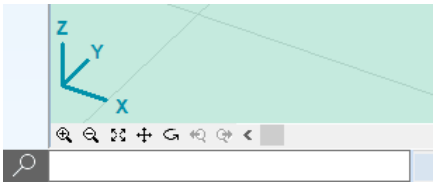
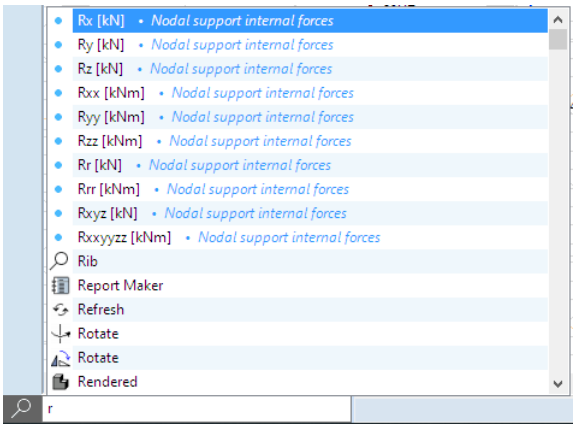
New features of **AxisVM X6 Release 1**

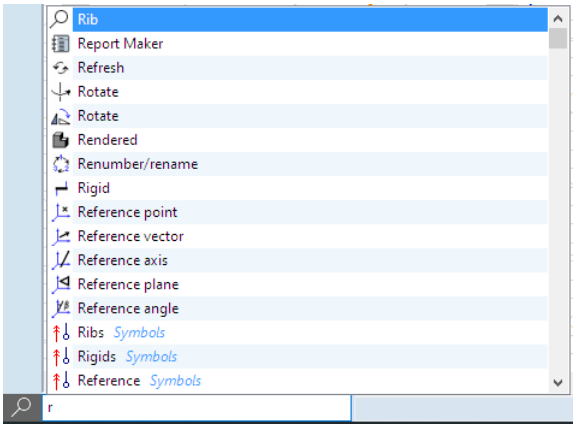
GENERAL FEATURES

- ### Smart command line and search

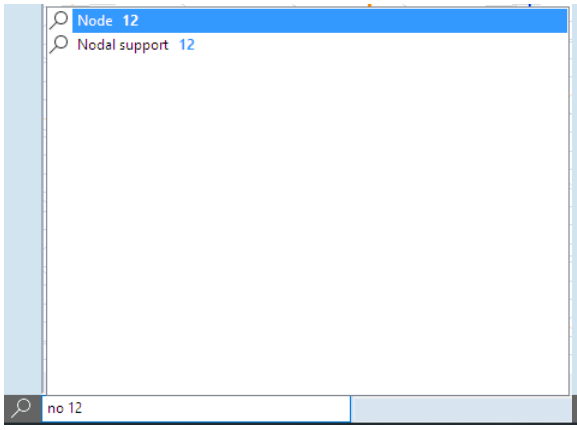
  Most of the commands and settings of AxisVM are accessible directly through a simple search function. By typing in letters of the command, a list of matches is displayed. The content of the list depends on the active tab of the main AxisVM window, e.g. the *Static* tab allows selecting result components, while the *Elements* tab does not. Load cases can be selected in both tabs.

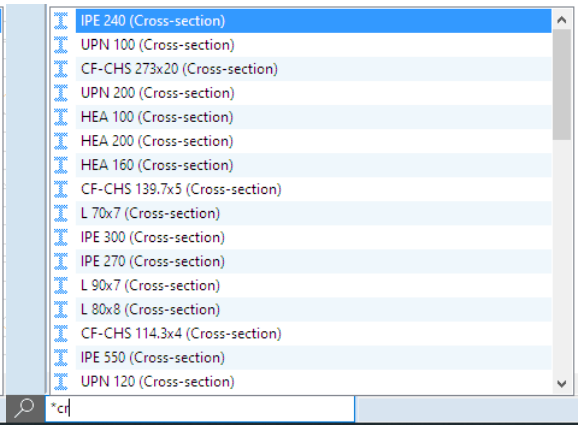


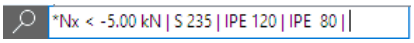




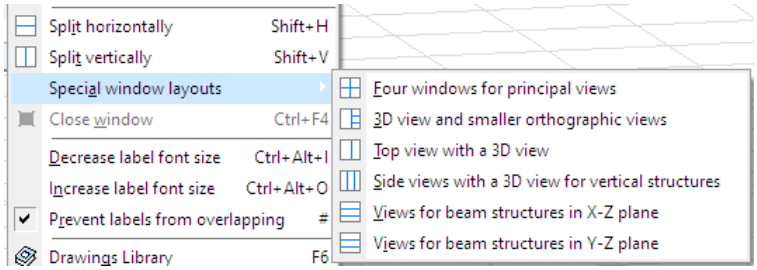
Additional functions are: finding an element by its number or name, selecting elements by property value (material, cross-section, length, eccentricity, domain thickness, domain area), by value of a result component, or by using multiple criteria.



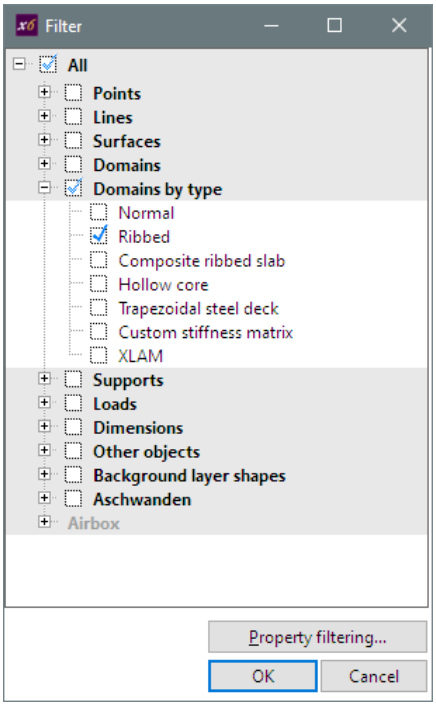




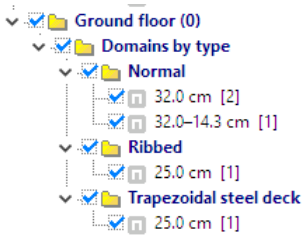
- Special window layouts in the *Windows* menu
  There are predefined layouts consisting of different views in each subwindow.



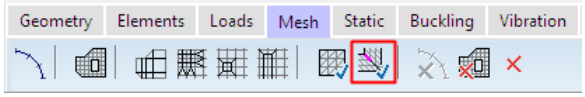
- Enhanced selection filter
  A selection can be filtered based on domain type (ribbed, hollow core, trapezoidal steel deck, XLAM, etc). The filter retains the last setting.



- Logical parts by type of special domains
  Logical parts are created based on the type of finite elements or architectural role of domains. X6 also creates logical parts based on the domain type.



- Mesh check selecting free edges
  This function selects edges connected to only one domain, making it easier to find meshing problems where meshes of two walls, or of a wall and of a slab, do not match.



- Customization of more graphic symbols
  Customizable color and size of beam/rib end releases and edge hinges.
  Customizable color and line thickness for logical and eccentric axes of beams and ribs.
  Customizable default font color and size for different labels (node number, material, cross-section, etc.)
- Copy/move virtual strips with the underlying elements
- Copy a system of structural gridlines
  It is easier to define slightly different systems of structural gridlines on each floor by copying an existing grid and then adjusting it.

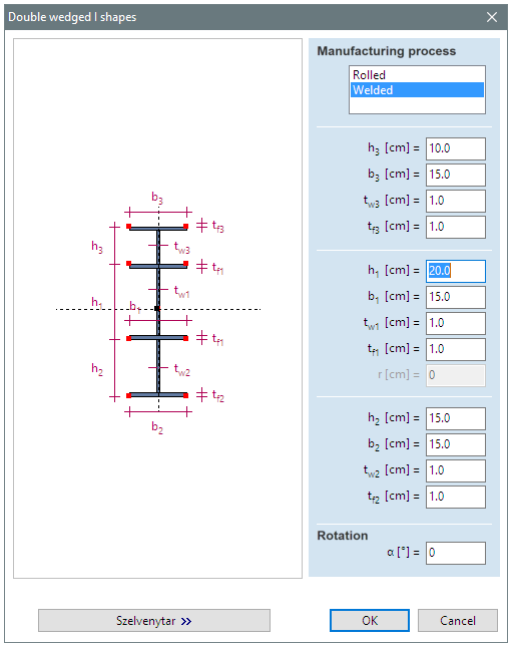
LINKS WITH OTHER PROGRAMS

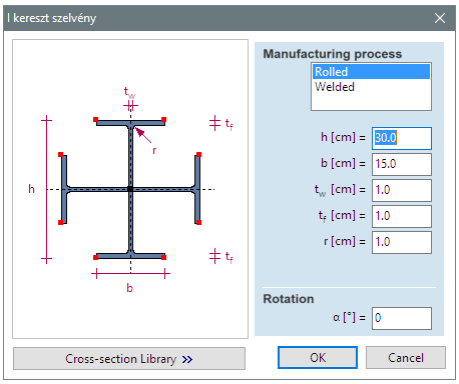
- New AxisVM components for Rhino/Grasshopper
  New plugin is available for parametric surface mesh generation .
- SAF interface imports and exports loads (**SAF** module)

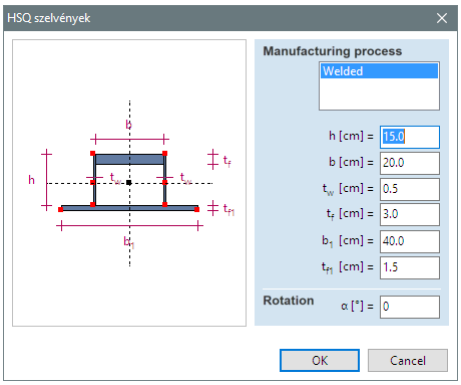
SAF

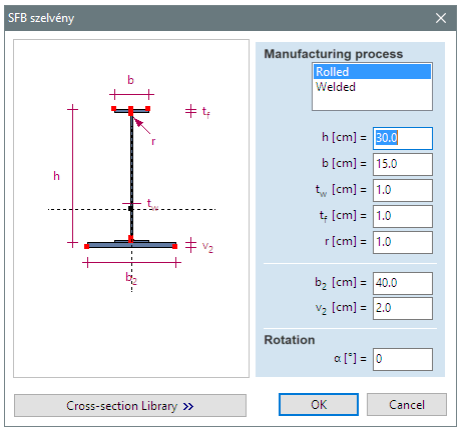
- Tekla interface imports and exports beam end releases, and nodal and line supports (**TI** module)

- Parametric double wedged I, crossed I, SFB, IFB, symmetric and asymmetric HSQ profiles



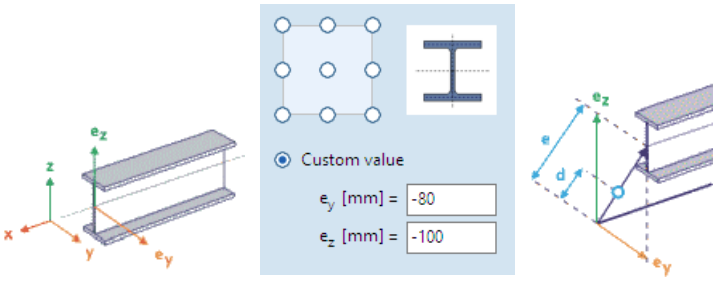


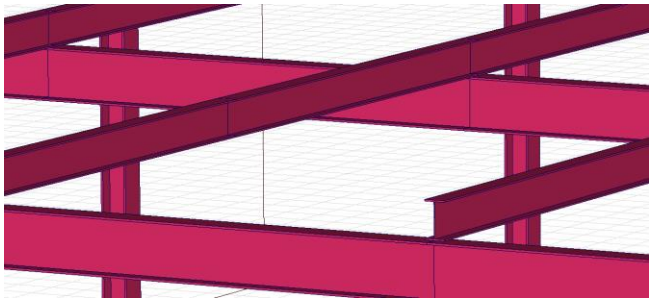




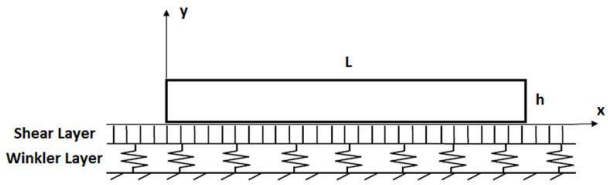
- Eccentric beams

  e_y and e_z eccentricities can be defined with an alignment point on the bounding envelope of the cross-section, or by entering custom values. Eccentricity of a beam placed on the top of other beams is calculated and updated automatically. Stiffness of the eccentric connection can also be controlled.





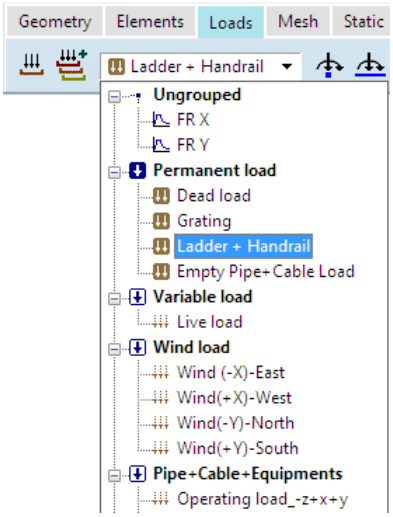
- Winkler-Pasternak elastic foundation
  This type of surface support also includes a shear layer.



- New beam element with 7 degrees of freedom (new **7DOF** module)
- Copy nodal support stiffness values from an Excel table to AxisVM

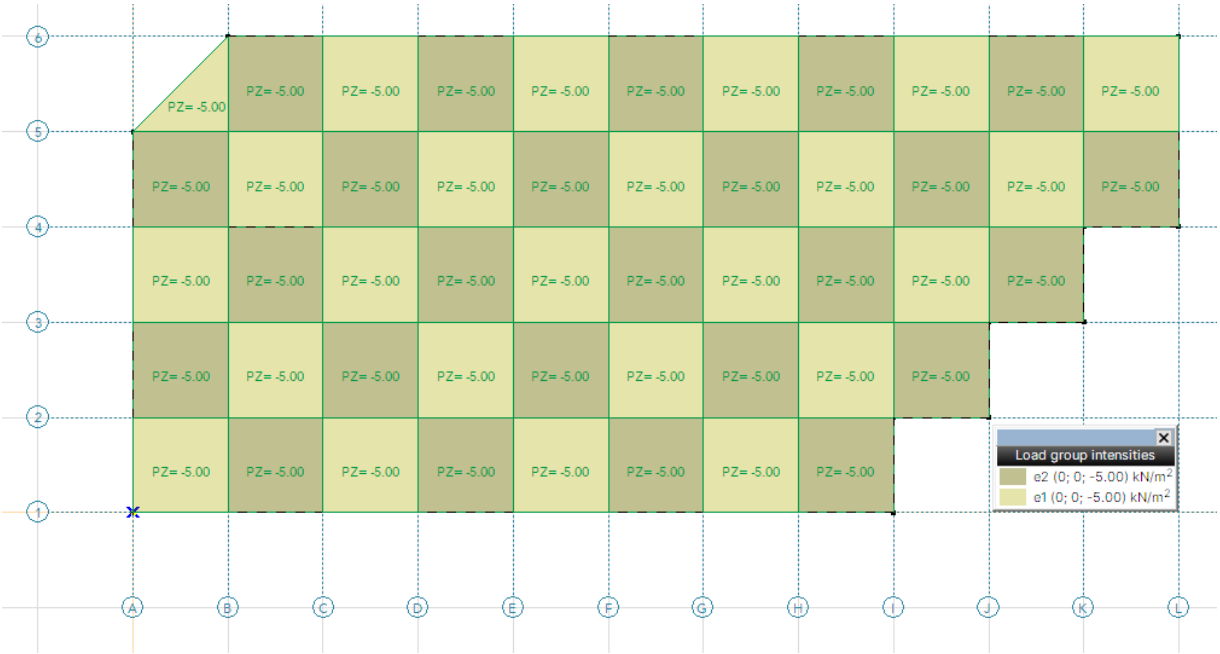
LOADS

- Load cases can be selected from a structured dropdown list in the *Loads* tab

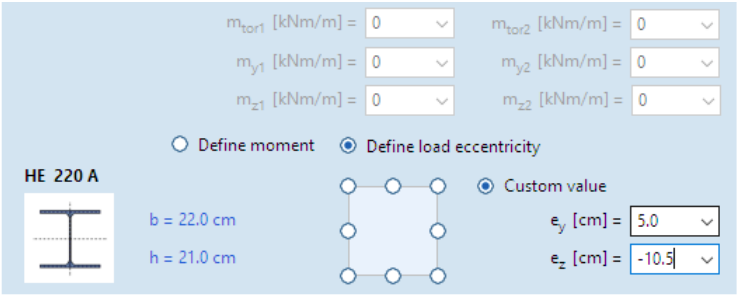


- Additional load split functions
  Split existing loads according to storeys or structural gridlines

- Display of color-coded surface loads of all load cases of a load group in a single view



- Generate wind loads from a CFD model (new **CFD** module)
  Export the model via an STL file for computational wind tunnel analysis and then import the nodal pressure values via a special file and convert them into static or dynamic loads.
- Display of color-coded snow and wind loads
- Applying eccentric concentrated or distributed loads on beams and ribs
  Instead of defining moments, loads can be created with an e_y and e_z eccentricity.



- Options to handle multiple loads
  Control what happens when loads with different or equal intensities are placed in the same position.
- Customized default color of surface and line loads

- Rules to generate custom combinations in the critical load group combinations table

Critical load group combinations

	PERM1	VAR1	VAR2	VAR3	VAR4	VAR5	VAR6
1	Active	Simultaneous (1)	Simultaneous (1)	Simultaneous (2)	Simultaneous (2)	Excluded	Active
2	Active	Simultaneous (1)	Simultaneous (1)	Simultaneous (2)	Simultaneous (2)	Active	Excluded
3	Active	Active	Active	Active	Active	Active	Active
4	Active	Simultaneous (1)	Simultaneous (1)	Leading (1)	Leading (1)	Active	Active
5	Active	Leading (1)	Leading (1)	Leading (2)	Leading (2)	Active	Active
6	Active	Simultaneous (1)	Simultaneous (1)	Leading (1)	Leading (1)	Leading (2)	Leading (2)
7	Active	Leading (1)	Leading (1)	Active	Active	Excluded	Excluded
8	Active	Leading (1)	Leading (1)	Excluded	Excluded	Active	Active
9	Active	Active	Active	Excluded	Excluded	Excluded	Excluded
10	Active	Excluded	Excluded	Active	Active	Excluded	Excluded
11	Active	Simultaneous (1)	Simultaneous (1)	Leading (1)	Leading (1)	Active	Excluded
12	Active	Simultaneous (1)	Simultaneous (1)	Leading (1)	Leading (1)	Excluded	Active

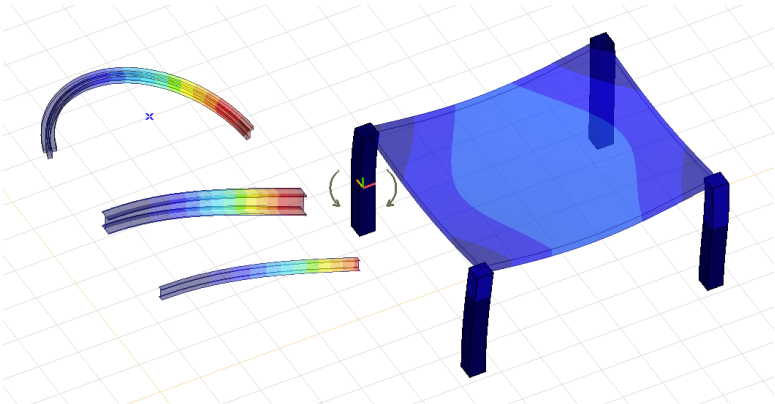
- Define the direction of spectra for seismic analysis
- Define moving loads on load panels
- Transparent display option for load panels
- Extend selection to loads with the same load component magnitude

ANALYSIS

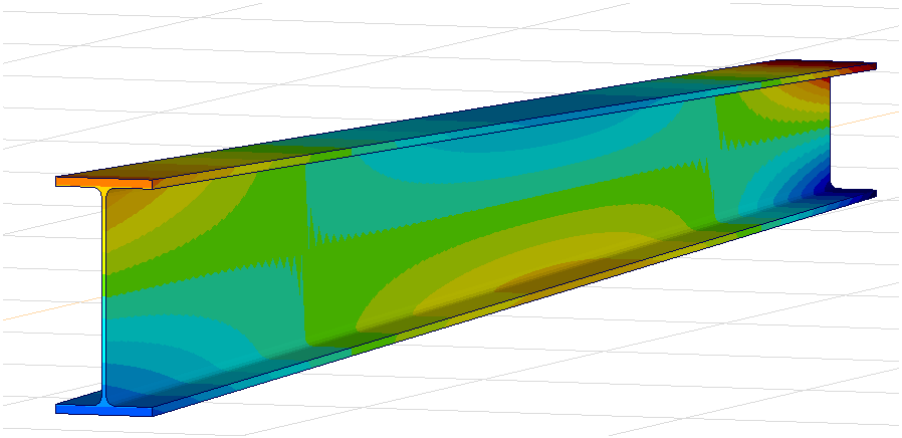
- Obtain imperfect shape from buckling shape(s) (New **IMP** module)
- Nonlinear analysis with reinforcement calculated from the ULS envelope of nonlinear results
  In earlier versions, only two options were available: *Actual reinforcement / Reinforcement calculated from critical internal forces*

RESULTS AND REPORTS

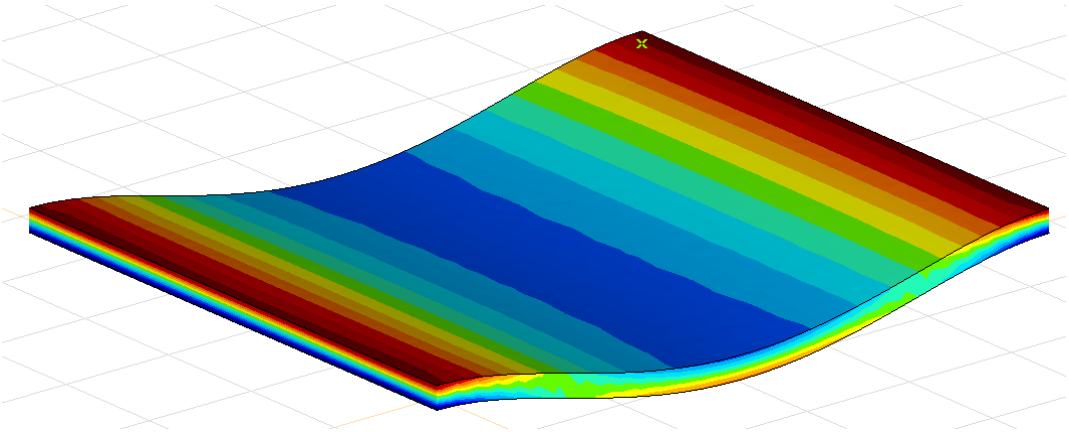
- Results display in rendered view



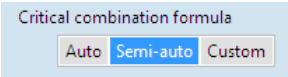
- Rendered view can display distribution of normal stress within the cross-section of a beam



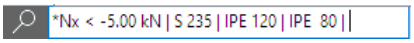
- Rendered view can display top and bottom components of surface stresses, reinforcement amounts, and crack width values simultaneously (**RC1** module)



- New automatic critical combination selection
  Semi-auto allows for choosing an SLS combination for results to be calculated from an SLS combination. The proper combination is selected automatically in other cases

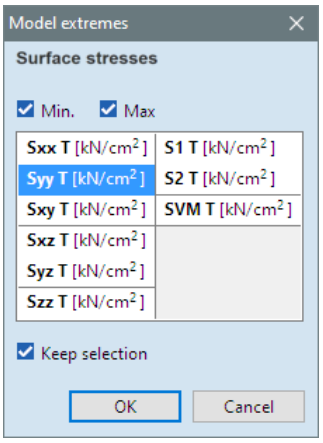


- Selection filtering by any result component
  See Smart command line above



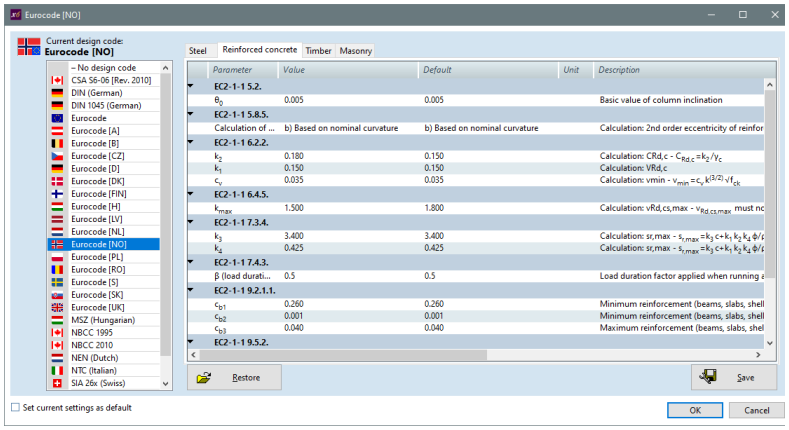
- Bicolor (positive/negative) color display mode
  Setting two ranges for (min–0) and (0–max) in blue and red.
- New color legend option
  The new option does not display hatching and/or labels for values above or below the range.

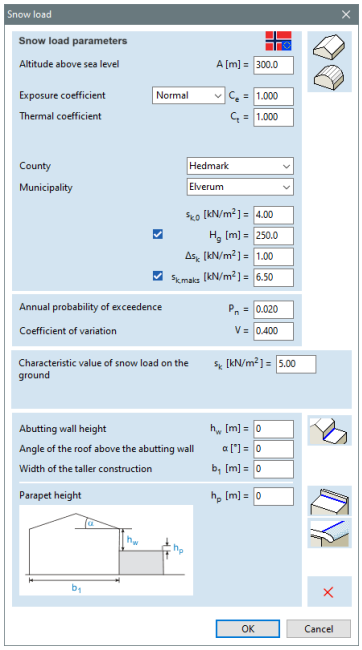
- New function for searching for *minimum / maximum values*
  Select which extreme (min. or max.) should be displayed. *Keep selection* helps when using the command *Show only selected elements* on the elements with extreme values.



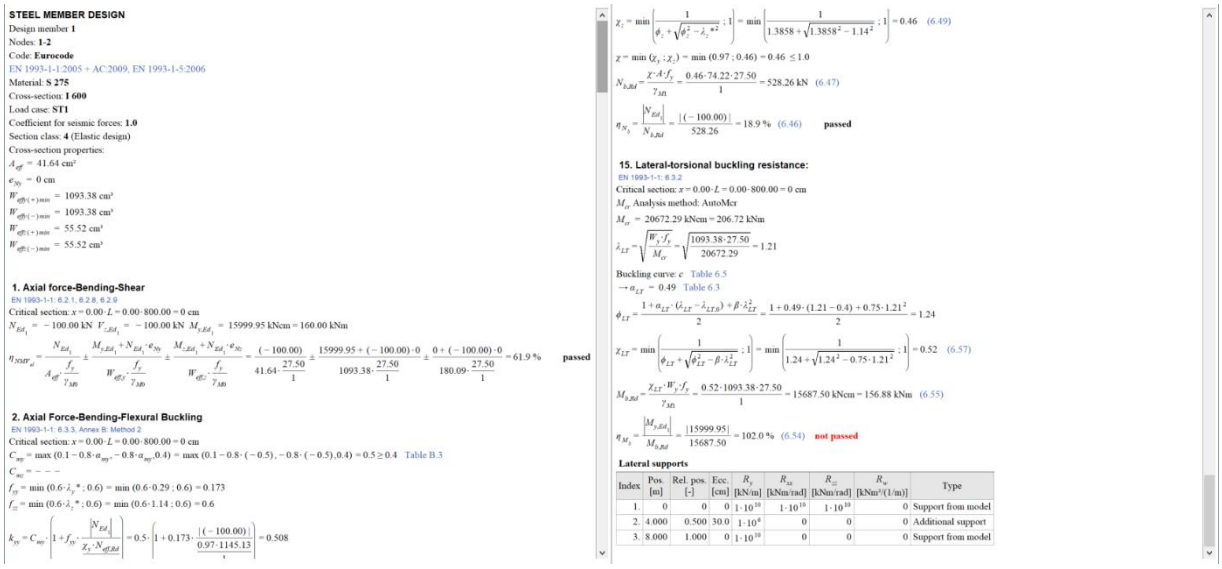
DESIGN

- Support of Norwegian NAD for Eurocode

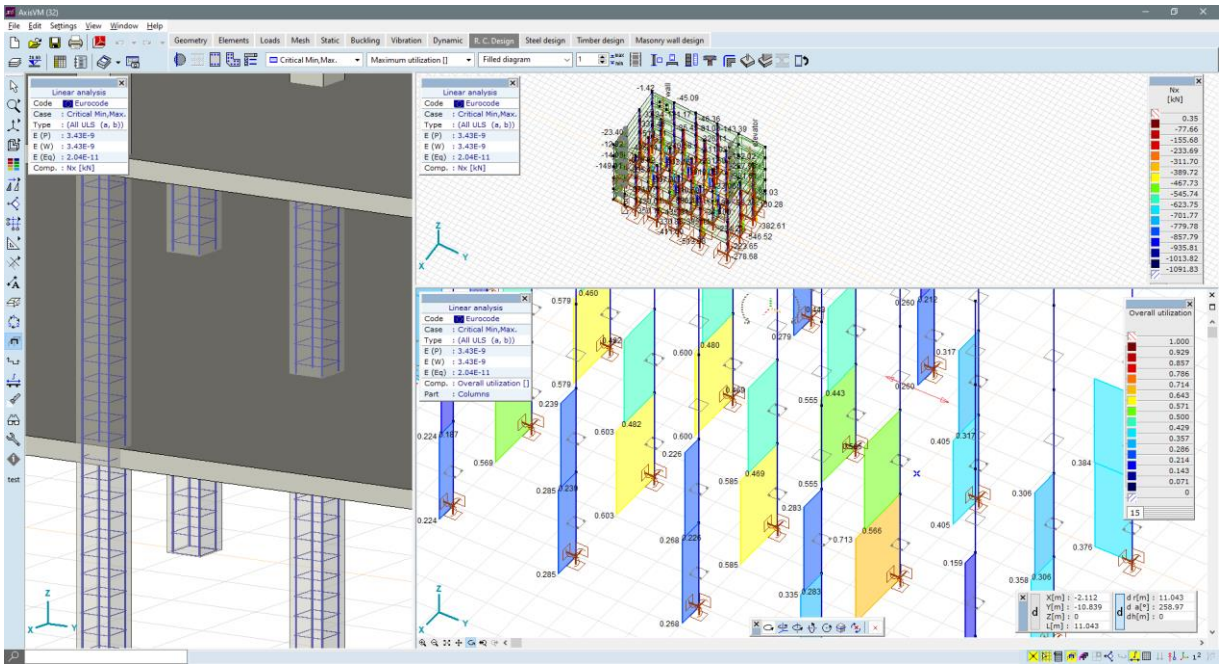




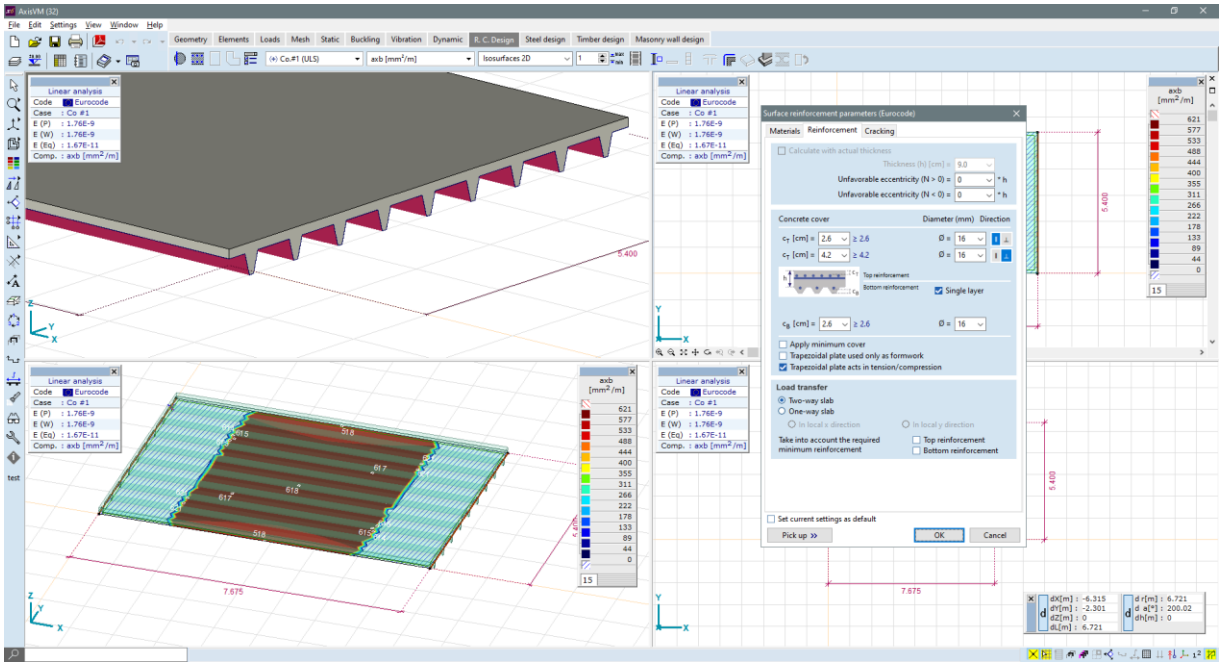
- Steel design calculation reports include effective cross-section parameters and lateral supports (**SD1** module)



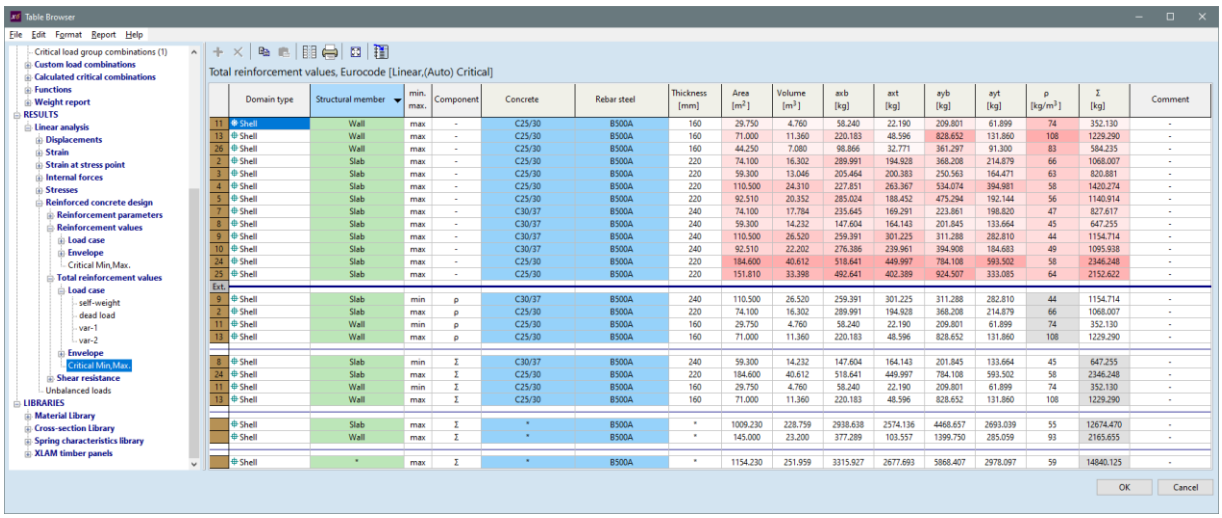
- Speed improvements in reinforced concrete beam design calculations by running multiple threads (**RC2** module)
- Utilization tables for reinforced concrete columns, reinforced concrete walls, and masonry walls in the Table Browser (**RC2, RC5, MD1** modules)
- Utilization result component and diagrams for reinforced concrete columns (**RC2** module)



- Calculation of the required reinforcement for reinforced trapezoid steel decks. (**RC1** module)



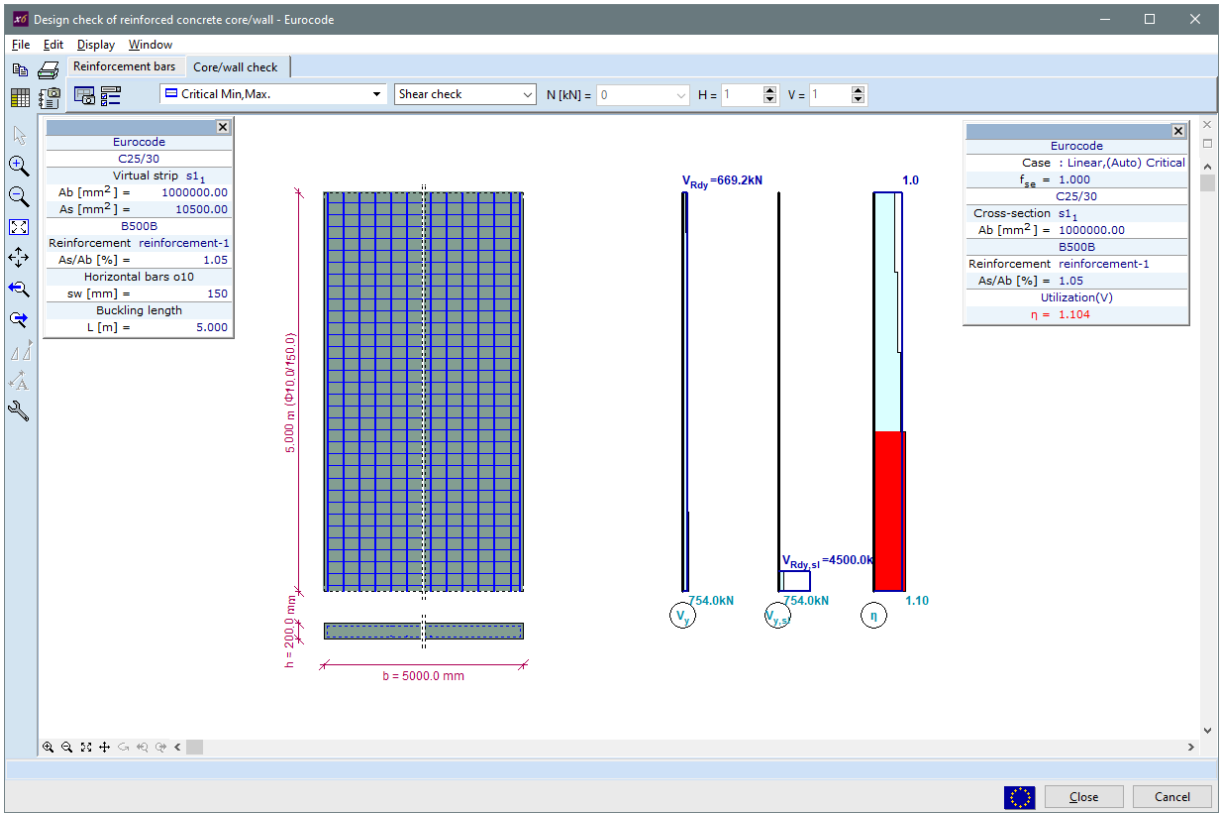
- New table for specific amount of reinforcement calculated for each domain (**RC1** module)



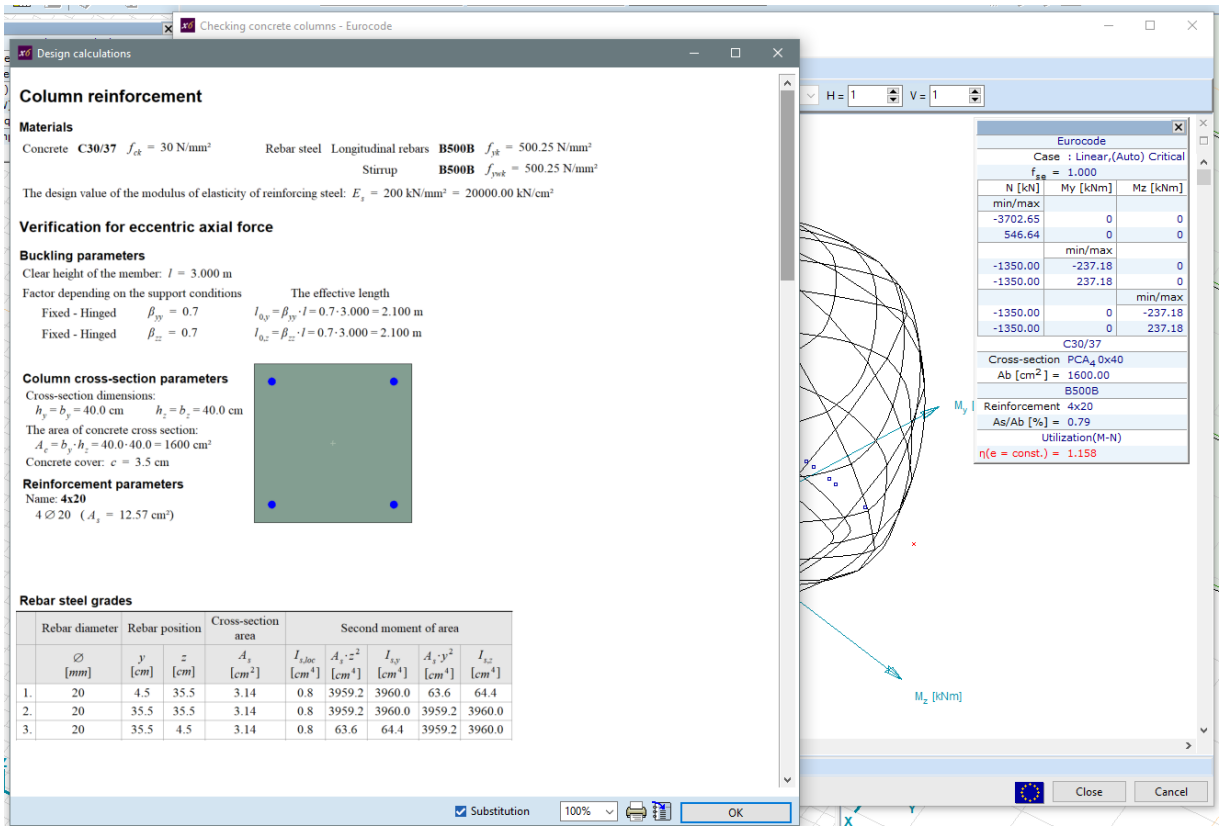
Total reinforcement values, Eurocode [Linear,(Auto) Critical]

	Domain type	Structural member	min. max.	Component	Concrete	Rebar steel	Thickness [mm]	Area [m²]	Volume [m³]	axb [kg]	axt [kg]	ayb [kg]	ayt [kg]	ρ [kg/m³]	Σ [kg]	Comment
11	Shell	Wall	max	-	C25/30	B500A	160	29.750	4.760	58.240	22.190	209.801	61.899	74	352.130	-
13	Shell	Wall	max	-	C25/30	B500A	160	71.000	11.360	220.183	48.596	828.652	131.860	108	1229.290	-
26	Shell	Wall	max	-	C25/30	B500A	160	44.250	7.080	98.866	32.771	361.297	91.300	83	584.235	-
2	Shell	Slab	max	-	C25/30	B500A	220	74.100	16.302	289.991	194.928	368.208	214.879	66	1068.007	-
3	Shell	Slab	max	-	C25/30	B500A	220	59.300	13.046	205.464	200.383	250.563	164.471	63	820.881	-
4	Shell	Slab	max	-	C25/30	B500A	220	110.500	24.310	227.851	263.367	534.074	394.981	58	1420.274	-
5	Shell	Slab	max	-	C25/30	B500A	220	92.510	20.352	285.024	188.452	475.294	192.144	56	1140.914	-
7	Shell	Slab	max	-	C30/37	B500A	240	74.100	17.784	235.645	169.291	223.861	198.820	47	827.617	-
8	Shell	Slab	max	-	C30/37	B500A	240	59.300	14.232	147.604	164.143	201.845	133.664	45	647.255	-
9	Shell	Slab	max	-	C30/37	B500A	240	110.500	26.520	259.391	301.225	311.288	282.810	44	1154.714	-
10	Shell	Slab	max	-	C30/37	B500A	240	92.510	22.202	276.386	239.961	394.908	184.683	49	1095.938	-
24	Shell	Slab	max	-	C25/30	B500A	220	184.600	40.612	518.641	449.997	784.108	593.502	58	2346.248	-
25	Shell	Slab	max	-	C25/30	B500A	220	151.810	33.398	492.641	402.389	924.507	333.085	64	2152.622	-
Ext.																
9	Shell	Slab	min	ρ	C30/37	B500A	240	110.500	26.520	259.391	301.225	311.288	282.810	44	1154.714	-
2	Shell	Slab	max	ρ	C25/30	B500A	220	74.100	16.302	289.991	194.928	368.208	214.879	66	1068.007	-
11	Shell	Wall	min	ρ	C25/30	B500A	160	29.750	4.760	58.240	22.190	209.801	61.899	74	352.130	-
13	Shell	Wall	max	ρ	C25/30	B500A	160	71.000	11.360	220.183	48.596	828.652	131.860	108	1229.290	-
8	Shell	Slab	min	Σ	C30/37	B500A	240	59.300	14.232	147.604	164.143	201.845	133.664	45	647.255	-
24	Shell	Slab	max	Σ	C25/30	B500A	220	184.600	40.612	518.641	449.997	784.108	593.502	58	2346.248	-
11	Shell	Wall	min	Σ	C25/30	B500A	160	29.750	4.760	58.240	22.190	209.801	61.899	74	352.130	-
13	Shell	Wall	max	Σ	C25/30	B500A	160	71.000	11.360	220.183	48.596	828.652	131.860	108	1229.290	-
	Shell	Slab	max	Σ	*	B500A	*	1009.230	228.759	2938.638	2574.136	4468.657	2693.039	55	12674.470	-
	Shell	Wall	max	Σ	*	B500A	*	145.000	23.200	377.289	103.557	1399.750	285.059	93	2165.655	-
	Shell	*	max	Σ	*	B500A	*	1154.230	251.959	3315.927	2677.693	5868.407	2978.097	59	14840.125	-

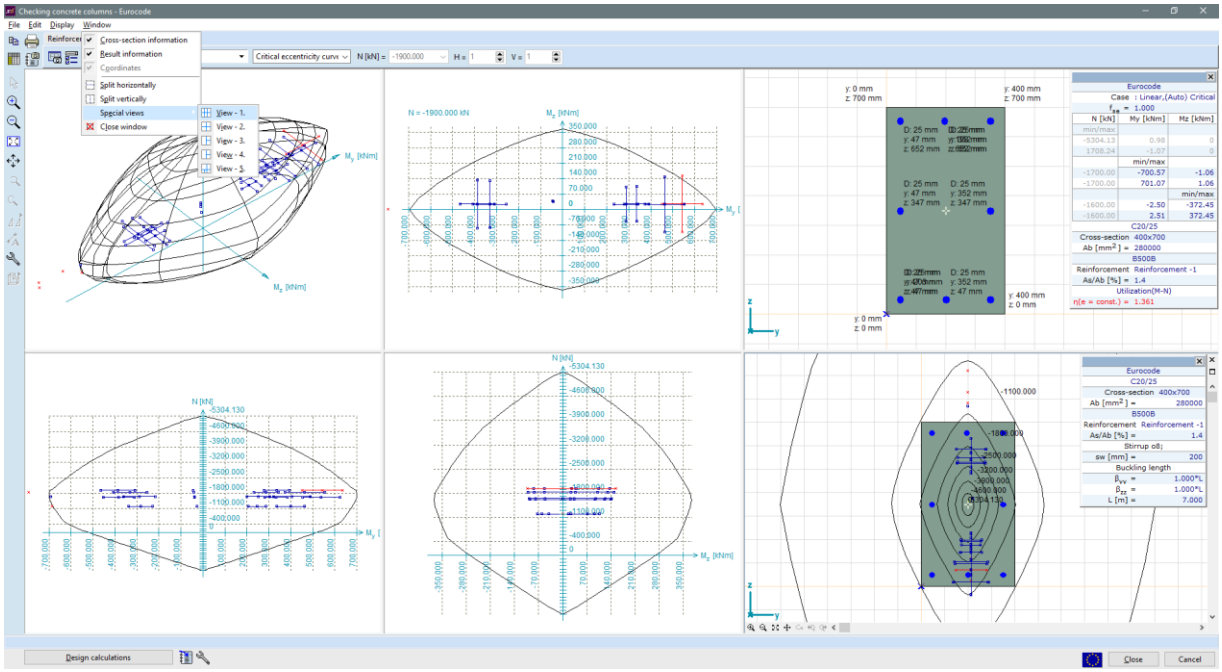
- Shear design of reinforced concrete walls (**RC5** module)



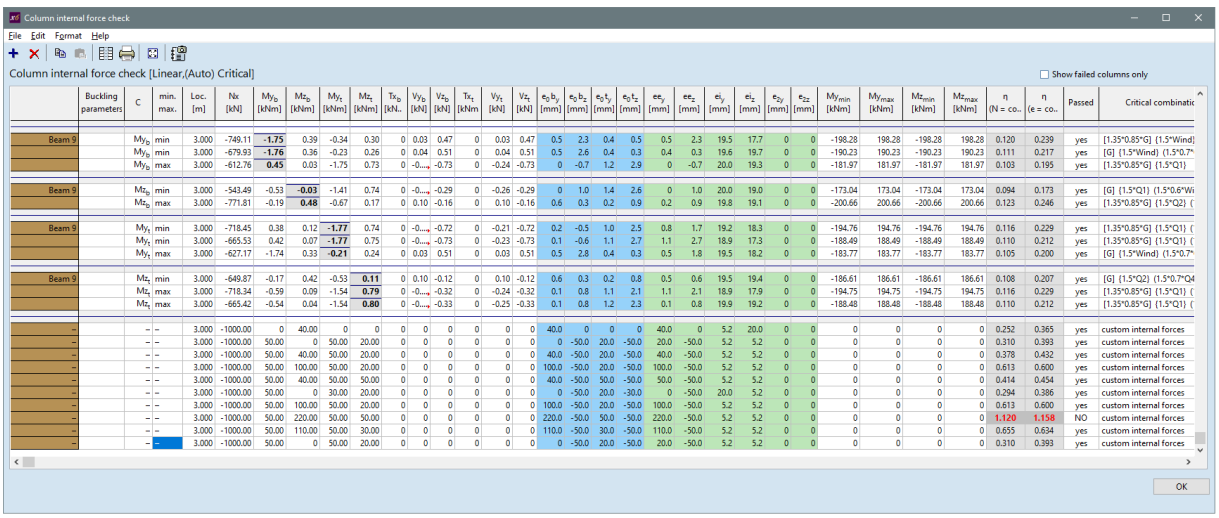
- Design calculation report for reinforced concrete columns (**RC2** module)



- Predefined window layouts for column reinforcement design (**RC2** module)



- Custom force values to design a reinforced concrete column are saved with the column (**RC2** module)
- Custom forces for column design can be imported via clipboard (**RC2** module)



February 8, 2021