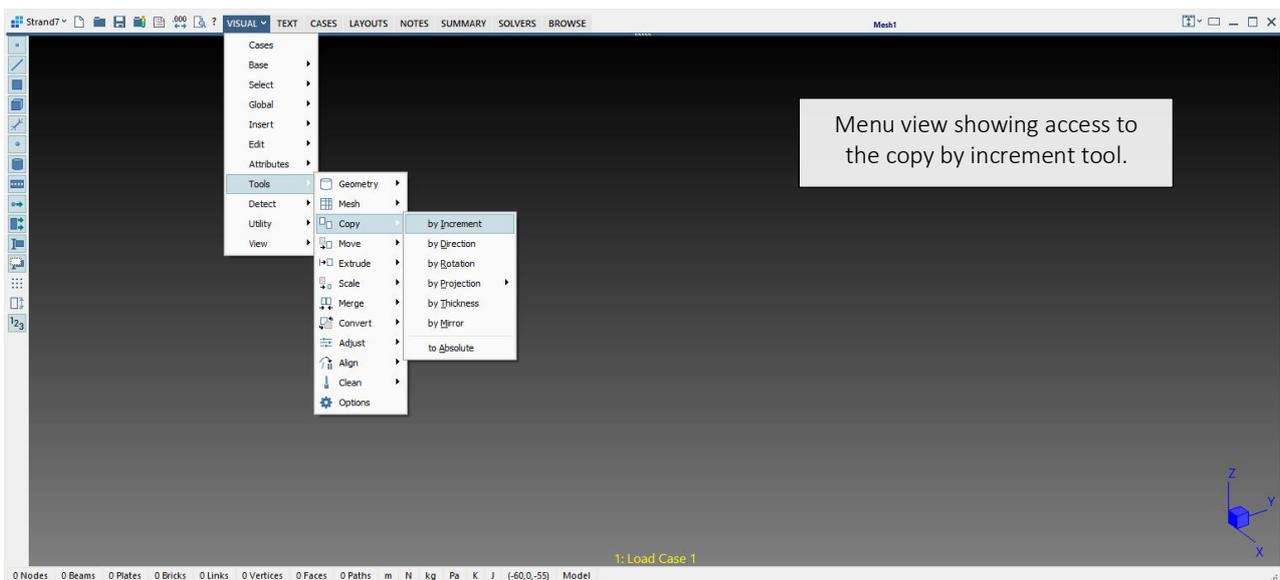
Open an existing model or create a new one to show the model window. The **VISUAL** tab is similar to the model window in R24. Every model file in R3 comes with its own set of **VISUAL**, **TEXT**, **SOLVERS** and other main tabs, and a set of integrated menus, icons and toolbars. These controls follow the model window around as you move, resize and minimise it, in contrast to the single R24 menu bar at the top of the screen shared by multiple model windows.



By default, the integrated controls are shown fully expanded to give you the most direct access to commonly used controls and functions. You can adjust the look of your integrated controls as shown below to help with your transition to R3 or simply as a preference.



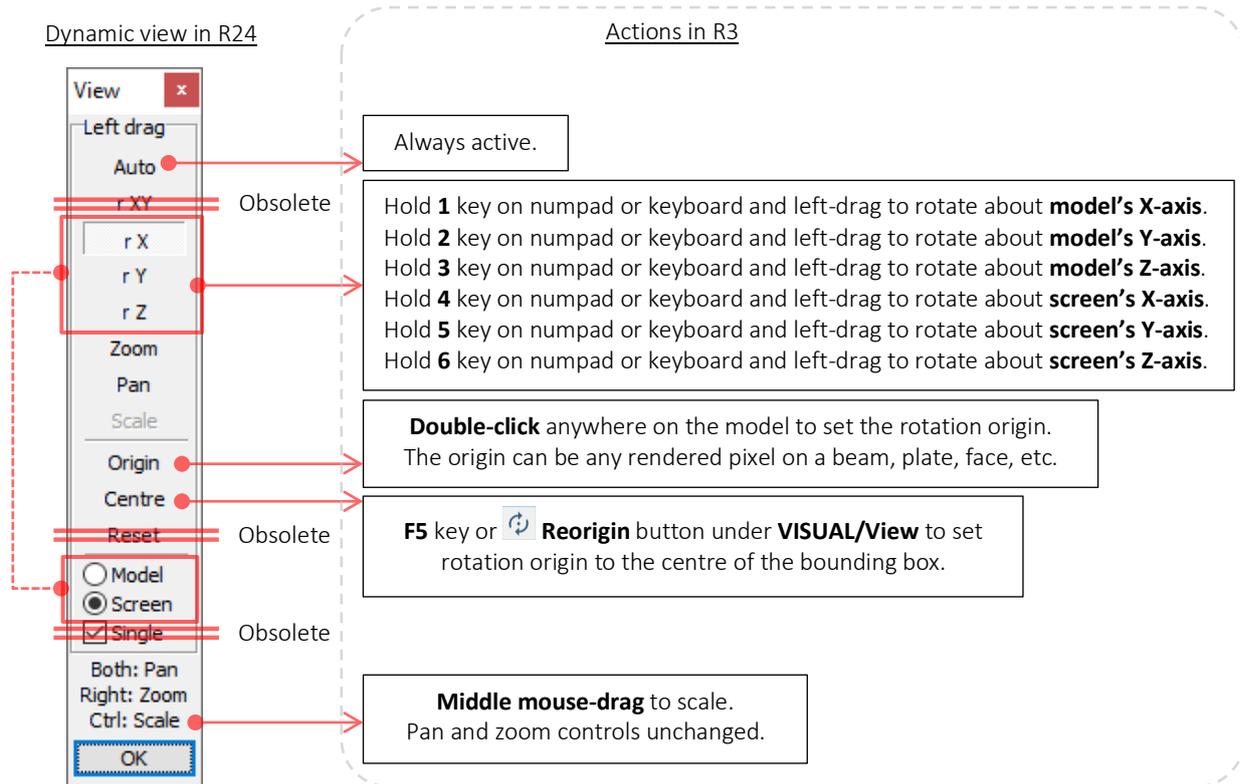
Or you can choose to maximise the model display area by compacting all controls to the main tabs and access the controls and functions via dropdown menus and submenus.



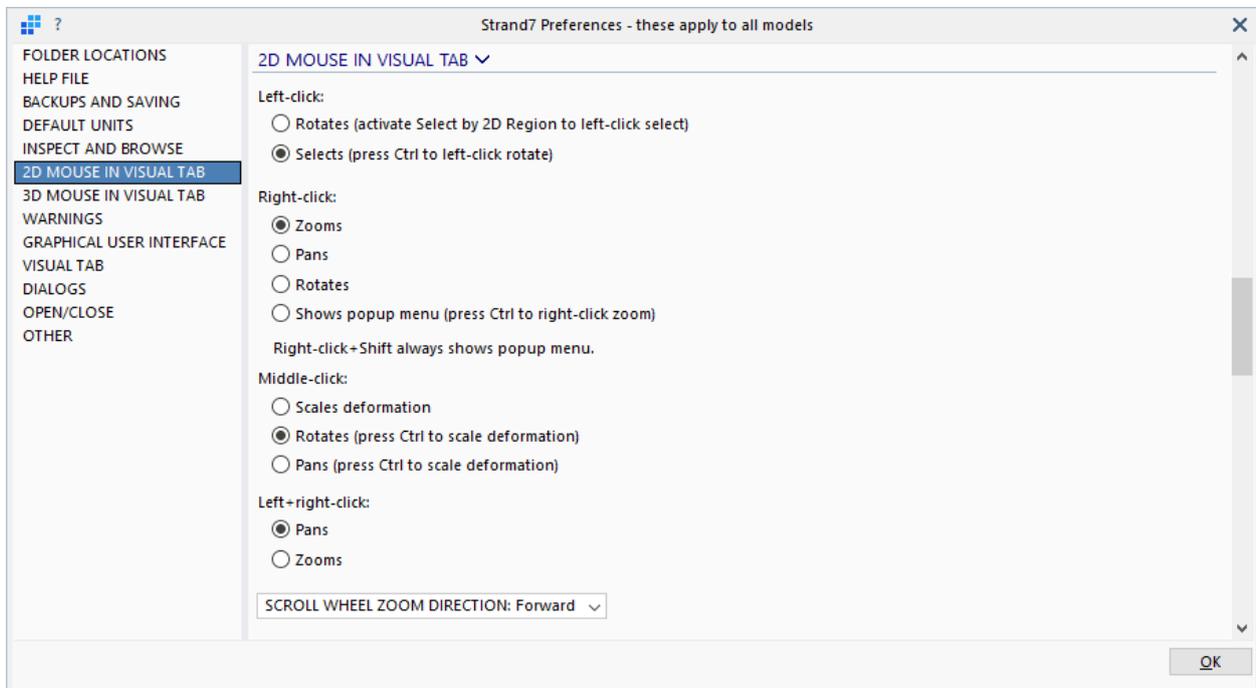
## Rotate, pan and zoom

In R3, you can directly pan, zoom and change the view angle of your model with the mouse; no need to open a dynamic view dialog from a dropdown menu or by pressing the **F4** key, as in R24. You can also use a **3D mouse** or **touchscreen** gestures to interact with the model in R3.

The schematic below describes the default keystrokes and actions required to perform the functions available through the dynamic view dialog in R24.



In addition, R3 offers the possibility of customising the way the mouse buttons are used for view manipulation and for point-and-click select. The **2D MOUSE in VISUAL TAB** section of **Preferences**, provides options for setting the function performed by each button click.

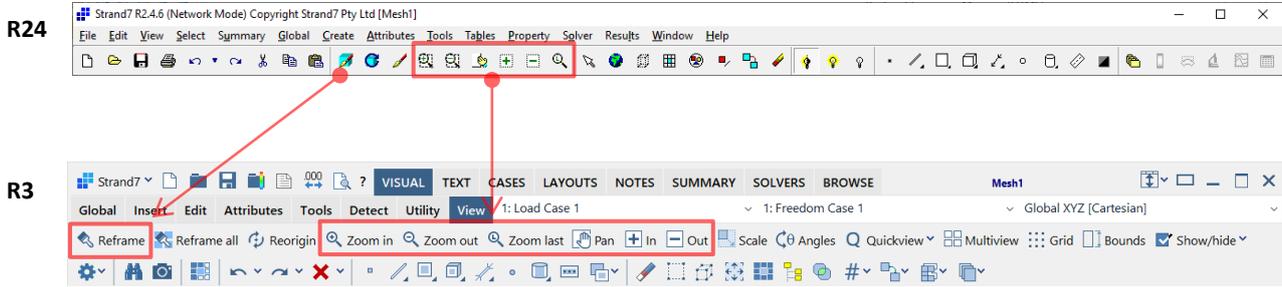


You can still use the **F3** key to reframe an active view as in R24. **F4** is now used to reframe all views when in multi-view mode.

Note that if you have specific functions or dialogs open that also require mouse clicks to function, you can press and hold the **Ctrl** key to temporarily pause the function and permit mouse clicks to be used for dynamic view manipulation.

For example, if you have the **Select by property** dialog open, it automatically limits mouse clicks to hot pointer operation only. But you can hold down the **Ctrl** key to unlock the mouse for rotate, pan or zoom actions. Simply release the **Ctrl** key to revert back to the hot pointer mode.

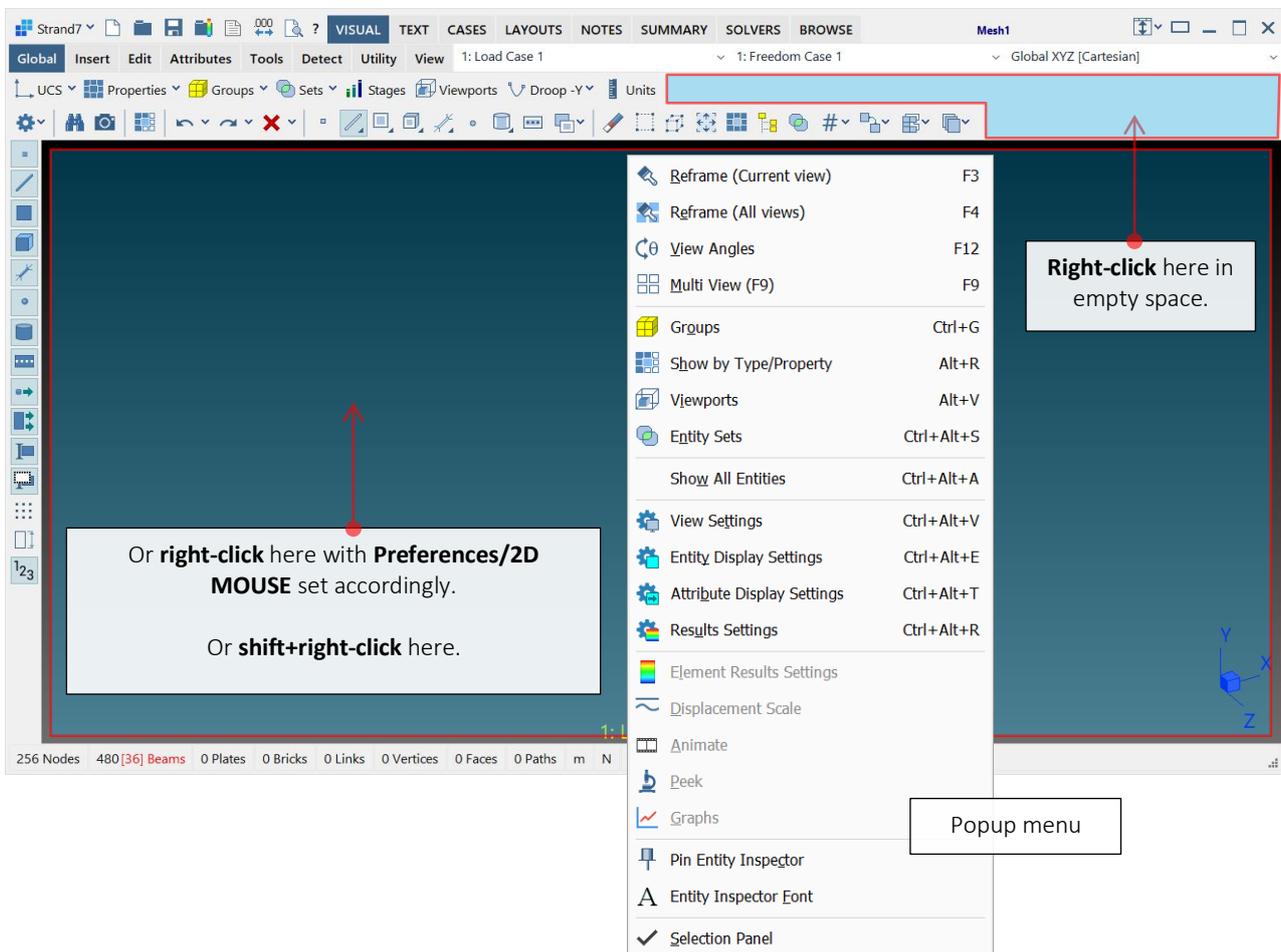
Besides dynamic view, view related buttons from the R24 main toolbar have moved to **VISUAL/View**:



The Dynamic Rotate (**F4** key)  and Refresh Display (**F5** key)  buttons are no longer available as they are superseded by the new dynamic view functionality described above. The R24 function Draw (**F9** key) is also obsolete.

### Right-click in model window

A menu of shortcuts is accessible by right-clicking the display area of the model window in R24. By default, right-click on the model display area in R3 is reserved for zoom/pan operations as mentioned above, but the popup menu is still available by a right-click on the empty space of the main toolbar as shown below. However, you can set the **Right-click shows popup menu** option under **Preferences/2D MOUSE** (as shown above) to enable a **right-click** in the model window to show the popup menu. Alternatively, **Shift+Right-Click** in the model window will always show the popup menu, no matter how the mouse buttons are configured.



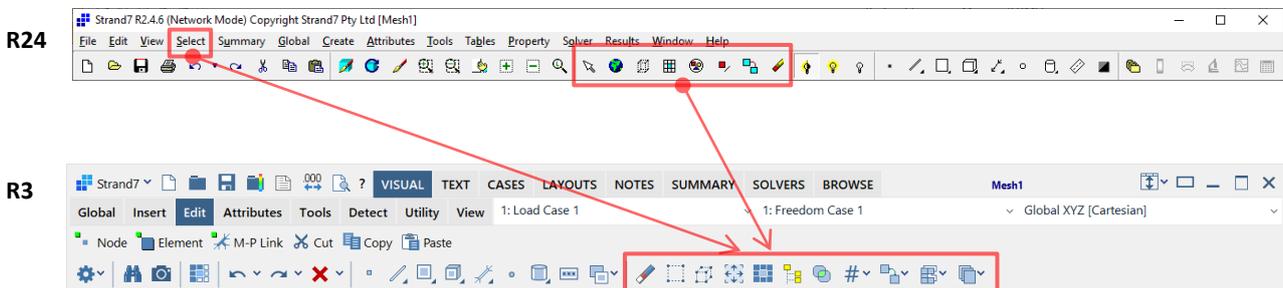
## Selecting entities

The **Spacebar** is no longer used to activate or deactivate the Select  icon. To better reflect the actual function of the Select icon, it is now labelled as **Select by 2D region**  and its corresponding hotkey is **Alt+2**. Here 2D refers to the fact that selection is made in 2D screen space.

**Preferences/2D MOUSE** offers the option to lock the left mouse button to always perform **Select by 2D region** in preference to view manipulation (i.e., **Select by 2D region** always active). With this option in place, another mouse button, or **Ctrl+Left-Click**, can be used for view manipulation.

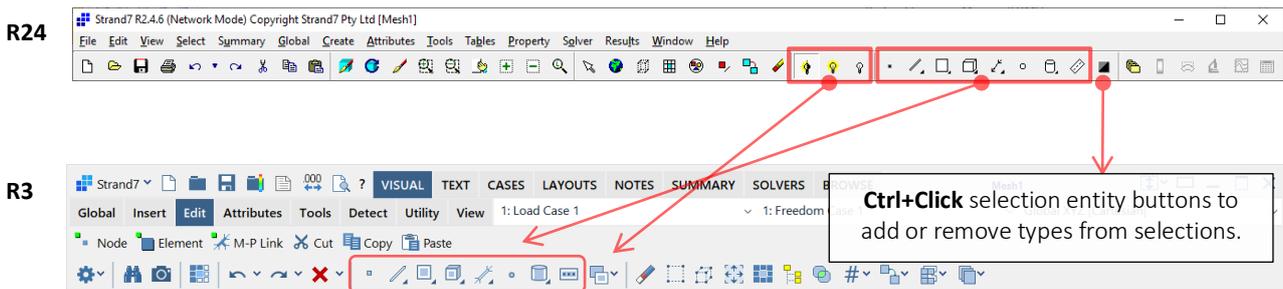
The Select by Region icon in R24 is now more clearly labelled as **Select by 3D region**  with a hotkey of **Alt+3**. Here 3D refers to the fact that selection is made in 3D model space.

One other noticeable change is the transformation of the entire Select menu into toolbar icons and its merging with the rest of the selection functions as illustrated below:



Most cosmetic changes and minor repositioning as shown above will be reasonably recognisable by R24 users.

**Select All**  and **Select by Group**  icons are two exceptions which have undergone more substantive changes to  and  respectively. Selection entities icons have also undergone minor changes with the selection mode  icons now compacted into a list showing only one of  at a time (the active one).



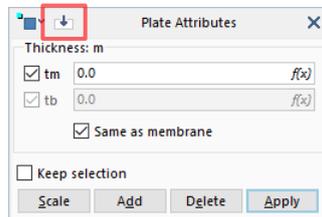
The Additive/Exclusive Toggles (**X** key)  icon is replaced by **Ctrl+Clicking** the selection entities icons to include or exclude them from successive selection operations (i.e., to enable more than one to be active at a time). Or you can simply press the hotkeys; e.g., **N** key for node, **B** key for beam, **P** key for plate, **K** for brick, **L** for link, **V** for vertex, **G** for geometry face, and **T** for load path to toggle the selection entities buttons individually.

## Show/Hide Selected/Unselected

Similarly to R24, R3 offers two icons on the entity toggles toolbar to enable the showing or hiding of selected and/or unselected entities  . Unlike R24, which requires an explicit refresh, when either of these icons is active in R3, selection changes in the model window are immediately flushed and the display updated. This means that it is not possible to hide the currently selected entities and then select other entities and keep these visible. For that type of workflow, Entity Sets can be used in R3. The shortcut keys **Alt+H** and **Ctrl+Alt+H** can be used to quickly define an entity set containing the currently selected entities. The visibility of the set can then be quickly toggled by pressing **H**.

## Hotkeys / Keystrokes

If you are accustomed to using **Ctrl+Click** in R24 to retrieve attribute values from an element to the attribute dialog, or to find the property number of an element quickly, the hotkey for retrieval has changed to **Shift+Ctrl+Click**. In addition to the hotkey, a **Retrieve from model**  icon is available on all dialogs that offer data retrieval; you can use this to retrieve data from the model. An example dialog with this icon is shown below.

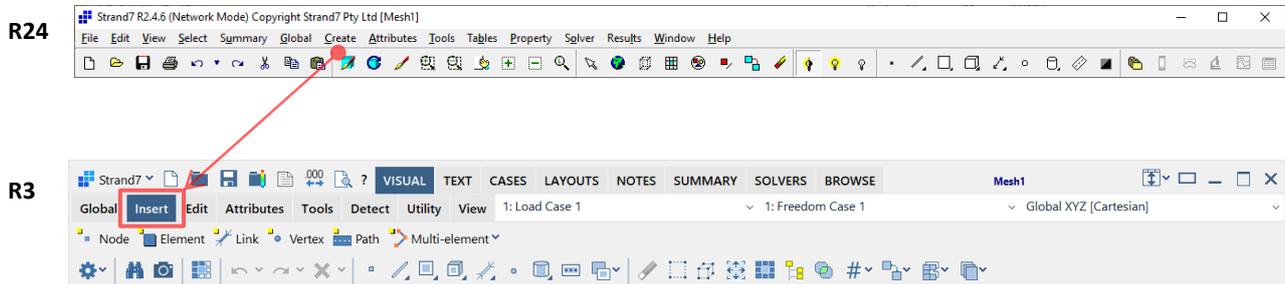


Other notable changes to hotkeys and keystrokes are:

Function	R24 keystrokes	New R3 keystrokes
Copy Graphics	Shift+Ctrl+C	Ctrl+Alt+F
Open Browse Window	Ctrl+B	Ctrl+B on startup screen
Beam Property	Ctrl+Alt+B	Alt+P
Plate Property	Ctrl+Alt+P	
Brick Property	Ctrl+Alt+K	
Select / Select by 2D Region	Spacebar	Alt+2
Dynamic Rotate	F4	No longer applicable
Refresh	F5	
Draw	F9	
Additive/Exclusive Toggles	X	

## Inserting elements

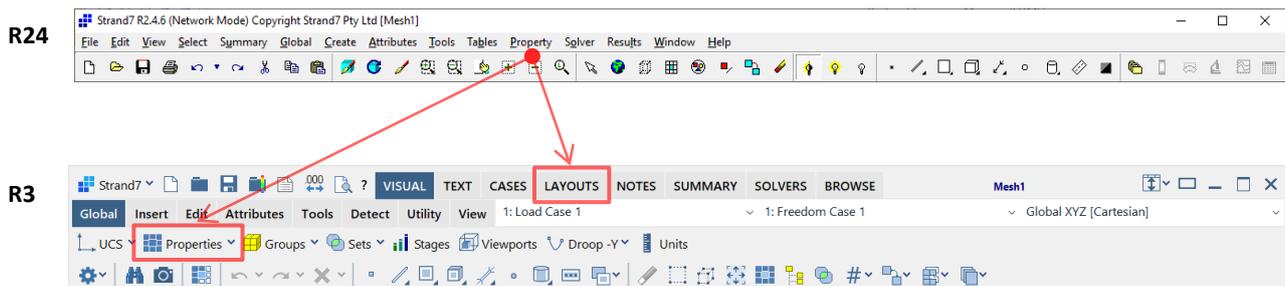
The Create menu, which contains Create Node, Create Element, etc., in R24, is now labelled as **Insert**. The Insert sub-tab is located under the **VISUAL** tab as illustrated below:



## Defining material properties

The Property menu, which contains Beam Property, Laminate Stack, etc., in R24, is categorised into **VISUAL/Global/Properties** and the **LAYOUTS** tab, as shown below.

VISUAL/Global/Properties	Beam, Plate, Brick
The LAYOUTS tab	Ply, Laminate, Creep, Plate RC, Load Path, Cavities



## Tool locations

You can find the majority of the R24 tools under the **VISUAL/Tools** tab but some tools have been relocated or superseded by new tools. Some of the changes include:

- The **Mirror** tool is now available under both **VISUAL/Tools/Copy** and **Move**. As such, the Erase Source option in R24 is no longer applicable in R3.
- A new item, **VISUAL/Insert/Multi-element/**, groups together a set of conceptually similar tools, including the following:
  - The **Tessellate** tools, which are now more clearly labelled as:
    - **Beams on Element Edges,**
    - **Beams on Geometry Edges,** and
    - **Plates on Brick Faces.**
  - The **Points and Lines** tool, which is now more clearly labelled as **Nodes and Beams by Line.**
  - The **Create Load Patches** tool, which is now more clearly labelled as **Load Patch Plates on Beam Polygons.**
  - The **Convert Beams to Plates** tool, which is now more clearly labelled as **Plates on Beam Polygons.**
- The **Auto Assign Restraints** tool is separated into **VISUAL/Attributes/Node/Symmetry Restraints** and **VISUAL/Insert/Multi-element/Link Clusters** to better reflect their actual functions.

- The **Auto Assign Soil In-situ Stress** tool has moved to **VISUAL/Utility/**. See the Utility section below for more details.
- The **Convert Tri to Quad** tool has moved to **VISUAL/Tools/Merge/**.
- The **Convert Beams to/from Links** tool is separated into **VISUAL/Tools/Convert/**:
  - **Beams to Links**, and
  - **Links to Beams**.
- The **Scale Geometry** tool is absorbed into **VISUAL/Tools/Scale/by UCS**, as geometry faces can now be scaled non-uniformly like elements.

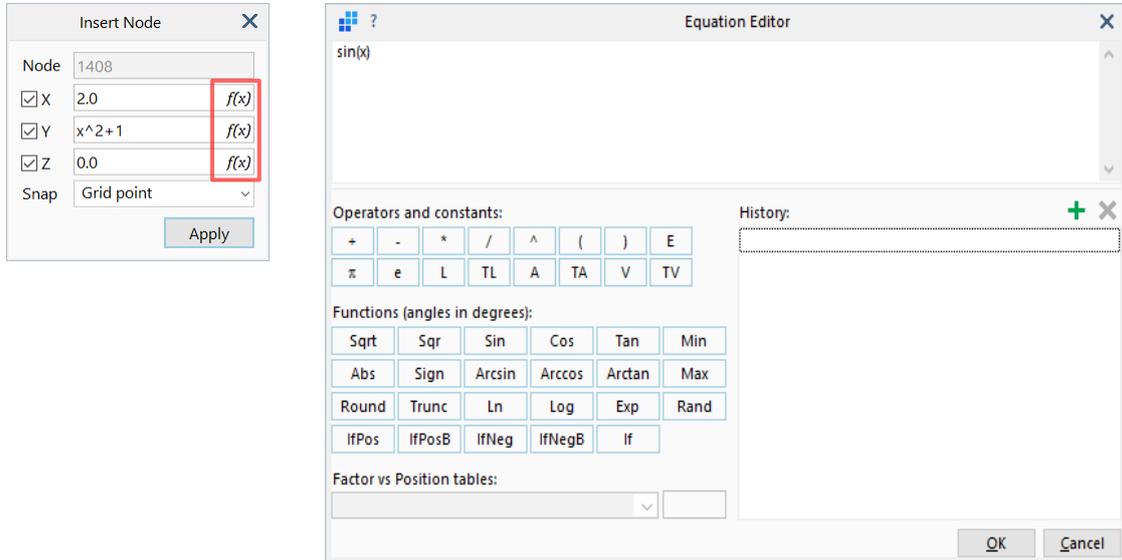
Other changes are relatively minor, including regrouping and relabelling of the tools, as summarised below.

R24 Tools	Locations in R3 (All under The VISUAL tab)
Mid-plane Projection	Tools/Mesh/
Subdivide	
Cut Beams and Plates	
Grade Plates and Bricks	
Plane Slice	
Split Beams	
Intersect Beams	
Interpolate Beam Sections	
Fillet Plates	
Loft Beams	
Automeshing	
Attach Parts	
Detach Elements	
Reposition	
Create Entity UCS	Global/UCS/
Smooth Plates	Tools/Adjust/
Adjust Mid-side Nodes	
Reorder Nodes	
Auto Assign Beam Offsets	Tools/Align/
Auto Assign Plate Offsets	

## Equations and formulas

Equations and formulas with variables can now not only be applied to attributes but also to tools, insert node, etc.

Most edit boxes will be shown with the formula  $f(x)$  button, which opens a dedicated **Equation Editor** dialog that simplifies the definition of more complex equations and also allows quick selection of previously defined formulas.



If the **Store formulas** option is set on the attributes dialog when assigning an attribute equation to geometry faces and elements, these are evaluated upon automeshing and re-evaluated after mesh refinement such that the resulting mesh will inherit the correct attribute distributions based on the element coordinates.

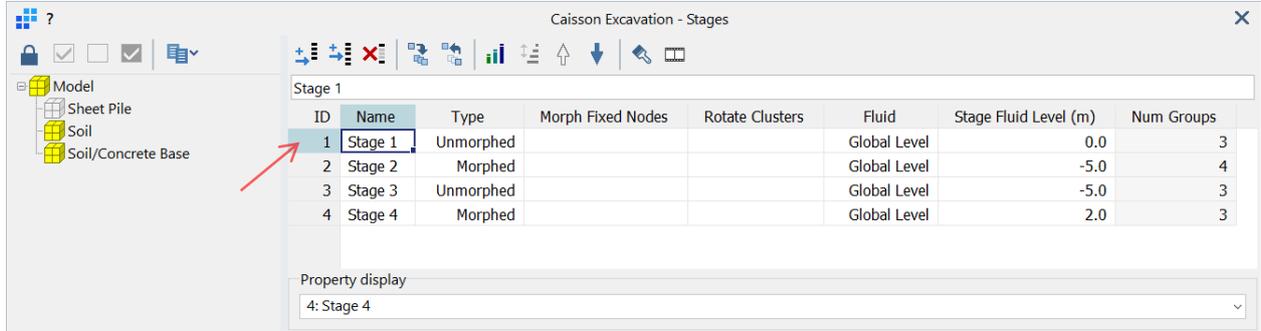
## Utilities

The following file functions and tools are now grouped together under the **VISUAL/Utility** tab.

R24 file functions and utilities	Locations in R3 (All under the VISUAL tab)
File/Import	The  Strand7 menu/Import Utility/Import
File/Export	The  Strand7 menu/Export Utility/Export
File/Save Sub Model	The  Strand7 menu/Saving/Save Sub-model Utility/
File/Make Beam Section	Utility/Make BXS
Tools/Auto Assign/Soil In-situ Stress	Utility/Soil In-situ
File/Make Library	Utility/Make Library

## Defining stages

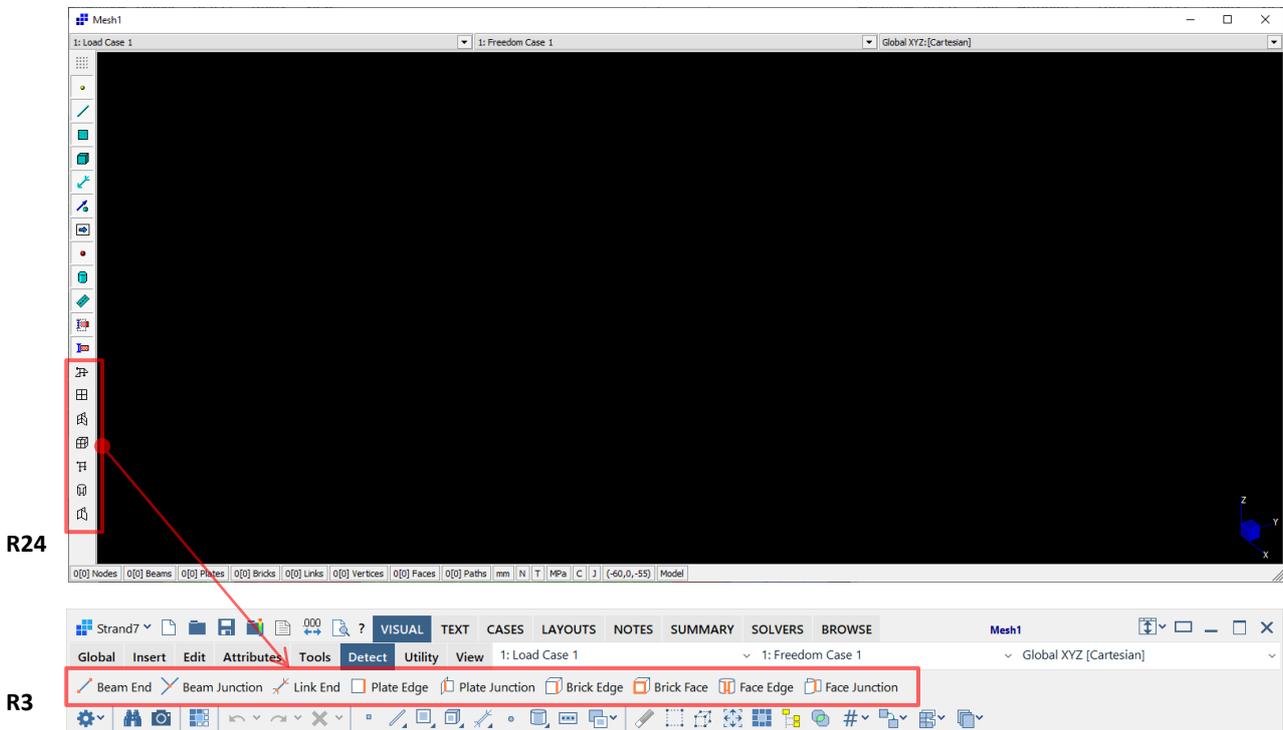
The Stages window has a new grid layout that improves the workflow with complex construction sequences. There is also more flexibility with how stages can be defined; e.g., stages can now be **Reset** (in addition to Morphed or Unmorphed), soil fluid levels can vary with stages, property switched elements can inherit birth stages, etc.



To set the model window to show the active groups in a particular stage, click the **Display selected stage** icon , or double-click the stage **ID** on the Stages window.

## Detecting free ends, edges and faces

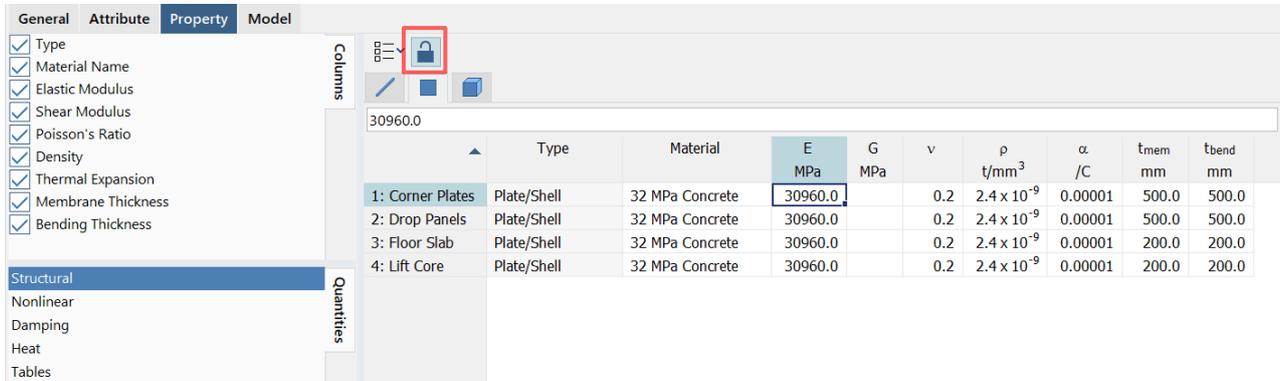
Entity connectivity detection functions such as **Show/Hide Beam Free Ends** , have moved to the **VISUAL/Detect** tab in R3.



## Lock and unlock editable grids

If you see a padlock button, it means that you can unlock the nearby grids, group trees, etc., for editing.

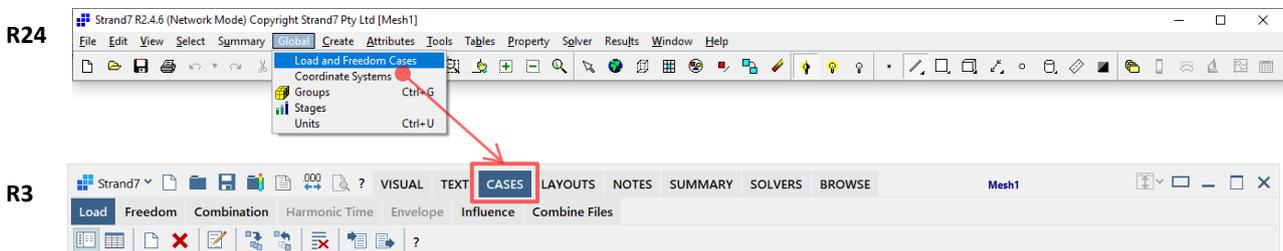
Note that **SUMMARY/Property** now offers an edit option by unlocking it. Editing a large list of properties is now much easier.



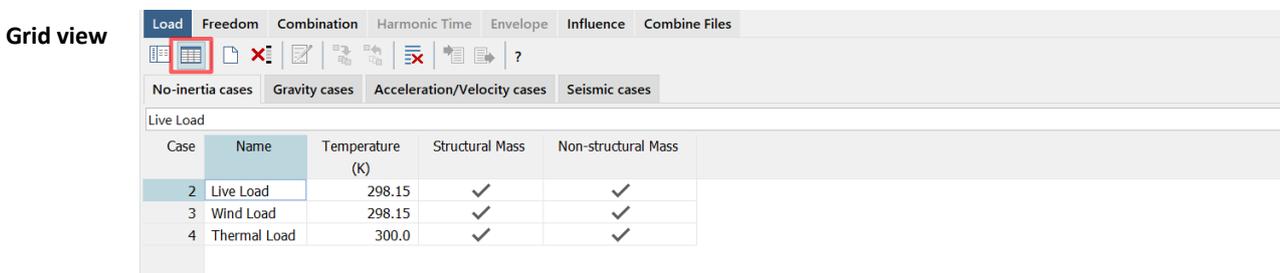
## The CASES tab

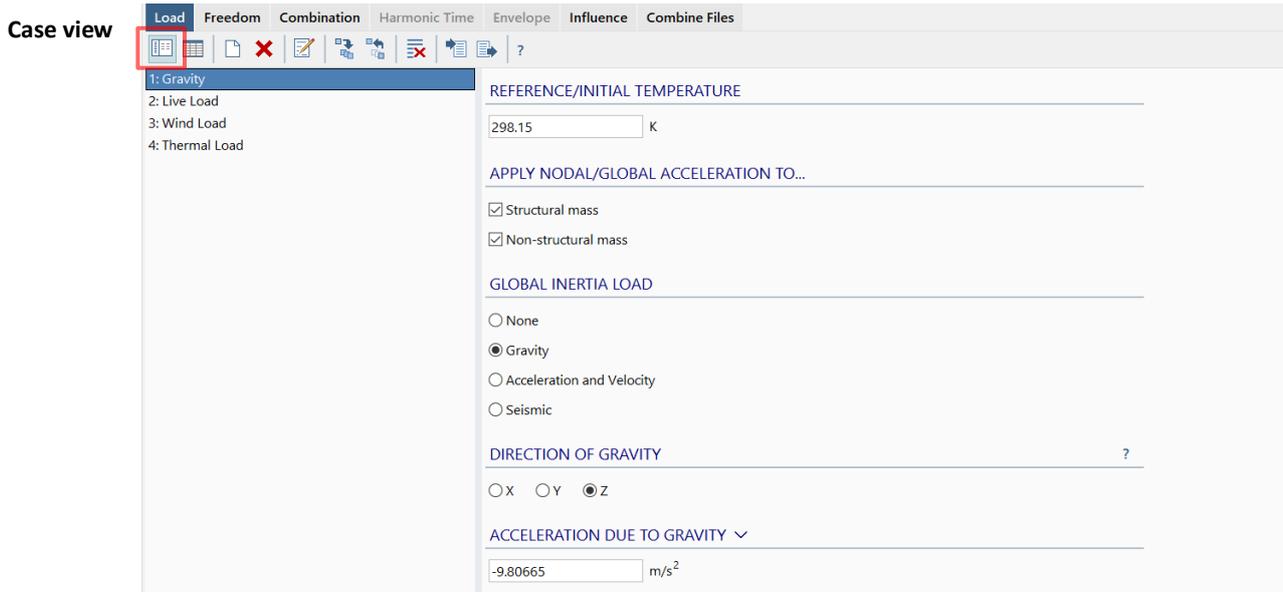
The **CASES** tab is where you create new primary **Load** cases, results **Combination** cases, **Freedom** cases, **Envelopes**, **Influence** cases, etc.

### Load and freedom cases



Load and freedom cases can be displayed in **Case view**, which resembles the R24 look, or in the new **Grid view**, which lists case definitions in a grid for clarity and bulk editing; this is especially useful if there are a large number of cases.

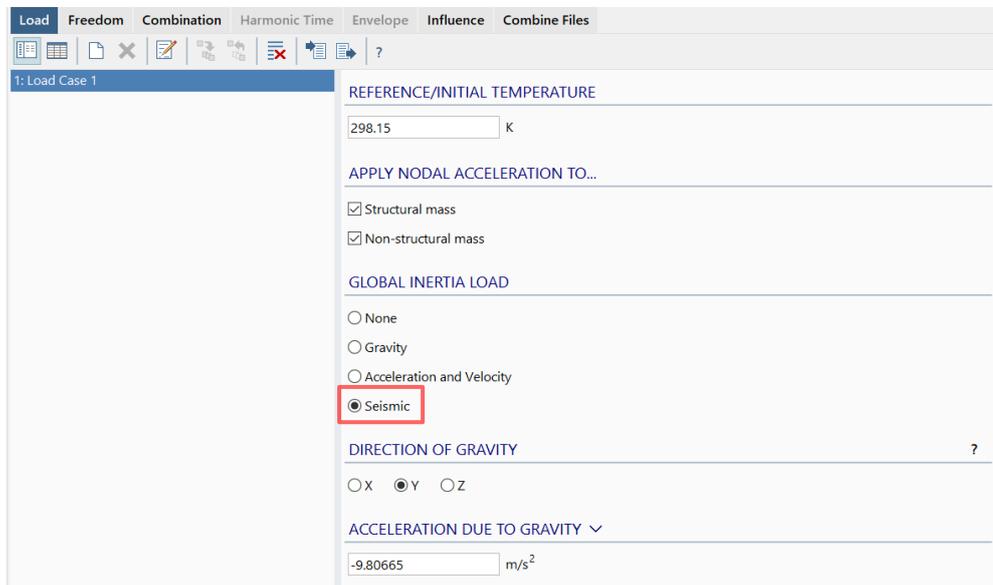




### Seismic load case

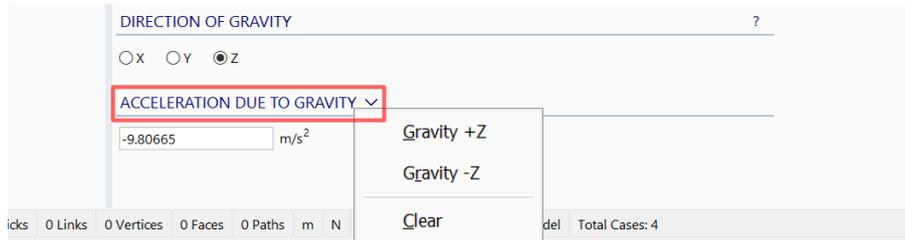
Seismic load cases are now just a type of **Load** case, as selected under **GLOBAL INERTIA LOAD**.

The **Add non-structural mass** section in R24 is no longer necessary as non-structural mass can now be directly included in the seismic load case. If you are opening an R24 model, all included non-structural mass attributes will be copied to the seismic load case, each with a unique attribute ID. In R3, seismic load cases can also contain any other load case dependent attributes.



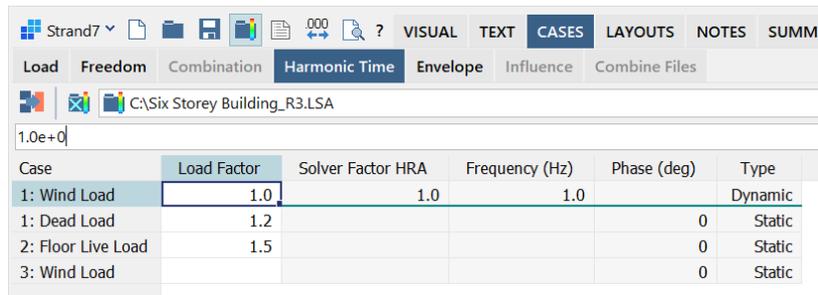
## Assign standard gravity value

The standard value of gravitational acceleration can be selected from a dropdown list by clicking the header **ACCELERATION DUE TO GRAVITY**. Alternatively, the **g** character can be typed in any edit box; this will be evaluated to the gravitational acceleration value consistent with the model units.



## Combine harmonic time history with linear static results

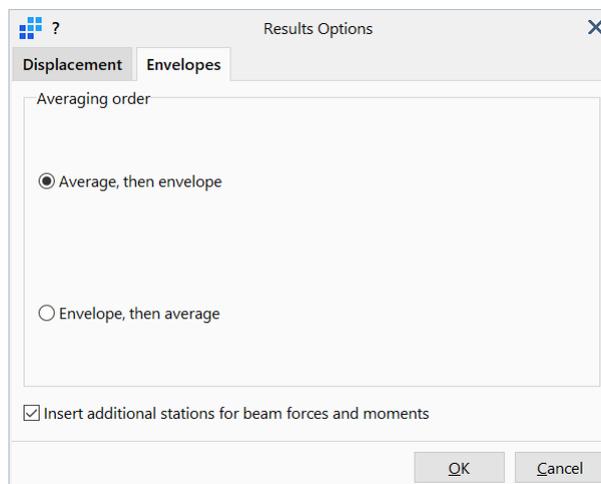
You can now combine linear static primary result cases with **vs Time** harmonic response results to produce a harmonic time history. Both the static result cases and the dynamic result cases can be factored for the combination. Therefore, there is no need to add zero frequency static load cases to your **vs Time** harmonic response analysis.



## Envelopes and averaging of element results

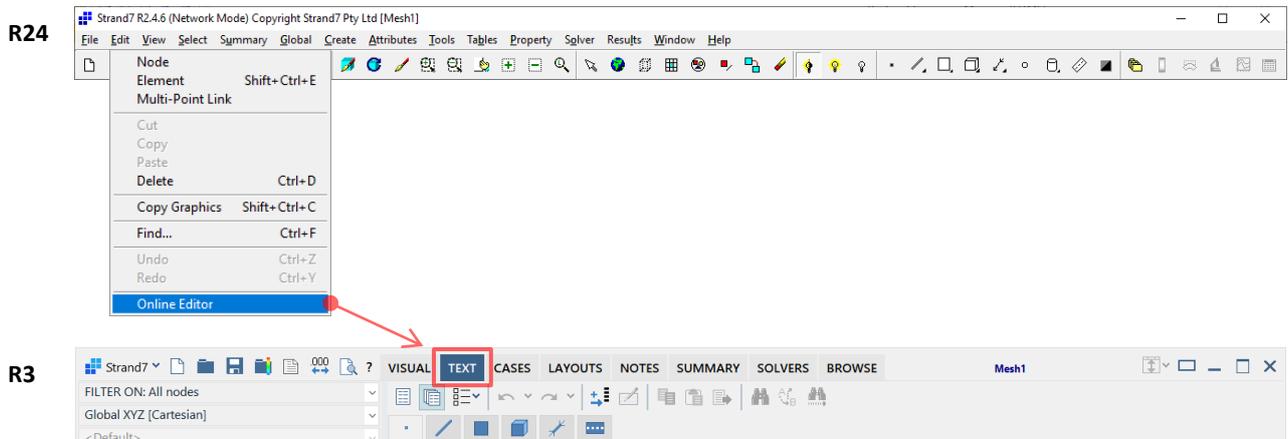
If you need to create envelopes, plate and brick envelope results can now be configured under **Settings/Results Options** to:

- find the limit result values prior to applying the averaging options; or
- apply the averaging options prior to finding the limit result values.



## The TEXT Tab

The TEXT tab is where model information is displayed in grid view, equivalent to the **Online Editor** in R24.



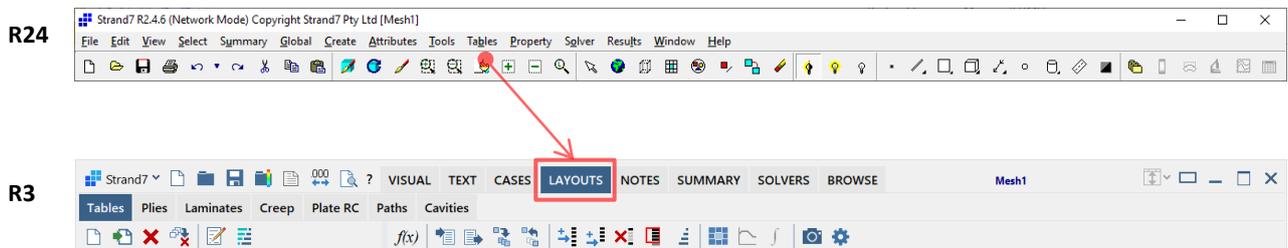
## The LAYOUTS tab

The **LAYOUTS** tab is where you define **Tables**, **Laminates** and **Plies**, **Creep** data, concrete reinforcement (**RC**), load **Paths** and the new **Cavities**.

### Creating tables

The **LAYOUTS** tab is where you create and define **Tables** such as:

- stress vs strain
- factor vs time
- etc.



### Temperature vs Time

In R3, temperatures are no longer scaled by a Factor vs Time table. Instead, temperatures that vary with time are directly defined by a **Temperature vs Time** table to avoid ambiguity with temperature units.

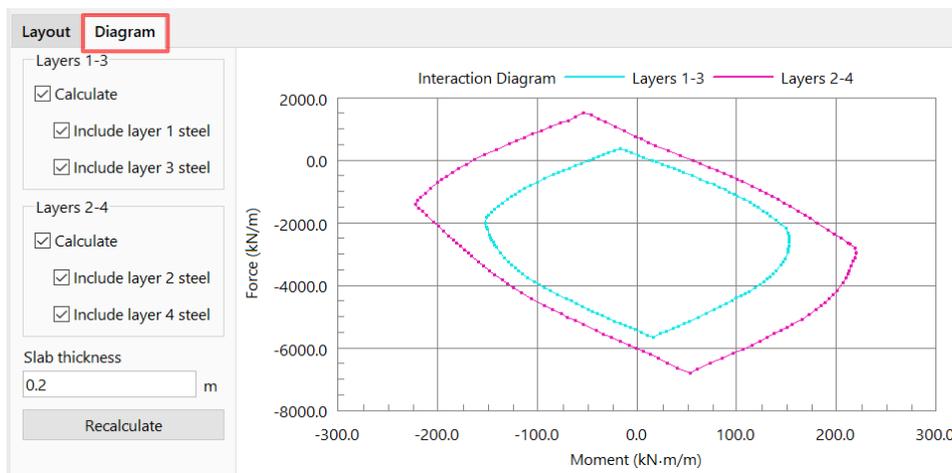
### Plate RC

With the addition of ACI 318 support, there have been slight adjustments to the design parameters and factors. Standard code-specific material parameters are also available as quick-set dropdowns by clicking the header

**MATERIAL** 

Assign default concrete (ACI 318)	fc = 2.5 ksi
Assign default steel (ACI 318)	fc = 3 ksi
Clear concrete	fc = 3.5 ksi
Clear steel	fc = 4 ksi
	fc = 4.5 ksi
	fc = 5 ksi
	fc = 6 ksi
	fc = 7 ksi
	fc = 8 ksi
	fc = 9 ksi
	fc = 10 ksi
	fc = 11 ksi
	fc = 12 ksi
	fc = 13 ksi

You can also get a quick assessment of the user-specified reinforcement layout by going to the **Diagram** tab and inspecting the section's force-moment interaction diagram.



## Cavities

Cavities are closed volumes bounded by plate elements and/or brick faces that conform to the pressure effects of fluid inside the closed volumes such as the inside surface of a balloon membrane or the gas inside an IGU (Insulated Glass Unit).

## The SOLVERS tab

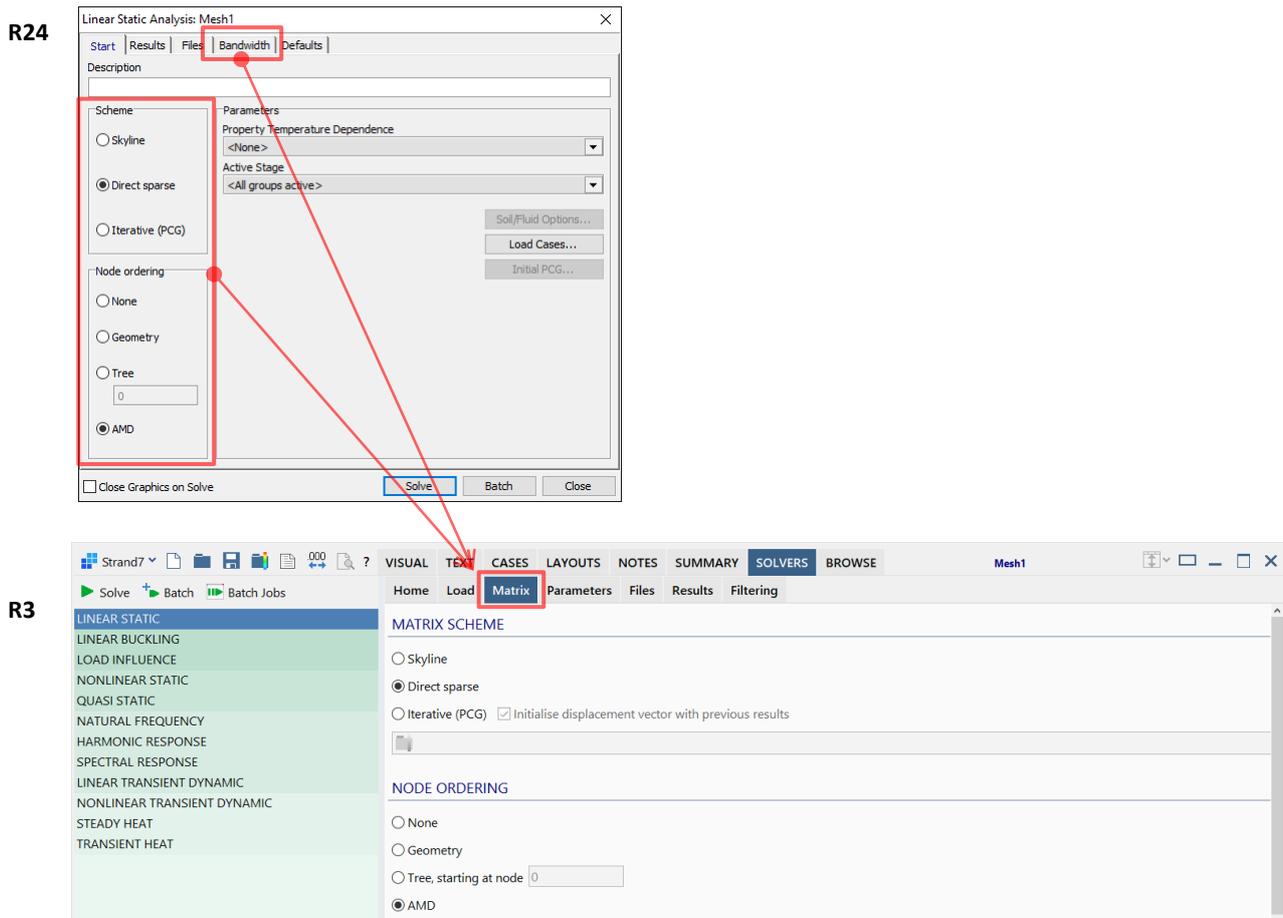
All solvers are now accessible from the **SOLVERS** tab, so you can switch from one solver to another quickly. You can **double-click** the solver name to launch the solver or click the **Solve** icon.

If you have multiple solves to run in succession, you can press **Alt+B** to send the solver job to a batch list and then press **Alt+J** to run batch jobs when ready.

Note that the **Close Graphics on Solve** function is not available in R3.

## Solver scheme and node ordering

All solver scheme and node ordering related settings have moved to the **Matrix** tab in R3.



Other solver icons and dialogs now either have their own tabs or are directly visible under the **Home** sub-tab in the respective solver. A summary of the changes is shown below.

R24 buttons and dialogs	R3 tabs	Applicable to...
Load Cases	Load	Linear Static Load Influence Harmonic Response Spectral Response
Load Increments	Load	Nonlinear Static
Load Tables	Load	Quasi Static Linear Transient Dynamic Nonlinear Transient Dynamic
Load cases to solve	Load	Steady State Heat Transient Heat
Time Steps	Time	Quasi Static Linear Transient Dynamic Nonlinear Transient Dynamic Transient Heat
Moving Load	Paths	Quasi Static Linear Transient Dynamic Nonlinear Transient Dynamic Transient Heat
Node History	History	Quasi Static Linear Transient Dynamic Nonlinear Transient Dynamic
Frequency File	Modes	Harmonic Response Spectral Response Linear Transient Dynamic
Direction Vector	Load Base	Spectral Response

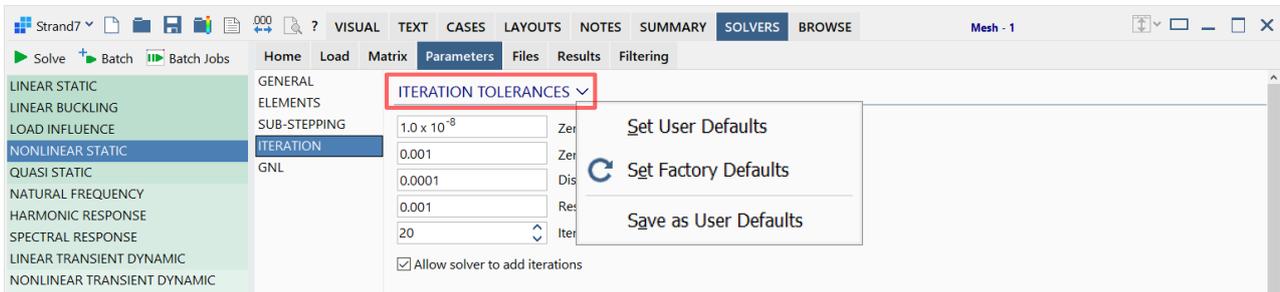
## Results and filtering

The solver Results tab in R24 is now split into two tabs – **Results** and **Filtering**. The functionality to select which results quantities to calculate and which groups and properties to exclude from the results file is still available.

The Surface Bricks Only checkbox under the section Stress Limits in R24 is no longer available as it is becoming less relevant given that result file sizes in R3 are no longer limited to 32 GB.

## Solver parameters

All solver related parameters are here. To reset the parameters back to the factory default values, click the header of each section to reveal a popup menu and select **Set Factory Defaults**.

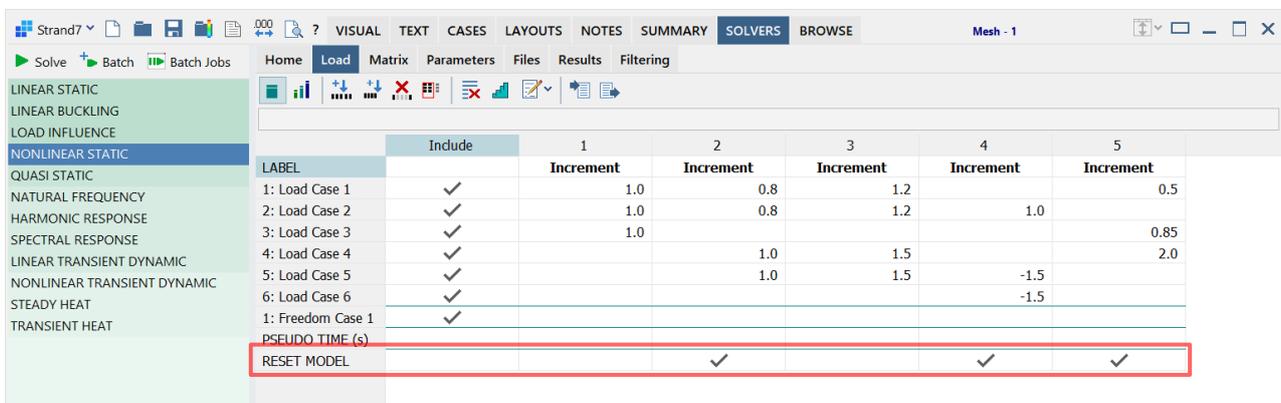


Relocation of some parameters is listed below:

- The Drilling settings are available under the **ELEMENTS** page.
- The Geometric Stiffness [KG], Finite Strain Definition, and Beam Length settings are available under the **GNL** page.
- The Nonlinear Material Modulus Update and Contact settings are available under the **ITERATION** page.
- The Contact Sliding Friction Factor, Sticking Friction Factor and Contact Cutoff Strain are replaced with explicit definitions directly in the point contact filtering property dialog.

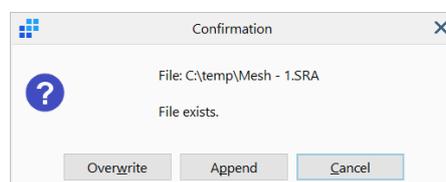
## Reset nonlinear static load combinations

Each column of the nonlinear static load table represents a static equilibrium. If you want to solve multiple independent combination cases (that is, so that a combination does not depend on the previous one), you can set the **RESET MODEL** option to use a fresh, stress-free model from that column onwards. There's no need to create empty stages to reset the model.



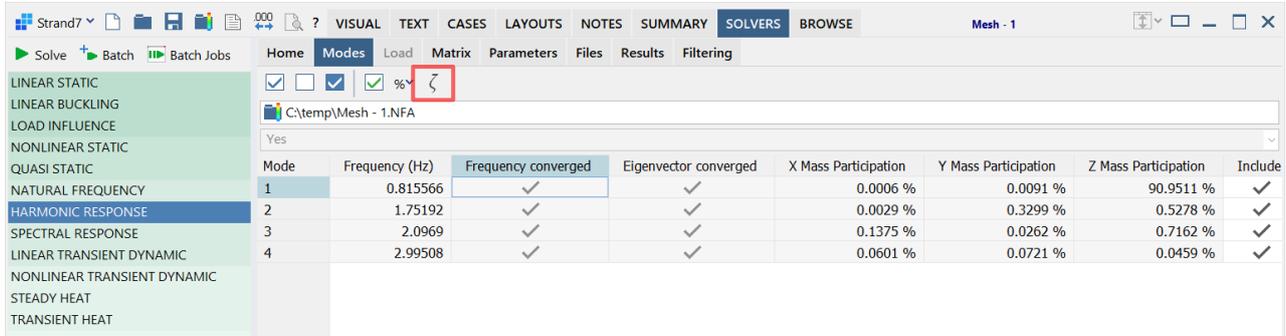
## Append to existing spectral response results file

If your model has several natural frequency results files due to different mass, restraint or stage configurations, you would produce multiple corresponding spectral response results files in R24. Now in R3, upon launching the Spectral Response solver, you will be prompted to overwrite or append to existing results file, if one already exists. Compiling all spectral response results into a single result file makes it easier to combine spectral response results with other static result cases under the **CASES/Combinations** tab and to compare the spectral response results for different sets of freedom cases (each of which requires a separate natural frequency analysis).



## Retrieve effective modal damping from natural frequency solution

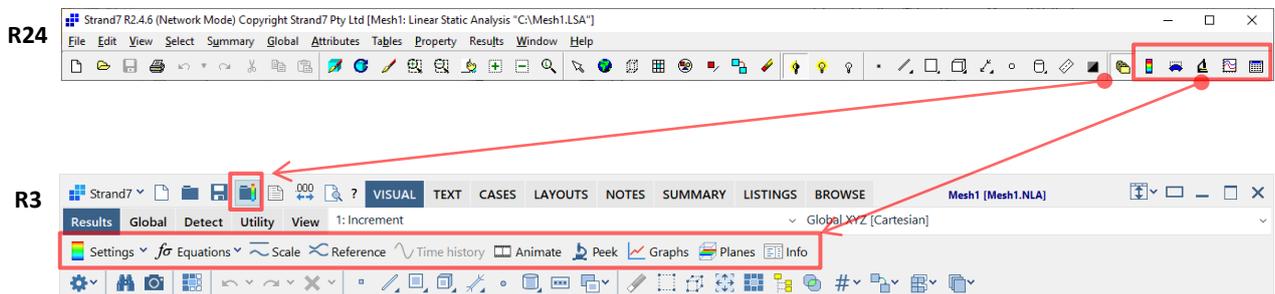
In R24, you would use the right-click menu within the Frequency File dialog to retrieve the effective modal damping values for harmonic response, spectral response and linear transient dynamic analyses. In R3, this function is accessible by clicking the  icon under the **Modes** tab of the solver, if it has **Modal damping** selected.



## Results Icons

The **Open/Close Results File**  icon is now grouped with other main menu icons with a new look . This icon appears throughout the R3 interface whenever a result file is to be opened for any purpose.

R3 will open and post-process result files generated with R24, however, to benefit from the new result features in R3, the model should be re-run in R3.



## Extracting results

The **Results** sub-tab and icons are only accessible when a results file is open. The familiar results functions are still available on this tab:

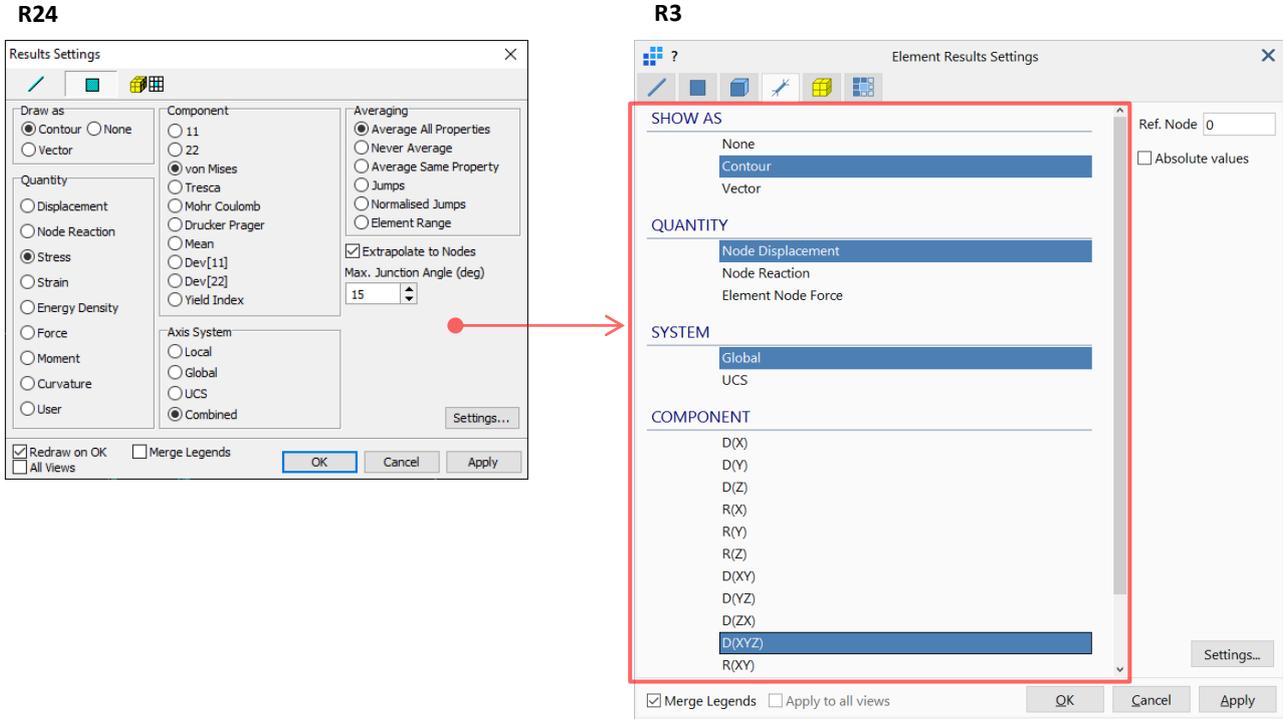
-  Results Settings,
-  Displacement Scale,
-  Animate,
-  Peek, and
-  Graphs.

The results combinations, load influence combinations, harmonic time history and envelopes have moved to the **CASES** tab.

The results listings are now available in the dedicated **LISTINGS** tab.

## Results Settings

The results settings dialog now shows a dynamic list of results quantities, components, etc. Scroll down to access more items and settings. The dialog can be stretched vertically to show more, thereby reducing the need to scroll.



## Brick cutting planes

If you are working with brick elements, you can now produce brick cutting plane results with a new tool that is separate from the results settings dialog. The dedicated  **Brick cutting planes** dialog is where you can define multiple cutting planes at once. You can also display results contours on all cutting planes simultaneously.

Plane ID	Show	Name	UCS	Plane	Axis 1	Axis 2	Axis 3
1	<input checked="" type="checkbox"/>	Cutting Plane	Global XYZ [Cartesian]	XY Plane	0.0	0.0	0.0
2	<input checked="" type="checkbox"/>	Cutting Plane	UCS 1 [Cylindrical]	Rθ Plane	0.0	0.0	0.0
3	<input checked="" type="checkbox"/>	Cutting Plane	UCS 2 [Cartesian]	YZ Plane	0.0	0.0	0.0

The **Integrals** tab is available to evaluate respective cutting plane integrals, i.e., summation of forces and moments and the centroid of the cutting planes. Unlike R24, you do not need to display any results contour to calculate the cutting plane integrals in R3; three forces and three moments are automatically calculated.

Plane ID	Result Case	CX mm	CY mm	CZ mm	F1 N	F2 N	F3 N	M1 N-mm	M2 N-mm	M3 N-mm
1	2: [1: G+Q+W] [Combination]	69.49	224.0	0.0	1.929 x 10 <sup>-4</sup>	0.0212	-35.66	-8.449	-376.5	-1.879
2	2: [1: G+Q+W] [Combination]	75.0	482.1	0.0	-25.95	-0.0056	-1.148	-2.863	-659.0	-2.918
3	2: [1: G+Q+W] [Combination]	69.76	481.9	0.0	-126.8	-0.0184	-20.5	-0.3589	-8620.	-6.778

You might also be interested in extracting forces and moments from brick elements by using the new **Reaction MPL**. This new link type provides significant new functionality for extracting resultants anywhere within the finite element model and for producing free body diagrams.

## Results combinations and envelopes

Linear load case combinations, results envelopes, harmonic time history, load influence combinations and combine results files, are now located under the **CASES** tab.

## Results listings

Results listings are now available under the **LISTINGS** tab.

## Link results

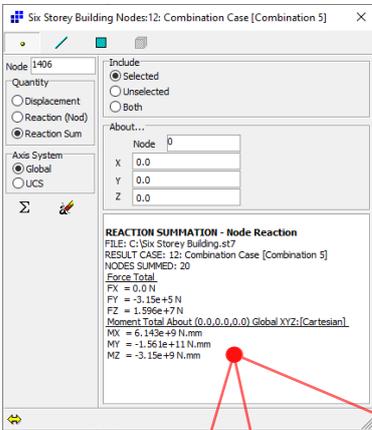
Links now produce displacement, force and moment results similarly to elements; these can be contoured, graphed and displayed in **Peek, Graphs** and in the **LISTINGS** tab. The following link results are available:

- Link displacement
- Link force and moment
- Force and moment summations (Reaction MPLs only).

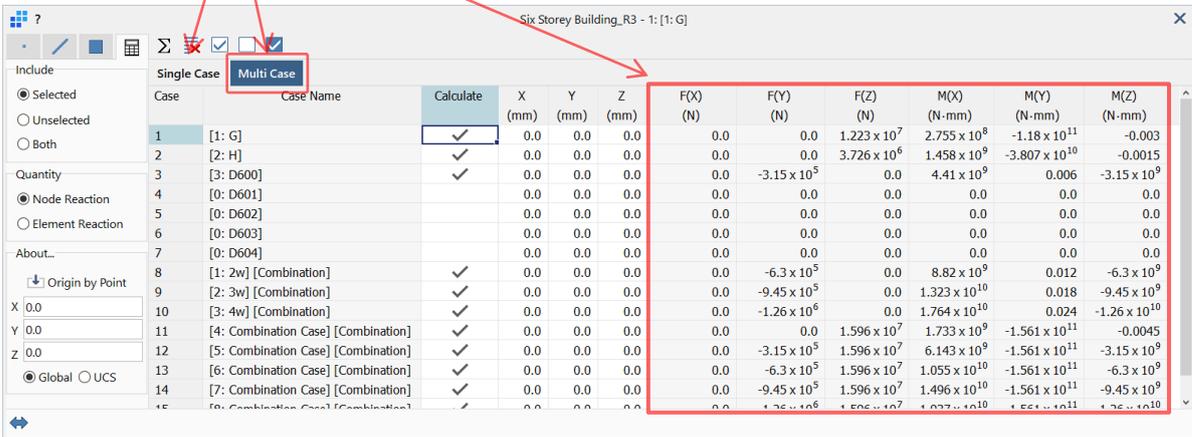
## Peek node reaction summation

Node reaction summation of one result case at a time, as in R24, is now performed under the  **Single Case** in **Results/Peek**. A new **Multi Case** tab is available to calculate summations of multiple result cases at once and list them in a grid.

**R24**



**R3**



Case	Case Name	Calculate	X (mm)	Y (mm)	Z (mm)	F(X) (N)	F(Y) (N)	F(Z) (N)	M(X) (N-mm)	M(Y) (N-mm)	M(Z) (N-mm)
1	[1: G]	✓	0.0	0.0	0.0	0.0	0.0	1.223 x 10 <sup>7</sup>	2.755 x 10 <sup>8</sup>	-1.18 x 10 <sup>11</sup>	-0.003
2	[2: H]	✓	0.0	0.0	0.0	0.0	0.0	3.726 x 10 <sup>6</sup>	1.458 x 10 <sup>9</sup>	-3.807 x 10 <sup>10</sup>	-0.0015
3	[3: D600]	✓	0.0	0.0	0.0	0.0	-3.15 x 10 <sup>5</sup>	0.0	4.41 x 10 <sup>9</sup>	0.006	-3.15 x 10 <sup>9</sup>
4	[0: D601]		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	[0: D602]		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	[0: D603]		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	[0: D604]		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	[1: 2w] [Combination]	✓	0.0	0.0	0.0	0.0	-6.3 x 10 <sup>5</sup>	0.0	8.82 x 10 <sup>9</sup>	0.012	-6.3 x 10 <sup>9</sup>
9	[2: 3w] [Combination]	✓	0.0	0.0	0.0	0.0	-9.45 x 10 <sup>5</sup>	0.0	1.323 x 10 <sup>10</sup>	0.018	-9.45 x 10 <sup>9</sup>
10	[3: 4w] [Combination]	✓	0.0	0.0	0.0	0.0	-1.26 x 10 <sup>6</sup>	0.0	1.764 x 10 <sup>10</sup>	0.024	-1.26 x 10 <sup>10</sup>
11	[4: Combination Case] [Combination]	✓	0.0	0.0	0.0	0.0	0.0	1.596 x 10 <sup>7</sup>	1.733 x 10 <sup>9</sup>	-1.561 x 10 <sup>11</sup>	-0.0045
12	[5: Combination Case] [Combination]	✓	0.0	0.0	0.0	0.0	-3.15 x 10 <sup>5</sup>	1.596 x 10 <sup>7</sup>	6.143 x 10 <sup>9</sup>	-1.561 x 10 <sup>11</sup>	-3.15 x 10 <sup>9</sup>
13	[6: Combination Case] [Combination]	✓	0.0	0.0	0.0	0.0	-6.3 x 10 <sup>5</sup>	1.596 x 10 <sup>7</sup>	1.055 x 10 <sup>10</sup>	-1.561 x 10 <sup>11</sup>	-6.3 x 10 <sup>9</sup>
14	[7: Combination Case] [Combination]	✓	0.0	0.0	0.0	0.0	-9.45 x 10 <sup>5</sup>	1.596 x 10 <sup>7</sup>	1.496 x 10 <sup>10</sup>	-1.561 x 10 <sup>11</sup>	-9.45 x 10 <sup>9</sup>
15	[8: Combination Case] [Combination]	✓	0.0	0.0	0.0	0.0	-1.26 x 10 <sup>6</sup>	1.596 x 10 <sup>7</sup>	1.037 x 10 <sup>10</sup>	-1.561 x 10 <sup>11</sup>	-1.26 x 10 <sup>10</sup>

## Quick Reference

You can use the mapping tables below to find the new locations of tools and functions in R3. Tools and functions not available in R24 are not listed.

### File menu

R24 menu items	R24 keystrokes	Location in R3 (All under the VISUAL tab unless otherwise specified)	R3 keystrokes
New	Ctrl+N	The  Strand7 menu/New	Ctrl+N
Open	Ctrl+O	The  Strand7 menu/Open	Ctrl+O
Close		The  Strand7 menu/Close	
Save	Ctrl+S	The  Strand7 menu/Saving/Save	Ctrl+S
Save As		The  Strand7 menu/Saving/Save As	
Save To		The  Strand7 menu/Saving/Save Copy	
Browse	Ctrl+B	The  Strand7 menu/Browser The BROWSE tab	
Import	Ctrl+I	The  Strand7 menu/Import Utility/Import	Ctrl+I
Export		The  Strand7 menu/Export Utility/Export	
Save Sub Model		The  Strand7 menu/Saving/Save Sub-model Utility/Sub-model	
Make Beam Section		Utility/Make BXS	
Make Library		Utility/Make library	
Print Preview	Ctrl+P	The  Strand7 menu/Print preview	Ctrl+P
Print Setup		Inside  Print preview	
Preferences		The  Strand7 menu/Preferences	Alt+O
List of recently opened models		The  Strand7 menu/Recent	
Exit	Alt+X	The  Strand7 menu/Exit Strand7	Alt+X

## Edit menu

R24 menu items	R24 keystrokes	Location in R3 (All under the VISUAL tab unless otherwise specified)	R3 keystrokes
Node		Edit/Node	Shift+Ctrl+W
Element	Shift+Ctrl+E	Edit/Element	Shift+Ctrl+E
Multi-Point Link		Edit/M-P Link	Shift+Ctrl+L
Cut	Ctrl+X	Edit/Cut	Ctrl+X
Copy	Ctrl+C	Edit/Copy	Ctrl+C
Paste	Ctrl+V	Edit/Paste	Ctrl+V
Delete	Ctrl+D	 Delete with Options under  Base/Delete with Options	Ctrl+D
Copy Graphics	Shift+Ctrl+C	The  Copy graphics to clipboard button Base/Copy Graphics	Ctrl+Alt+F
Find	Ctrl+F	The  Find button Base/Find	Ctrl+F
Undo	Ctrl+Z	The  Undo button Base/Undo	Ctrl+Z
Redo	Ctrl+Y	The  Redo button Base/Redo	Ctrl+Y
Online Editor		The TEXT tab	

## View menu

R24 menu items	R24 keystrokes	Location in R3 (All under the VISUAL tab)	R3 keystrokes
Redraw	F3	View/Reframe (current view) View/Reframe (all views)	F3 F4
Dynamic	F4		
Refresh	F5		
Clear			
Zoom In	F6	View/Zoom in	F6
Zoom Out	F7	View/Zoom out	F7
Zoom Last	F8	View/Last view	F8
Draw	F9		

Pan	F10	View/Pan	F10
Scale	F11	View/Scale	F11
Angles	F12	View/View Angles	F12
Multi View		View/Multi View	F9
Snap Grid Settings		View/Snap Grid Settings	
Show/Hide Selected/Unselected		View/Show/hide	
Show/Hide/Toggle Hidden			
Show/Hide/Show All Entities	Ctrl+Alt+A	View/Show all entities	Ctrl+Alt+A
Display		View/Show/hide entities	
Show by Type/Property		The  Show by type or property button Base/Show by Type/Property	Alt+R
Viewports		Global/Viewports	Alt+V
Beam Free Ends		Detect/Beam End	
Plate Free Edges		Detect/Plate Edge	
Plate T-Junctions		Detect/Plate Junction	
Brick Free Edges		Detect/Brick Edge	
Link Free Ends		Detect/Link End	
Face Free Edges		Detect/Face Edge	
Face T-Junctions		Detect/Face Junction	
Entity Display	Ctrl+Alt+E	 Entity Display Settings under   Base/Entity Display Settings	Ctrl+Alt+E
Attribute Display	Ctrl+Alt+T	 Attribute Display Settings under   Base/Attribute Display Settings	Ctrl+Alt+T
Options	Ctrl+Alt+V	 View Settings under   Base/View Settings	Ctrl+Alt+V
Toolbars/Entity Toggles		Right-click panel to dock or hide	

**Select menu**

R24 menu items	R24 keystrokes	Location in R3 (All under the VISUAL tab)	R3 keystrokes
Select	Space bar	The  Select by 2D region button Select/Select by Region - 2D	Alt+2
All	Ctrl+A	The  Select all button Select/Select All	Ctrl+A
by Region		The  Select by 3D region button Select/Select by Region - 3D	Alt+3
by Property		The  Select by property button Select/Select by Property	Alt+Alt+P
by Group		The  Select by group button Select/Select by Group	Alt+G
by ID		 Select by ID under  # 	
Free Entities		 Select Free Entities under 	
Connected Entities		 Select Free Entities under 	
Plate Faces		 Select Plate Faces under 	
Brick Faces		 Select Brick Faces under 	
Entities on Load Path		 Select Entities on Load Path under 	
Beams on Patch Plates		 Select Beams on Patch Plates under 	
Clear All Selections	Ctrl+Q	The  Clear all selections button Select/Clear All Selections	Ctrl+Q

## Summary menu

R24 menu items	R24 keystrokes	Location in R3	R3 keystrokes
Information		The NOTES tab	
Attribute		The SUMMARY tab/Attribute	
Table		The SUMMARY tab/General	
Property		The SUMMARY tab/Property	
Model		The SUMMARY tab/Model	
Whiteboard	Ctrl+Alt+W	The VISUAL tab/View/Show/hide/Whiteboard Click <b>Nodes</b> field on the status bar	Ctrl+Alt+W

## Global menu

R24 menu items	R24 keystrokes	Location in R3	R3 keystrokes
Load and Freedom Cases		The CASES tab/Load The CASES tab/Freedom	
Coordinate Systems		The VISUAL tab/Global/Define UCS	Alt+U
Groups	Ctrl+G	The VISUAL tab/Global/Groups	Ctrl+G
Stages		The VISUAL tab/Global/Stages	Alt+T
Units	Ctrl+U	The VISUAL tab/Global/Units	Ctrl+U

## Create menu

R24 menu items	R24 keystrokes	Location in R3 (All under the VISUAL tab)	R3 keystrokes
Node	Ctrl+W	Insert/Node	Ctrl+W
Element	Ctrl+E	Insert/Element	Ctrl+E
Link	Ctrl+L	Insert/Link	Ctrl+L
Vertex	Ctrl+R	Insert/Vertex	Ctrl+R
Load Path	Ctrl+T	Insert/Path	Ctrl+T

## Attributes menu

R24 menu items	R24 keystrokes	Location in R3 (All under the VISUAL tab)	R3 keystrokes
Node/Temperature		Attributes/Node/Temperature Attributes/Node/Import Temperature	
All other Node attributes		Attributes/Node	
Beam/Attachment		Attributes/Beam/Attachment/End Attributes/Beam/Attachment/Side	

All other Beam attributes		Attributes/Beam	
Plate/Edge Load/Pressure		Attributes/Plate/Edge Load/Normal Pressure	
Plate/Edge Load/Shear Stress		Attributes/Plate/Edge Load/Shear Stress	
Plate/Edge Load/Normal Shear Stress		Attributes/Plate/Edge Load/Transverse Shear Stress	
All other Plate attributes		Attributes/Plate	
All Brick attributes		Attributes/Brick	
All Link attributes		Attributes/Link	
All Vertex attributes		Attributes/Vertex	
Edge/Pressure		Attributes/Edge/Normal Pressure	
Edge/Normal Shear Stress		Attributes/Edge/Transverse Shear Stress	
All other Edge attributes		Attributes/Edge	
All Face attributes		Attributes/Face	
All Load Path attributes		Attributes/Path	

**Tools menu**

R24 menu items	R24 keystrokes	Location in R3 (All under the VISUAL tab)	R3 keystrokes
Copy		Tools/Copy	
Move		Tools/Move	
Extrude		Tools/Extrude	
Mirror		Tools/Copy/by Mirror Tools/Move/by Mirror	
Mid-plane Projection		Tools/Mesh/Mid-plane Plate Projection	
Scale Nodes and Elements		Tools/Scale/by UCS Tools/by Taper (Nodes and Elements)	
Scale Geometry		Tools/Scale/by UCS	
Reposition		Tools/Move	
Geometry Tools		Tools/Geometry	
Subdivide	Ctrl+Shift+S	Tools/Mesh/Subdivide	Shift+Ctrl+S
Cut Beams and Plates		Tools/Mesh/Cut Elements	
Grade Plates and Bricks		Tools/Mesh/Grade Plates and Bricks	
Plane Slice		Tools/Mesh/Slice on Plane	
Split Beams		Tools/Mesh/Split Beams by End Ratio	
Intersect Beams		Tools/Mesh/Intersect Beams and Links	

Interpolate Beam Sections		Tools/Mesh/Interpolate Beam Sections	
Points and Lines		Insert/Multi-elements/Nodes and Beams by Line	
Fillet Plates		Tools/Mesh/Fillet Plates	
Loft Beams		Tools/Mesh/Loft Beams	
Tessellate/Lines		Insert/Multi-element/Beams on Element Edges Insert/Multi-element/Beams on Geometry Edges	
Tessellate/Faces		Insert/Multi-element/Plates on Brick Faces	
Create Entity UCS		Global/Create Entity UCS	
Align/Beam Axes		Tools/Align/Beam/Axes to UCS	
Align/Beam Frameworks		Tools/Align/Beam/Axes to Framework	
Align/Beam to Plates		Tools/Align/Beam/Axes to Plate	
Align/Remove Beam Reference Nodes		Tools/Align/Beam/Remove Reference Node	
Align/Plate Axes		Tools/Align/Plate/Axes to UCS	
Align/Plate Normals		Tools/Align/Plate/Normal by Connection	
Align/Plate Reinforcement (RC) Direction		Tools/Align/Plate/RC Directions to UCS	
Align/Drape Beams		Tools/Align/Beam/3-Axis by Connection	
Align/Drape Plates		Tools/Align/Plate/Axes by Connection	
Align/Rotate Plates		Tools/Align/Plate/Rotate Connections	
Align/Flip Entities		Tools/Align/Flip Entity	
Smooth Plates		Tools/Adjust/Smooth Plates	
Adjust Mid-side Nodes		Tools/Adjust/Relocate Mid-side Nodes	
Reorder Nodes		Tools/Adjust/Reorder Nodes	
Merge		Tools/Merge	
Convert/Beams to Plates		Insert/Multi-element/Plates on Beam Polygons	
Convert/Beams to/from Links		Tools/Convert/Beams to Links Tools/Convert/Links to Beams	
Convert/Tri to Quad		Tools/Merge/Tris to Quads	
Convert/Patch Loads to Beam Loads		Tools/Convert/Patch Loads to Beam Loads	
Convert/Load Paths to Load Cases		Tools/Convert/Load Paths to Load Cases	
Create Load Patches		Insert/Multi-element/Load Patch Plates on Beam Polygons	

Auto Assign/Restraints		Attributes/Node/Symmetry Restraints Insert/Multi-element/Link Clusters	
Auto Assign/Beam Offsets		Tools/Align/Beam/Offsets by Cross Section	
Auto Assign/Plate Offsets		Tools/Align/Plate/Offset by Thickness	
Auto Assign/Soil In-situ Stress		Utility/Soil In-situ	
Automeshing/Surface Mesh		Tools/Mesh/Surface Automesh	Ctrl+M
Automeshing/Solid Mesh	Ctrl+Alt+M	Tools/Mesh/Solid Automesh from Plates Tools/Mesh/Direct Solid Automesh	Ctrl+Alt+M Ctrl+Alt+D
Attach Parts		Tools/Mesh/Attach Parts	
Detach Elements		Tools/Mesh/Detach Elements	
Clean/Mesh	Ctrl+Alt+C	Tools/Clean/Mesh	Ctrl+Alt+C
Clean/Geometry	Ctrl+Alt+G	Tools/Clean/Geometry	Ctrl+Alt+G
Options		Tools/Options	

### Tables menu

R24 menu items	R24 keystrokes	Location in R3	R3 keystrokes
All tables		The LAYOUTS tab/Tables	

### Property menu

R24 menu items	R24 keystrokes	Location in R3	R3 keystrokes
Beam	Ctrl+Alt+B	The VISUAL tab/Global/Properties	Alt+P
Plate	Ctrl+Alt+P		
Brick	Ctrl+Alt+K		
Ply	Ctrl+Alt+Y	The LAYOUTS tab/Plies	
Laminate	Ctrl+Alt+L	The LAYOUTS tab/Laminates	
Creep		The LAYOUTS tab/Creep	
Plate RC	Ctrl+Alt+R	The LAYOUTS tab/Plate RC	
Load Path		The LAYOUTS tab/Paths	

### Solver menu

R24 menu items	R24 keystrokes	Location in R3	R3 keystrokes
All solvers		The SOLVERS tab	
Batch Solver		The  Strand7 menu/Run Batch Jobs The SOLVERS tab/Batch Jobs	Alt+J

**Results menu**

R24 menu items	R24 keystrokes	Location in R3	R3 keystrokes
Open Results File Close Results File		The  Strand7 menu/Results The  Open/close results file button	Ctrl+Alt+O
View Results Log File		The  Strand7 menu/View Log File The  View log file button	Ctrl+Alt+L
Results Settings		The VISUAL tab/Results/Element Results Settings (visible when results file is open)	
Displacement Scale		The VISUAL tab/Results/Displacement Scale Click <b>DS:</b> field on the status bar	
Reference Displacement		The VISUAL tab/Results/Reference Displacement	
Create Animation		The VISUAL tab/Results/Animate	
Play Animation File		The  Strand7 menu/Play Animation File	
Sequence Display			
Harmonic Time History		The VISUAL tab/Results/Harmonic Time History The CASES tab/Harmonic Time	
Linear Load Case Combinations		The CASES tab/Combination	
Load Influence Combinations		The CASES tab/Influence	
Envelopes		The CASES tab/Envelope	
Combine Results Files		The CASES tab/Combine Files	
Peek		The VISUAL tab/Results/Peek	
Graph		The VISUAL tab/Results/Graphs	
Listings		The LISTINGS tab	
View Load Factors		The VISUAL tab/Results/Information	
Options		 Results Settings under  The VISUAL tab/Base/Results Settings Results Options under  The VISUAL tab/Base/Results Options	Ctrl+Alt+R

## Window menu

R24 menu items	R24 keystrokes	Location in R3	R3 keystrokes
Tile Horizontally		The  Strand7 menu/Arrange/Tile Across	
Tile Vertically		The  Strand7 menu/Arrange/Tile Down	
Normalise All		The  Strand7 menu/Arrange/Centre Size All	
Window Border			
Normalise		The  Centre Size button	Alt+W
List of currently open models	Ctrl+Tab to switch	The  Strand7 menu/Current	Ctrl+Tab to switch

## Help menu

R24 menu items	R24 keystrokes	Location in R3	R3 keystrokes
Help Topics		The  button on all dialogs and windows The  Strand7 menu/Help	F1
Tutorial			
Licence Information		The  Strand7 menu/Licence Information	
About			