Getting started with SODA: The User Interface

Working with Viewport Input and Modeling

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The Workflow

The design workflow is similar to previous versions of SODA, with more options to create the model. A standard workflow would be:

1. Define the project (units, database, fabrication and definition) on the Project tab.
2. Input nodes – optional – see Nodes input below.
3. Define Design Group(s), select active group.
4. Input members. Usually by typing in the data grids.
5. Define loads. Apply loads to members and/or nodes.
6. Define load combinations.
7. Run the design engine.

As SODA now includes more modeling tools, an improved workflow would be as follows:

1. Project definition - same as above
2. Add template or define Design Groups, save frequently used ones as templates.
3. Add templates or define node and member loads, save common ones as templates.
4. Select the name generation pattern for nodes and members.
5. Input members:
   - Input in layers - face by face or floor by floor, using the The Input and Edit Plane: Workplanes – see below.
   - Use the snap feature for precise input.
   - *Don't input repetitive faces or floors manually.* Create the first one then use the modeling tools to create copies at new locations (see Editing selected Nodes and Members).
   - Apply loads to the nodes and the members of the first face (or floor), before copying it to the new locations. *This way the copies will have the same loading applied!*
   - When working with horizontal workplanes in the 3D view, use the *Create columns* feature to input columns with one click.
   - Use the automatic member splitting feature to create multiple beams over multiple collinear nodes (e.g. column tops) with two clicks.
   - For multilevel structures, create copies of entire levels and move them up to add another level. SODA will automatically merge the copies with existing nodes and members.
   - Use the Modeling tab and/or the node and member edit dialogs to adjust multiple items at one for coordinates and other properties, as needed.

6. Define load combinations.
7. Run the design engine.

The Workspace

Viewports:

Double-click on any viewport's toolbar (e.g. the *Top View*) to maximize it (expand it over the other viewports) or restore its original size, respectively.

Forms/Tabs:

Double-click on any form's current title bar (e.g. *Structural elements*) to make the entire form float, double-click again to dock it back. ***Useful when working with two screens.***

Double-click on any tab on a form (e.g. the *Structure* tab) to make only that tab float, double-click again – on the title bar this time- to dock it back within its group. ***Useful when working with two screens.***

You can drag and dock any form to any side of the workspace. You can group forms as tabbed views or arrange them side-by-side.

You can pin or unpin any form and make it slide in and out of the workspace when unpinned. Hold the mouse over the tab of a hidden form to make it slide.
Useful when working on one screen and you want to maximize viewport space.

Expand any group box that has a (+) sign next to its name by clicking on the (+) sign. Click the (-) sign to collapse it.

The Input and Edit Plane: Workplanes

Graphical input via mouse in a 3D or projection viewport has to convert a click on the screen to a point in the 3D space. SODA uses an active input plane in each projection viewport where you can input or select nodes and members.

Each viewport (except the 3D) has a drop-down list on its toolbar where you can add new workplanes and then select the active workplane for that viewport. The grid automatically updates and reflects the currently selected workplane.

The default input planes created for a new project are:

$X = 0$ for the Side View
$Z = 0$ for the Front View
$Y = 0$ for the Top View

To better understand SODA's input approach, imagine the workplanes as vertical or horizontal sheets at various coordinates along the X, Y and Z axes. You input nodes and members in any one of them, by selecting one and making it active in its corresponding viewport.

Example: *You want to input a face that will be located at Z = 4m. You create a new input workplane by typing the coordinate for the workplane, i.e. 4 (for Z = 4m) in the Front View's drop-down edit field and press "Enter". This will create a new plane at that coordinate and set it as the active workplane. All subsequent input of nodes and members will happen in that plane, until you select another one.*
This way you can input all beams that belong in the face located at Y = 4m.

Note: See Viewports **below on how to hide existing items in front or behind the workplane so that you can see only what you are editing!**

…Then you create a new workplane at Z = 8m and then copy and move members (from the previous face, see Editing selected Nodes and Members, *below).*

Once created, work planes are available in the drop-down list. Only the currently selected workplane is active at any given time.

The workplanes for a project are saved and loaded with the file so you don't need to re-create them.

To set a workplane active in the 3D view, hover the mouse on the projection viewport that has the desired active workplane.

Grids

Each projection viewport has its own grid for each workplane. The grids are useful for mouse input of members when used in conjunction with the snap settings.

The grid is automatically adjusted to cover the entire extent of the structure. You can change the grid properties in the *Graphics* tab (for all grids) or in the viewport's *Grid* drop-down menu (for the current grid).

Viewports

Remember that elements in any projection view can be covered by other elements that are closer to the viewer.

You can filter out portions of the scene using the *Filter items* button and drop-down menu on each viewport's toolbar.

Uncheck "*Before workplane*" and "*Behind workplane*" to see only elements located in the workplane.

You can show or hide the input grid, world axes, the 'glass' workplane, node and member names, member local axes.

Showing or hiding the grid does not affect the "snap" input mode that is controlled by its corresponding setting (on the *Graphics* tab).

Node and Member Names

Nodes and members created via mouse input are named automatically using the currently selected Name generation pattern in the respective group box.

The patterns allow for incremental naming (e.g. N_1, N_2…) or using relative coordinates (e.g. x0y3z2) and to include a prefix, body and suffix.

Note: the relative coordinate naming only works when the nodes are input in order (e.g. for a 2D structure - from bottom-left to top-right) without inserting a node between existing nodes.

Names can also be changed later using the Rename All and Rename Selected buttons

Members can also be named using the start and end node names (e.g. N1N2, or N1_N2) when the corresponding check box is selected.

Nodes input

Note: nodes are not required to be pre-exist for members to be created via mouse input, they are by default created with new members. Pre-existing nodes are only needed when members are created via keyboard input using the data grid.

Click on the *Node input mode* button on the workspace vertical toolbar. Create nodes by clicking at the desired location in any view.

Nodes are always created in the view's active workplane, even in the 3D view.

Choose the right viewport: e.g. the Top View to input a floor, Side or Front View to input a wall, etc.

Design groups

Note: At least one design group is needed before any members can be created.

Select a design group to set it as active and have it automatically assigned to new members.

Selecting multiple design groups in the Groups data grid does not change the active group assigned to new members.

Cool Feature: You can save design groups as template groups and load them into other projects. SODA has sample design groups saved as templates that you can load into your project – select one from the *Template* drop-down and click the *Add to project* button.

Members input

Click on the *Member input mode*, or *Linked members input mode* button on the workspace vertical toolbar. Click on the start point then on the end point to create the member.

Cool Feature: Chained mode lets you input linked members with each click of the mouse.

The default is to create members without pre-existing nodes. The *Create nodes with members* box on the *Graphics* tab is checked by default to have SODA create end nodes on the fly.

Note: New start and end nodes for new members are always created in the active workplane.

You can also select existing nodes. Hover over a node to see it highlighted then click to have it assigned as start/end node for the member. ***Note: in the projection viewports, only nodes located within the active workplane can be selected!***

Cool Feature: When creating a member between the first and last node in a row of collinear nodes (e.g. top of columns), the member is automatically split between nodes.

Cool Feature: You can create members in the 3D view between any existing nodes, *even (and especially!) outside the active workplane.*

You can cancel the member creation anytime with a mouse right-click.

You can create columns with a single mouse click in the Top and 3D views (when the active workplane is horizontal). Set the column height and direction in the edit fields above the *Members* data grid.

You can Undo/Redo any input

Node and Member Selection

Click on the *Select nodes and/or members* button (below the *Loads input mode* button) on the workspace vertical toolbar to enter Selection mode.

Click on the *Node input mode* button if you only want to select nodes. Similarly, click on the *Member input mode* button if you only want to select members.

If you want to select both nodes and members, make sure none of these input mode buttons (Nodes or Members Input) is active.

You can now select nodes and/or members by clicking on each one individually (while holding down the *Ctrl* key), or by using click-and-drag to select multiple items.

If you do this in the 3D viewport you will select items regardless of their location in the 3D world. Do this in a projection viewport if you only want to select items that lie in the current workplane of that viewport (e.g. a floor in the top viewport).

(Remember to filter out items that are in front of the workplane - uncheck the Before work plane *menu item in the viewport's* Filter *drop-down to hide those items, otherwise you won't be able to select items in the workplane that are hidden by those items located in front of them.)*

You can also select nodes or members in the data grids by clicking on the row headers, either individually (while holding *Ctrl* down) or by click-and-drag on row headers.
Hint: you can sort the items in the grid, or group them by any column (e.g. group Nodes by X-coordinate to then select all nodes in a face). See Data grids notes section below.

You can also select all members of a design group (or more) by clicking on the respective row(s) in the *Design Group* data grid.

Editing selected Nodes and Members

Now that you have selected nodes and/or members, there are many ways that you can modify their location, or other properties.

It's important to note that SODA makes little distinction between only nodes or members being selected, or both. SODA keeps track of the relationship between nodes and members, so moving ones will also affect the others.

When you move nodes, the connected members will move as well, and vice-versa, moving members will cause their start and end nodes to move as well. This applies to translation, rotation and any combination of these actions.

The main differences between node and member selection is as follows:
- Selecting and **moving** nodes will cause a connected member to either move (if both its nodes were selected) or adjust its geometry (i.e. orientation and length), when only one of its nodes was selected.
- **Copying** only nodes at a new location will not copy the connected members.
- When **moving** a selection of members, they will keep their geometry and their start and end nodes will move regardless if they were selected or not.

Note: This will affect any non-selected members that are connected to the end nodes, when the *Retain connections when moving partial selection* checkbox on the *Graphics* tab is checked.

The following details the possible ways to edit selected items:

1. Delete the selection

   Press the *Delete* key, or click the *Edit…Delete* menu, or the *Delete* toolbar button.

2. Translate/Copy items using the mouse

   Click the *Move mode* button on the workspace vertical toolbar, then in any viewport, left-click and drag to move the selection along the viewport's active workplane. Release the button to drop the selection at the new location. (Hold down *Ctrl* to create a copy).

3. Translate/Rotate/Mirror/Copy items using the *Modeling* tab

   Use the tools on this tab to:
   o Move/copy items (e.g. select the nodes in a face then move along the perpendicular axis (with *Copy at new location* box checked) to create a new face
   o Rotate & copy a selection to create circular structures
   o Mirror & copy a selection to create symmetrical structures
   o Perform combinations of these actions (e.g. use rotate, move up and copy to create a circular staircase)

4. Edit nodes and members using the context menu

   You can set a new value for a property and apply it to all selected items at once using this menu.

   Right-click in any viewport to bring up the context menu.
   o Select *Edit Nodes*, then in the *Edit selected nodes* dialog you can edit the common coordinate (e.g. the Y coordinate of a floor), or the support type of the selected nodes.
   o Select *Edit Members*, then you can edit any property except the start/end nodes

5. Copy items using Copy/Paste

   The main use case is when you want to copy a selection into another project. Have a truss you want to reuse? Select it, then click the *Copy* button on the viewport's toolbar (or use *Ctrl + C*). Switch to the other project and select the *Edit…Add to project* menu, or press *Ctrl+Shift+V* to insert the copied items into the workspace.

6. Apply Loads using the context menu

You can apply one or multiple loads to all selected items at once using this menu.

Right-click in any viewport to bring up the context menu. Select *Apply node/member loads*, then in the *Apply Loads* dialog select the loads you want to apply and click the *Apply* button.

Move/Copy Hints:

1. You don't need to worry about node or member overlap when moving or copying items to a new location. SODA checks for existing nodes and members at the new locations and automatically merges the moved/copied assemblage into the existing structure. Nodes landing on an existing member will automatically split that member if that option is checked in the *Graphics* tab.
2. Items are copied with their loads, so in many cases it is useful to fully load a face, for instance, before duplicating it at other locations.
3. As with the input actions, you can Undo/Redo.

Applying loads

Create loads by typing into the data fields, or by adding a saved **template load** (see sample loads in each load type's templates list).

Delete a load by selecting its row in the grid and pressing the *Delete* key.

To apply a load to an item (node or member), select the load to make it active, then:
1. Check the boxes of the items you want to apply it to in the items list on the Loads tab.
2. Or, click on the desired items in any viewport.

For batch load application, use the *Apply Loads* dialog as described in the *Editing selected Nodes and Members* section above.

Note: Applied loads are shown in the main 3D viewport (on all items applied to) and in the Loads tab's own viewport (for only those items –rows- that are selected in the top-left data list).

A few notes about Data grids

- You can resize the group boxes that contain the nodes/groups/member data grids. Just hover the mouse over the group box's bottom line until the cursor becomes a vertical double arrow, then click and drag up or down to resize the group box.

- Click on a column's header to sort the data in a grid by that column.

- Nodes and Members can be grouped in the grid by dragging a column header in the space above the table (e.g. group nodes by Y coordinate to identify floors).