



STRAP & IDEA StatiCa User Guide

Designing connection for steel structures using
STRAP ,IDEA StatiCa CheckBot & IDEA StatiCa Connections

All rights, including those of translation, are reserved.

No portion of this document may be reproduced, including photocopying without a written permission from ATIR Engineering software LTD.

© ATIR Engineering software LTD
13 Kehilat Saloniki, Tel Aviv, Israel
Tel: +972-3-6480129
Website: <http://www.atir.com>
Email: atir@atirsoft.com

Table of Contents

1. Objective, Recommendations, and Guidelines	4
2. IDEA StatiCa CheckBot – User Interface	5
2.1. Home Panel	5
2.1.1. Settings	6
2.1.1.1. General Settings	6
2.1.1.2. Presentation Settings	6
2.1.1.3. Colors Settings	7
2.1.1.4. Units Settings	8
2.1.2. Information	8
2.1.3. About	9
2.1.4. Licenses	9
2.2. Project Panel	10
2.2.1. Main Navigation Menu	10
2.2.2. Display and Commands Menu	11
2.2.2.1. Import Tab	11
2.2.2.2. Labels Tab	11
2.2.2.3. Current Item Tab	12
2.2.2.4. Structural Model Tab	12
2.2.2.5. Options Tab	13
2.2.2.6. Member 1D Forces Tab	13
2.2.2.7. New Tab	14
2.2.3. List of Project Items	15
2.2.4. Model Window	17
2.2.5. Properties Window	18
2.2.5.1. Connection Properties	18
2.2.5.2. Member Properties	19
2.3. Materials Panel	20
2.3.1. Used Material Window	20
2.3.2. Edit Window	20
2.3.3. Preview Window	20
2.3.4. Commands Menu	20
2.3.4.1. DB Tab	21
2.3.4.2. New Tab	21
2.3.4.3. Edit Tab	21

3. IDEA StatiCa CheckBot – Operations	22
3.1. Starting the CheckBot via <i>STRAP</i>	22
3.2. Importing Connections from <i>STRAP</i> to the CheckBot	23
3.3. Creating a Connection from Regular Node	24
3.4. Opening a Connections Using IDEA StatiCa Connections ..	25
3.5. Export Connection to Separate File	26
3.6. Export Several Connections to Single Project	27
3.7. Edit Connection's Connected Members	28
3.8. Merge Members	29
3.9. Divide Members	30
3.10. Enable/Disable Evaluate Critical Effects	31

1. Objective, Recommendations, and Guidelines

The main objective of this guide is to provide basic knowledge about IDEA StatiCa CheckBot user interface and basic operations that can be made using the CheckBot and *STRAP*. The major role of the CheckBot is to manage the process for steel connection design based on the steel structure made in *STRAP*.

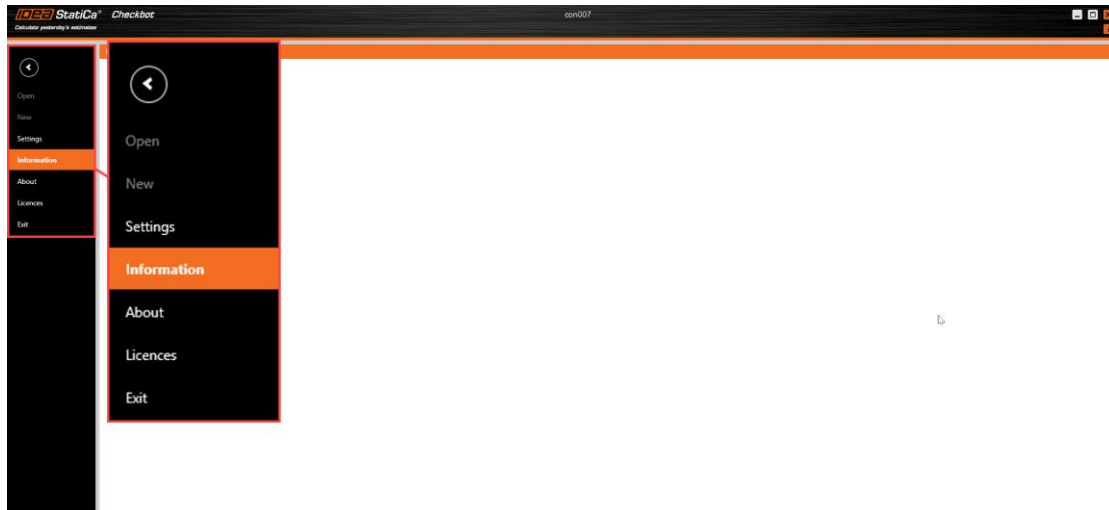
IDEA StatiCa CheckBot offers easy import of connection node, with their connected members (beams and columns) directly from *STRAP*, using direct synchronization between the two programs (known as BIM Link). The software allows certain editable parameters for the members imported from *STRAP* (such as cross sections and eccentricity from the node), and manage the design process of the connections that is done using IDEA StatiCa Connections software.

Recommendations and Guidelines

- For optimized and effective use of the software it is recommended to launch IDEA StatiCa CheckBot directly from *STRAP*, and not from other places (desktop icon and such).
- It is recommended to open connections using IDEA StatiCa CheckBot, this operation will launch the IDEA StatiCa Connections software with all the Data given by the CheckBot about the given connections.
- Upon completion of the connection design via IDEA StatiCa Connections it is recommended to save the connection and check that all the data about the design has been updated to the CheckBot.
- Due to the BIM Link between *STRAP* and IDEA StatiCa CheckBot, any change made in *STRAP* steel postprocessor will to be sync in the CheckBot using the Sync button. It is important to notice that any changes made in *STRAP* steel postprocessor will maintain the link between the two software, **but** any change made in *STRAP* geometry of load modules that will force new calculation of the model in *STRAP* will break the link between that two software. In those cases, the user must close IDEA StatiCa CheckBot, relaunch it from *STRAP* and use the Sync Button.

2. IDEA StatiCa CheckBot – User Interface

2.1. Home Panel



The menu to the left is used to navigate to the software's settings or back to the project panel. The menu contains the following options:

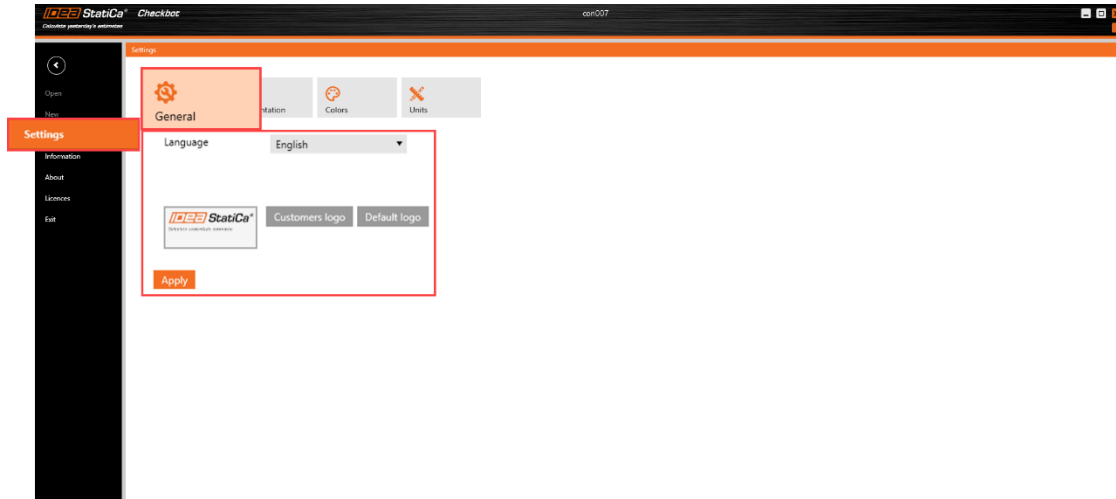
- A back arrow that will direct the user back to the project panel.
- * Open – Open an existing project within the current folder.
- * New – Create a new project.
- Settings – Manage the software main settings.
- Information – Display and edit information about the current project.
- About – General information about the software (build, rights, etc.).
- Licences – Sign in and general information about the current licensing.
- Exit – Close the software.

* Not available when using the CheckBot via *STRAP*.

2.1.1. Settings

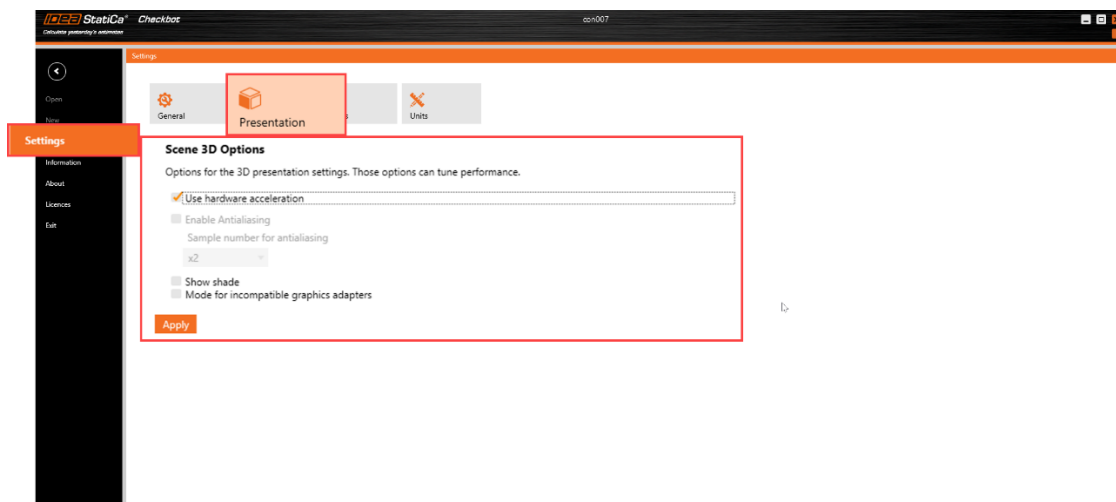
2.1.1.1. General Settings

On the General Settings tab the user can edit the display language and the logo image that will be displayed in the reports.



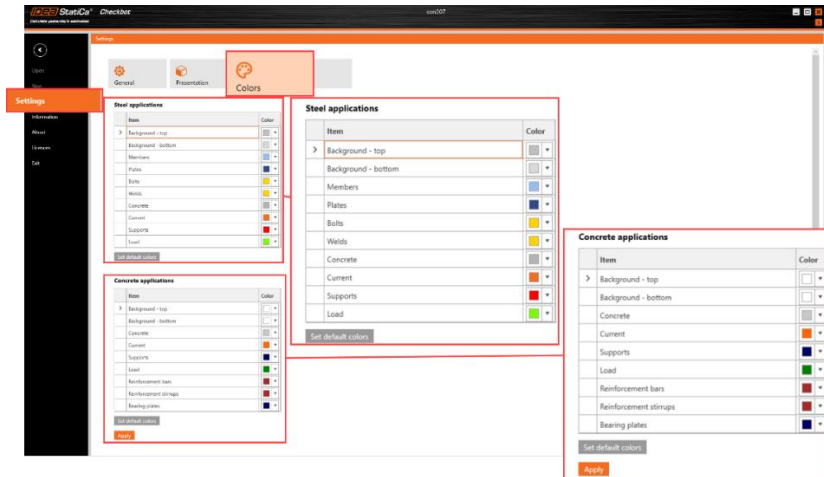
2.1.1.2. Presentation Settings

On the Presentation Setting the user can edit the model display setting, choosing if to use graphic acceleration driver, display shades, or use legacy display due to unsupported graphic driver.



2.1.1.3. Colors Settings

On Colors Setting the user can edit all display colors for the Steel and Concrete sections of the IDEA StatiCa softwares

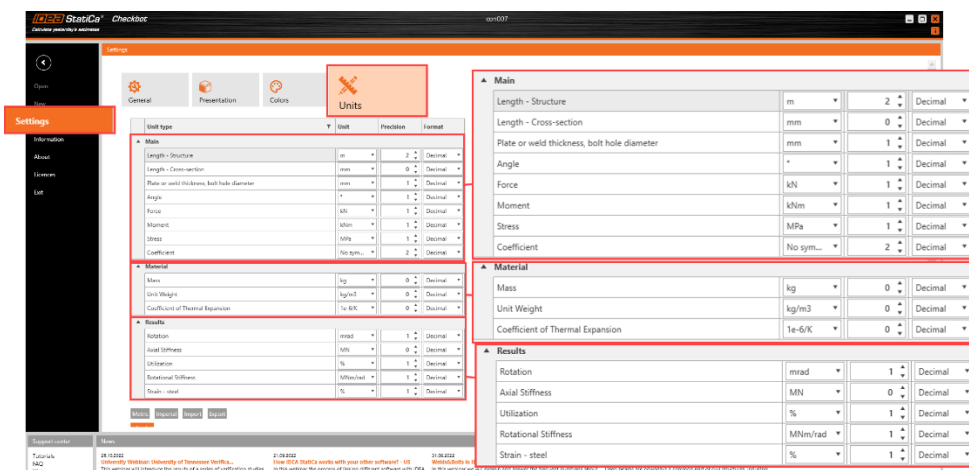


- **Steel software:** the user can edit the colors for the following items:
 - * Background - Top – coloring for upper part of the model window.
 - * Background - Bottom – coloring for lower part of the model window.
 - Members – coloring for member connected to nodes.
 - Plates – coloring for connection plates within connection design.
 - Bolts – coloring for connection bolts within connection design.
 - Welds – coloring for connection welds within connection design.
 - Concrete – coloring for any concrete part in the model.
 - Current – coloring for the current item being selected.
 - Supports – coloring for connection support within connection design.
 - Loads – coloring for loads (forces/moments) within connection design.
 - **Concrete software:** the user can edit the colors for the following items:
 - * Background - Top – coloring for upper part of the model window.
 - * Background - Bottom – coloring for lower part of the model window.
 - Concrete – coloring for any concrete part in the model.
 - Current – coloring for the current item being selected.
 - Supports – coloring for connection support within concrete design.
 - Loads – coloring for loads (forces/moments) within connection design.
 - Reinforcement Bars – coloring for longitudinal rebars in the concrete.
 - Reinforcement Stirrups – coloring for transverse rebar in the concrete.
 - Bearing Plates – coloring for support and load bearing plates.
- * The model window is colored as linear shift from the top to bottom background colors selected in the corresponding options.

2.1.1.4. Units Settings

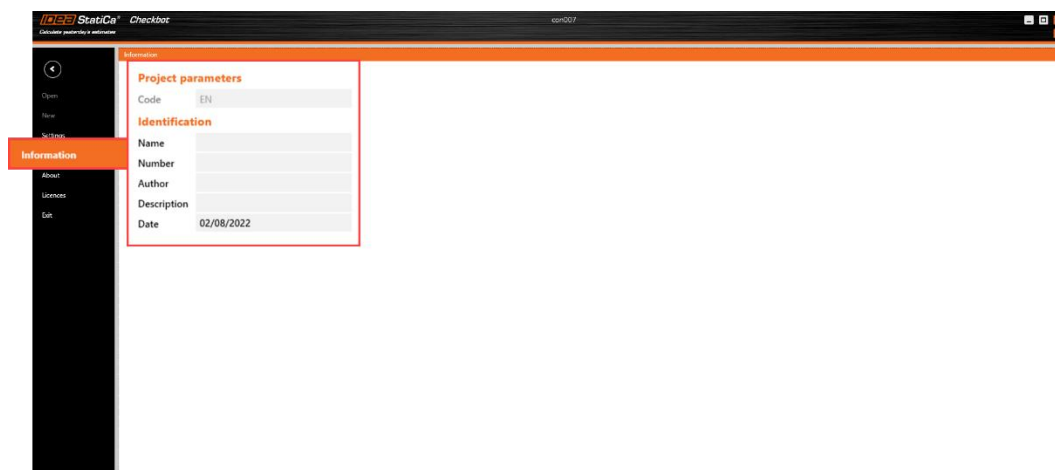
On Units Settings tab the user can edit the following unit parameters:

- **Main Units** – those units include all geometrical units (member length, cross sections measurements, and connection measurements such as plates, bolts and welds dimensions), loading units, and coefficients.
- **Material Units** – those units include the mass, weight and thermal expansion coefficient.
- **Results Units** – those units include the displacements/rotational units, and the displacements/rotational stiffness units, and also the strain units (Steel only).
- **Presets** – the user can choose the unit preset (metric or imperial) or import and export unit presets.



2.1.1.2. Information

The information tab displays the current project design code, with the basic project info such as name, number, author, description and creation date.



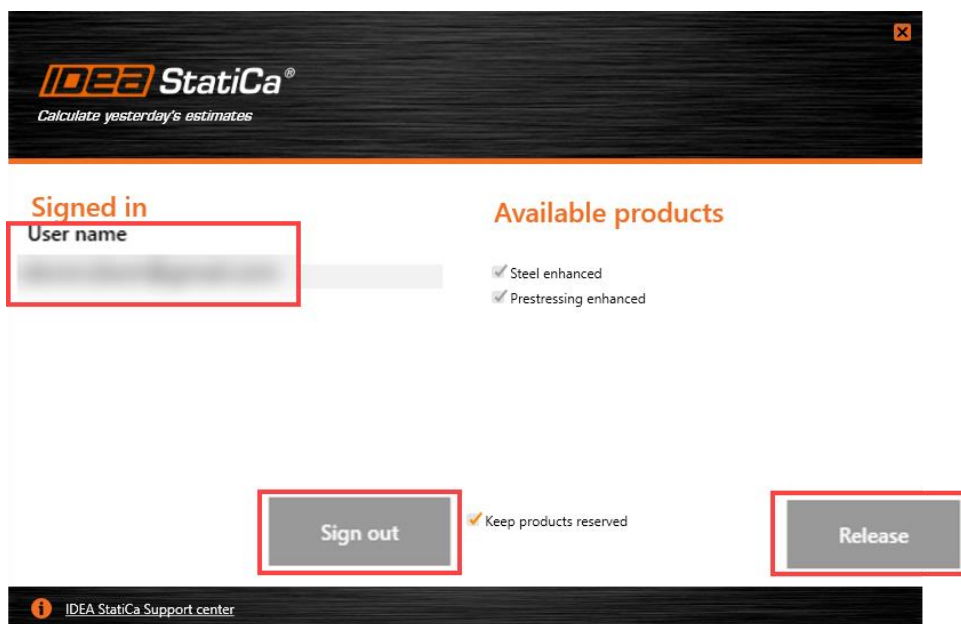
2.1.3. About

The About tab display the current version of the software with option to update the version.



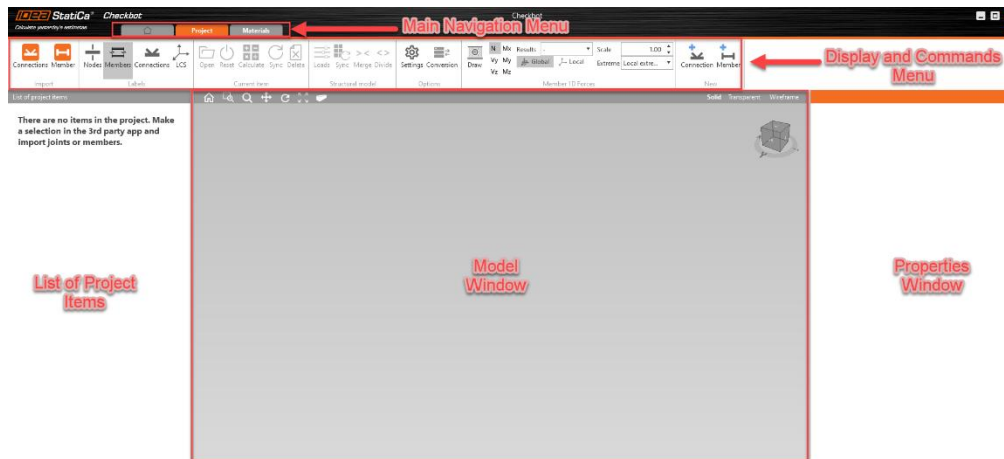
2.1.4. Licenses

On the Licenses tab the user can connect or disconnect from a certain license, it is also possible to release the installed software from the current license in order to attach them to other licenses, and manage the linked software to the current license.

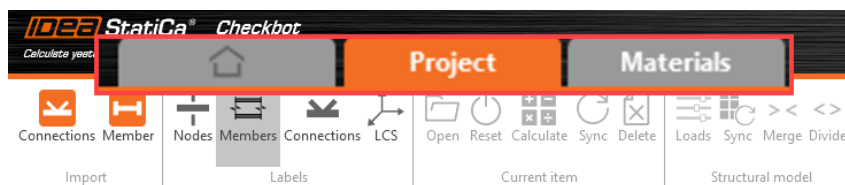


2.2. Project Panel

When the user launch IDEA StatiCa CheckBot via STRAP, the following screen will appear after creating the project.



2.2.1. Main Navigation Menu



The main navigation menu contains usually the following items:

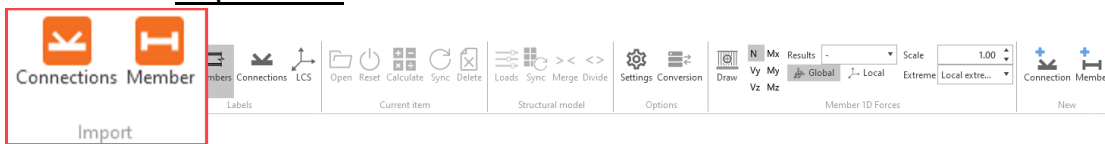
- Home Panel – Indicated by the Home icon, the home panel button will move to the home screen where it is possible to edit the software settings, view current project info and manage licenses.
- Project Panel – The main screen for the current project, there the user can import and edit the connections from STRAP, view loading data, and launch the IDEA StatiCa Connections software to design the connections.
- Materials Panel – On the material screen the user can edit all the parameters regarding the materials, cross sections, plates, bolts and welds that can be used in the current project.

2.2.2. Display and Commands Menu



With the display and commands menu the user can enable several display options for the model, and apply several operations of the model in the project.

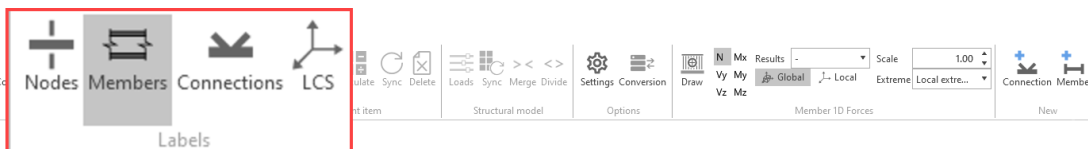
2.2.2.1. Import Tab



The import tab contains two buttons that allows the user to import items to the model in the CheckBot:

- Connections – This button will allow the user to import connections nodes from *STRAP* to the CheckBot. The operation will import the selected nodes, define them as connection nodes, import all connected members, and the nodes on the other side of the imported members. The imported connection nodes can be designed using IDEA StatiCa Connections.
- Members – This button will allow the user to import members and all their nodes. The imported members can be designed using IDEA StatiCa Members. Notice that is options is not available using *STRAP* BIM Link.

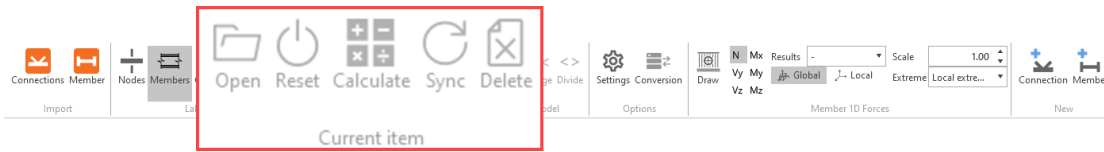
2.2.2.2. Labels Tab



The labels tab contains button to turn on and off the corresponding labels in the model window, the labels are the following:

- Nodes – turn on/off all node numbers as imported from *STRAP*.
- Members – turn on/off all beam (beams and columns) numbers as imported from *STRAP*.
- Connections – turn on/off only connection node numbers.
- LCS – turn on/off local coordinate system for each member in the model as imported from *STRAP*. The LCS will be displayed at the start of each member.

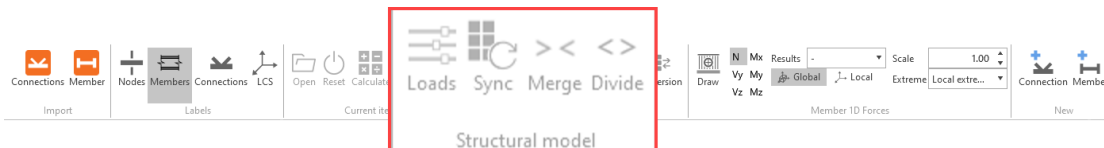
2.2.2.3. Current Item Tab



The current item tab contains operations to manage the selected item in the model, be it a connection node or a member (beam or column), the buttons are the following:

- Open – open the current item in its corresponding software (IDEA StatiCa Connections or IDEA StatiCa Members).
- Reset – reset the current item to its original state as it was just after being imported.
- Calculate – calculate the current item to its specific design by the code assigned to the project.
- Sync – synchronize the current item to *STRAP* In case any changes were made in the *STRAP* model while working on the CheckBot. Notice, this operation is available only if the BIM Link is still operational.
- Delete – delete the current item from the model connection/member list.

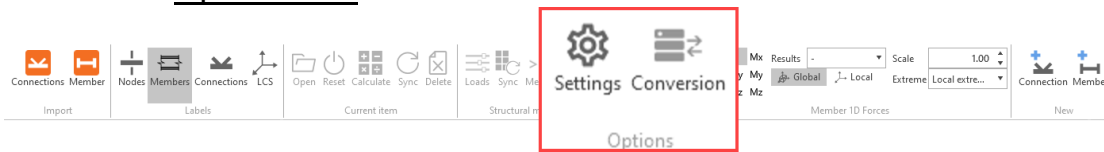
2.2.2.4. Structural Model Tab



The structural model tab contains operations to manage the whole model, the buttons are the following:

- Loads – open the load list that was imported from *STRAP*. If the *STRAP* model had combination list, the loads in the CheckBot will be the combinations from that list, otherwise the loads will be all the load cases in the *STRAP* model.
- Sync – synchronize the whole model to *STRAP* In case any changes were made in the *STRAP* model while working on the CheckBot. Notice, this operation is available only if the BIM Link is still operational.
- Merge – merge select member to its adjacent members on **direct** line. Notice, only members with the same local X direction will be merged.
- Divide – divide merged member to its original members.

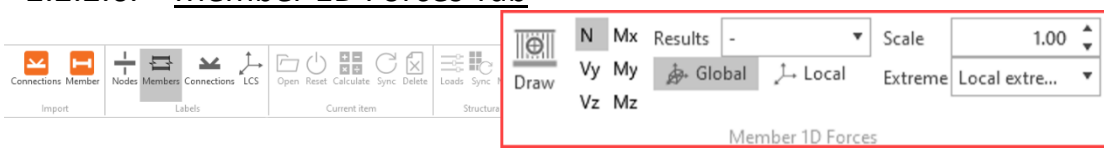
2.2.2.5. Options Tab



The options tab contains 2 buttons to edit several settings parameters for the current project:

- Settings – edit the parameters related to all costs of the model, i.e. costs of members, plates, bolts and so on.
- Conversion – edit the parameters for converting unknown sections to predefined sections or standard ones according to conversion tables.

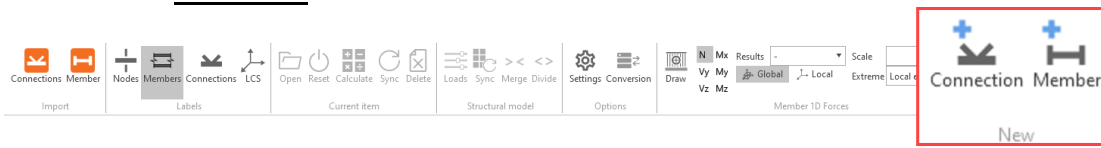
2.2.2.6. Member 1D Forces Tab



The member 1D force tab contains buttons to display the internal forces graphs on the members, the buttons are the following:

- Draw – display the members internal forces, notice that the values are presented at the member node and the line connecting the nodes is always linear, even though the graph can be nonlinear on *STRAP*.
- N/Vx/Vy/Mx/My/Mz – choosing one of those buttons will change which type for internal force/moment will be displayed.
- Global/Local – display the internal force either relative to local or global coordinate system.
- Results – display the internal forces according to one of the load cases or combinations imported from *STRAP*.
- Scale – define the scale for the internal force's values.
- Extreme – display the extreme values of the internal forces according to the following states:
 - No – don't display values at all.
 - Section – display the values at both nodes of the members.
 - Local Extreme – display the larger value between both nodes of the members.

2.2.2.7. New Tab



The new tab contains 2 buttons regarding additions of items to the list of connections, the buttons are:

- Connection – adding new connection node to the list, this operation is useful for cases of imported nodes that were not marked as connection nodes.
- Member – adding new member to the list.

2.2.3. List of Project Items

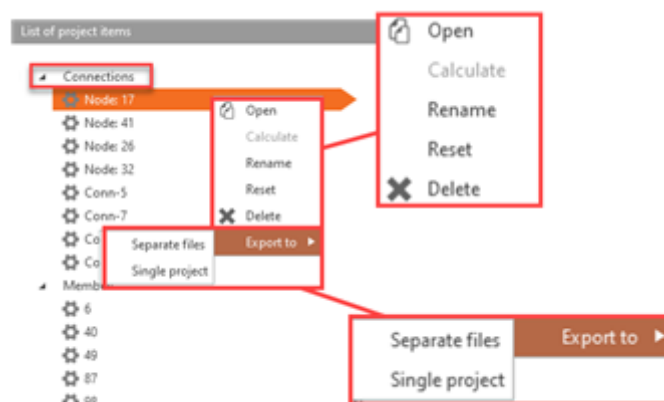
The list of project items is separated into 2 lists, list of connections, and list of members. Usually using *STRAP* BIM link, the connections imported from *STRAP* will appear on the list without any members, more connections can be added and also members.

The list of connections displays all the connections that were imported or created in the current project. By right click on one of the connections, an operations menu will appear, containing operations that will be divided to two sections, basic operations, and export operations. The basic operations are the following:

- Open – open the selected connection using IDEA StatiCa Connections.
- Calculate – calculated the selected connection using connection design data.
- Rename – change the selected connection name within the CheckBot.
- Reset – reset the selected connection to its original state, if the connection was during design process, all the data will be lost.
- Delete – delete the selected connection from the list.

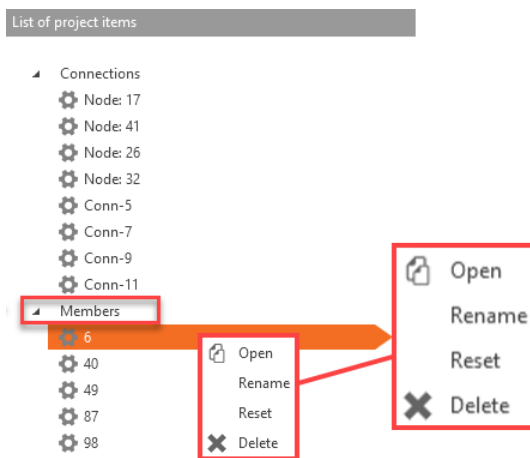
The export operations are the following:

- Separate Files – export a single connection into a separate file that will allow full editing of all aspects of that connection and will be disconnected from the BIM link with *STRAP*.
- Single Project – export several selected connections to a single IDEA StatiCa Connections project. Same as separate files operation, the connections selected can be fully edited and are disconnected from the BIM link with *STRAP*.

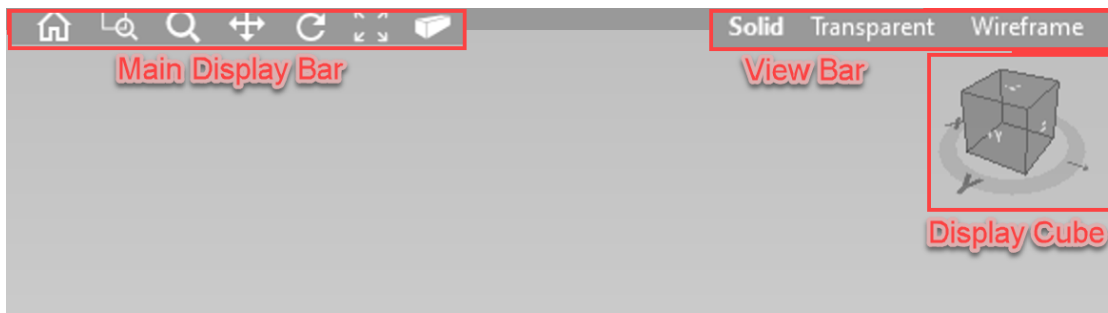


The list of members displays all the members that were created in the current project. By right click on one of the members, an operations menu will appear, containing basic operations that can be used. The basic operations are the following:

- Open – open the selected member using IDEA StatiCa Members.
- Rename – change the selected member name within the CheckBot.
- Reset – reset the selected member to its original state, if the member was during design process, all the data will be lost.
- Delete – delete the selected member from the list.



2.2.4. Model Window



The model window displays the model (or part of it) that was imported to the CheckBot. The window consists of the display area (which can be colored via the software settings) and the edit display buttons above the display area. The display buttons are the following:

- Main Display Bar (from left to right):
 - Default Display – return to default display settings.
 - Zoom By Window – use the mouse to define a window and the display will zoom to that window area.
 - Zoom In/Out – change the cursor to magnifying glass icon that indicate that the user can zoom the display in or out to relative to the center of the display by holding the mouse button and moving the mouse up or down (can also use the mouse wheel to zoom in or out to the cursor location).
 - Pan – change the cursor to arrow cross icon that indicate that the user can pan the display by holding the mouse button and dragging the mouse to specified location.
 - Rotate – change the cursor to circle arrow indicate that the user can rotate the display relative to cursor location by holding the mouse button and moving the mouse.
 - Zoom extent – zoom that display such that the whole model will be displayed.
 - Isometric View – change the display to preset isometric view.
- View Bar:
 - Solid – display the members as solid bodies.
 - Transparent – display the members as semi see-through bodies.
 - Wireframe – display only the nodes in the model.
- Display Cube:
The display cube allows the user to control and rotate the display in any angle.

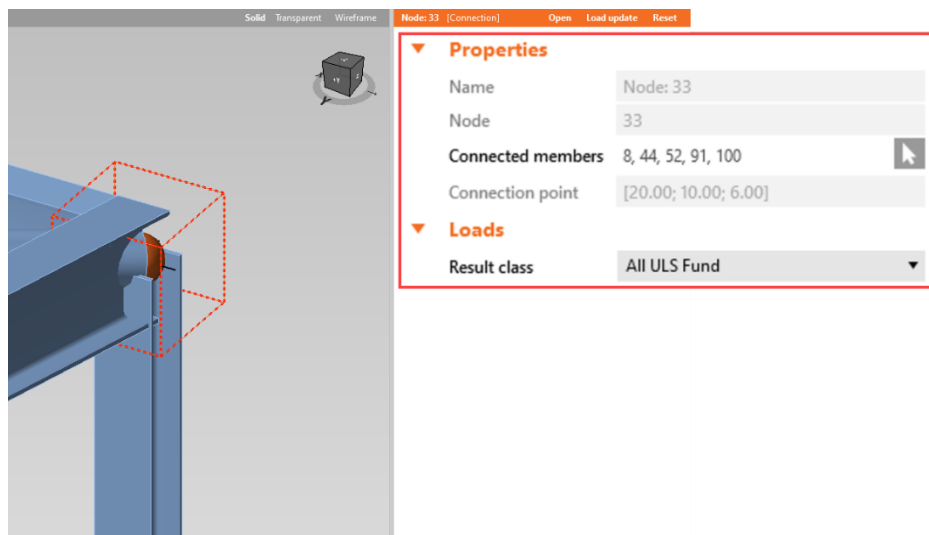
2.2.5. Properties Window

The properties window contains information about the selected item in the model window or list of project items be it a connection or a member, some of the properties are editable and some are lock due to the BIM link.

2.2.5.1. Connection Properties

When selecting a connection, the following items will be displayed in the properties window:

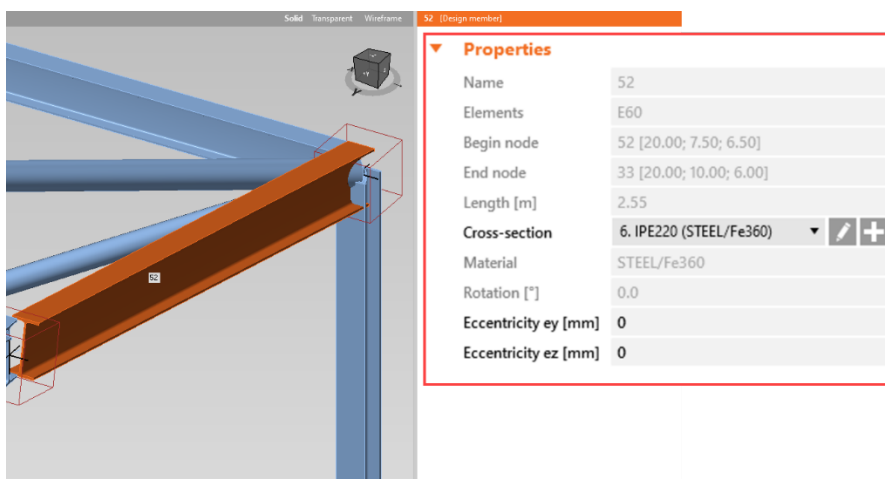
- Name – the name of the connection automatically given by the import process, mostly then name will be Node #, where # indicate the node number in the model related to this connection.
- Node number – the node number for the connection as numbered in *STRAP*.
- Connected Members – display a list of members connected at the node, the listed members will be included in the connection design using IDEA StatiCa Connections.
- Connection Point – the coordinates of the selected connection node based on the origin made in STRAP.
- Result Class – the load case that will be used to design the connection using IDEA StatiCa Connections, there is a choice for all.



2.2.5.2. Member Properties

When selecting a member, the following items will be displayed in the properties window:

- Name – the name of the member automatically given by the import process, mostly then name will be #, where # indicate the member number in the model in *STRAP*.
- Elements – the element number created by the CheckBot during the import process.
- Begin Node – the node on which the member starts.
- End Node – the node on which the member ends.
- Length – the length of the member.
- Cross-Section – the cross section of the member that was imported from *STRAP*.
- Material – the material from which the member is made, as chosen in *STRAP*.
- Rotation – the angle on which the members is rotated along its local X direction.
- Eccentricity ey – the eccentricity on the local Y direction to move the member from its current center line.
- Eccentricity ez – the eccentricity on the local Z direction to move the member from its current center line.
-



2.3. Material Panel



2.3.1. Used Material Window

The used material window contains all the materials, cross-sections and bolts that were imported or created by the user for the current project.

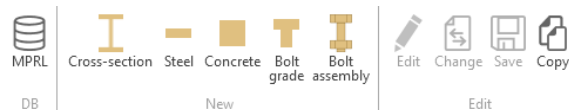
2.3.2. Edit Window

The edit window contains all the details about the select item from the used material window, most of the details can be edited by the user.

2.3.3. Section Preview

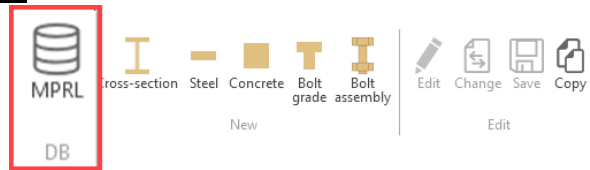
The section preview displays the cross section according to the given values in the edit window.

2.3.4. Commands Menu



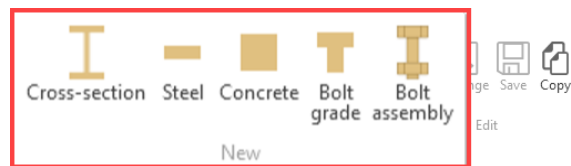
With the commands menu the user can create and edit cross-sections, material and bolts that are used in the current project.

2.3.4.1. DB Tab



MPRL – import material items from MPRL database.

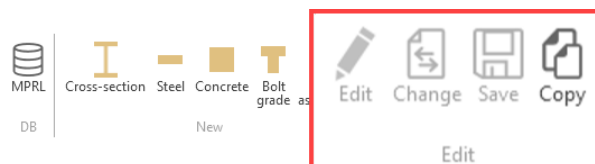
2.3.4.2. New Tab



The new tab is used to create new items for the current project, such as cross-sections, materials and bolts, the tab contains the following buttons:

- Cross-Section – create a cross section item from standard sections, combined section, cold form section, or rectangular section.
- Steel – create a new material property of steel from predefined material templates.
- Concrete - create a new material property of concrete from predefined material templates.
- Bolt Grade - create a new material property of bolts from predefined bolt grade templates according to steel strength.
- Bolt Assembly - create a new bolt assembly property from predefined templates.

2.3.4.3. Edit Tab



The new tab is used to edit selected items from the used Material window, the tab contains the following buttons:

- Edit – enable the edit mode for the selected item.
- Change – change the selected item to another item from the same type.
- Save – save the changes made in a MPRL database.
- Copy – duplicate the selected item.

3. IDEA StatiCa CheckBot - Operations

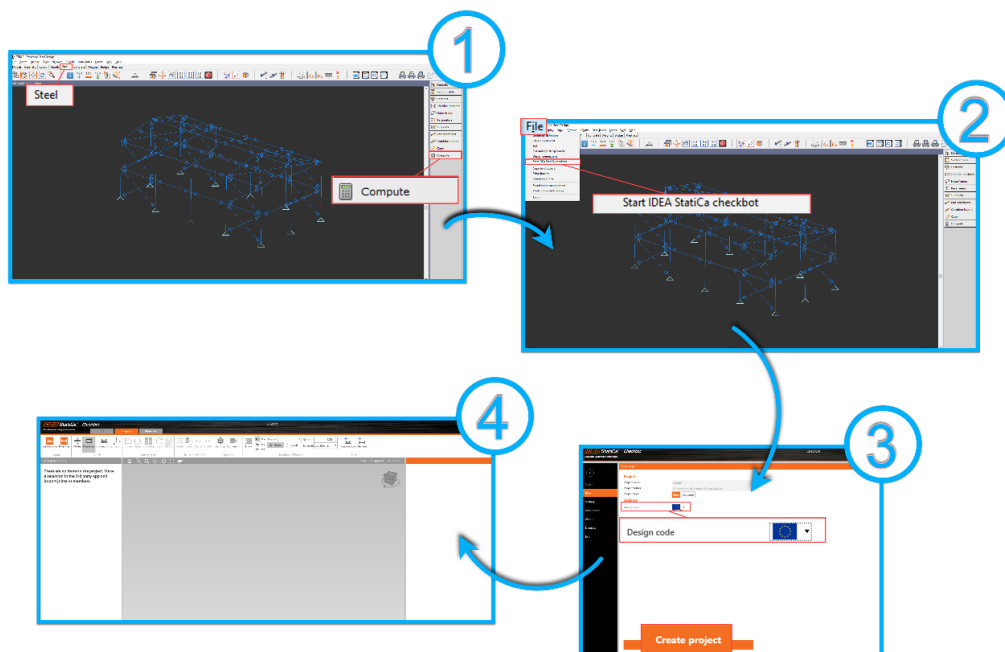
3.1. Starting the CheckBot via STRAP

Objective

This operation is used in order launch the IDEA StatiCa CheckBot software to manage, calculate and design steel connections based on *STRAP* model.

Operation Steps

- ① Make sure to calculate the steel structure model in STRAP. On Steel module press on "Compute", then select "For all beams", and click OK. After the calculation has been made, close the Result Summary window.
- ② Open the File menu, then click on Start IDEA StatiCa CheckBot.
- ③ Once the program is open, if this is the first time the program is launched for the current model, the Create Project screen will be displayed, choose the design code to use and press Create Project.
- ④ Finally, the main project panel will appear with blank model display.



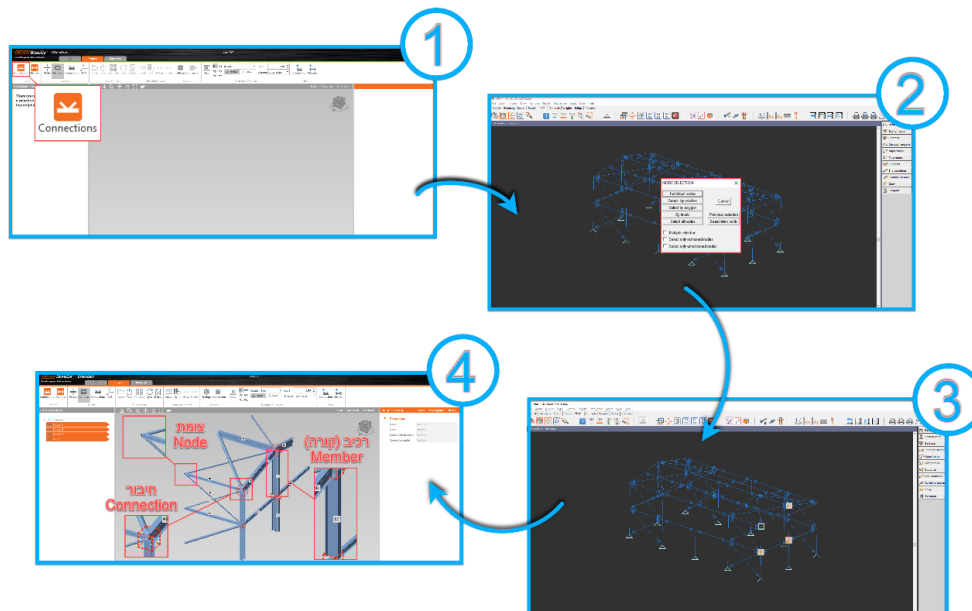
3.2. Importing Connections from STRAP to the CheckBot

Objective

This operation is used in order to import connection nodes from model made in *STRAP* to the IDEA StatiCa CheckBot. Notice that it is recommended to import a limited number of nodes each time (not more than 10 to 15 nodes) due to the long loading time. Also, notice that the operation imports several items: the connection node, all the members (beams and columns) connected to that node, and the nodes at the end of those members (those nodes are not defined as connections).

Operation Steps

- ① On the project panel, click on the "Connections" in the Import tab.
- ② The screen focus will move to *STRAP* with node selection menu open.
- ③ Select the requested nodes to import (use any of *STRAP* node selection options).
- ④ The import process will start, the CheckBot will load all connection nodes that were selected and the members connected to those nodes. Once complete, the imported model will be display in the model window of the CheckBot.



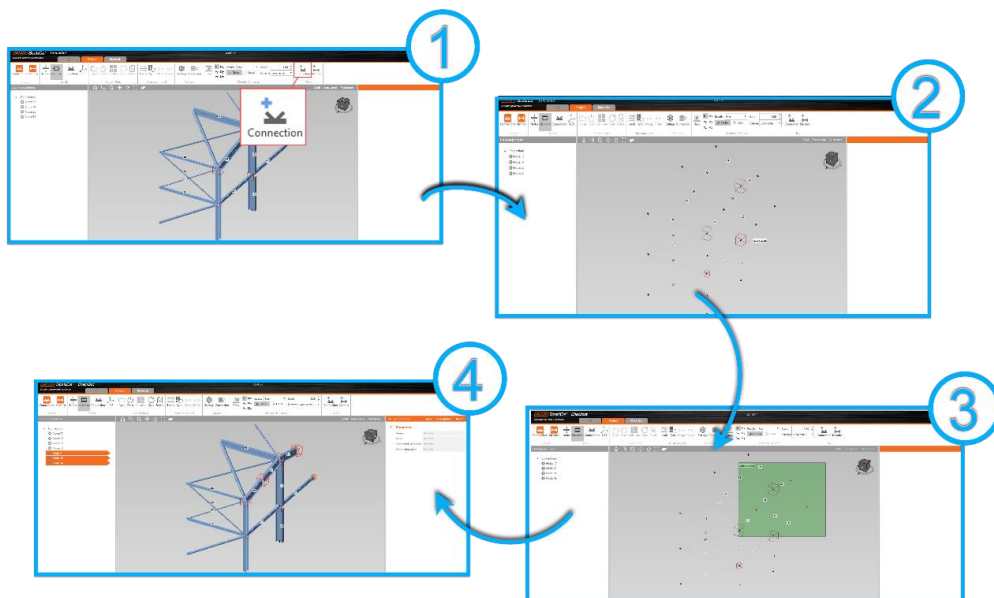
3.3. Creating a Connection from Regular Node

Objective

This operation is used to create a connection node from a node that was imported from *STRAP* but was not selected directly on *STRAP* during the import process (i.e., a node on the other side of a member), or in cases where a connection node was deleted and need to be redefined.

Operation Steps

- ① On the project panel, click on "Connection" in the New tab.
- ② On the model window, all members will disappear and only the nodes will be displayed.
- ③ Select the requested nodes to create connections at those locations. It is possible to select one node by click on it, or select several nodes using a selection window. Once the selection is done, press on the spacebar key to confirm the selection.
- ④ The newly defined connection will be added to the connections list.



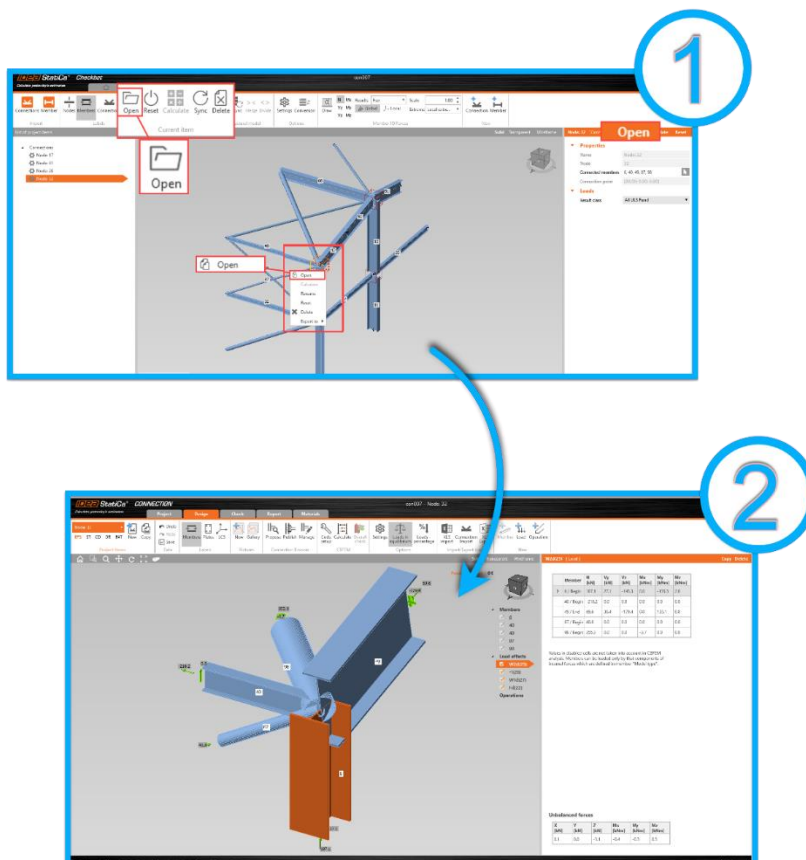
3.4. Opening a Connection using IDEA StatiCa Connections

Objective

This operation is used to open the connection file using IDEA StatiCa Connections software for the selected connection node in order to start the connection design process.

Operation Steps

- ① Select the requested connection node, either via the connection list to the left or via the model window. Once selected, click on the Open button on the Current Item tab or via the Properties window to the right or right click on the connection node in the model window and click open.
- ② After few moments the IDEA StatiCa Connections software will open with the desired connection node ready to start the design process.



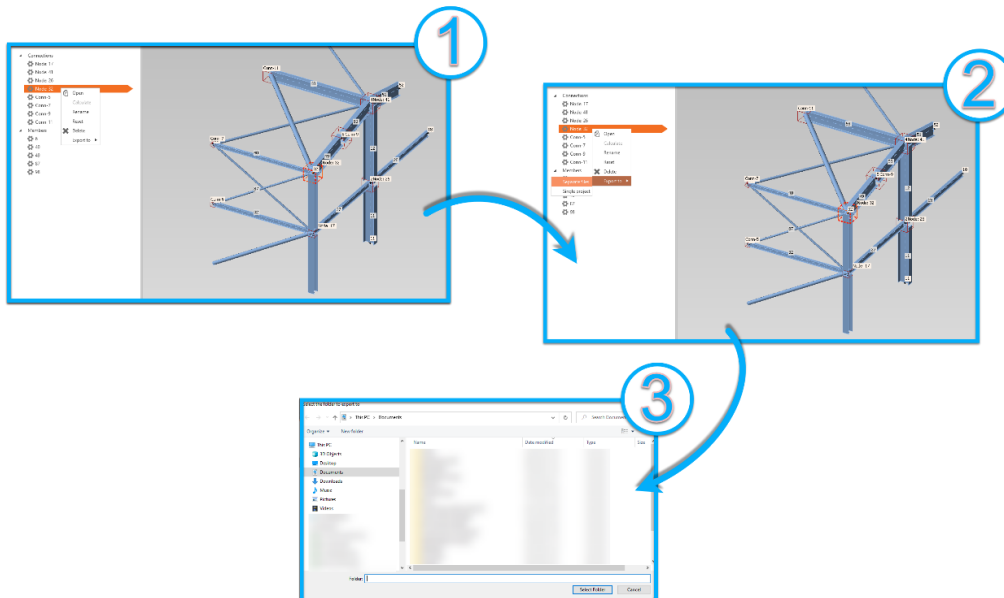
3.5. Export Connection to Separate File

Objective

This operation is used in order to export a connection to a separate IDEA StatiCa Connection file, in doing so, the connection can be fully edited in the IDEA StatiCa Connection software. Normally, while using the CheckBot with BIM link to STRAP, the connection editing is limited regarding members geometry and loading. Thus, exporting to separate file remove any editing limitations. Notice, sometimes the new exported file is save without file extension, there for a ".IdeaCon" extension should be added manually.

Operation Steps

- ① Select the requested connection node, either via the connection list to the left or via the model window. Once selected, right click on the mouse button.
- ② Hover to "Export To" and on the sub menu click on "Separate File".
- ③ On the opened window, select the folder to export the connection to and click on "Select Folder".



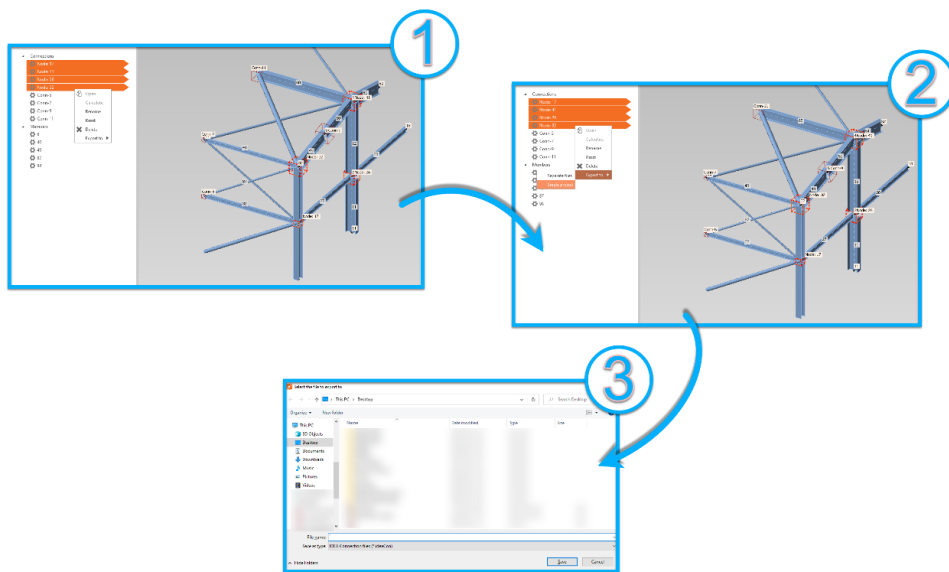
3.6. Export Several Connections to Single Project

Objective

Like "Export Connection to Separate File", this operation is used to export several connections into a single project file (contain all the selected connections) in order to allow full editing of the connections in the IDEA StatiCa Connections software.

Operation Steps

- ① Select several connections, either via the connection list to the left or directly from the model window. Once selected, right click on the mouse button.
- ② Hover to "Export To" and on the sub menu click on "Single Project".
- ③ In the opened window, select the folder to export to, write a name for the file, and click "Save".





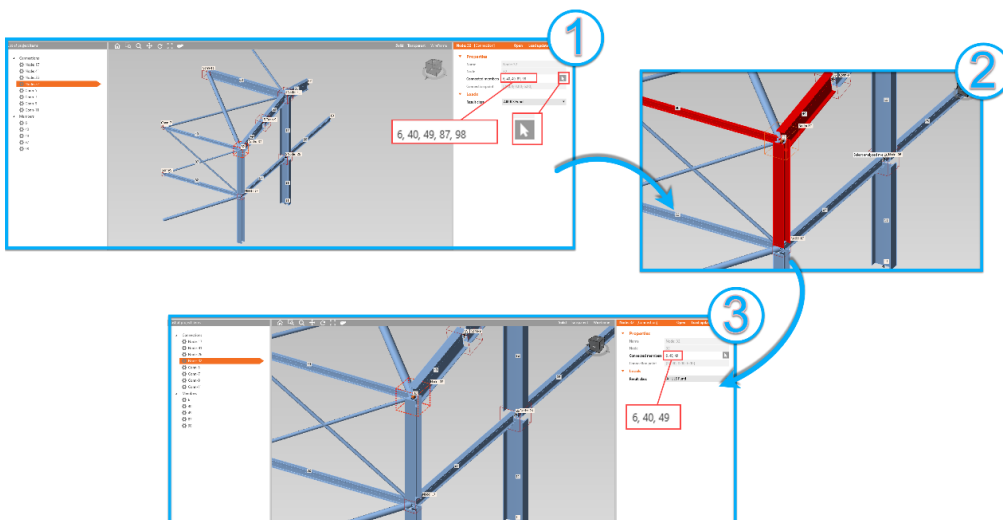
3.7. Edit Connection's Connected Members

Objective

This operation is used to define which of the original members that were connected to the connection node in *STRAP* will be included in the connection itself. This operation is useful in many cases where there is an eccentricity of the actual member from its center line, or in cases where some members are not going to be designed in the selected connection.

Operation Steps

- ① Select the requested connection node, then click on the  at the "Connected Members" option in the properties window to the right.
- ② Select the members that are going to be included within the connection design. It is recommended to use a selection window or the Ctrl button for manual selection.
- ③ To confirm the selection, press the spacebar key or the  in the properties window to the right.



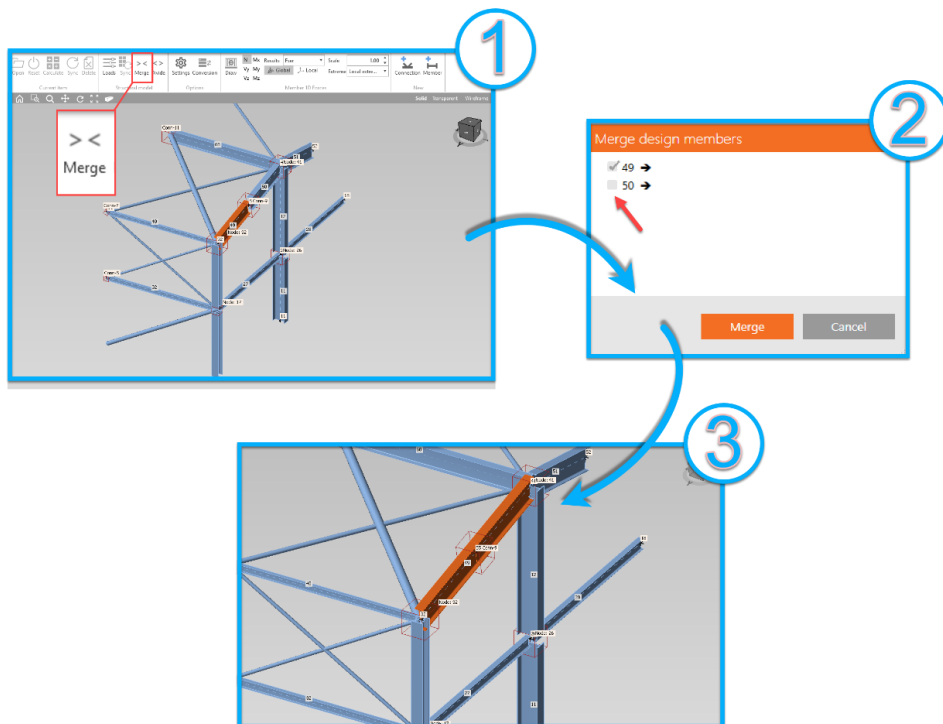
3.8. Merge Members

Objective

This operation is used to merge continuous members connected by a node. The operation is useful in cases where the connection node doesn't separate the segment of beam or column in real life, and there is another member connected at the node. Notice, it is not possible to merge members where the local X axis is reversed between the members.

Operation Steps

- ① Select a member and click on the Merge button in the Structural Model tab.
- ② If the member has continuous members along its line, it will show on the opened window with same arrow direction. Mark the members to merge.
- ③ After clicking Ok, the members will be merged and the member number will be the one that was first in the line.



:

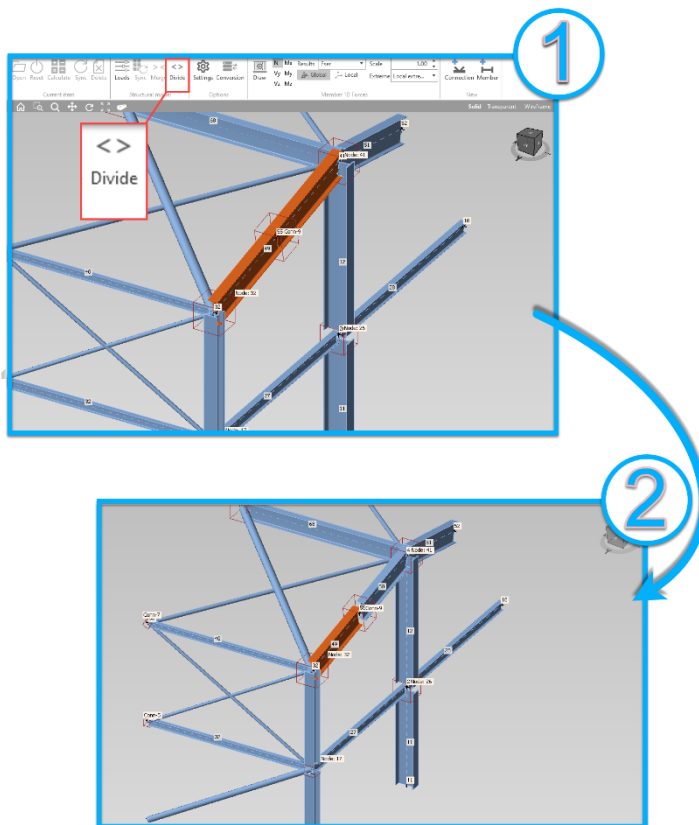
3.9. Divide Members

Objective

This operation is used to divide continues members that were merged by the Merge operation. The operation returns the members to their original state.

Operation Steps

- ① Select a member needed to be divided and click on the Divide button on the Structural Model tab.
- ② If the member can be divided, the CheckBot will divide the member to its original members.



3.10. Enable/Disable Evaluate Critical Effects

Objective

This operation is used to enable or disable the critical effect evaluation mode. This evaluation will determine which load cases will be included in the connection design in the IDEA StatiCa Connections software. For example, if in *STRAP* there were several design combinations, they would all be loaded to the CheckBot but only few of them would be loaded to the IDEA StatiCa Connection software because they are the most critical of the combinations. Notice, the more combinations loaded into the Connection software, the longer the design time.

Operation Steps

- ① Under Structural Model tab, click on the Loads button.
- ② In the opened window, under Result Classes for Checks, select All ULS Found class.
- ③ Mark / Unmark the checkbox for Evaluate Critical Effects to enable/disable the critical loaded cases during the design process (the checkbox is marked by default).

