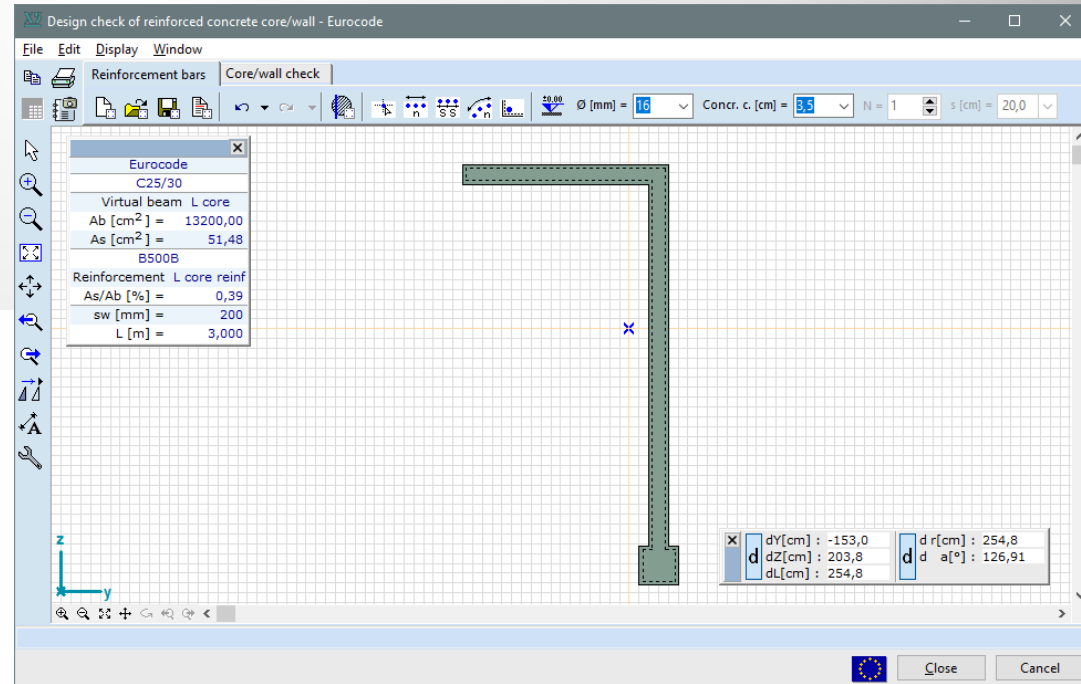
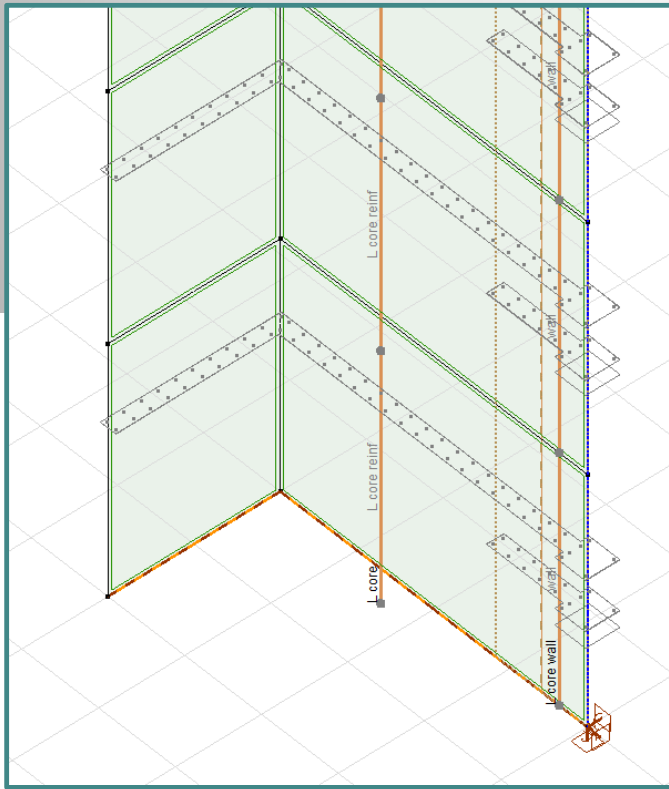
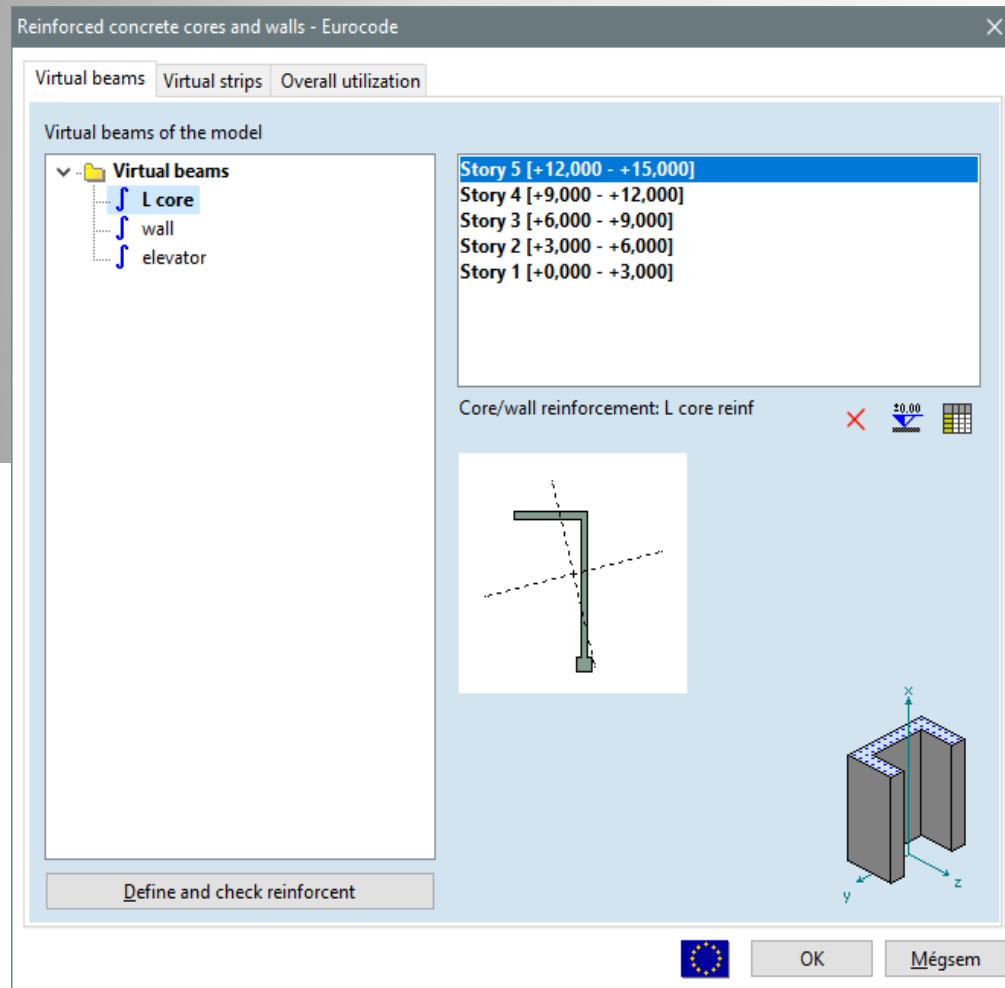


Design of reinforced concrete cores and walls in AxisVM X5



RC5 module

Reinforced concrete cores and walls

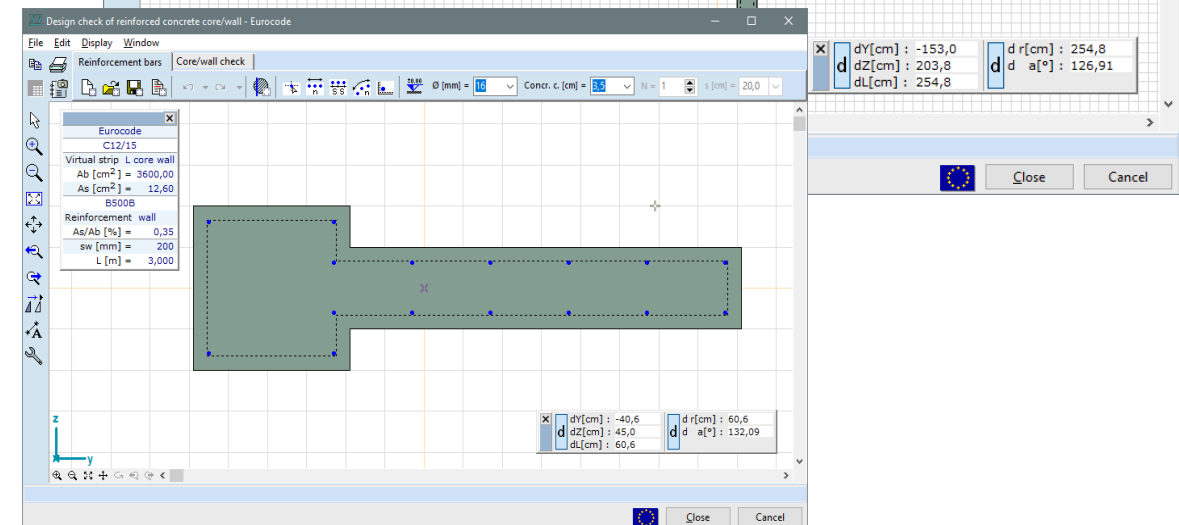
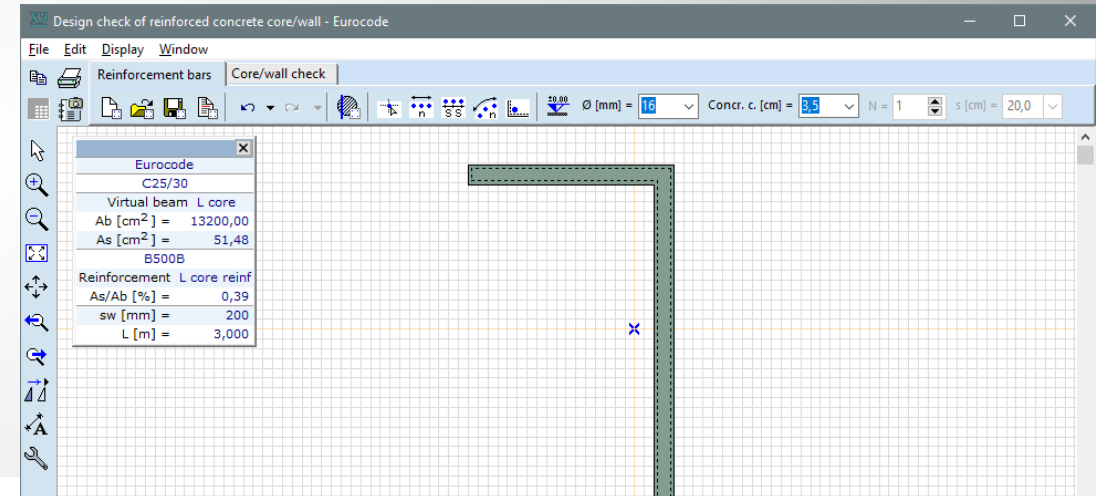


Reinforcement can be assigned to virtual beams and virtual strips:

- Virtual beams can be used to design reinforced concrete cores with the assumption that sections remain approximately plane before and after loading.
- Virtual strips can be used by the design check of wall ends or wall segments considering possible buckling failures of the wall between floors.

Defining reinforcement

- Parameters for reinforcement and actual reinforcement can be specified in the dialog (*Design check of reinforced concrete core/wall*) below.
- This dialog can be opened after clicking on *Define and check reinforcement* button on *Virtual beams* and *Virtual strips* tabs, respectively.
- On the page of *Reinforcement bars* the steel material, the concrete material, the out-of-plane buckling parameters (only in case of virtual strips) can be specified and longitudinal reinforcement with certain diameter can be placed in the cross section.



Design check

Design check of reinforced concrete core/wall - Eurocode

File Edit Display Window

Reinforcement bars Core/wall check

Critical Min,Max. N-M Surface N [kN] = 0 H = 1 V = 6,5

Eurocode

C25/30

Virtual beam elevator

Ab [cm²] = 25199,99

As [cm²] = 25,20

B500B

Reinforcement elevator

As/Ab [%] = 0,1

Warning: As < As,min [%]

sw [mm] = 200

L [m] = 3,000

Eurocode

Case : Linear,(Auto) Critical

$f_{se} = 1,000$

N [kN]	My [kNm]	Mz [kNm]
min/max		
-44192,88	80,48	-101,71
1049,54	1346,95	541,39
	min/max	
-16500,00	-25285,99	-8895,31
-25000,00	27733,46	8812,12
		min/max
-23500,00	-10546,49	-45394,00
-18500,00	7449,27	44911,24

C25/30

Cross-section elevator

Ab [cm²] = 25199,99

B500B

Reinforcement elevator

As/Ab [%] = 0,1

Warning: As < As,min [%]

Utilization(M-N)

$\eta(N = \text{const.}) = 0,324$

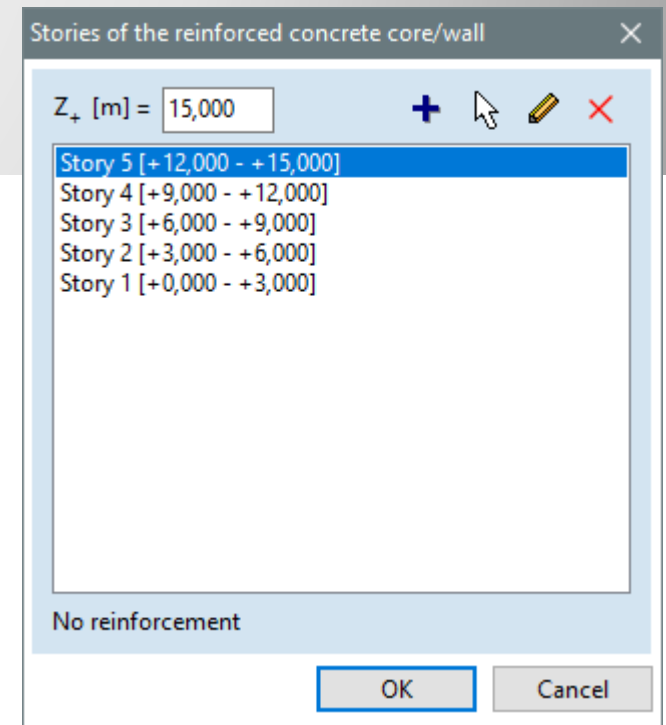
Close Cancel

After selecting *Core/wall check* tab, the program performs the verification against bending with or without axial force based on the cross-section properties and reinforcement parameters.

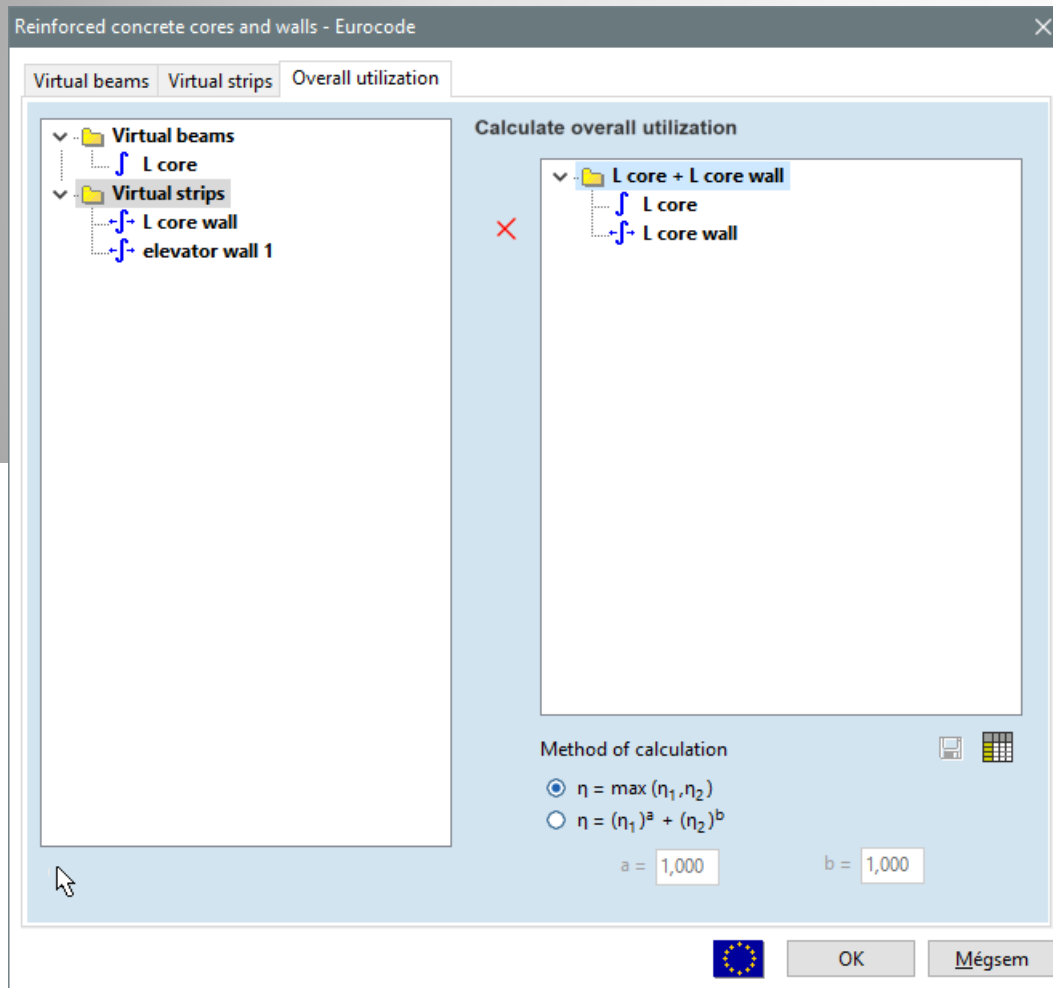
Storeys

Before definition of actual reinforcement, stories need to be assigned of the virtual beams/strips. Using stories, more economical and efficient reinforcement can be assigned to the virtual beam that follows the change in the internal forces.

A storey needs to have intersection with the axis of the selected virtual beam/strip. The software fills the list of stories with predefined model stories if there are any. The stories assigned to a virtual beam or strips does not necessarily need to be identical with the stories of the model.



Overall utilization



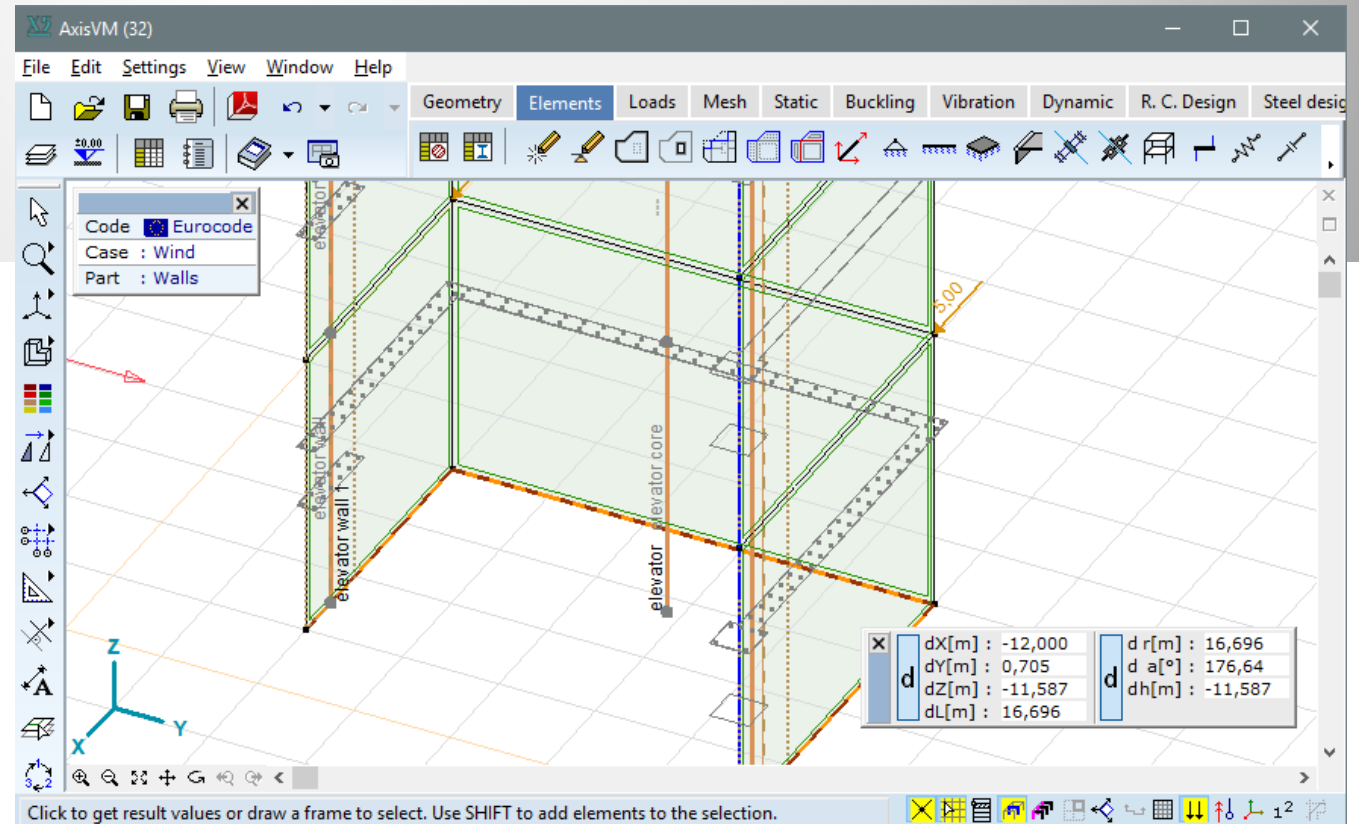
On the overall utilization tab, design results of reinforced concrete cores calculated with virtual beams and design results of wall ends/segments calculated with virtual strips can be summed. It may be necessary because the N_x - M_y - M_z strength interaction diagram of cores is generated without consideration the loss of stability of compressed wall ends and inner wall segments. The program supports the use of various summation rules as it can be seen in the following figure.

The combination rule to calculate utilization for the selected virtual beam – virtual strip pair can be defined below the list. The different combination rules are available:

1. $\eta = \max(\eta_1, \eta_2)$
2. $\eta = (\eta_1)^a + (\eta_2)^b$

Display

If stories and actual reinforcement are assigned to the virtual beam/strip, the cross section with reinforcement will be displayed together with circles on the axis of virtual beam/strip indicating the boundaries of the defined stories. The name of the actual reinforcement assigned to the storey is displayed close to the middle of the storey on the axis of the virtual beam/strip.



Design result tables – Virtual beam/strip

Design results [Linear,(Auto) Critical]

	C	min. max.	Loc. [m]	Nx [kN]	My _b [kNm]	Mz _b [kNm]	My _t [kNm]	Mz _t [kNm]	e ₀ b _y [mm]	e ₀ b _z [mm]	e ₀ t _y [mm]	e ₀ t _z [mm]	My _{min} [kNm]	My _{max} [kNm]	Mz _{min} [kNm]	Mz _{max} [kNm]	η (N = const.)	η (e = const.)
																	0,124	0,061
1	Nx	min	15,000	-267,22	-73,25	52,86	123,11	-106,97	197,8	274,1	-400,3	-460,7	-3699,16	5952,47	-2745,98	992,24	0,122	0,061
1	Nx	min	15,000	-266,71	-51,91	58,66	117,03	-108,59	219,9	194,6	-407,2	-438,8	-3698,36	5951,57	-2745,76	992,07	0,124	0,061
1	Nx	max	15,000	-166,94	-61,34	19,88	68,87	-51,76	119,1	367,4	-310,1	-412,5	-3539,51	5768,24	-2696,03	959,16	0,062	0,031
1	Nx	max	15,000	-166,10	-25,77	29,54	58,73	-54,47	177,9	155,1	-328,0	-353,6	-3538,17	5766,65	-2695,52	958,88	0,064	0,032
1	My _b	min	15,000	-193,36	-81,61	47,51	76,10	-73,65	245,7	422,1	-380,9	-393,6	-3581,57	5818,41	-2712,01	967,87	0,086	0,042
1	My _b	max	15,000	-223,90	-17,02	36,23	109,68	-89,09	161,8	76,0	-397,9	-489,9	-3630,20	5874,21	-2726,68	977,95	0,104	0,051
1	Mz _b	min	15,000	-166,94	-61,34	19,88	68,87	-51,76	119,1	367,4	-310,1	-412,5	-3539,51	5768,24	-2696,03	959,16	0,062	0,031
1	Mz _b	max	15,000	-266,71	-51,91	58,66	117,03	-108,59	219,9	194,6	-407,2	-438,8	-3698,36	5951,57	-2745,76	992,07	0,124	0,061
1	My _t	min	15,000	-166,10	-25,77	29,54	58,73	-54,47	177,9	155,1	-328,0	-353,6	-3538,17	5766,65	-2695,52	958,88	0,064	0,032
1	My _t	max	15,000	-250,92	-65,40	48,88	126,50	-106,32	194,8	260,7	-423,7	-504,2	-3673,22	5923,03	-2738,72	986,86	0,123	0,061
1	Mz _t	min	15,000	-266,71	-51,91	58,66	117,03	-108,59	219,9	194,6	-407,2	-438,8	-3698,36	5951,57	-2745,76	992,07	0,124	0,061
1	Mz _t	max	15,000	-166,94	-61,34	19,88	68,87	-51,76	119,1	367,4	-310,1	-412,5	-3539,51	5768,24	-2696,03	959,16	0,062	0,031

Hidden columns: C, min. max.

Design result tables – Overall utilization

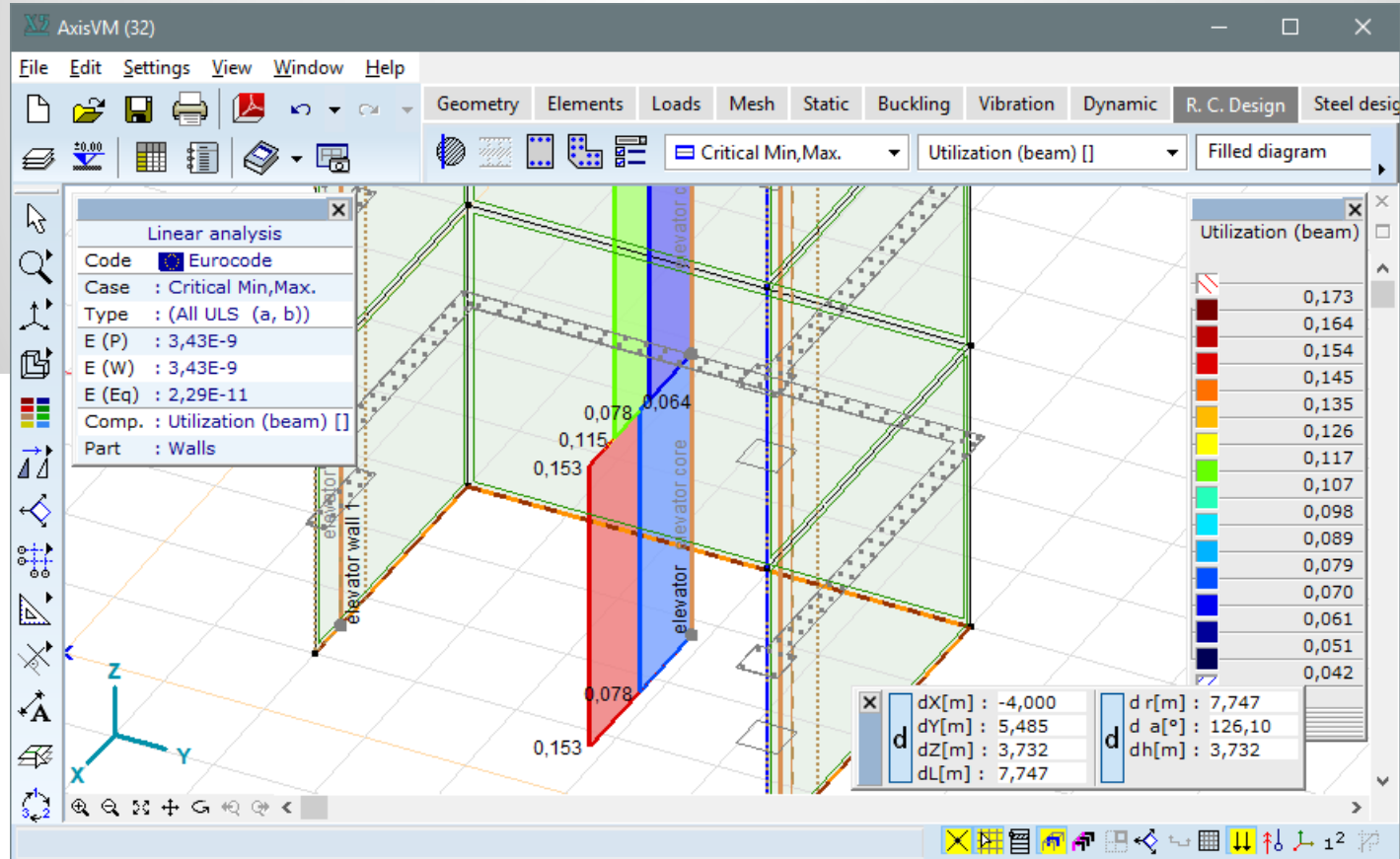
Design results [Linear,(Auto) Critical]

Stories	min. max.	Virtual beam	Virtual strip	η (Virtual beam)	η (Virtual strip)	η (Min)	η (Max)	Passed	Critical combination
1	min/max	L core	L core wall	0,070/0,173	0,100/0,207	0,100	0,207	yes	[G] {1,5*Q2}; [1,35*0,85*G] {1,5*... >
2	min/max	L core	L core wall	0,060/0,133	0,151/0,272	0,151	0,282	yes	[G] {1,5*Q3}; [1,35*G] {1,5*0,7*Q... >
3	min/max	L core	L core wall	0,047/0,090	0,148/0,289	0,148	0,289	yes	[G] {1,5*Q4} (1,5*0,7*Q1); [1,35*... >
4	min/max	L core	L core wall	0,042/0,076	0,153/0,305	0,153	0,310	yes	[G] {1,5*Q2}; [1,35*0,85*G] {1,5*... >
5	min/max	L core	L core wall	0,062/0,124	0,281/0,537	0,281	0,537	yes	[G]; [1,35*G] {1,5*0,7*Q1} (1,5*0,... >

Editing Extreme type

Hidden columns: min. max.

New result components





Inter-CAD Ltd. 2019

Further information...

Detailed description of RC5 module in the User's manual ([User's manual of AxisVM X5](#))

6.5.13. Design of reinforced concrete cores and walls – RC5 module

Do not hesitate to download the trial version of AxisVM X5 with 30 days license ([AxisVM X5 trial version](#)) and try our new modules!

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