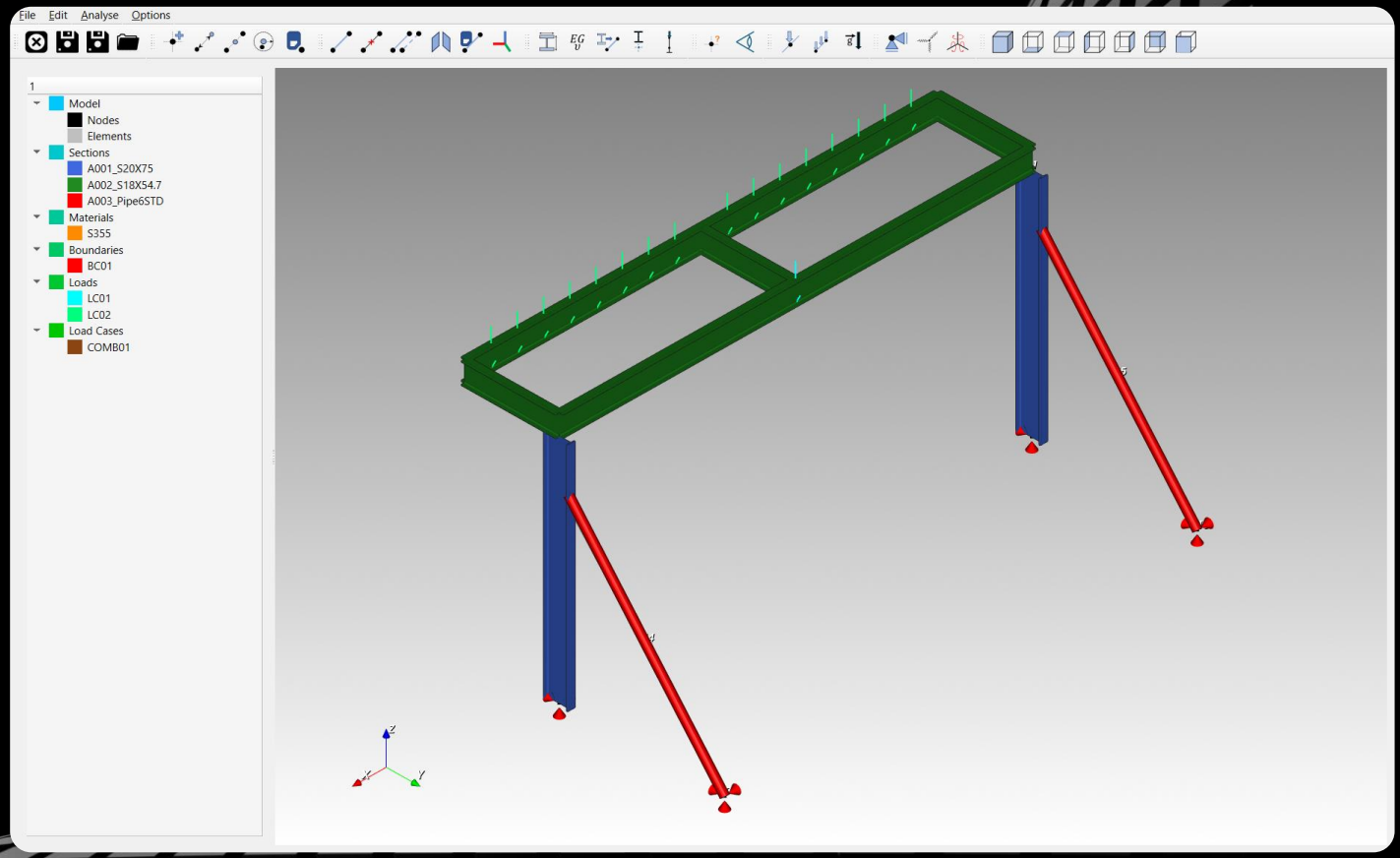
USER GUIDE

KUSOR-3D

Interface, selection and model building, step by step

Part 1 · buttons, windows, mouse · Part 2 · the TUTO model



November 2026 · rev.01

KUSOR-3D

MODELING & SIMULATION By ENERGAS

01

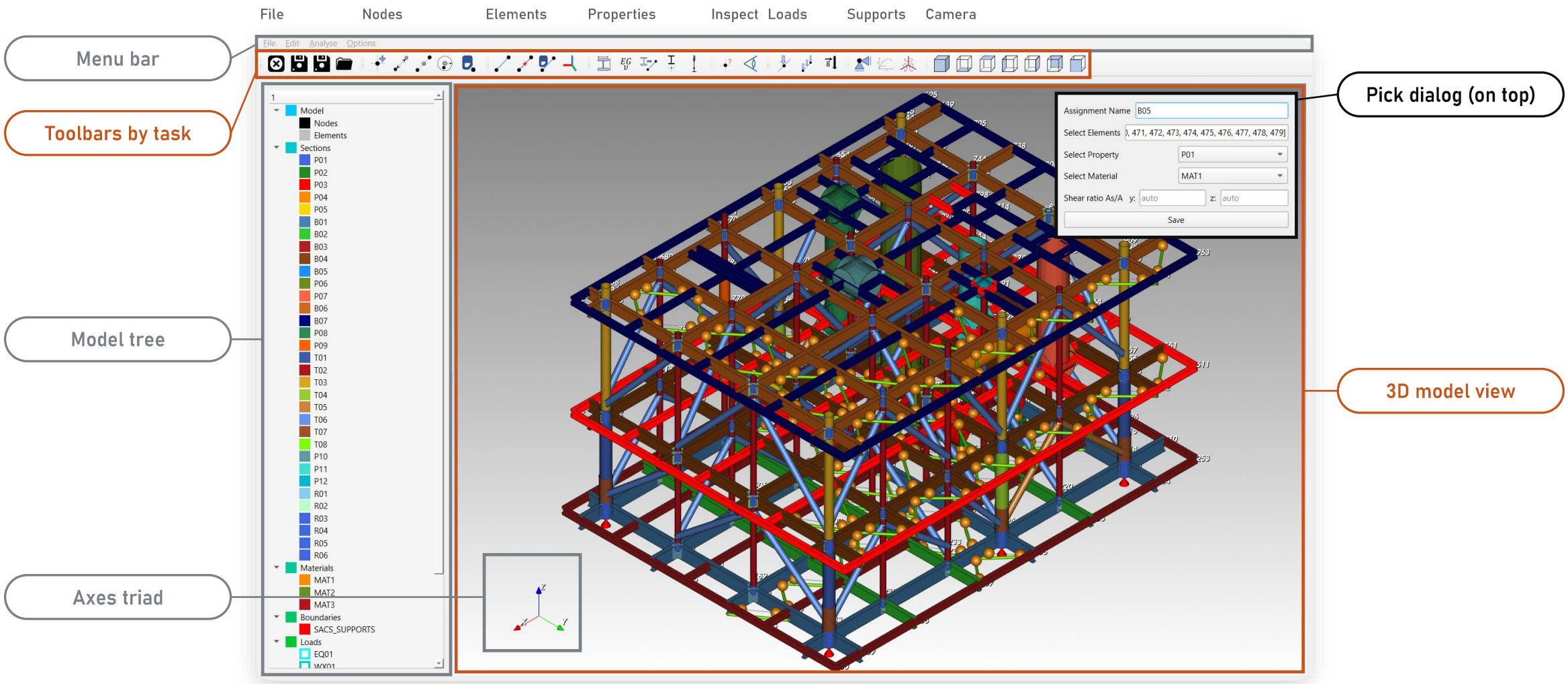
Interface

- The window
- Mouse and camera
- Selection
- Toolbars, button by button
- Menus and windows
- The model tree

KUSOR-3D

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The window

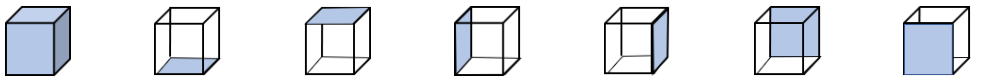


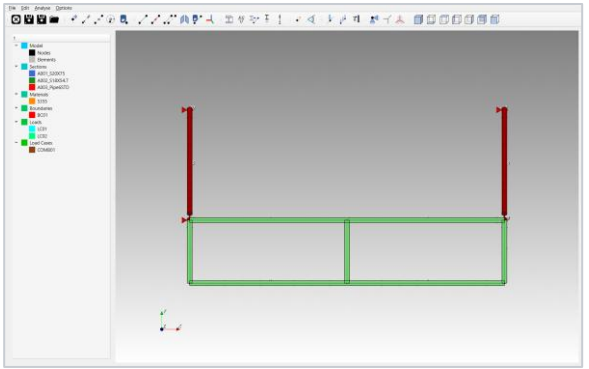
One window: menu bar, toolbars by task, model tree, 3D view, and the current tool's dialog on top

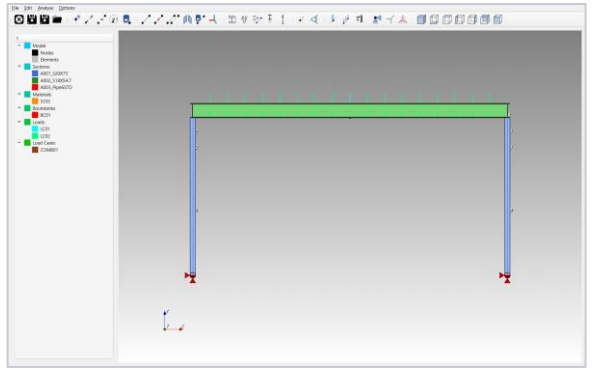
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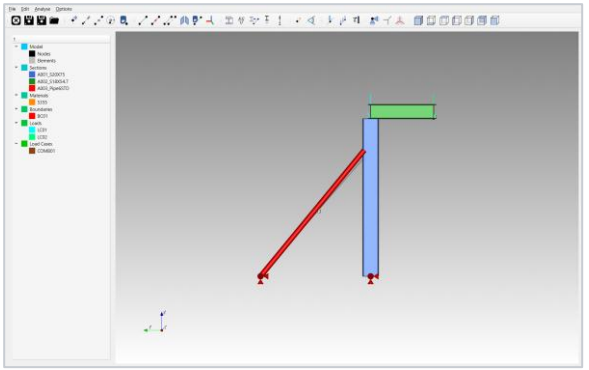
Mouse and camera

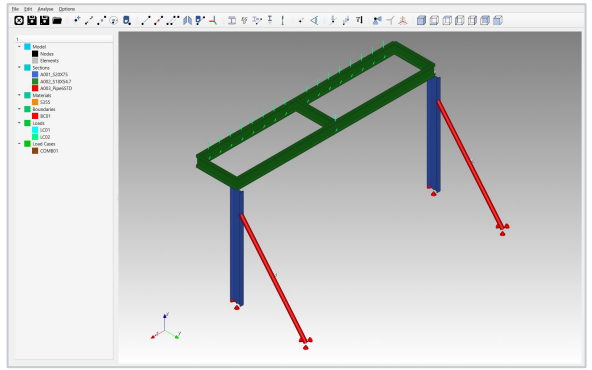
- **Left click** selects the node or member under the cursor. The pick is decided when the button is released, so a click that moved the view selects nothing.
- **Left drag** turns the model around the view centre.
- **Middle drag** pans. **Right drag / wheel** zooms.
- **Shift + drag** draws a box: every node or member inside it is toggled. A second box over the same members deselects them.
- **Shift + click** toggles the one item under the cursor.
- **Camera toolbar** seven presets: isometric, bottom, top, left, right, back, front. Each preset refits the model in the view.
- **Keyboard** Ctrl+O open, Ctrl+S save, Ctrl+Shift+S save as, Ctrl+Z undo, Ctrl+Y redo, Ctrl+Q quit.




Top


Front

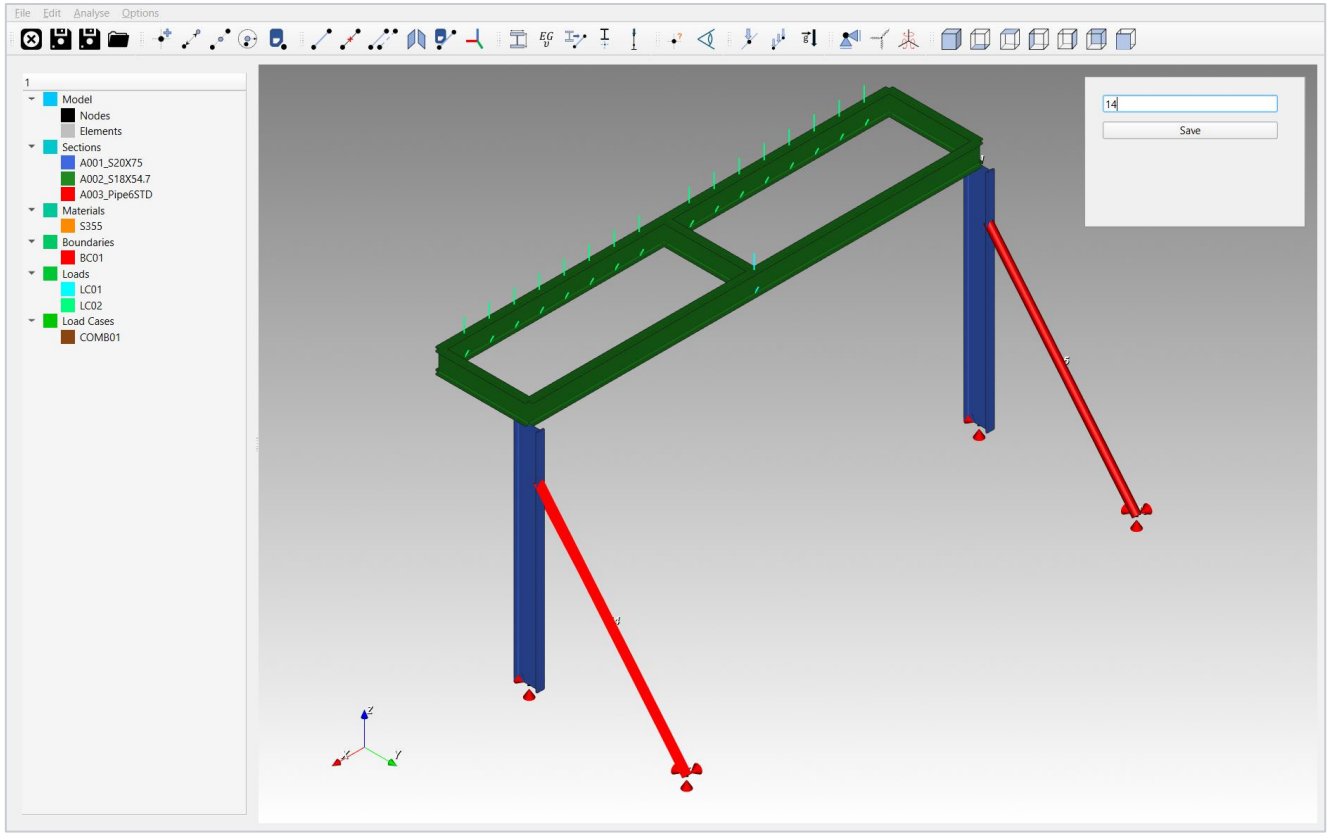

Right


Isometric: the TUTO model

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Selection: one logic for every tool

- **A tool opens a pick dialog** that stays on top of the 3D view. While it is open, clicks in the view go to it: the dialog says whether it picks nodes or members.
- **Click toggles.** A picked item turns red and its id joins the dialog's list; clicking it again removes it.
- **Box select toggles too.** Shift + drag adds what is inside the box and removes what was already selected.
- **Ids can be typed** in the list, separated by commas, when picking is awkward.
- **Pick points.** Dialogs that need a point (Split at a coordinate, Symmetry, Views) take it from the next node you click: the picker returns to its normal mode afterwards.
- **One dialog at a time.** Opening another tool closes the current one and clears the selection. Save or Add applies; closing the dialog discards.
- **Views** limits what is drawn and picked to a box of x, y, z; filling a _min field moves the cursor to its _max.



Delete Elements open: member 14 picked in red, its id in the dialog; Shift+drag would box several

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The toolbars



File Nodes Elements Properties Inspection Loads Boundary Camera

- **File** exit, save, save as, open. Models are .pkl files; a file saved by the full version opens in the demo when it fits its limits.
- **Nodes** create a point from x y z, copy or move points by a vector, mid point of two nodes, merge coincident nodes, delete nodes.
- **Elements** line between two nodes, split a member, copy members by a vector, mirror about a plane, delete members, toggle the local axes.
- **Properties** the sections app, materials, assignment of section and material to members, member end offsets, buckling lengths.
- **Inspection** inspect a node or a member (coordinates, section, dimensions), limit the view to a box.
- **Loads** concentrated loads on nodes, line loads on members, self-weight and accelerations.
- **Boundary** supports by blocked degrees of freedom, elastic supports, member end releases.
- **Camera** the seven view presets.

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Nodes toolbar



Point x y z type the coordinates in metres, Add. The dialog stays open for the next node.



Point relative pick nodes, type dx dy dz: Copy creates new nodes, Move displaces the picked ones.



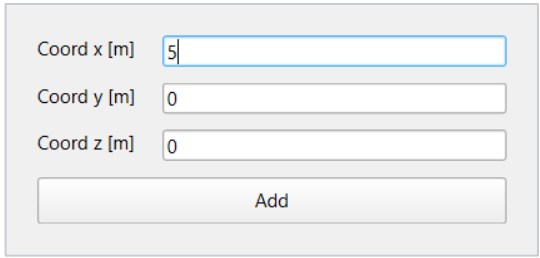
Mid point a node halfway between two picked nodes.



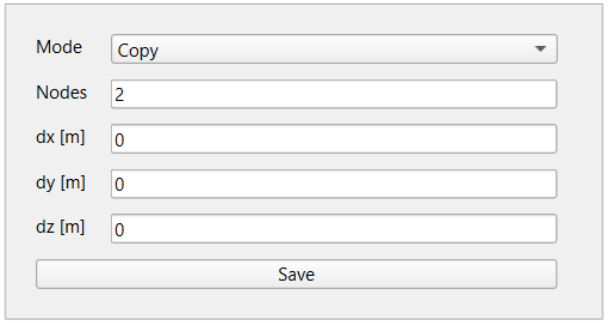
Merge nodes Find Closest highlights nodes closer than the distance; Merge Closest fuses them.



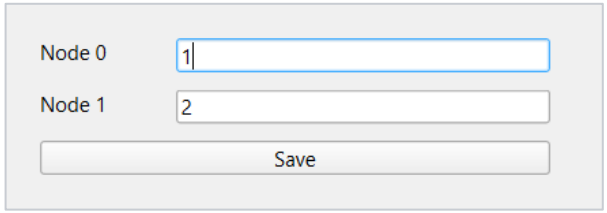
Delete node removes the nodes and every member, load and support attached to them.



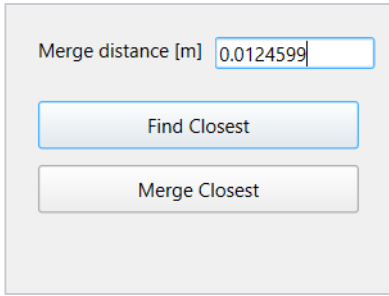
Point x y z



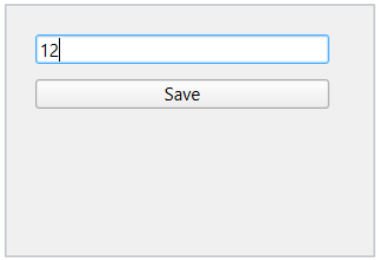
Point relative: Copy or Move



Mid point



Merge nodes



Delete nodes: the picked ids

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Elements toolbar

Line pick two nodes (or type their ids) and Add: a member from A to B; the dialog stays open.

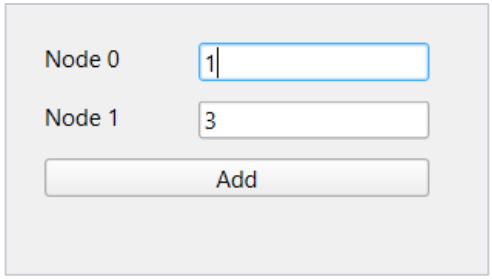
Split element equal parts, a ratio, a length from node 1, or a cut at an x, y or z coordinate; the pieces inherit section, material and group.

Copy elements the picked members translated by dx dy dz, with their data.

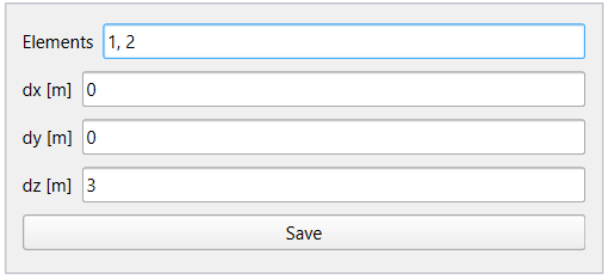
Symmetry mirror nodes or members about three points or an XY, XZ, YZ plane through a point.

Delete element removes the picked members and their loads.

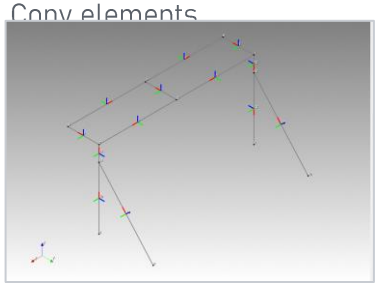
Toggle coords shows the local x, y, z axes of every member.



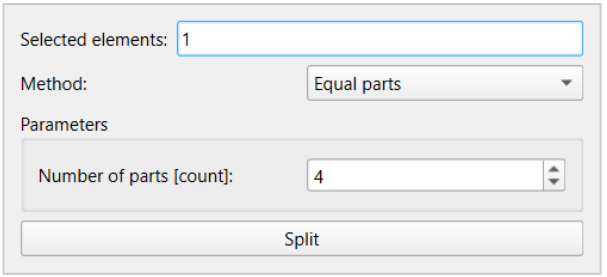
Line



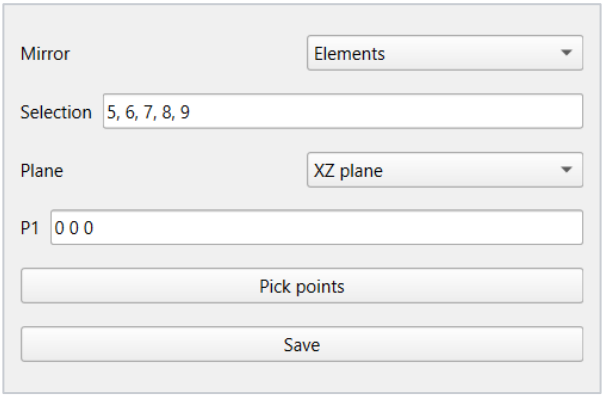
Copy elements



Toggle coords on the TUTO model



Split element: method and parameters



Symmetry: plane and points

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Properties toolbar

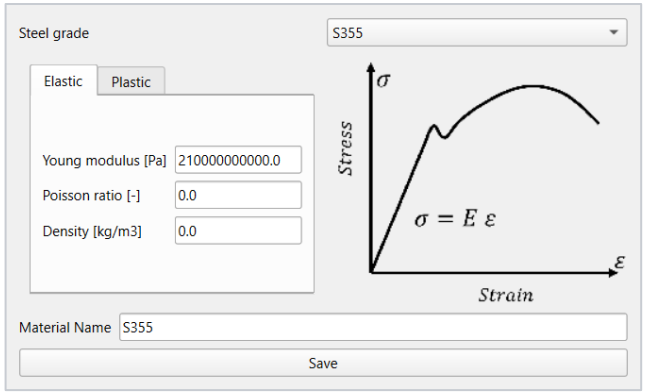
Sections opens the sections app: library, typical and drawn sections, their properties.

Materials E, Poisson ratio, density, yield strength; a steel grade fills them.

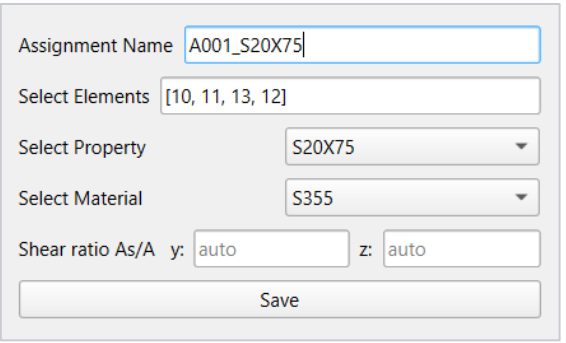
Assign a named assignment: picked members, a section, a material, optional shear ratios.

Member offsets node to member end offsets, dX dY dZ at each end, in global or member axes.

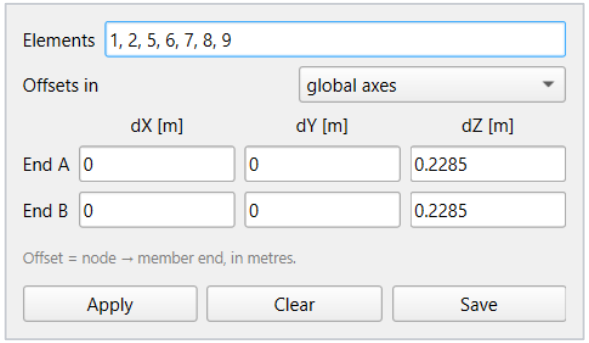
Buckling length Ky Kz factors or Ly Lz lengths, and the lateral-torsional length Lb.



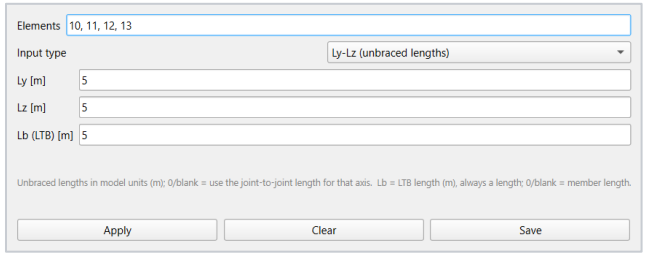
Materials: grade S355 picked



Assign



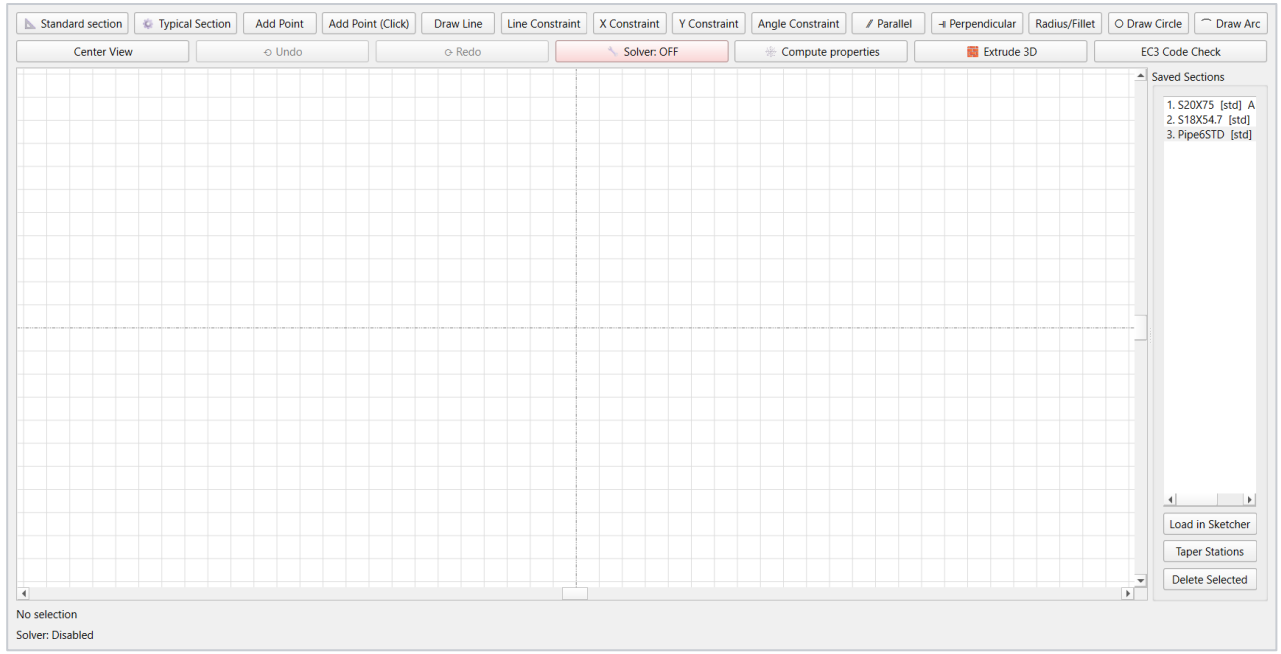
Member end offsets



Buckling length

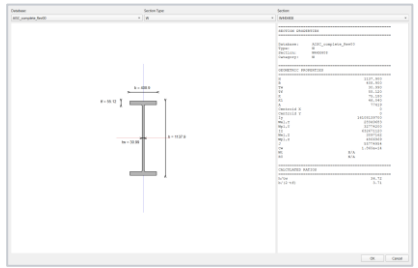
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The sections app

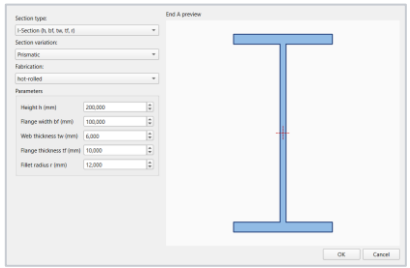


The sections window: tools above, the sketch canvas, the saved sections on the right

- **Standard section** a profile from the AISC or Eurocode database, saved at once.
- **Typical Section** parametric I, H, T, channel, angle, RHS, CHS, plate girder, in mm; prismatic or tapered.
- **Sketch tools** points, lines, constraints, circle, arc, radius for an arbitrary section.
- **Compute properties** meshes the drawing and computes A, I, J, W, the shear centre and the warping constant.
- **Extrude 3D** a 3D view of the section along a length.
- **EC3 Code Check** a stand-alone Eurocode 3 check of a saved section under typed loads.
- **Saved sections** the list the Assign dialog offers; Taper Stations shows a cone's properties along it.



Standard section: the profile selector



Typical Section

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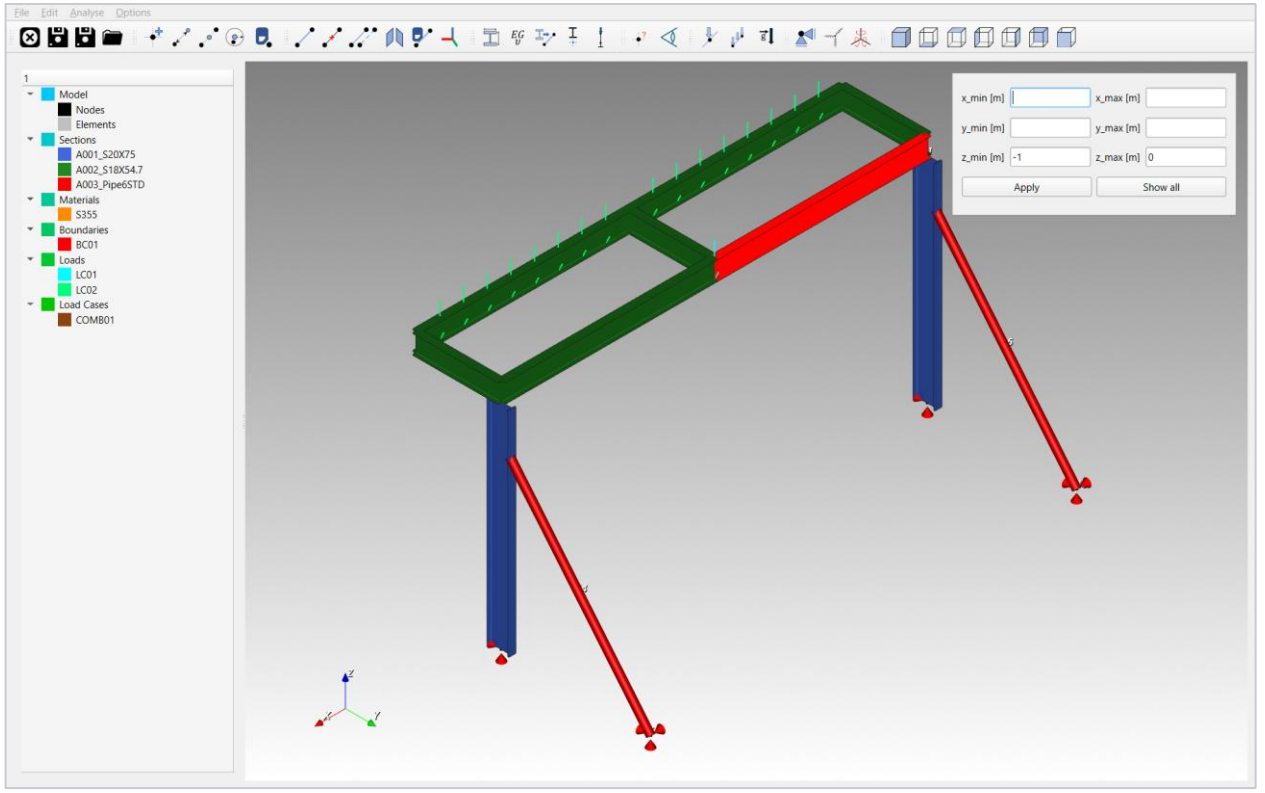
Inspection toolbar

Inspect pick a node: its coordinates, editable, with Move; pick a member: its nodes, section, dimensions in mm, local axes, with Reverse direction.

Views x, y, z limits in metres: only what lies inside is drawn and picked. Type a limit or pick a node for it; Show all removes the box.



Inspect on member 1



Views with z between −1 and 0 m typed: the columns' lower parts and braces disappear once applied

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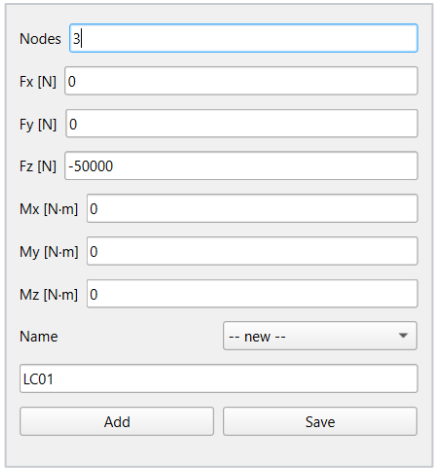
Loads toolbar

Concentrated load Fx Fy Fz in N and Mx My Mz in N·m on picked nodes; Add accumulates into the named load case.

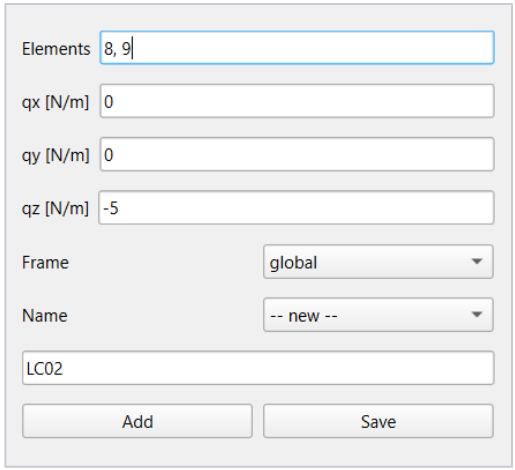
Line load qx qy qz in N/m on picked members, in global or member-local axes.

Dead load self-weight from sections and material: an acceleration vector, an angular acceleration and its centre.

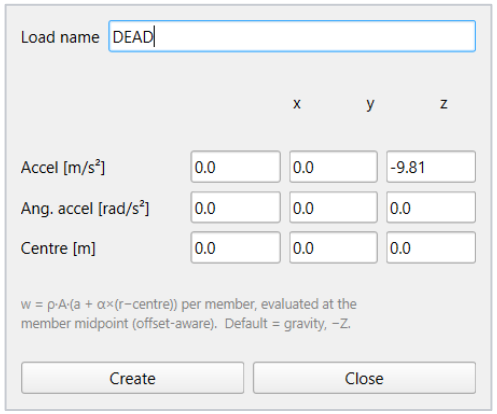
Edit (model tree) right-click a load case: its tables, a Global factor per table, remove rows.



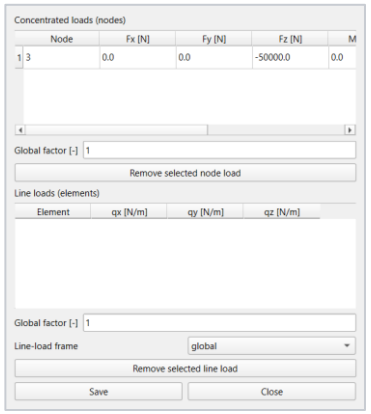
Concentrated load



Line load



Dead load



Edit load condition, from the tree

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Boundary toolbar



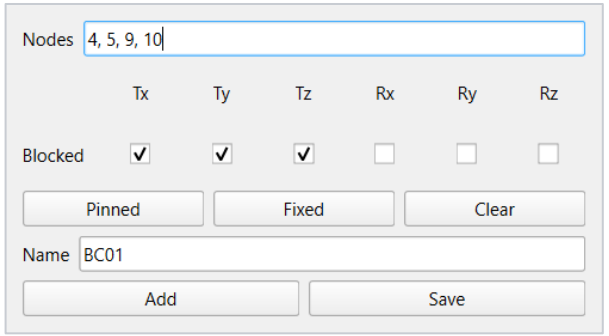
Boundary tick the blocked degrees of freedom Tx Ty Tz Rx Ry Rz on picked nodes; Pinned and Fixed presets.



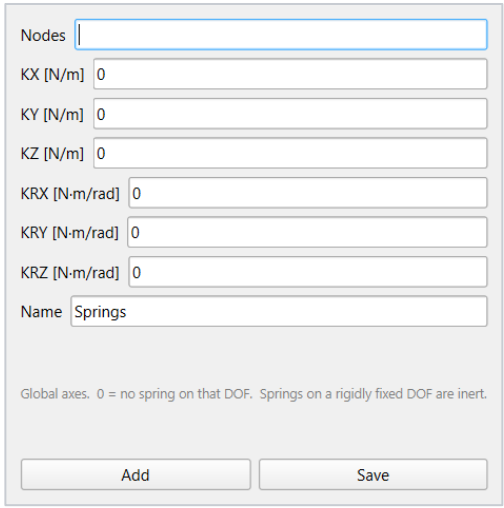
Elastic support springs KX KY KZ in N/m and KRX KRY KRZ in N·m/rad on picked nodes.



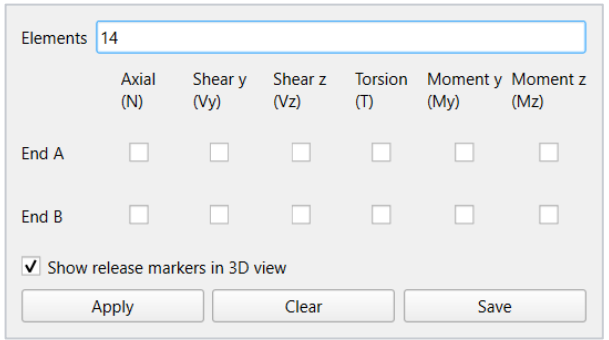
Member releases the released forces and moments at end A and end B of picked members.



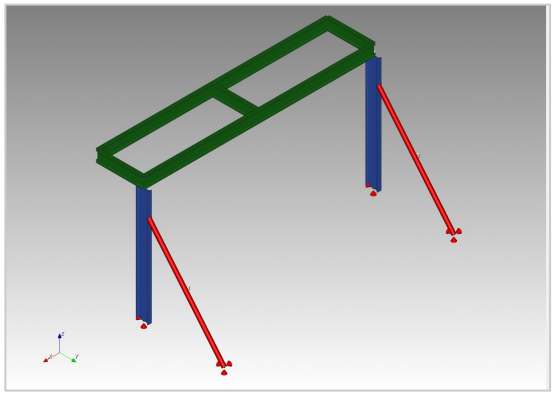
Boundary: BC01, pinned



Elastic support



Member releases

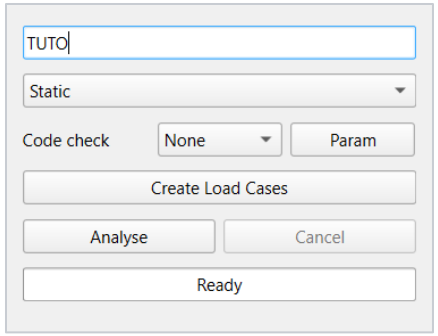


Pinned supports drawn at the feet

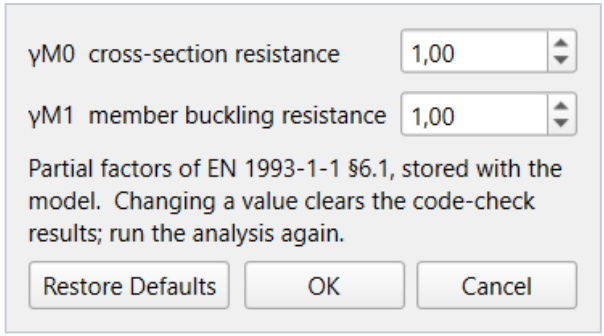
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Menus and windows

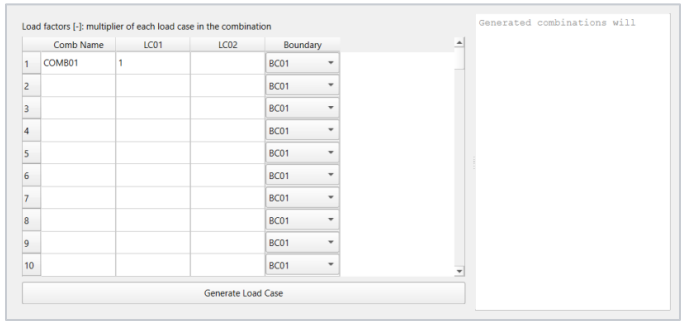
- **File** Open, Save, Save As, Import (full version), Exit.
- **Edit** Undo and Redo of every model change.
- **Analyse → Analysis** name, Static, code check None or Eurocode, Param for the partial factors, Create Load Cases for the combination table, Analyse.
- **Create Load Cases** one row per combination: a factor per load case and the boundary set.
- **Analyse → Postprocessing** results on the model: scope, category, quantity, combination; deformed shape with a magnitude; Member Review; Report.
- **Options → Display Settings** background, node size, line width, colours, arrows, lighting, section drawing.



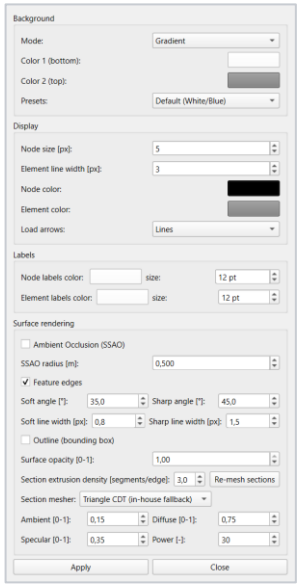
Analysis



Param: γM0, γM1

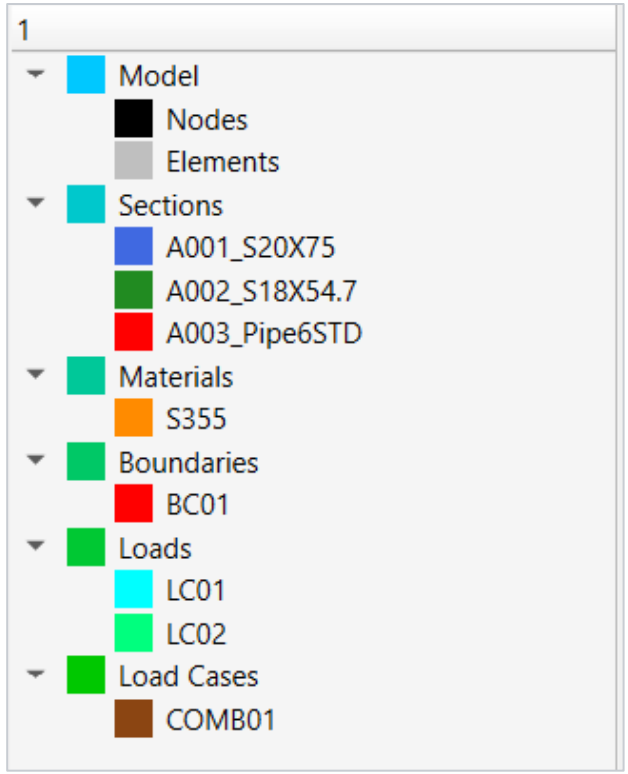


Load combinations



Display settings

The model tree

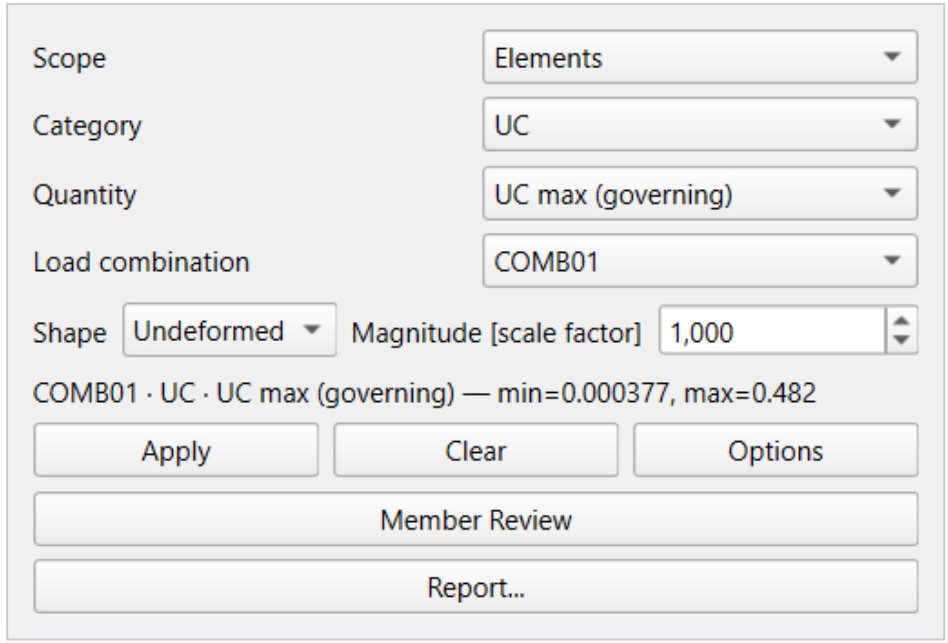


The TUTO tree: nodes, elements, three section groups, a material, a support set, two load cases, one combination

- **What it lists** Model (nodes, elements), Sections (one entry per assignment, in its colour), Materials, Boundaries, Loads, Load Cases (the combinations).
- **Tick boxes** show or hide a category or an entry; the 3D view and the picks follow.
- **Right-click** Hide, Unhide, Edit, Delete, Label: labels write node ids, member ids or section names in the view.
- **Click an entry** highlights its members for a moment.
- **Edit** reopens the entry in its dialog: an assignment, a support set, a load case with its Global factor, a material.
- **Colours** each section group gets one; they are kept in the file.

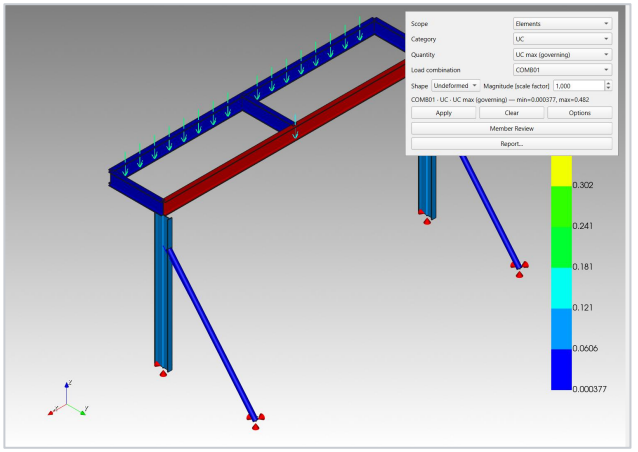
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The post-processing window



UC max of COMB01 on the TUTO model, min and max written under the controls

- **Scope** Elements or Nodes.
- **Category and quantity** elements: Loads (N, Vy, Vz, T, My, Mz), UC (every Eurocode check and the governing one), Stress; nodes: Displacements (Ux … Rz), Reactions (Fx … Mz).
- **Load combination** one of the solved combinations.
- **Shape** Undeformed or Deformed, with a magnitude factor on the displacements.
- **Apply / Clear** draws the map with its legend, or removes it. Options sets the legend bands.
- **Member Review** pick a member: the Eurocode 3 form pre-filled with its section, length and forces.
- **Report…** one fixed-width text file: sections, load cases, combinations, member loads, UC per group and per member.



The map and its legend in the view

02

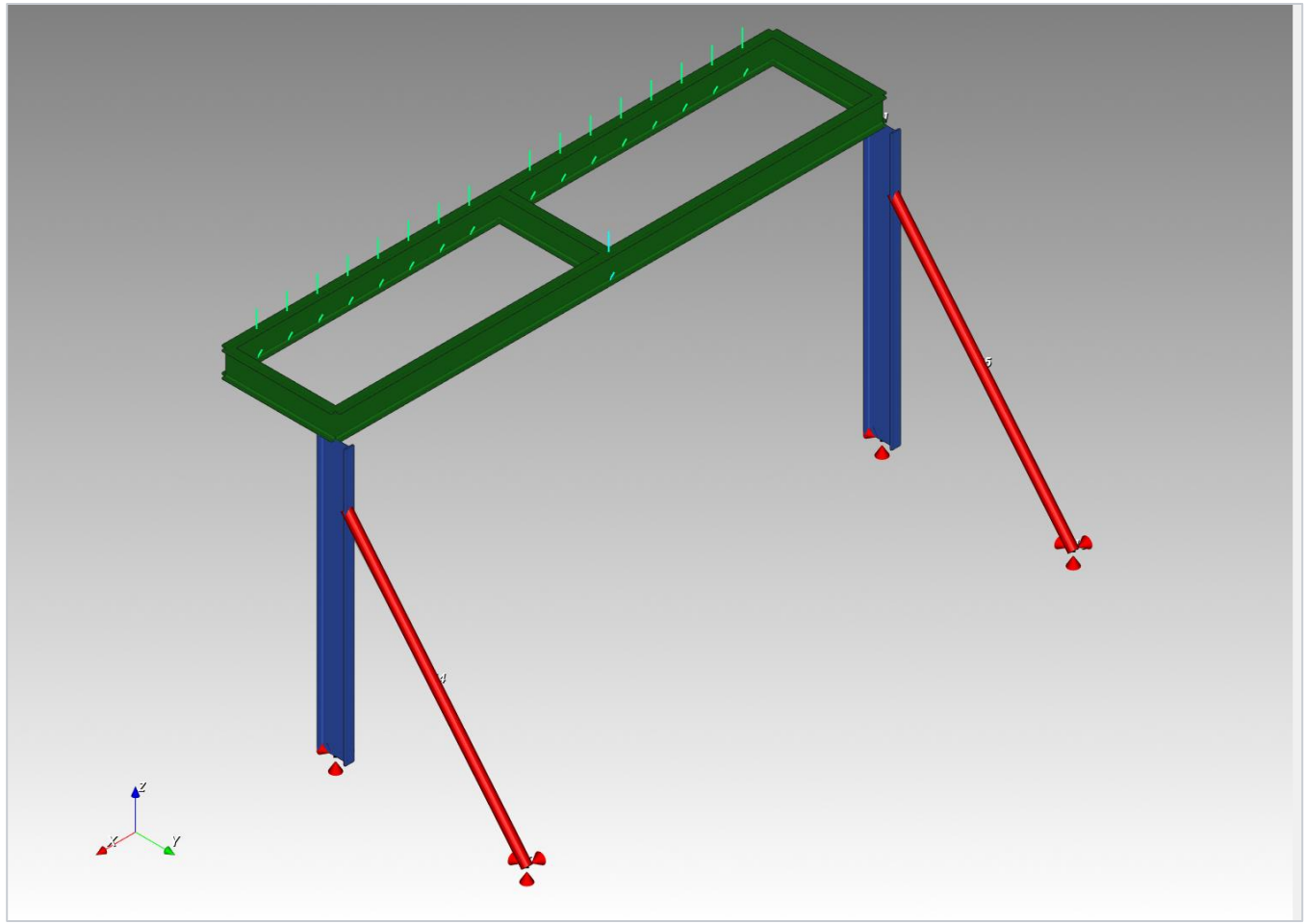
Building the TUTO model

- The model
- Nodes and members
- Sections and assignment
- Offsets, buckling lengths
- Supports and loads
- Analysis and results

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The model to build



TUTO: a beam frame on two columns, braced by two pipes

A frame of 10 m × 2 m at z = 0

- 12 nodes, 13 members, all in S355
- two columns S20X75, 5 m high, cut at z = −1 m where the braces arrive
- seven beams S18X54.7: two spans of 5 m, three cross beams of 2 m, two edge beams
- two braces Pipe 6 STD from the columns to the ground, 3.5 m out of plane

Member data

- beams raised by 0.2285 m: top flanges flush with the column tops
- columns checked over their full 5 m

Supports and loads

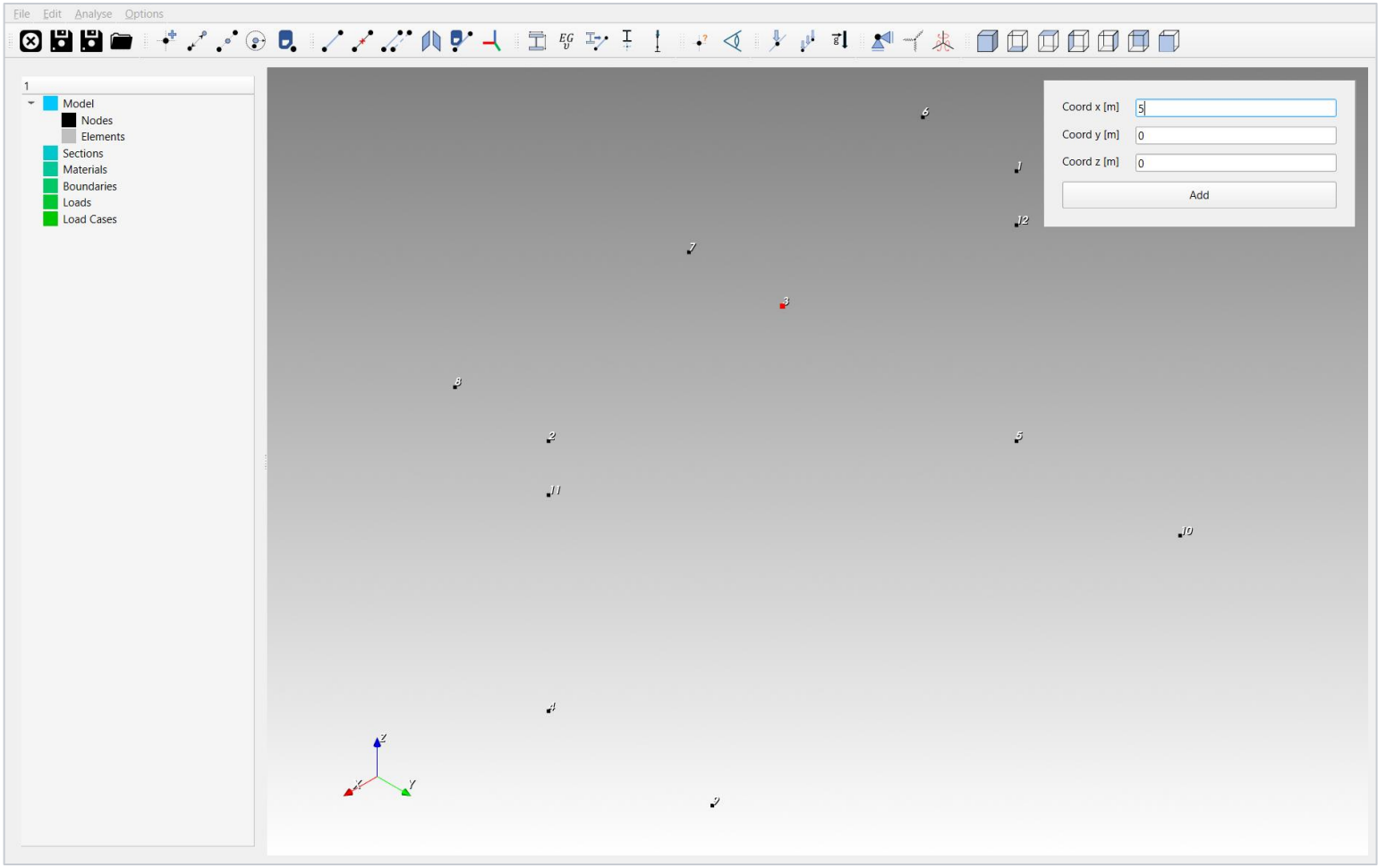
- BC01: the column feet and brace feet pinned
- LC01: 50 kN downwards at mid-span (node 3); LC02: a small line load on the edge beams
- COMB01 = 1.0 × LC01 on BC01, with the Eurocode check

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Step 1 · Nodes

Node	x [m]	y [m]	z [m]
1	0	0	0
2	10	0	0
3	5	0	0
4	10	0	-5
5	0	0	-5
6	0	-2	0
7	5	-2	0
8	10	-2	0
9	10	3.5	-5
10	0	3.5	-5
11	10	0	-1
12	0	0	-1

Point x y z: type the three coordinates in metres, Add, next node. Node 3 is the mid-span point where the load will go; 11 and 12 are where the braces meet the columns.

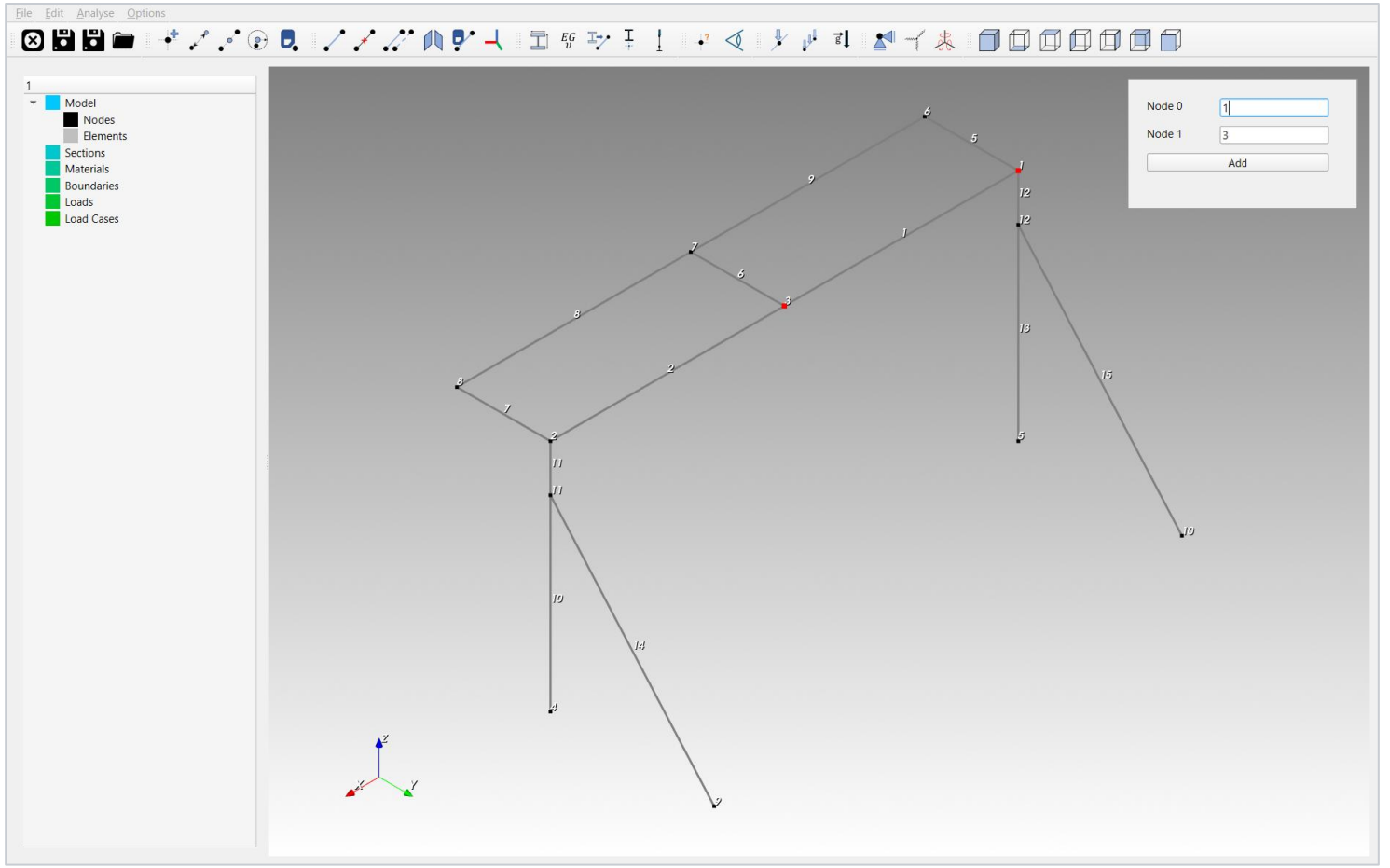


Create Node with node 3 typed; the twelve nodes with their ids in the view

Step 2 · Members

Member	A	B	Role
1	1	3	span beam
2	3	2	span beam
5	1	6	cross beam
6	3	7	cross beam
7	2	8	cross beam
8	8	7	edge beam
9	7	6	edge beam
10	4	11	column, lower
11	11	2	column, upper
12	1	12	column, upper
13	12	5	column, lower
14	9	11	brace
15	10	12	brace

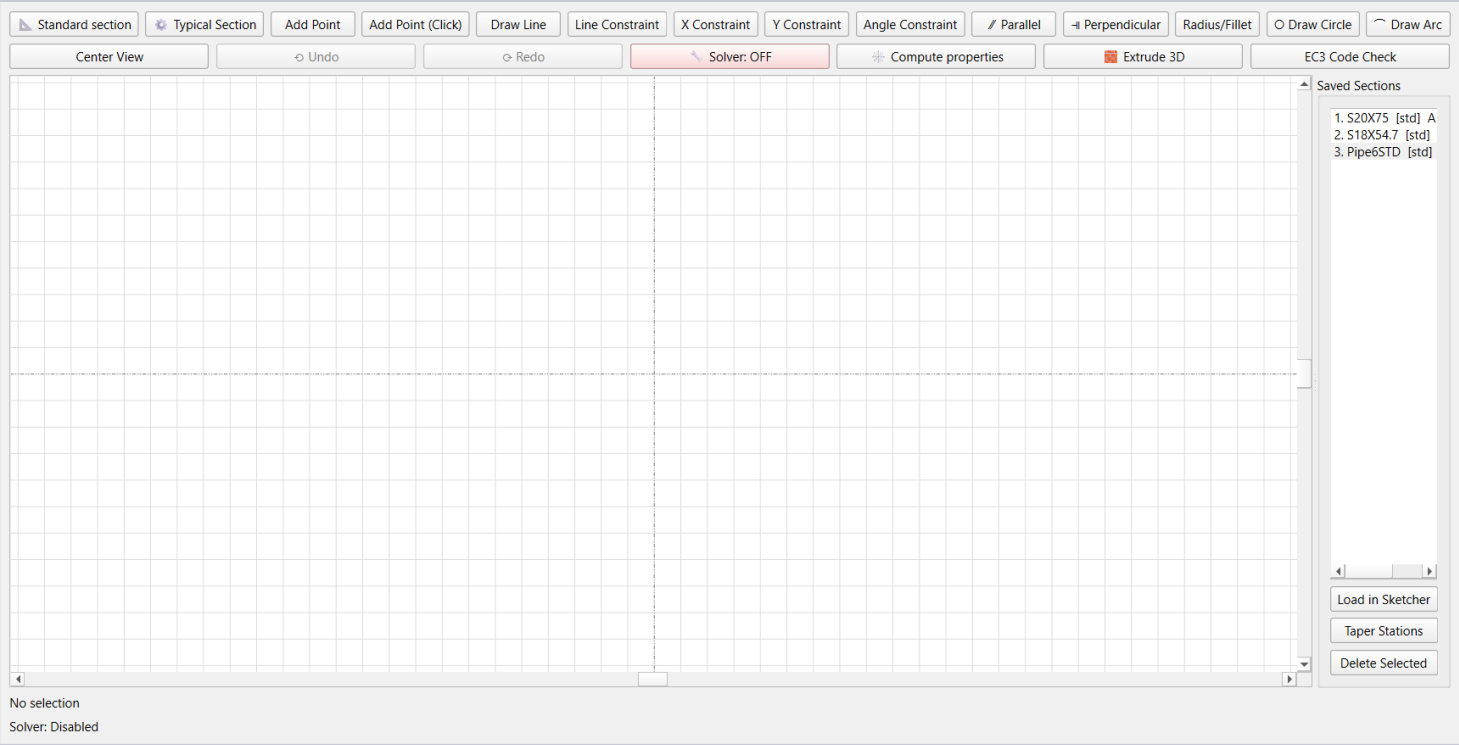
Line: pick node A then node B in the view, or type them, Add. The local x axis runs from A to B: Toggle coords shows it.



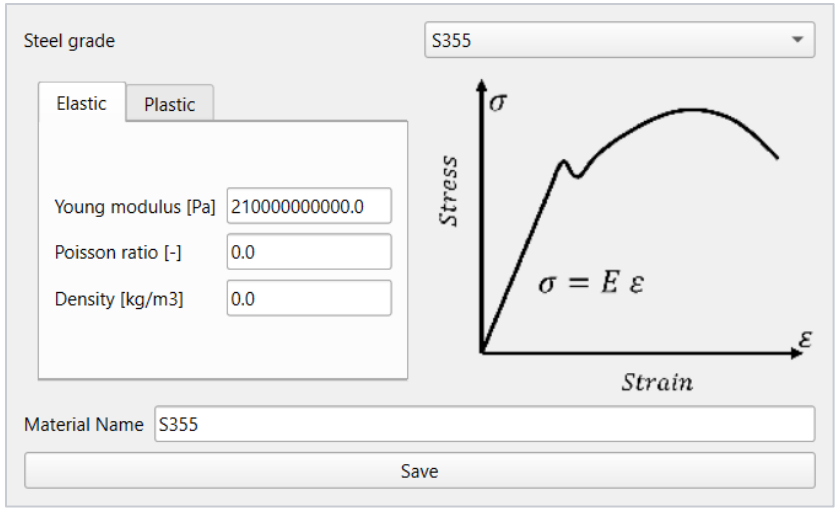
Line with nodes 1 and 3 picked (member 1); the thirteen members labelled

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Step 3 · Sections and material



The sections app with the three library sections saved: S20X75, S18X54.7, Pipe 6 STD



Materials: S355 fills E, ν, ρ and fy

Sections: Standard section, AISC database, pick S20X75, S18X54.7 and Pipe6STD; each is saved on OK.

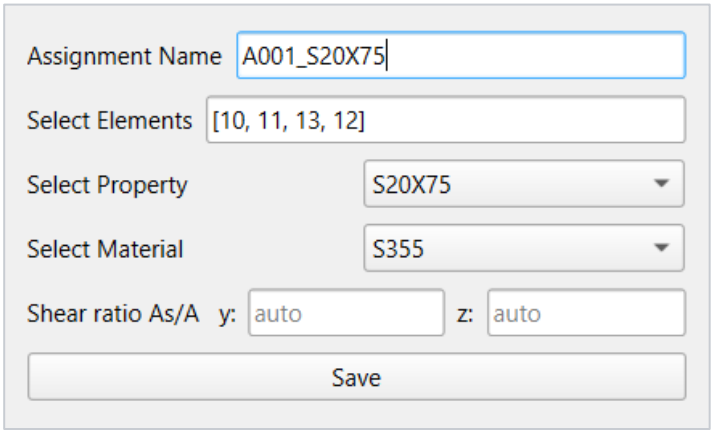
Material: Materials, grade S355, name it S355, Save.

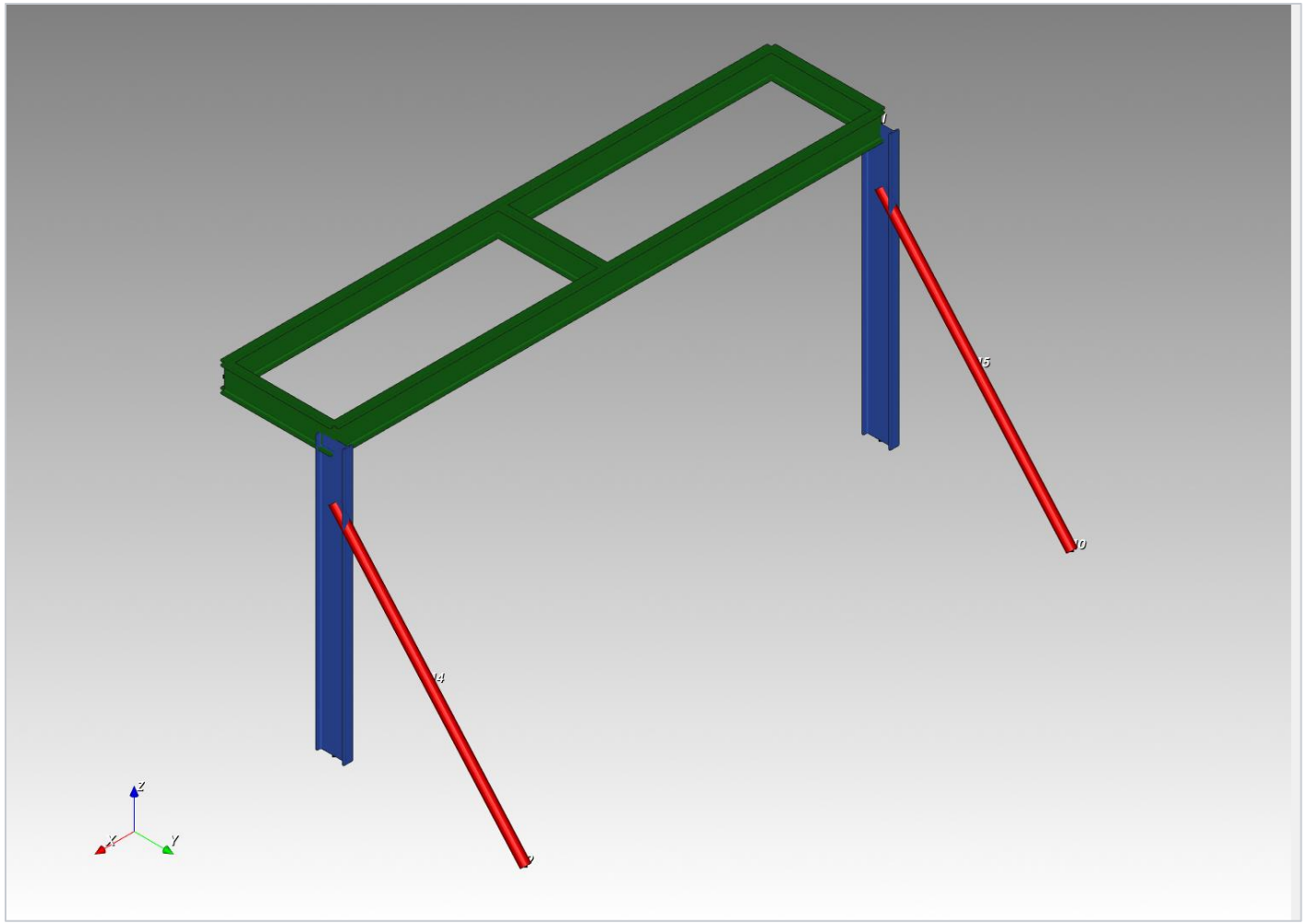
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Step 4 · Assign sections to members

Assignment	Section	Members
A001_S20X75	S20X75	10, 11, 12, 13 (columns)
A002_S18X54.7	S18X54.7	1, 2, 5, 6, 7, 8, 9 (beams)
A003_Pipe6STD	Pipe6STD	14, 15 (braces)

Assign: name the group, pick its members (click or Shift+drag), choose the section and the material S355, Save. One assignment per section; the group appears in the tree with its colour.





The sections drawn: columns in blue, beams in green, braces in red

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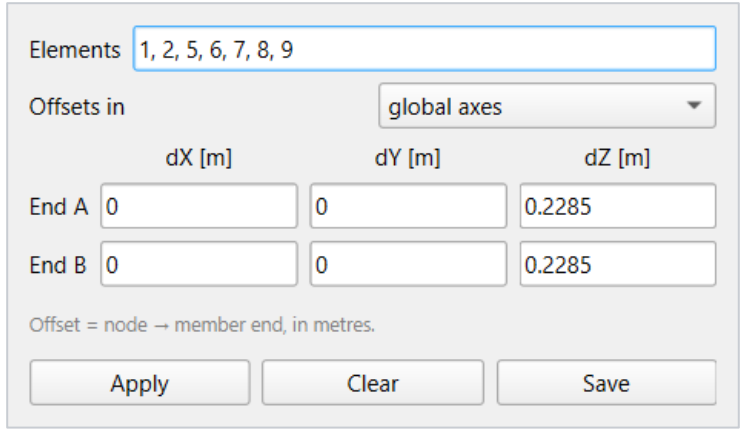
Step 5 · Member end offsets

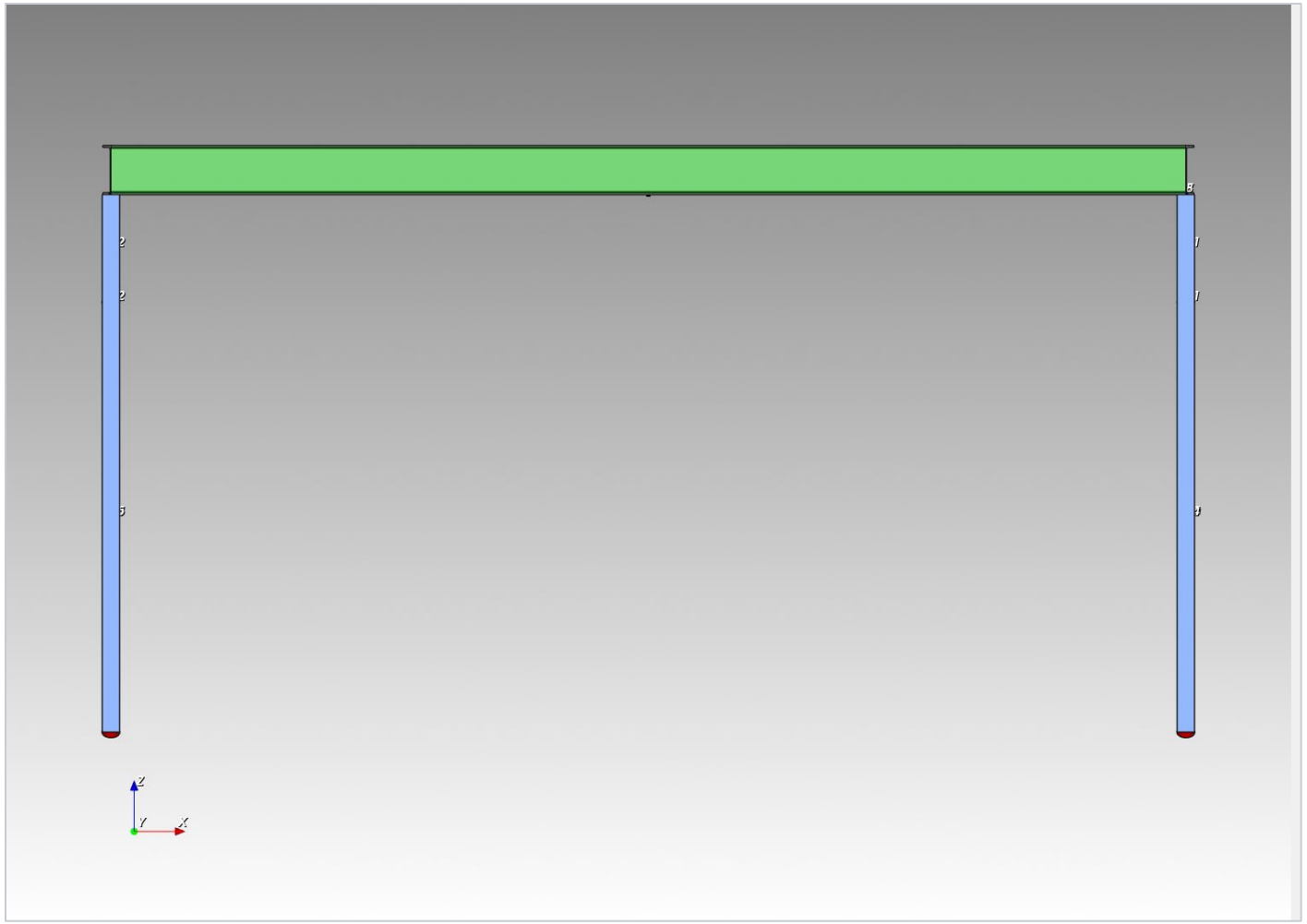
Why: the beams meet the columns at node level, but their top flanges should be flush with the column tops. An offset moves the member end away from its node without moving the node.

Beams 1, 2, 5, 6, 7, 8, 9: dZ = +0.2285 m at both ends, half the S18 depth (457 mm), in global axes.

Braces 14, 15: dY = 0.204 m at end B, to the column face.

Member offsets: pick the members, type the vector for End A and End B, Apply.





Front view: the beams sit on the columns, raised by the offset

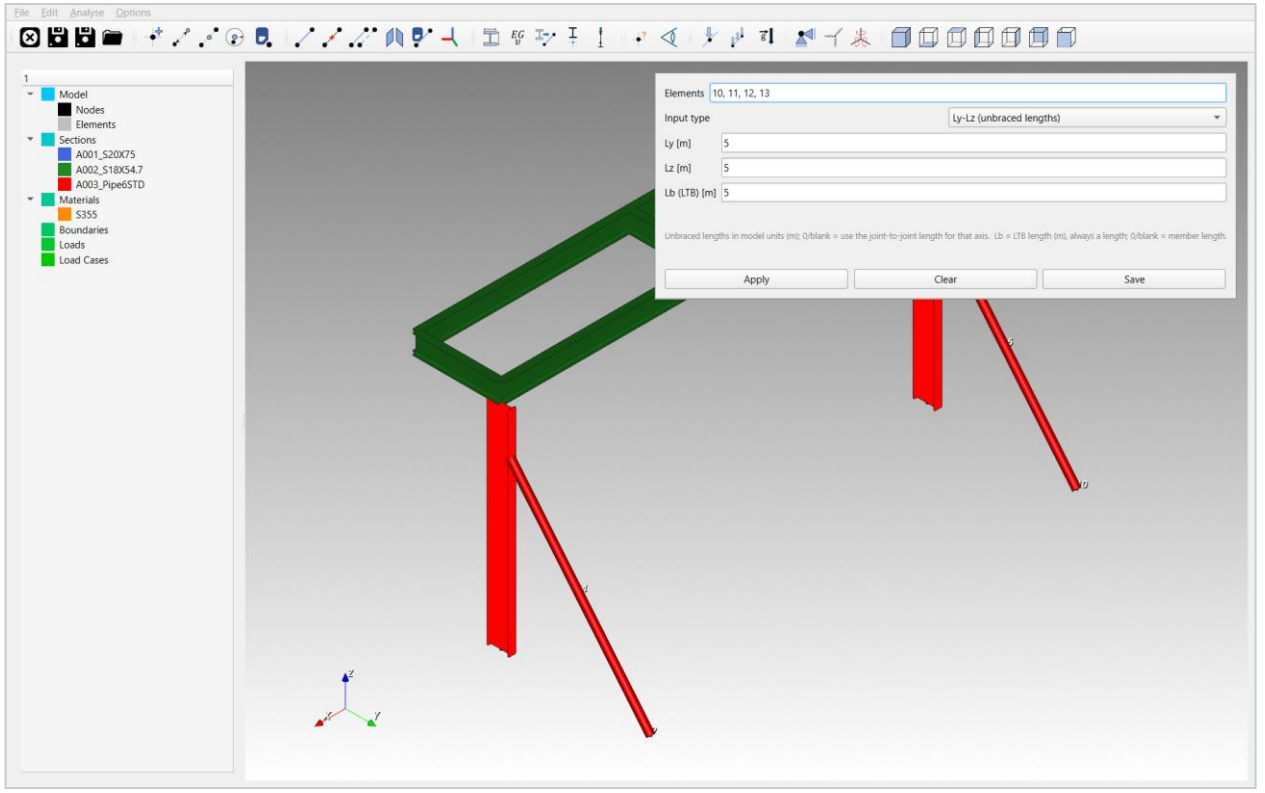
Step 6 · Buckling lengths

Why: each column is modelled as two members (the brace arrives at z = −1 m). Without a buckling length the check would use each piece's own length; the real column buckles over its 5 m.

Columns 10, 11, 12, 13: input type Ly-Lz, Ly = Lz = 5 m and Lb = 5 m.

Beams and braces: nothing to enter; the joint-to-joint length is used.

Buckling length: pick the members, choose factors or lengths, type the values, Apply.



The four column members picked, 5 m in the three fields

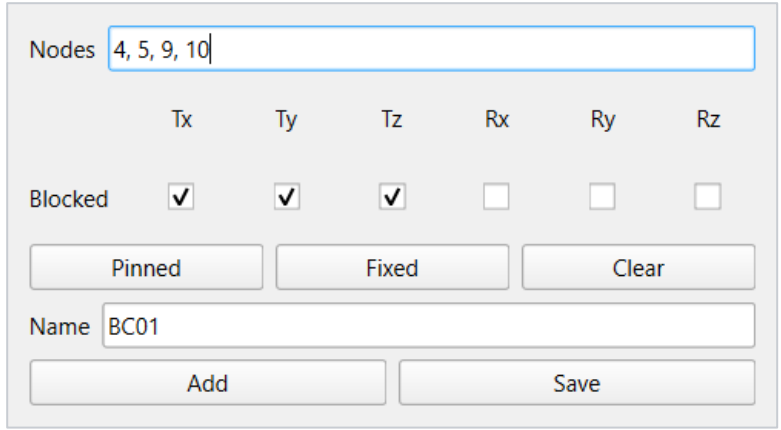
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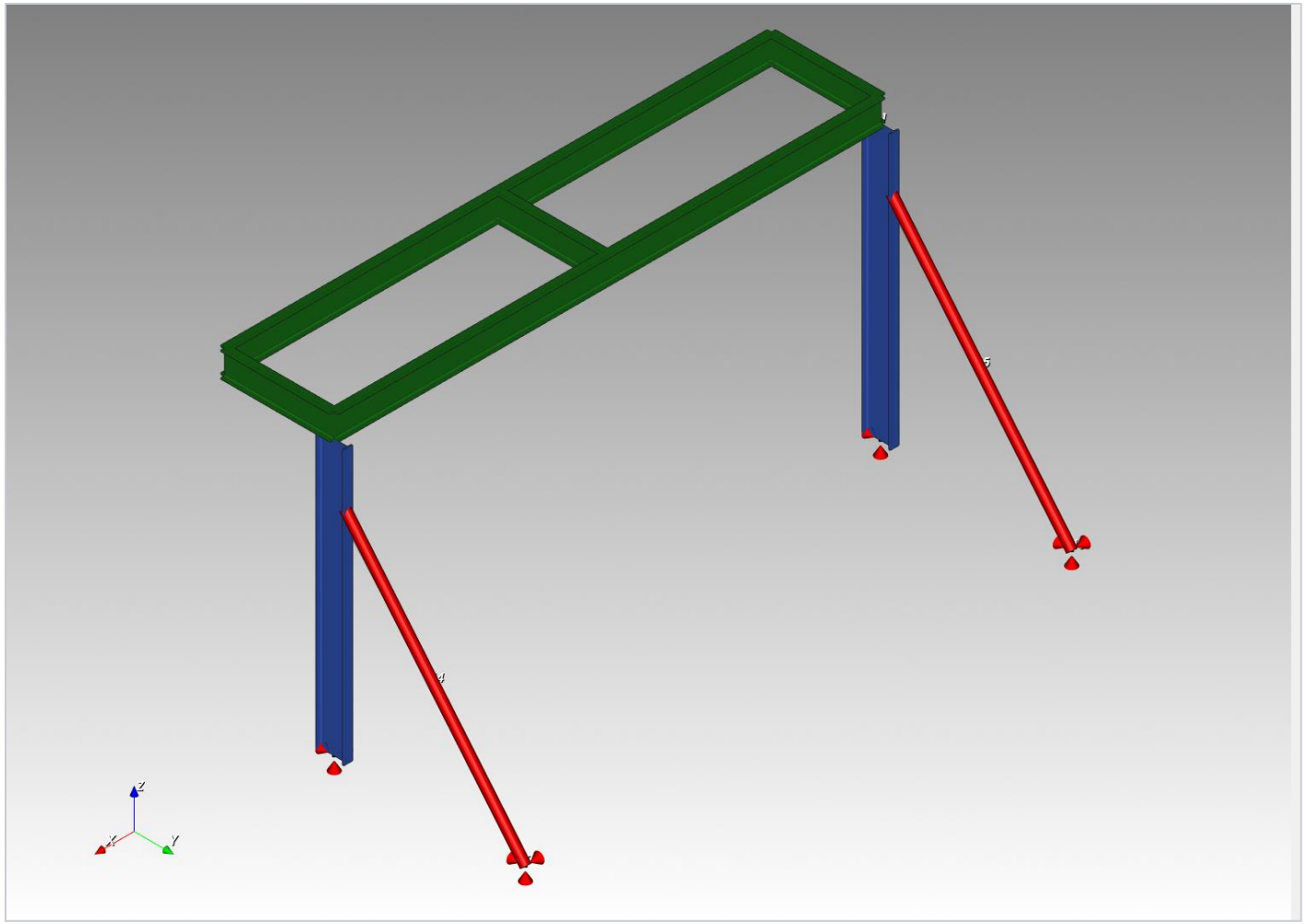
Step 7 · Supports

BC01: nodes 4, 5, 9, 10, the column feet and the brace feet, pinned: Tx, Ty, Tz blocked, rotations free.

Boundary: pick the nodes, tick the three translations (or press Pinned), name the set, Save.

One set per combination: the combination table assigns a boundary set to each combination, so alternative supports can live side by side.





The pinned supports drawn at the four feet

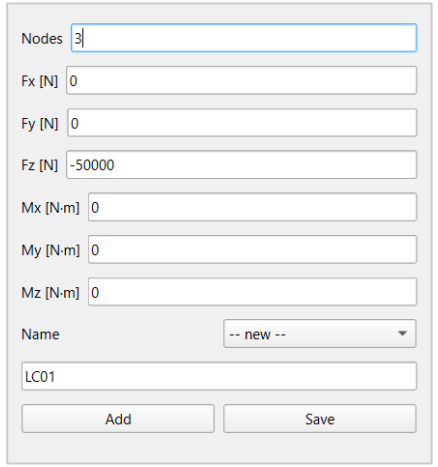
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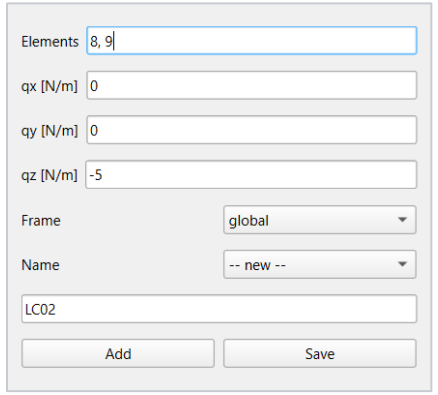
Step 8 · Loads

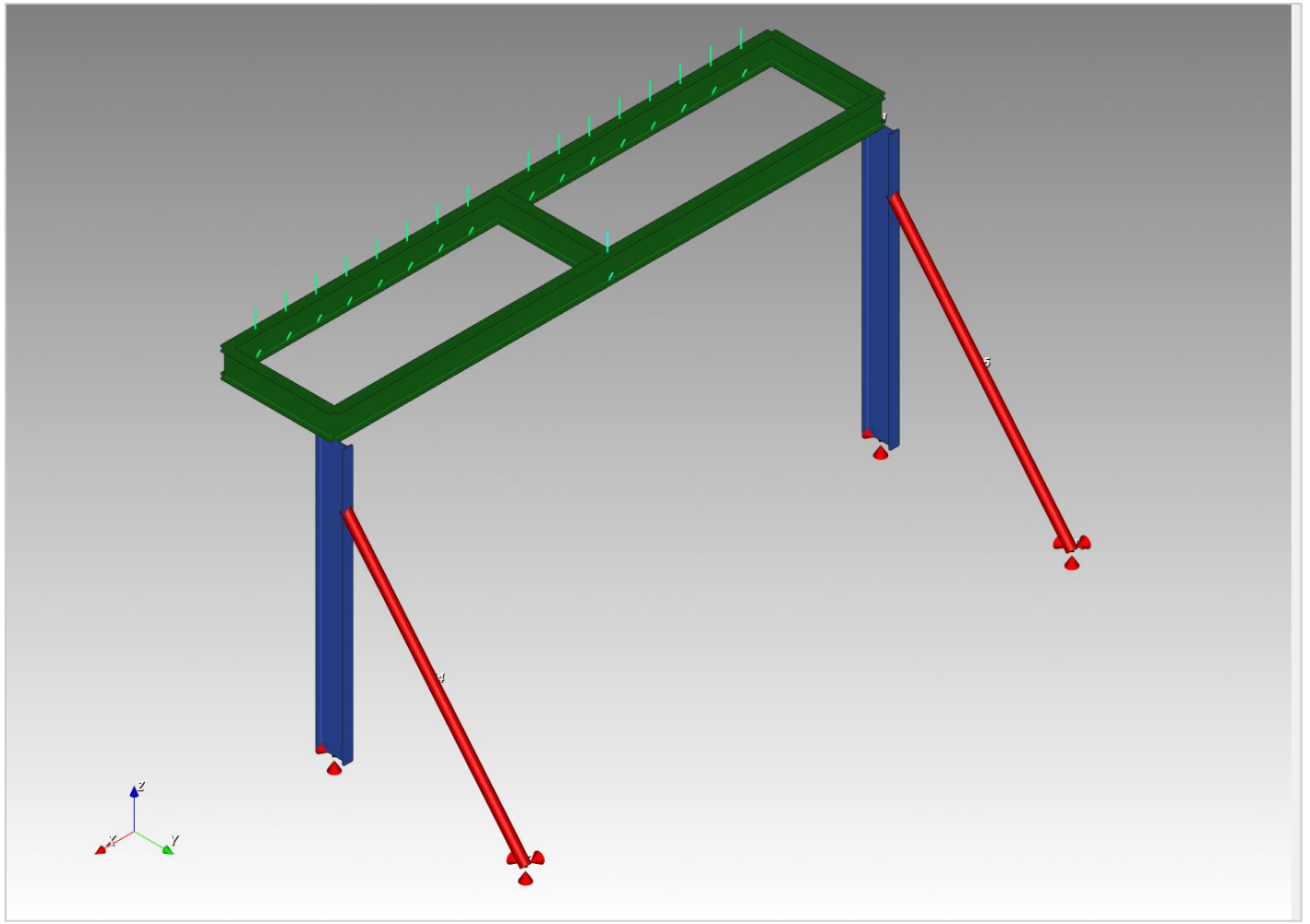
LC01: Concentrated load, node 3, Fz = −50 000 N, Add, Save.

LC02: Line load, members 8 and 9, qz = −5 N/m in global axes, Add, Save.

Load cases are named: the dropdown adds to an existing case or starts a new one; a case can mix concentrated and line loads.







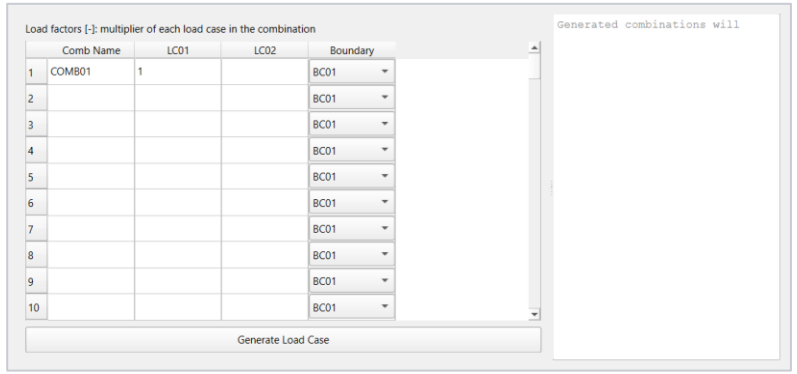
Both load cases shown: the 50 kN arrow at node 3, the line load on the edge beams

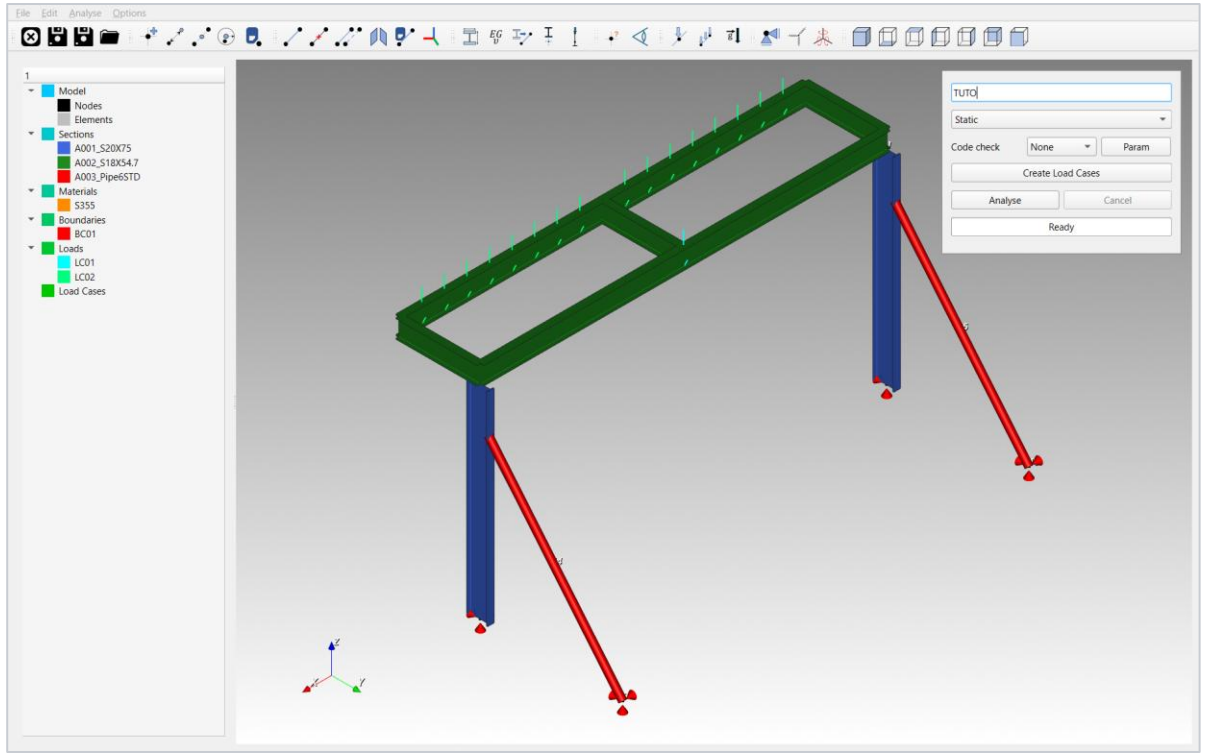
Step 9 · Combination and analysis

Create Load Cases: one row, COMB01, factor 1 on LC01, boundary BC01, Generate Load Case.

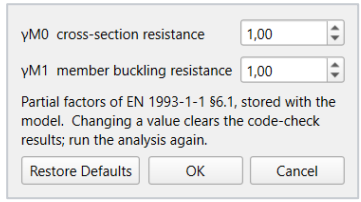
Analysis: a name, Static, Code check = Eurocode. Param shows γM0 = γM1 = 1.00; they are kept with the model.

Analyse: solves every combination and runs the Eurocode 3 check at seven stations per member. Results stay with the model until it changes.



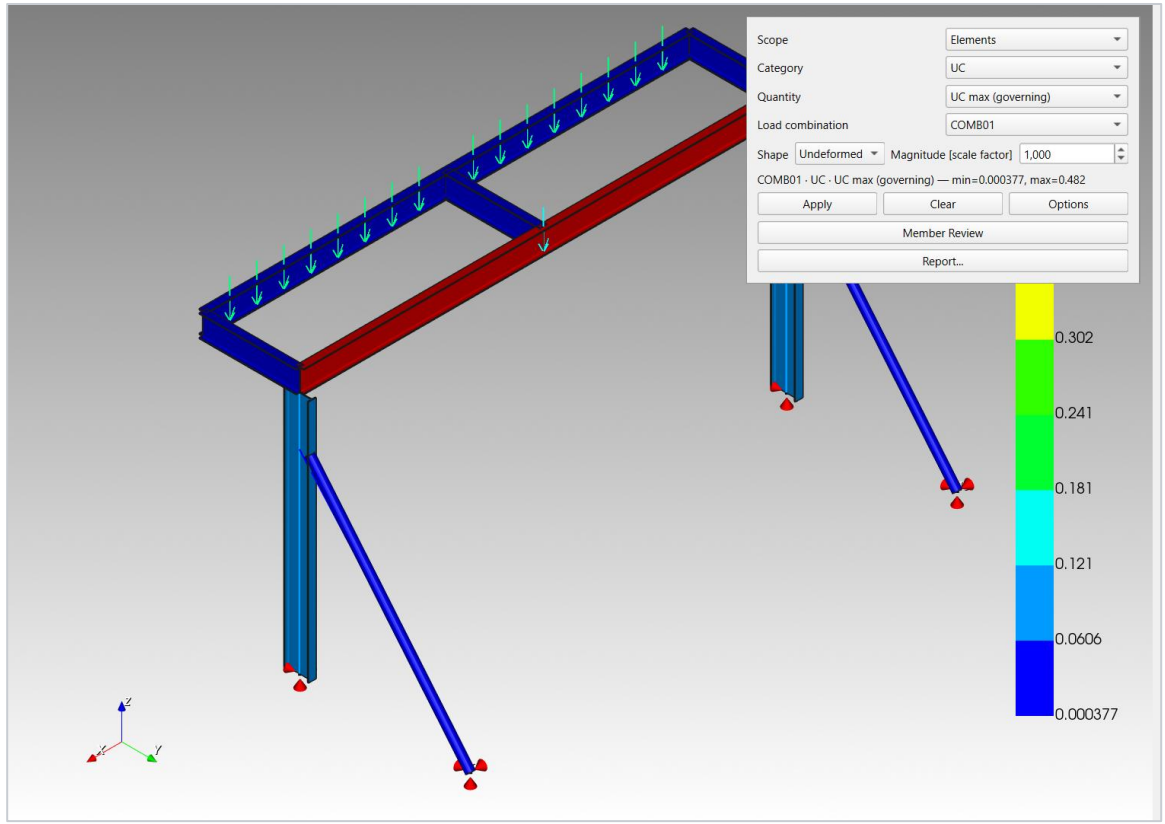


The Analysis dialog over the model

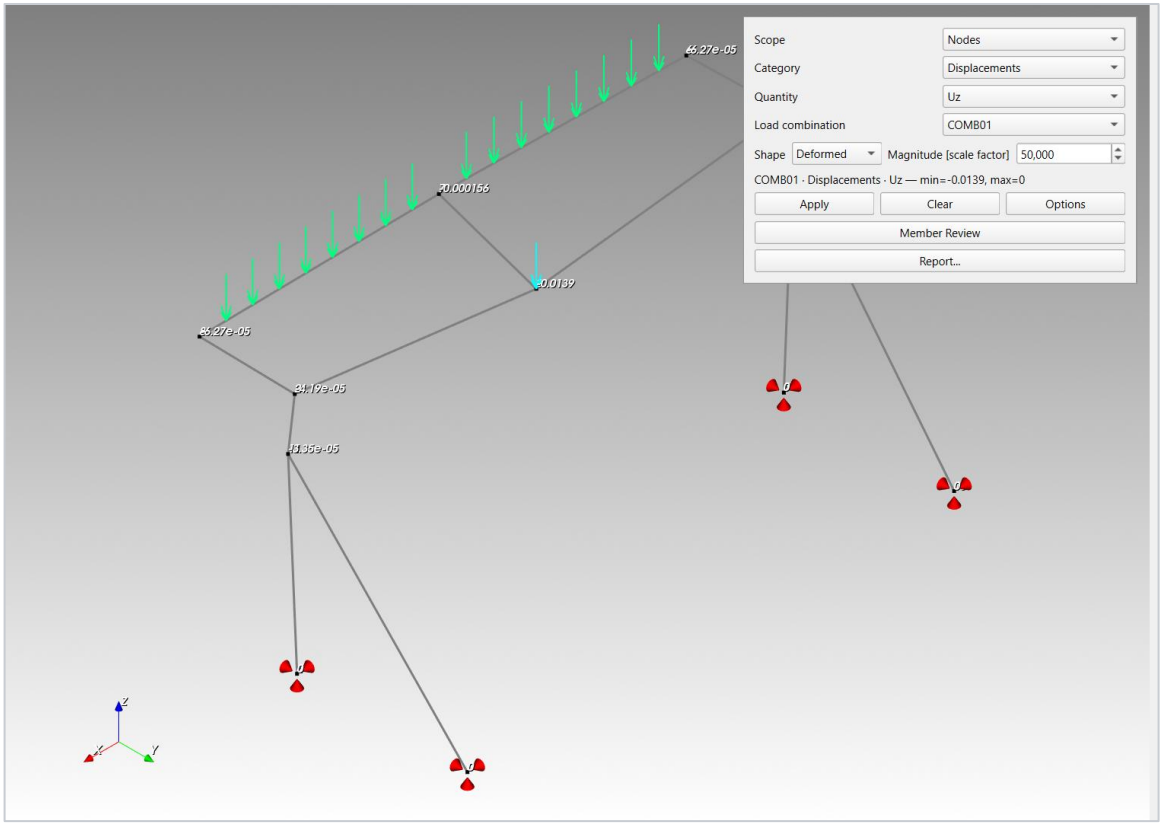


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Step 10 · Results



UC max (governing): 0.482 on member 1, lateral-torsional buckling of the loaded span

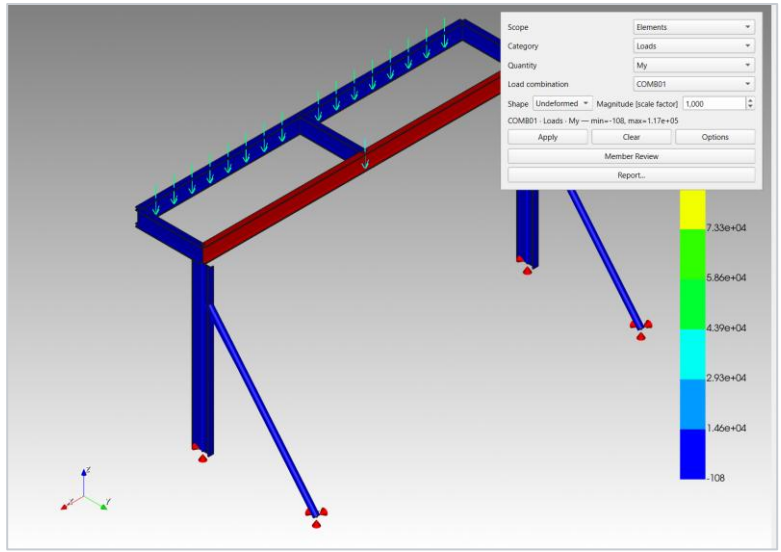


Deformed shape × 50 000 with Uz: 13.9 mm down at node 3

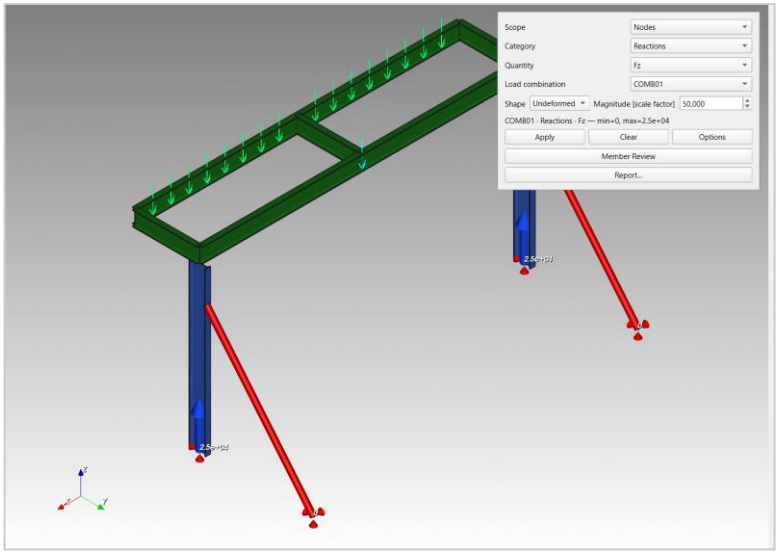
Postprocessing: Elements · UC · UC max · COMB01 · Apply. Then Nodes · Displacements · Uz, shape Deformed, magnitude 50 000. Group UC: beams 0.482, columns 0.100, braces 0.008, all OK.

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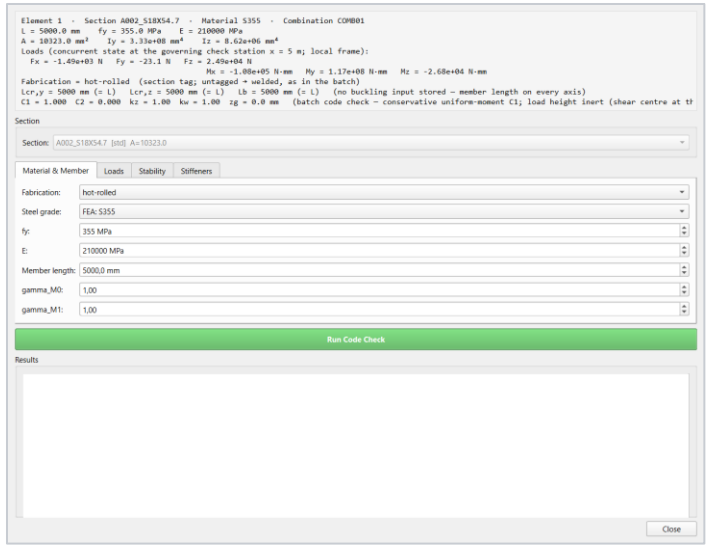
Step 11 · Forces, reactions, review, report



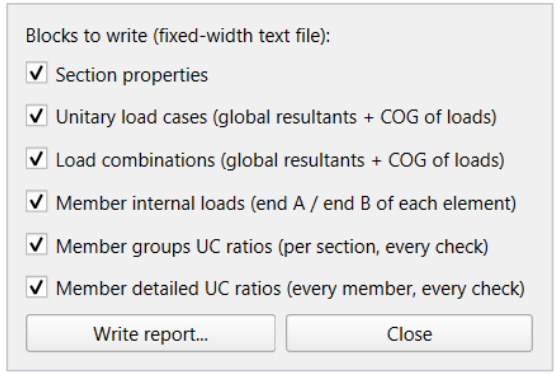
Loads · My under COMB01



Reactions · Fz at the four supports



Member Review of member 1



Member Review: the EC3 form pre-filled from the model for one member and one combination; change a value, check again.

Report: tick the blocks, choose the file: section properties, unitary load cases, combinations, member internal loads, group and member UC ratios, with the partial factors in the header.

Save: Ctrl+S writes the model with its results to TUTO.pkl.

THANK YOU

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