

What's New



2018 R2

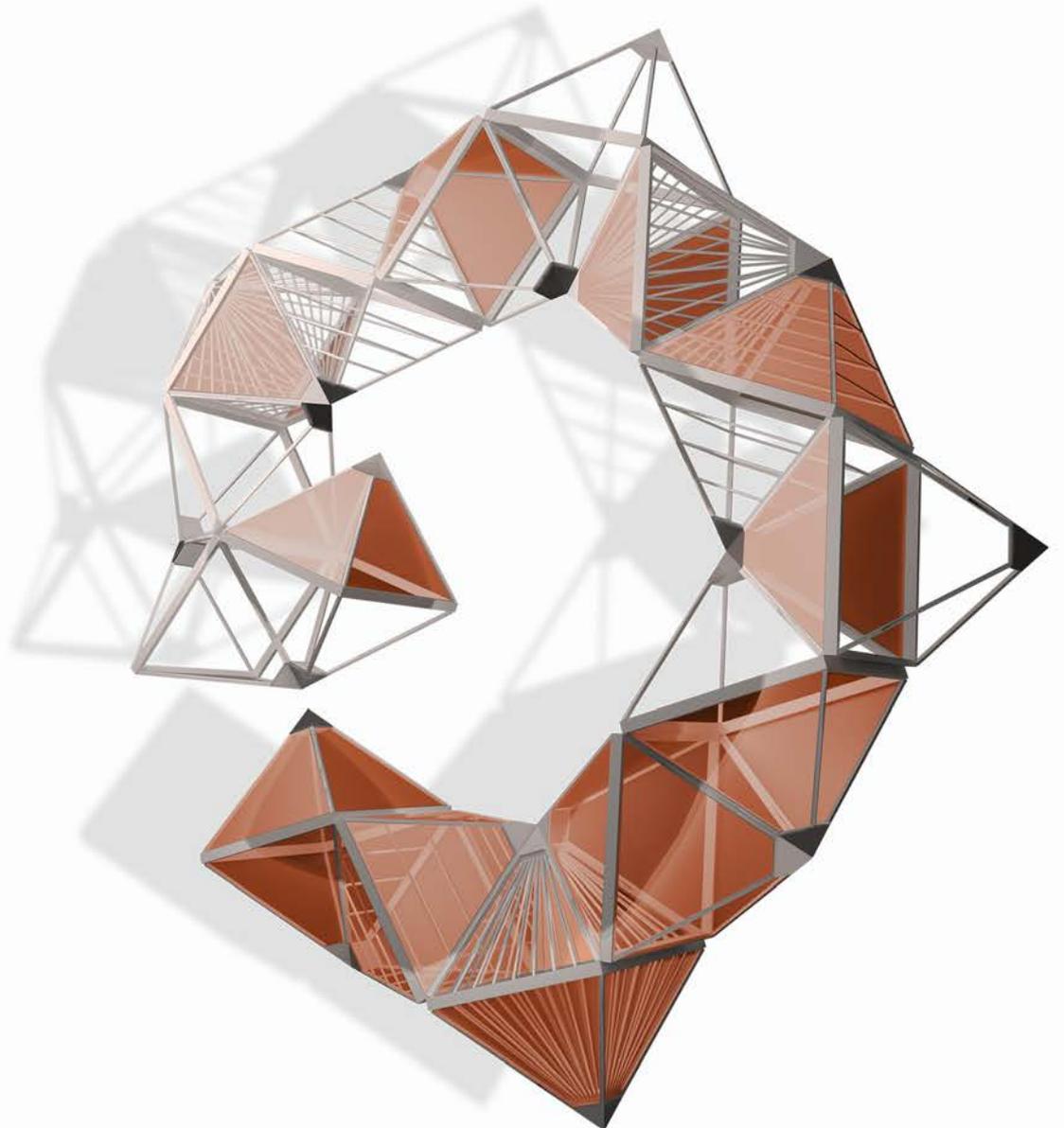


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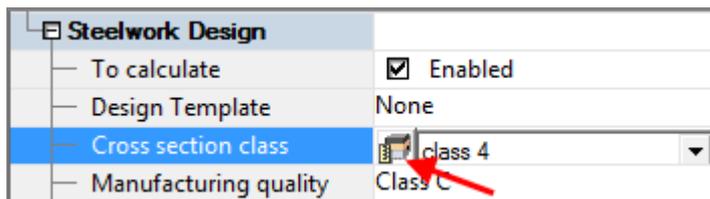
New Options & Improvements

Advance Design 2018 R2 introduces a number of new features and improvements, summarized in the chapters below.

EC3 Steel Design - Class 4 calculation of effective characteristics

The previous Advance Design version featured two possibilities for considering effective characteristics for Class 4 sections during steel design calculations:

- By manually entering effective characteristics and using a dedicated dialog available in the property list of a steel element, in which case the same (constant) characteristics were used along the element;



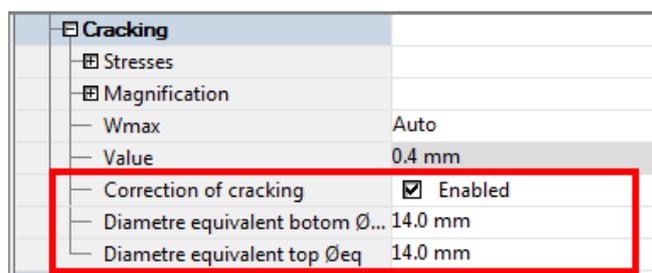
- By using automatically calculated effective characteristics, available for a standard "I" shape profiles, in which case, characteristics could be variable, based on the efforts diagrams.

Advance Design 2018 R2 brings another possibility, automatic calculations of effective characteristics for profiles other than standard "I". The effective characteristics are now automatically calculated when the section class is imposed or automatically detected as "Class 4".

Considering the fact that section classification (when set on "auto") is dependent on efforts diagrams, the class of the section can be different along the element - and consequently, effective characteristics are variable along the element.

Optimization of theoretical reinforcement according to EC2 due to max crack width

This new option is available on the RC property list of linear and planar elements (for Eurocode). It is used for automatically increasing theoretical reinforcement to satisfy the condition of the max crack width (independent for top and bottom crack).



Note: This new option is available for theoretical reinforcement calculation in Advance Design only. It is ignored for beams, columns and slabs if the real reinforcement calculation is activated, or defined / imposed.

The new functionality takes into account a separate diameter for top / bottom reinforcement, while optimizing the cracking width calculation within the limit by increasing the theoretical reinforcement to the top and/or bottom.

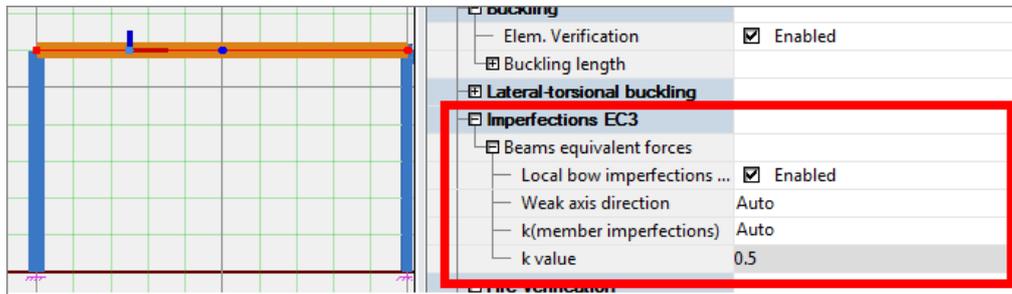
Concrete and reinforcement stresses are then re-calculated using the new modified theoretical reinforcement. The cracked inertia used in deflection calculation considers the updated theoretical reinforcement.

The optimization is useful for planar elements, as it reduces the number of calculations for cracking. With this option, the calculated theoretical reinforcement will lead to real reinforcement ($A_{real} > A_{th}$) that will satisfy the cracking limit with one important condition: the diameters used for top / bottom reinforcement must be the same as the assumption values in property list (the equivalent diameter is important in cracking calculation).

Local bow imperfections for non-vertical elements (beams)

Advance Design 2018 R2 allows the calculation of local bow imperfections for individual members (other than columns) in compression. The local bow imperfections are applied to non-column elements, according to EC3 – 5.3.4.2. For the verification of the lateral torsional buckling of a member in bending, the equivalent initial bow imperfection of the weak axis of the profile is considered with the eccentricity $k \cdot e_{0,d}$ (where the recommended value for k is 0.5, unless the National Annex requires a different value).

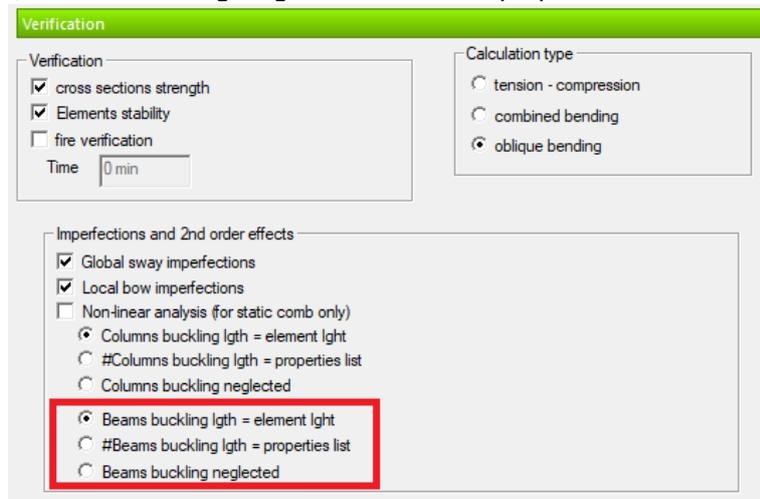
Advance Design 2018 R2 automatically detects the element's type (column or beam) and shows the relevant properties accordingly.



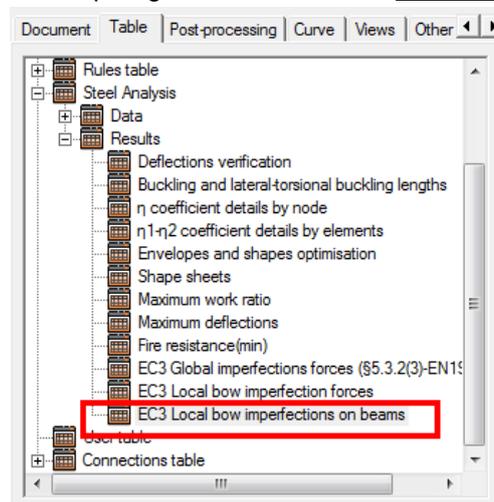
Options for beams include:

- *Local bow imperfections for weak axis direction*
- *Weak axis direction* – automatically detects the small inertia direction and generates the equivalent forces on that direction
- *k* – imperfection coefficient for a member

The Steel Design Settings dialog now includes separate options for beams and columns when considering any imperfections. Moreover, element buckling lengths defined in the properties list can be used.



In addition, a new table is added to the Report generator tables list: EC3 Local bow imperfections on beams.



Local bow imperfections according to EC3 National Annexes

Advance Design 2018 R2 features additional recommendations for local bow imperfections, determined by the National Annexes to EC3.

The changes concern two paragraphs from Eurocode 3, modified by the National Annex:

- 5.3.2 (3) – the value of e_0/L
- 5.3.4 (3) – the value of the imperfection coefficient k

Note: Recommended values for imperfections are available in National Annexes for France, UK, Germany and the Czech Republic. For other National Annexes to Eurocode 3 available on Advance Design 2018 R2, local bow imperfections are calculated using values recommended in Eurocode 3.

Improvements to Grid Tool component

Some additional changes were made to model editing features, part of the grid tool in Advance Design 2018 R2.

- Dynamic size: windows containing grid tables can now be resized and displayed in the 'full screen' mode.
- Precision: values are now displayed in cells in correlation with the maximum unit precision
- Individual or batch selection of rows in Grid Control

Identifier	Name	Load case	X (m)	Y (m)	Z (m)	Option	Coordinate system	FX (kN)	FY (kN)	FZ (kN)	MX (kN*m)	MY (kN*m)	MZ (kN*m)
1	Point Load	1 - D	4	0	14	global system/user	1	0	0	-26	0	0	0
2	Point Load	1 - D	7.5	0	14	global system/user	1	0	0	-26	0	0	0
3	Point Load	2 - S	12	0	14	global system/user	1	0	0	-12	0	0	0
4	Point Load	2 - S	3	0	16	global system/user	1	0	0	-12	0	0	0
5	Point Load	2 - S	7	0	16	global system/user	1	0	0	-8	0	0	0

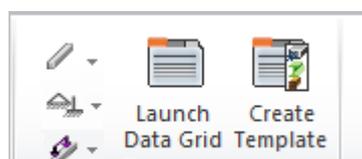
- Removal of selected rows or objects

Identifier	Name	Load case	X (m)	Y (m)	Z (m)
1	Point Load	1 - D	4	0	14
2	Point Load	1 - D	7.5	0	14
3	Point Load	2 - S	12	0	14
4				0	16
5				0	16

- New command for additional rows in the grid table

Note: The option isn't available in the table of planar elements.

- Improved graphic style (background color, location of buttons, icons)
- Shortcut icons on the ribbon to open typical tables



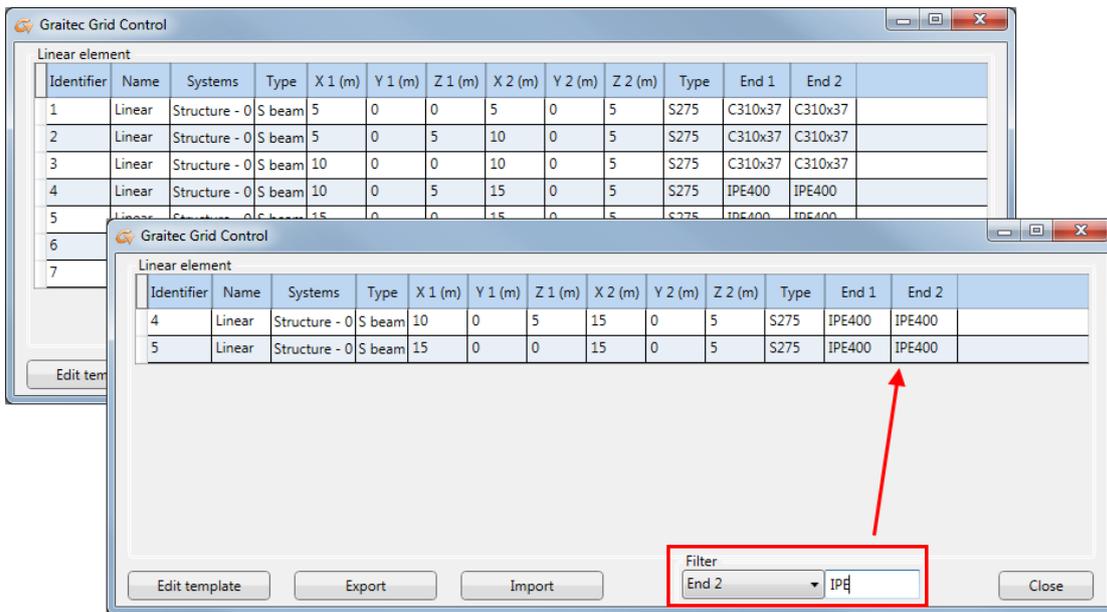
- Table of linear elements
- Table of planar elements



- Table of rigid point supports
- Table of rigid linear supports
- Table of rigid planar supports

- Table of point loads
- Table of linear loads
- Table of planar loads

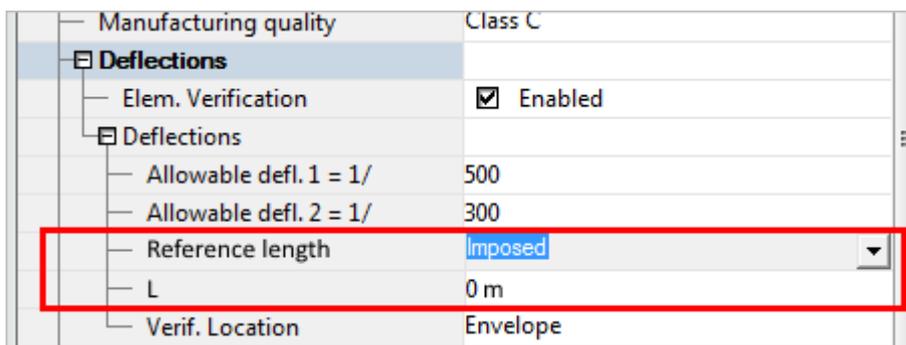
- Quick filtering options for parameters in Grid Control tables



Reference length for verification of deflection for steel linear elements

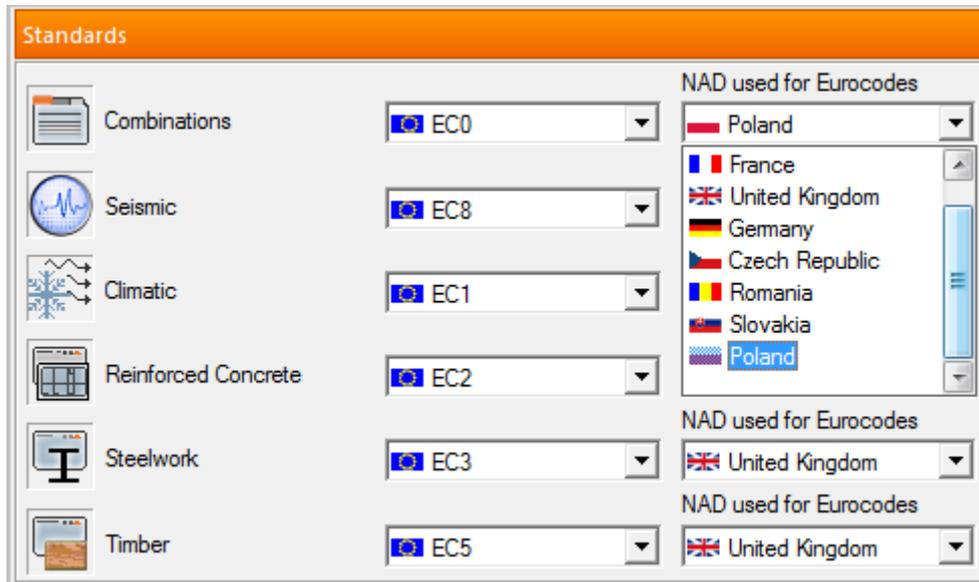
A new option is added to the properties list for steel linear elements allowing the reference length (L) to be manually adjusted before being used in the calculation of allowable deflection (L/100, L/200).

It has two options: *Auto* and *Imposed value*. When the default *Auto* value is selected, the L value is calculated automatically. When *Imposed value* is selected, the value of reference length for deflection 'L' becomes available to edit and it is then included in calculations.



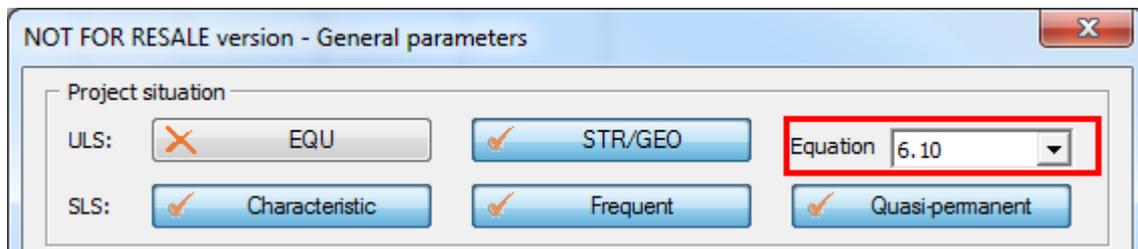
Polish National Appendix for Eurocode 0

The project configuration dialog now allows the selection of Polish National Appendix for Eurocode 0 (Load combinations).



Load combinations according to Eurocode 0 using equations (6.10a) and (6.10b)

Advance Design 2018 R2 can generate load combinations for STR/GEO according to Eurocode 0 (EC 1990) by using equations (6.10a) and (6.10b).



In the table A1.2 (B) (EC 1990, Annex 1) there are two choices: either equation 6.10 can be used or equations 6.10a and 6.10b. The method of choice depends on the national annex.

Persistent and transient design situations	Permanent actions		Leading variable action	Accompanying variable actions (*)	
	Unfavourable	Favourable		Main (if any)	Others
(Eq. 6.10)	$\gamma_{G,j,sup} G_{k,j,sup}$	$\gamma_{G,j,inf} G_{k,j,inf}$	$\gamma_{Q,i} Q_{k,i}$		$\gamma_{Q,i} \psi_{0,i} Q_{k,i}$

Persistent and transient design situations	Permanent actions		Leading variable action (*)	Accompanying variable actions (*)	
	Unfavourable	Favourable		Main	Others
(Eq. 6.10a)	$\chi_{G,j,sup} G_{k,j,sup}$	$\chi_{G,j,inf} G_{k,j,inf}$		$\chi_{Q,1} \psi_{0,1} Q_{k,1}$	$\chi_{Q,i} \psi_{0,i} Q_{k,i}$
(Eq. 6.10b)	$\xi \chi_{G,j,sup} G_{k,j,sup}$	$\chi_{G,j,inf} G_{k,j,inf}$	$\chi_{Q,1} Q_{k,1}$		$\chi_{Q,i} \psi_{0,i} Q_{k,i}$

Among all National Annexes to EC0 implemented to Advance Design 2018 R2, only the Polish National Annex recommends using equations 6.10a and 6.10b, while all other National Annexes recommend using equation 6.10. For this reason the choice between the standard method (according to formula 6.10) or the alternative (according to formulas 6.10a and 6.10b) is available only if:

- in the project configuration window, the Polish NAD to Eurocode 0 is set making the selection available on the *Combination options* for Simplified combinations and on the *General parameters* for Detailed combinations;
- in the project configuration window, the general Eurocode 0 is set (no NAD) making the selection available on the *General parameters* for Detailed combinations;

Note: For all National Annexes to Eurocode other than Polish or General, a standard method (according to formula 6.10) is used.

New coefficient for snow loads according to CR 1-1-3/2012 (Romania)

For the Romanian climatic code CR 1-1-3/2012, a new coefficient is available under the Snow Load Family properties: *Importance - Exposure Building Factor*.

Family	
Name	Snow CR1-1-3/2012
No	2
Snow category	
Combinations	
Color	
Situation of the project	
Parameters	
Typical value	A1
Snow load	1.50 kN/m ²
Exceptional snow load	3.00 kN/m ²
Exposure factor	Normal location
Thermal factor	1
Altitude	0.0 m
Importance-Exposure Buil...	Class III = 1.00

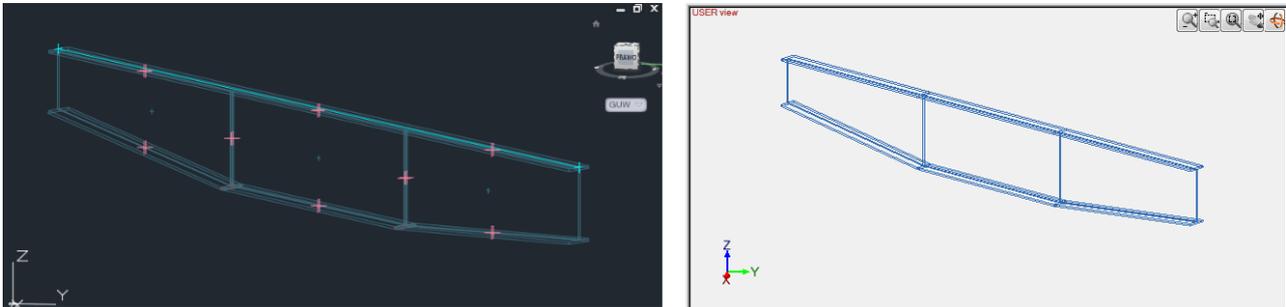
The value of this factor is multiplied by the other values inside the existing formula for the snow load, which affects the snow load on the windwall.

Exposure Building Factor can have one of the following values (available in a combo-list):

- Class I = 1.15
- Class II = 1.10
- Class III = 1.00 (default value)
- Class IV = 1.00

Improved transfer of tapered beams from Autodesk Advance Steel to Advance Design

Advance Design 2018 R2 allows better and more complete collaboration between Autodesk Advance Steel and Advance Design by introducing improvements to the import / export of geometry with variable tapered beams.



The tapered beams transferred from Advance Steel to Advance Design 2018 R2, using **.smlx** format, are created from parametric variable sections, each slope change meaning a new beam segment. The start/end beam heights are calculated in accordance with upper/lower flange fittings.

Advance Steel Tapered Beam

Segments

Section & Material

Flange

Flange special

Top flange bevels

Bottom flange ...

Web cuts

Segment welds

Splice welds

Welds special

Positioning

Naming

Fabrication data

User attributes

Upper flange from plates

Segment	Width at start	Parallel flanges	Width at end	Flange thickness
1	100.00	<input type="checkbox"/>	200.00	10.00
2	200.00	<input type="checkbox"/>	200.00	10.00
3	200.00	<input type="checkbox"/>	100.00	10.00

Lower flange from plates

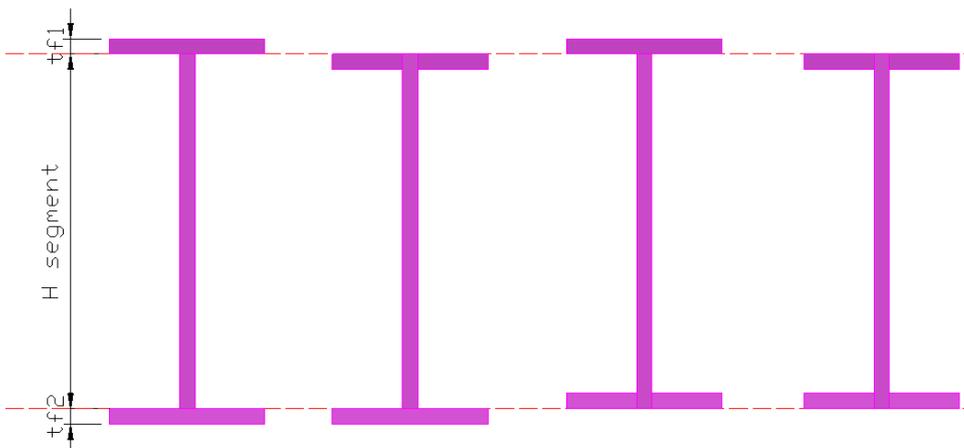
Segment	Width at start	Parallel flanges	Width at end	Flange thickness
1	100.00	<input type="checkbox"/>	200.00	10.00
2	200.00	<input type="checkbox"/>	200.00	10.00
3	200.00	<input type="checkbox"/>	100.00	10.00

Upper flange fitting upper plane

Lower flange fitting lower plane

Upper flange offset 0.00

Lower flange offset 0.00



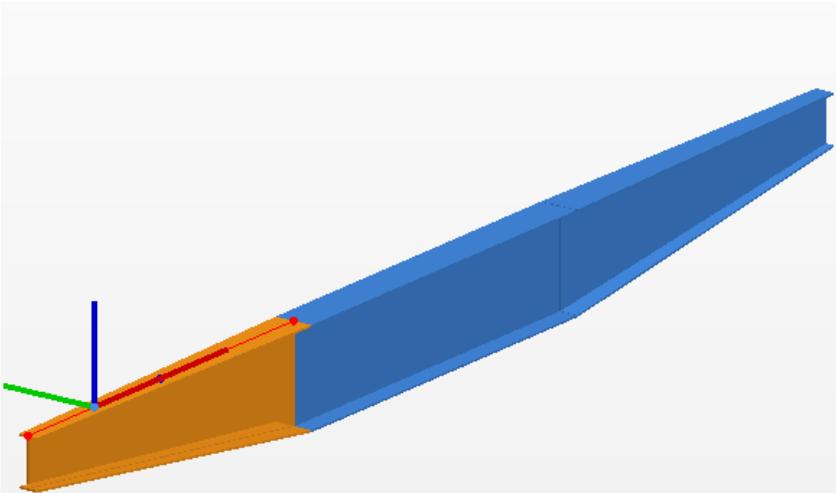
Centered / at top web / at bottom web element axis alignments are also taken into consideration for the transfer of tapered beams.

Advance Steel Tapered Beam

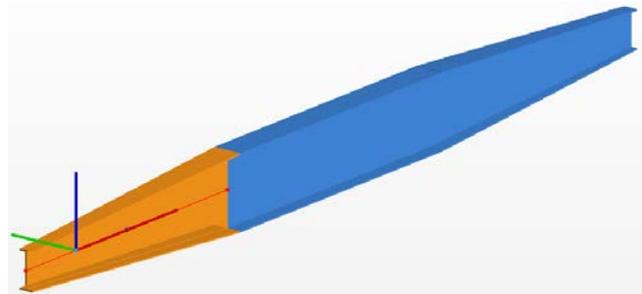
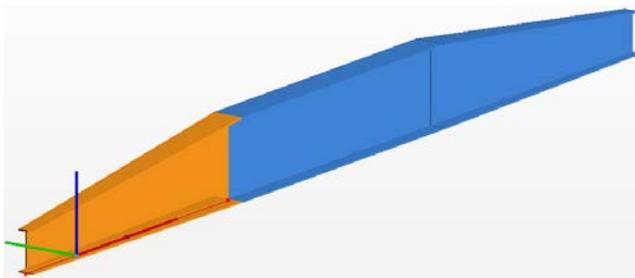
Segment	Length	Start height	End height	Web thickness	Fixed length
1	2000.00	250.00	500.00	10.00	<input type="checkbox"/>
2	2000.00	500.00	500.00	10.00	<input type="checkbox"/>
3	2000.00	500.00	250.00	10.00	<input type="checkbox"/>

Alignment
 top web
 centered
 top web
 bottom web

Web fitting
 Continuous web
 Create hollow box
 Gap

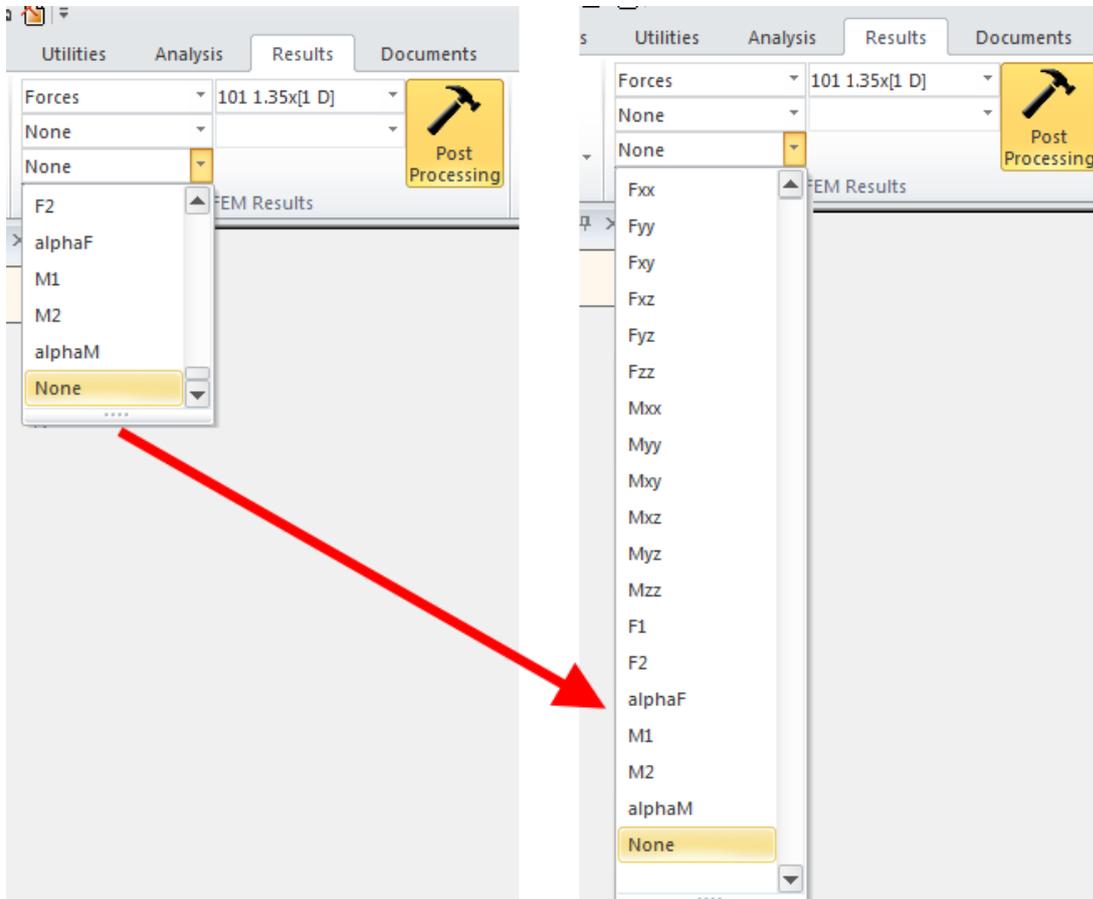


Cross section	
Extremity 1	I260*10+100*10
Extremity 2	I510*10+200*10
Eccentricity	
Option	(0,z-)
y1	0.00 m
y2	0.00 m
z1	0.00 m
z2	0.00 m
Considered for FEM	<input checked="" type="checkbox"/> Enabled
Concrete inertia type	Imposed value
Cracked section inertia coefficient	1.00
Haunches	
Haunch Start	
Haunch End	
Orientation	
Angle	0.00 °
Point	0



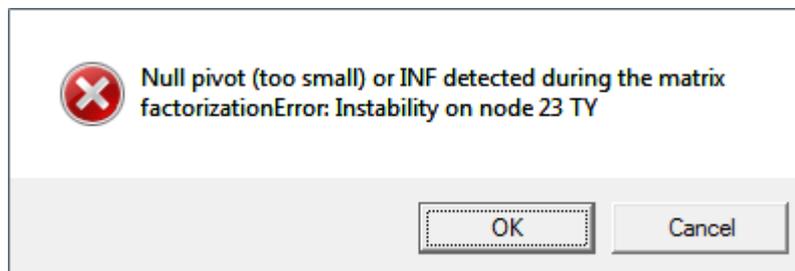
Lists of results expanded by default for the full length

An improvement to list-boxes with results was made available on ribbon *Results* (for FEM results and for RC/Steel/Timber design results). Lists can now expand by default for the full length, making it easier and faster to perform the desired selection.



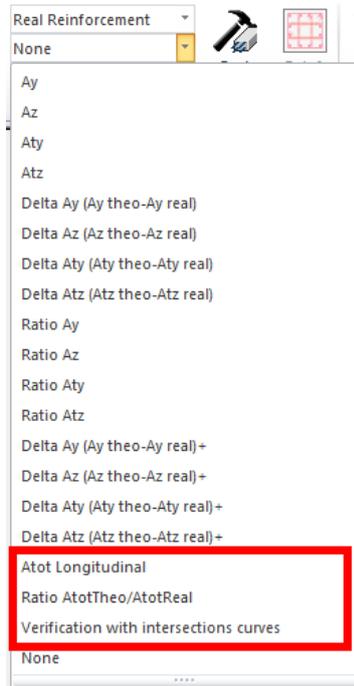
Ability to stop calculations when a warning is displayed

A new 'Cancel' button was added to stop further calculations if the absence of convergence for non-linear analysis is detected.



Entries for linear elements on the RC design results list

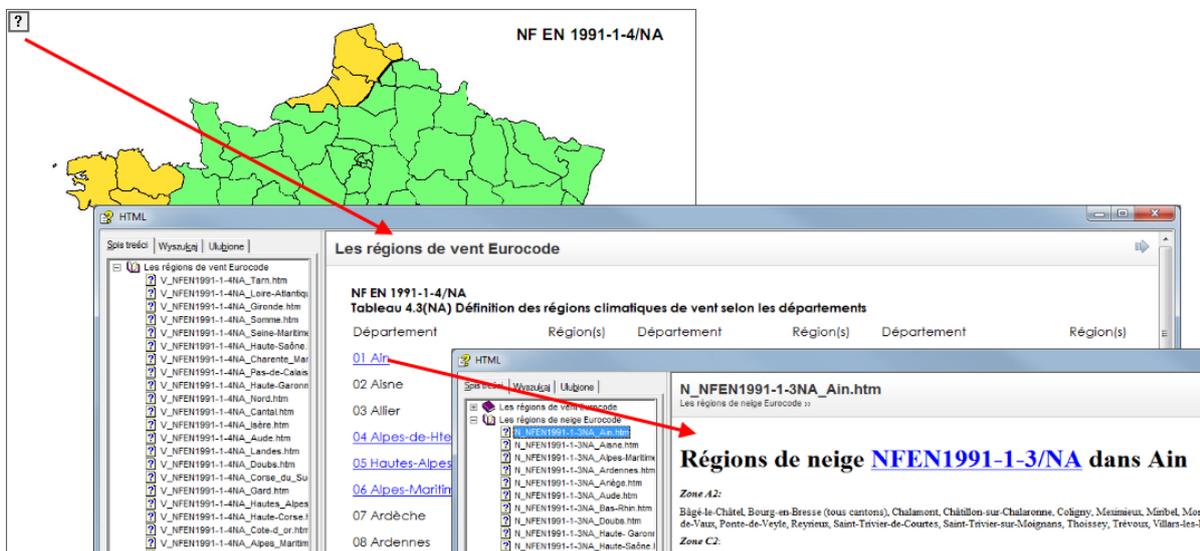
Three new items were added to the list of Real Reinforcement results for linear elements:



- **Atot Longitudinal:** total longitudinal reinforcement area for element. When it comes to columns, the value is equal to the sum of areas for all longitudinal bars.
- **Ratio AtotTheo/AtotReal:** the ratio of the total theoretical area to the total real area of longitudinal reinforcement for elements.
- **Verification of interaction curves:** the status of the columns verification with Interaction Curves. It provides information about which RC column passed (blue) / failed (red) the verification with interaction curves (if activated in Concrete calculation sequence).

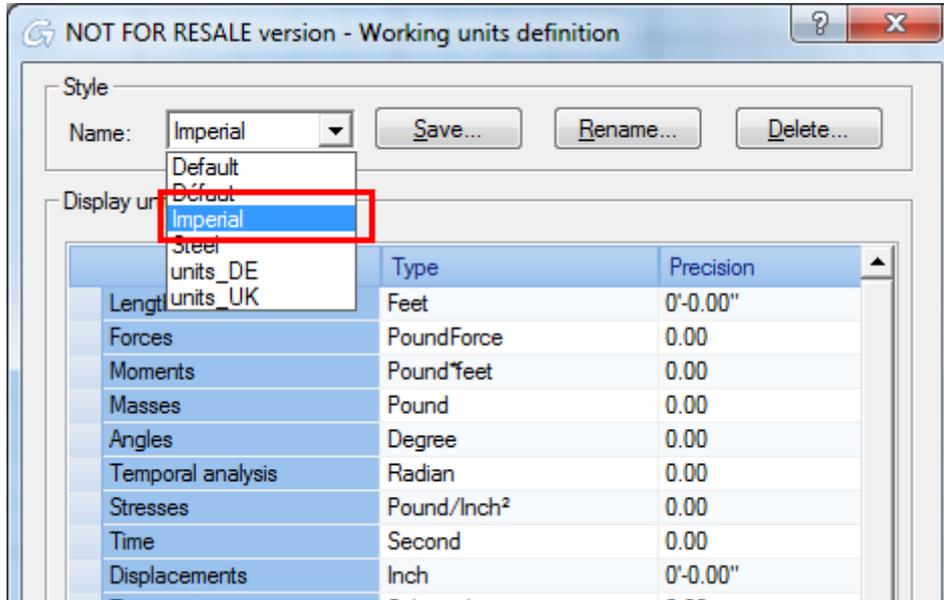
Additional information on climatic and seismic zones for France

If the selected National Annex to the EC1 (climatic loads) and EC8 (seismic loads) are set to France, then during the selection of a Region by using a map with regions (for Wind, Snow and Seismic load cases), an additional button is available on the upper left corner of maps. It allows to quickly display additional information about regions according to suitable French National Annex.



New template with Imperial units

The list of available templates for working units includes a new 'Imperial' entry.



Miscellaneous improvements & corrections

Advance Design 2018 R2 brings a number of improvements and corrections:

Improvements:

- Import of T sections to BIM Designers RC Beam module;
- Changes were introduced to the calculation of neutral axis in composed bending for determining cracks and deflections according to EC2;
- View of interaction curves for RC columns can be saved and featured in reports;
- The default color for supports is now different for each support type (Point/Linear/Planar);

Corrections:

- The diameter value of circular columns is correctly exported from Revit to Advance Design by using GTCX file format;
- Results for steel design under Buckling (ratio $L_{fy} / Elem. length$ and $L_{fz} / Elem. length$) are now correctly displayed;
- The geometry of steel elements used for defining steel connections in some cases can now be properly imported to the BIM Designers Steel Connection module;
- The Auto lintels command is available on rotated walls;
- Corrected a problem that occurred after splitting windwalls, causing changes in windwall geometry parameters, in some cases;
- A set of corrections was made to climatic loads generator according to Eurocode 1 (Snow and Wind).

