RCDC (SACD) V23.0.3

Release Notes

RCDC V23.00.03 release consists of implementation of minor enhancements and priority bugs. A few enhancements in the recent release includes:

No	Module	Description
1	Column	Calculation of Curvature ductility factor used for the Ductile Columns of Euro codes.
2	Pilecap	Enhancement in Projection (offset) of pilecap from edge of pile.
3	Pilecap	Pile capacities are allowed up to two decimals.
4	General	Defects Resolved

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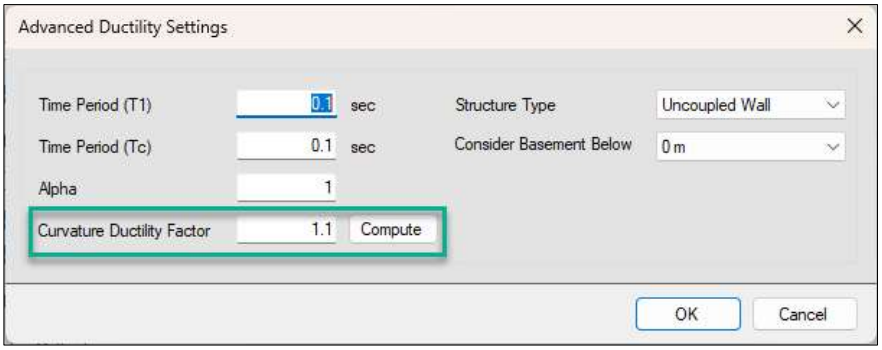
Column	Calculation of Curvature ductility factor used for the Ductile Columns of Euro codes

Curvature ductility factor (μϕ) is required to calculate the volumetric ratio of confining hoops for ductile (DCH frame) columns. In the earlier versions, RCDC was assuming the curvature ductility factors as '1.1'. Now, RCDC provides following two options to consider the curvature ductility factor.

- Compute curvature ductility factor based on the various inputs available on Advance Ductility Settings screen.
- User defined curvature ductility factor – Value calculated by program can be overridden by user.



Sample Design calculation Report:

Special confining reinforcement as per BS EN 1998-1:2004

Links at End Zone		
Criterion for spacing of End Zone links		
0.6 x Min. Longitudinal Bar dia X 20	=	384 mm
0.6 x Min. dimension of column	=	330 mm
0.6 x Max. Permissible	=	240 mm
Max. Permissible (User Input)	=	300 mm
Provided spacing, s	=	125 mm
Volume of confining hoops, Ash		
diameter of link		8 mm
dbl	=	32 mm
ωwd	=	(30 x μØ x Vd x εsyd x (bc/bo) - 0.035) / α
	=	0.08
α=αn x αs	=	0.7486
αn	=	0.9663
αs	=	0.7748
bc	=	550 mm
hc	=	700 mm
bo	=	458 mm
ho=Do		608
bi	=	125 mm
T1	=	0.1 sec
Tc	=	0.1 sec
Structure Type	=	Uncoupled Wall
Alpha	=	1
qo	=	4
μφ	=	1.1
Ned	=	1939.303 kN
Vd	=	Ned /(Ac x fcd)
	=	0.3022
εsyd	=	0.0025
Ash1, Volume Of confining link per m	=	1222.22 sqmm/m

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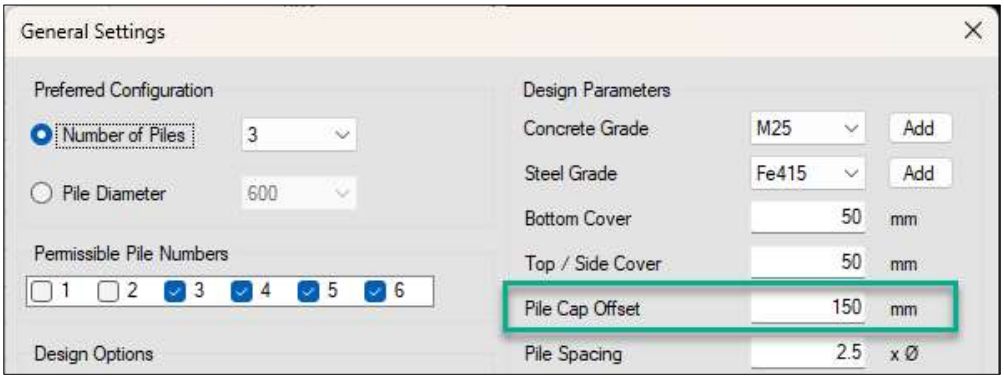
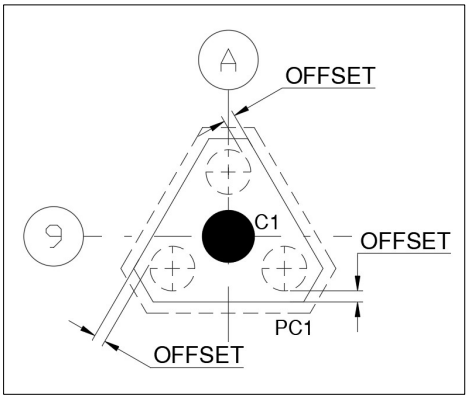
Pilecap — Enhancement in Projection (offset) of pilecap from edge of pile

The projection (offset)of pilecap from edge of pile is required to identify the pilecap size. Input for the same is available in the program on General Settings screen.



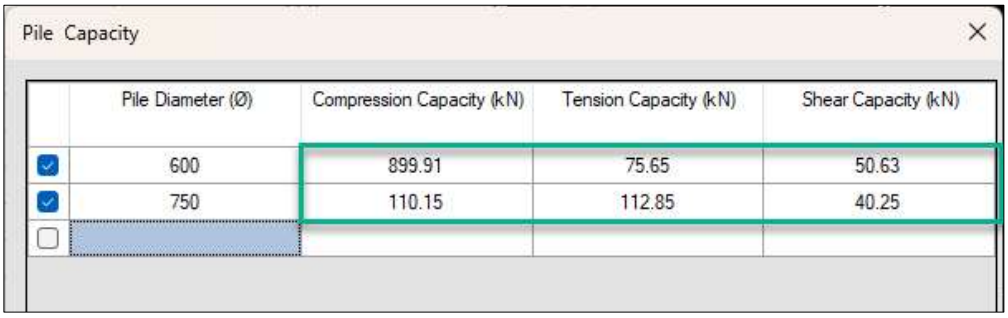
Sketch showing the pilecap offset:



In the earlier versions of RCDC, the maximum value allowed for pilecap offset was 300 mm/12 in . From this version the maximum value of 2000 mm/75 in is allowed for pilecap offset.

Pilecap — Pile capacities Values

In the earlier versions of RCDC values of compression, Tension and shear capacities of piles were allowed without decimals. Now these capacities are allowed to provide up to two decimals so that user can provide more accurate pile capacities for the pilecap design.



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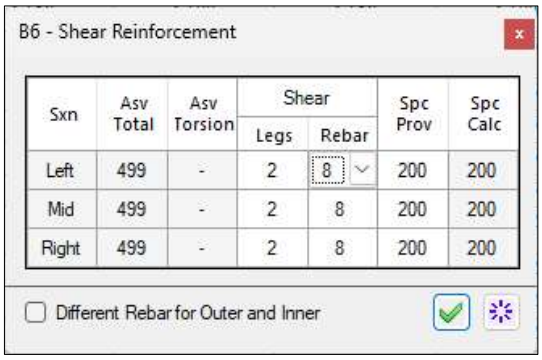
General Defects Resolved

Following is the list of Defects resolved in this release.

- **ADO ID – 615566 – Beam Design - Stirrups spacing is not updated when diameter is changed on redesign screen.**

  Issue:

  In the beam design, the area of shear reinforcement provided is calculated as per the stirrup's rebar diameter and its spacing. If the diameter is increased, the spacing can be increased by the program up to maximum spacing specified in the design code. There was issue identified if the diameter increased, program was not calculating the revised spacing . A snap of redesign stirrups screen is attached for reference.



  Solution:

  Now, if the stirrups rebar diameter or legs are changed, program recalculates the spacing as per design and detailing requirements.

- **ADO ID – 877512 – Design Calculation report enhancement if Ductile Shear wall is designed without Boundary element.**

  Issue:

  RCDC allows user to design ductile shear wall with and without boundary element check. When ductile shear wall is designed without boundary element, design and detailing criteria of boundary element is not applicable to wall.

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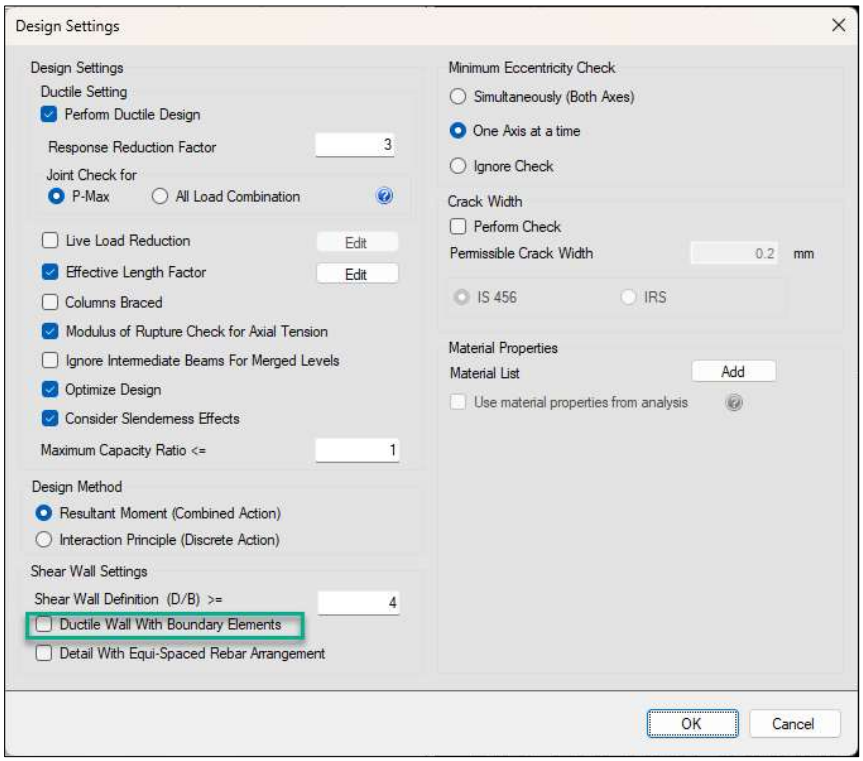

RCDC performs the ductile link qualification based on the maximum compressive stress in the wall due to axial force and bending moment. If the axial stress is more than the permissible limit, the ductile links are provided in the wall else Non-ductile links are provided.

This check related to links was performed by the program in the design. However, it was not presented in the design calculation report.

Solution:

This check is now added to design calculation report. Snap from the design calculation is added for reference.

Check For Requirement Of Ductile Links

Check For Maximum Compressive Stress

Having maxstress in between level's (4.2 m - 16.258 m)

At level (4.2 m)

Load Combination	=	[6] : 1.5 (LOAD 1: LOAD CASE 1) +1.5 (LOAD 3: LOAD CASE 3 EQ-X)
Maximum Stress	=	9.53
0.2 x Fck	=	5

Maximum Stress in Wall > 0.2 x Fck

Hence Ductile links are applicable

At level (16.258 m)

Load Combination	=	[6] : 1.5 (LOAD 1: LOAD CASE 1) +1.5 (LOAD 3: LOAD CASE 3 EQ-X)
Maximum Stress	=	3.65
0.15 x Fck	=	3.75

Maximum Stress in Wall < 0.15 x Fck

Hence Ductile links are not applicable

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- **ADO ID – 1046500 – Beam - Issue in generating design summary report.**
  Issue:
  RCDC was unable to generate a design summary report even if all beams were passing in the design. This was a file specific issue where user had executed few steps to modify the beam continuity to design beams. There was a problem in saving modified beam continuum data which was causing this issue.

  Solution:
  Whenever user is modifying the beam continuum data, correct data is saved by the program. This issue is resolved now and design summary report can be generated without any error.

- **ADO ID – 1271074 – Crash occurred while performing footing redesign function.**
  Issue:
  While performing redesign function for the footing, software was crashing. Due to crashing user was unable to perform the design of the footing with updated design parameters. There was an issue of not saving the Side face reinforcement data causing crashing of software. This issue was occurring only if user has selected to provide side face reinforcement in the footing design.

  Solution:
  Issue related to saving side face reinforcement data is resolved, redesign steps can be performed with updated parameters without any issue.

- **ADO ID – 1243676 – Footing design – sliding check report presentation issue.**
  Issue:
  There are three types of stability checks performed in the RCDC. i.e. sliding, overturning and buoyancy check. Separate set of load combinations can be assigned for each stability check.
  For Sliding check, all load combinations are considered however, incorrect load combination was presented in the design calculation report. This issue occurred when one or more the load combinations selected for the sliding check which has the zero-horizontal force. i.e. Fy and Fz are zero.

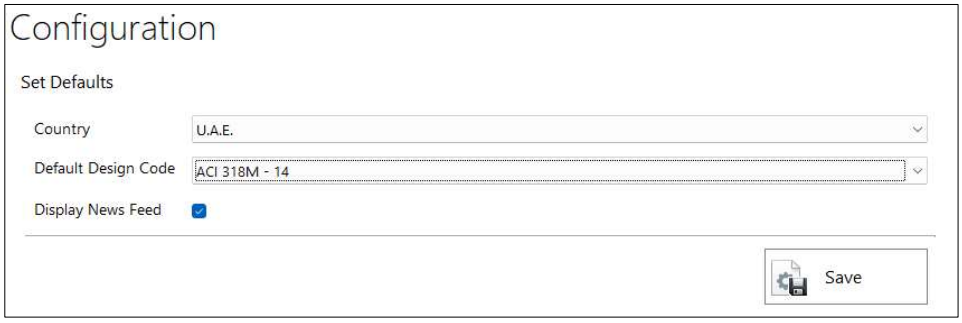
  Solution:
  As it was only the presentation issue, now the load combination which is critical for sliding check is presented in the design calculation report.

- **ADO ID – 1245630 – Column - Error performing Shear joint check in design.**
  Issue:
  It was observed that few ductile columns were failing in the joint shear check. These columns should have been passed in the design as the shear capacity of the cross

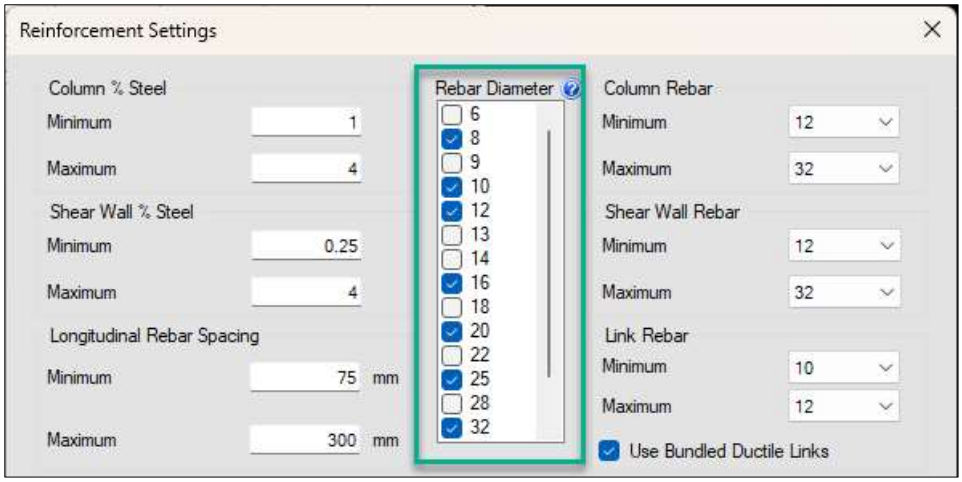
section of the column was higher than the shear demand. The reason for the issue was the incorrect design data passed for the joint check design. As incorrect data passed, the columns were showing failure in joint shear check.

Solution:
Issue related to passing correct design data to perform joint shear check is resolved now. The column joint checks can be performed without any errors.

- **ADO ID – 1313072 – Software crash on Reinforcement settings screen.**
  Issue:
  RCDC allows to configure the country and design code for design.



When country is selected as UAE and design code as ACI, RCDC by-default allows user to provide rebar diameter list instead of rebar numbers. Refer reinforcement settings snap below,



If user selects the country as UAE and ACI code, software was showing error on the reinforcement settings screen. This issue occurred due to conflict in the rebar diameter list used if country is selected as UAE.

Solution:
Issue related to rebar configuration for country as UAE has been resolved. There are no errors on the reinforcement screen now.

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- **ADO ID – 1322517 – Footing - The offset dimensions are marked from the column center instead of the column face.**

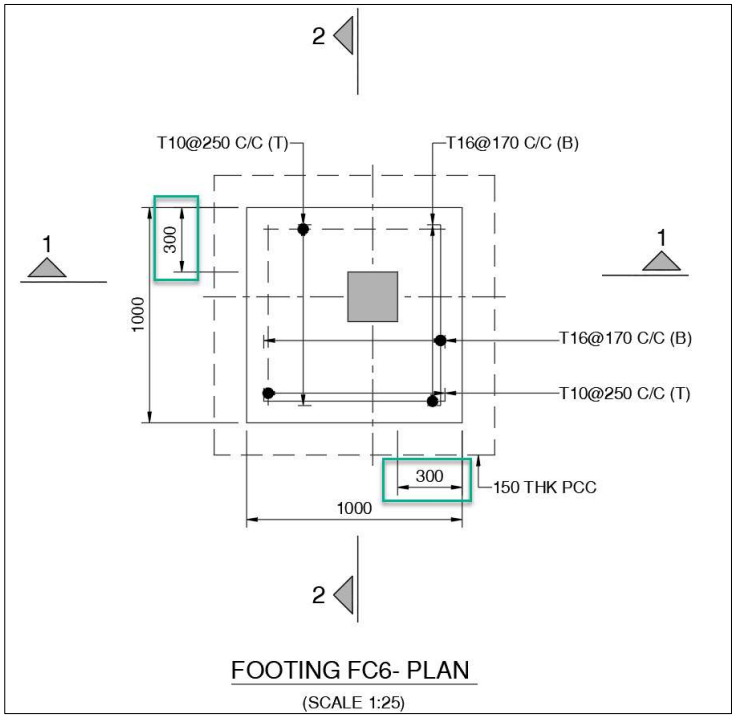
  Issue:

  Eccentric footing can be designed in RCDC. Eccentricity is considered between center of the column and center of the footing. The eccentricity can be achieved in RCDC by providing maximum allowable offsets from column face.

  On the detailed drawing, the offsets which are provided by user should be marked in the same manner as inputs are provided. i.e. from column face. However, the offsets were marked from the column center instead of column face on the detailed drawing.

  Solution:

  Footing plan drawing has been updated with correct demarcation of the offset values. Corrected sample drawing is added for reference.



- **ADO ID – 1325202 –Beam with varying (stepped) depth in analysis file - RCDC shows different depth in input and output.**

  Issue:

  If a single beam is assigned with two different depths in the analysis file, RCDC considers the lowest depth for the design of beam. Different depth of the beam is identified from analysis when beam is defined as tapered or stepped section. In the earlier version of RCDC if beam with different depth was available from

analysis, depth shown on the input screen and used for the design of beams were different.

Solution:
Now the correct (lower) depth shown on the input screen and same depth is used for the beam design and presented in all outputs.

- **ADO ID – 1325215 – Column Joint check design – incorrect beam location considered after performing Update design function.**
  Issue:
  In the column beam joint check, beam location with respect to column local axis plays an important role to calculate the flexural demand. As per the beam location, flexural demand is calculated along that axis of the column. When a new file is created, joint check is performed with correct beam locations. If user performs the Update design function with the revised analysis file, incorrect beam locations were considered. This was causing issue in the joint check as beam position data was incorrect. This issue occurred due to duplicate data being stored. This issue existing only if user used the update design function.

  Solution:
  Now, when update design function is used program has removed the old data related to beam position and used the updated position of the beam as per the revised analysis file to perform column beam joint check.

- **ADO ID – 1325544 – Gravity Column design – Issue in calculating additional design moment and shear for displacement compatibility.**
  Issue:
  Gravity columns are evaluated for gravity load combinations whichever is critical with the design displacement 'Δ' due to lateral loads. Additional moment and shear due to displacement compatibility are calculated to design the gravity column. The column flexural and shear capacity should be more than the forces calculated for displacement compatibility and gravity load combinations. In the process of calculating additional moment and shear, correct displacement values were not considered. This issue was existing in American design codes only.

  Solution:
  Now, the correct displacement 'Δ' values are considered to calculate additional moment and shear forces. Snap from the all load combination report is added for reference.

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Gravity Load Combination :

Member	LOC	L/C	Pu	Analysis		Storey Drift		Addtional Moment		Design			Mcap	Capacity Ratio
				Mx	My	Δx	Δy	Mx	My	Mux	Muy	MuRes		
			(kN)	(kNm)	(kNm)	(mm)	(mm)	(kNm)	(kNm)	(kNm)	(kNm)	(kNm)	(kNm)	
601	BOT	14(a)	3956.3	-27.39	-17.81	1.02	-	12.11	0.03	-15.28	-17.78	23.45	463.2	0.05
601	TOP	14(a)	3879.09	7.45	28.44	1.02	-	11.87	0.03	19.32	28.47	34.4	475.64	0.07
601	BOT	15(a)	3956.3	-15.35	-27.65	-	0.83	0.07	9.86	-15.28	-17.78	23.45	463.2	0.05
601	TOP	15(a)	3879.09	19.25	18.8	-	0.83	0.07	9.67	19.32	28.47	34.4	475.64	0.07
601	BOT	16(a)	3956.3	-3.18	-17.76	1.02	-	-12.11	-0.03	-15.28	-17.78	23.45	463.2	0.05
601	TOP	16(a)	3879.09	31.19	28.49	1.02	-	-11.87	-0.03	19.32	28.47	34.4	475.64	0.07
601	BOT	17(a)	3956.3	-15.21	-7.92	-	0.83	-0.07	-9.86	-15.28	-17.78	23.45	463.2	0.05
601	TOP	17(a)	3879.09	19.39	38.14	-	0.83	-0.07	-9.67	19.32	28.47	34.4	475.64	0.07