RCDC (SACD) V2023

Release Notes

RCDC V2023 is herewith now available with the following new features and design capabilities. The newly introduced features are:

No	Module	Description
1	Beam	Beam Crack-width check for corner Rebar - at the corner and side face of the beam – Indian code
2	Beam	Beam flexural calculation enhancement – ACI and NSCP codes
3	Column	AS 3600:2018 – New check added for Minimum percentage reinforcement for the column based on axial load
4	General	Addition of 6 & 9 mm rebars for Column and Beam design in ACI (metric) and NSCP codes
5	General	Load Type reading for load cases from STAAD
6	General	Enhancements
7	General	Defects Resolved

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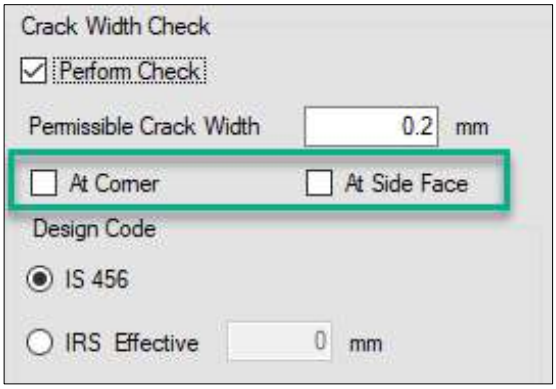
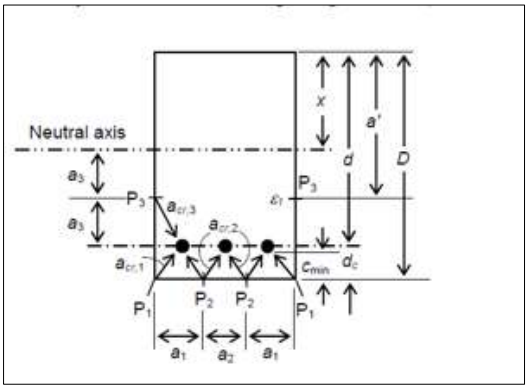
Beam — **Beam Crack-width check for corner Rebar - at the corner and side face of the beam – Indian code**

For the beam design, RCDC was performing the crack-width check at the bottom or top edge (P2 location in the image below). RCDC will now also consider the corner rebar for which crack width is performed at the corner (P1) and side face (P3) of the beam. The choice is given to the user to perform the crack-width check at these new locations.





Typical Beam Cross Section

Location,

P1 = At Corner

P2 = At Edge (Existing - default check)

P3 = At side face

Snap from Design calculation report:

Crack width as per IS 456 : 2000 + IS 13920 : 2016

	Beam Bottom			Beam Top		
	Left	Mid	Right	Left	Mid	Right
Critical L/C - RCDC	10002	10002	10002	10003	-	10002
BM (Unfactored) (kNm)	119.2	754.52	119.2	421.57	0	729.95
Reinf. In 1st layer	4-T32	4-T32	4-T32	4-T32		4-T32
sp (mm)	122.7	122.7	122.7	122.7		122.7
AstPrv (sqmm)	3217	6434	3217	3217		5180.48
Xact (mm)	272.4	351.5	272.4	272.4		325.6
Icr (mm^4)	10921508631	17453563368	10921508631	10921508631		15183426238
Check for Stress in Concrete						
σ_{cbc} (N/sqmm)	2.97	8.5	2.97	8.5		8.5
$\sigma_{cbc(Actual)}$ (N/sqmm)	8.5	8.5	8.5	8.5		8.5
Check for Stress in Reinforcement						
Fst (N/sqmm)	56.64	186.79	56.64	200.31		221.39
FstPerm (N/sqmm)	228.25	228.25	228.25	228.25		228.25
Crack Width Check						
Location Edge (Bottom/Top)						
acr (mm)	57.78	57.78	57.78	57.78		57.78
Epsilon-deff, ε1	0.000316	0.001064	0.000316	0.001118		0.001252
Epsilon-m, εm	0.000179	0.001005	0.000179	0.000981		0.001174
Wcr (mm)	0.0276	0.152	0.0276	0.1512		0.1788
WcrPerm (mm)	0.2	0.2	0.2	0.2		0.2
Location Corner (Bottom/Top)						
acr (mm)	41.98	41.98	41.98	41.98		41.98
Wcr (mm)	0.0212	0.1177	0.0212	0.1161		0.138
WcrPerm (mm)	0.2	0.2	0.2	0.2		0.2
Location Side Face						
acr (mm)	223.83	184.98	223.83	223.83		197.66
Epsilon-deff, ε1	0.000142	0.000467	0.000142	0.000501		0.000553
Epsilon-m, εm	0.00008	0.000441	0.00008	0.000439		0.000519
Wcr (mm)	0.0307	0.1428	0.0307	0.1682		0.1782
WcrPerm (mm)	0.2	0.2	0.2	0.2		0.2

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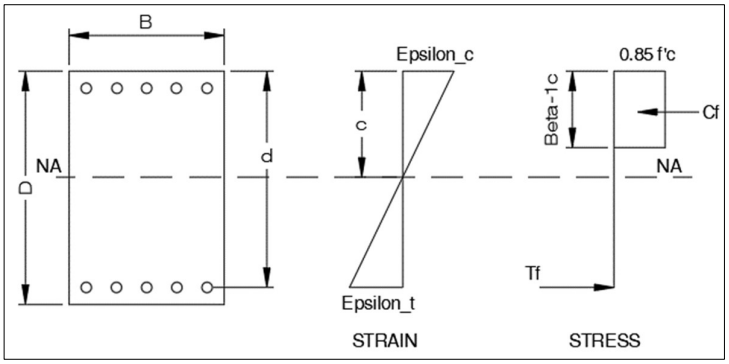
If the user selects to perform the crack-width, RCDC will by default perform the crack-width check at the bottom/top edge (P2) of the beam.
Crack-width as per IS 456-2000 and IRS would be performed at all three locations. RCDC will present the critical load combination which gives the maximum crack width from all these three locations.
This is applicable to the Indian code only.

Beam	Beam flexural calculation enhancement – ACI and NSCP codes

The maximum permissible percentage reinforcement in the beam module is now restricted as per the requirements of the tension-controlled section. The maximum percentage reinforcement is calculated as per the minimum tension-controlled strain limits given in the ACI and NSCP design codes. If the percentage reinforcement required for the flexural design is more than the user-defined maximum percentage reinforcement and percentage reinforcement calculated for the tension-controlled section, then the section is qualified as failed as the required % reinforcement exceeds the permissible % reinforcement.
Stress-Strain Diagram:



Where,
For ACI 318-2011 & 2014 (Metric & English)code,
Epsilon_c = εcu= 0.003, Strain in the concrete
εt >= 0.005 , strain in the reinforcement (for tension-controlled section)

For ACI 318-2019 (Metric & English) code,
Epsilon_c = εcu= 0.003, Strain in the concrete
εt >= εty + 0.003, strain in the reinforcement (for tension-controlled section)
εty = fy / Es
f'c = Specified compressive strength of concrete
fy = Specified yield strength of reinforcement
Es = Modulus of elasticity of reinforcement

Using the Strain Diagram, the Calculation of maximum % reinforcement (ρ)

$$\frac{\varepsilon cu}{c} = \frac{\varepsilon t}{d-c}$$

$$\varepsilon t = \varepsilon cu \frac{d-c}{c}$$

$$\varepsilon t = \frac{\varepsilon cu * d - \varepsilon cu * c}{c}$$

$$\varepsilon t = \varepsilon cu * \frac{d}{c} - \varepsilon cu$$

$$\varepsilon t + \varepsilon cu = \varepsilon cu * \frac{d}{c}$$

$$\frac{c}{d} = \frac{\varepsilon cu}{\varepsilon t + \varepsilon cu}$$ Equation-1

Using Stress Diagram,

compressive force = Tension force

$0.85 \times f'c \times \beta 1 \times c \times B = Fy \times Ast$

$0.85 \times f'c \times \beta 1 \times c \times B = Fy \times \rho \times B \times d$ where, $Ast = \rho \times B \times d$

$$\rho = \frac{0.85 \times f'c \times \beta 1 \times B \times c}{fy \times B \times d}$$ Equation-2

Using Equation-1

$$\rho = \frac{0.85 \times f'c \times \beta 1}{fy} * \left(\frac{\varepsilon cu}{\varepsilon t + \varepsilon cu}\right)$$

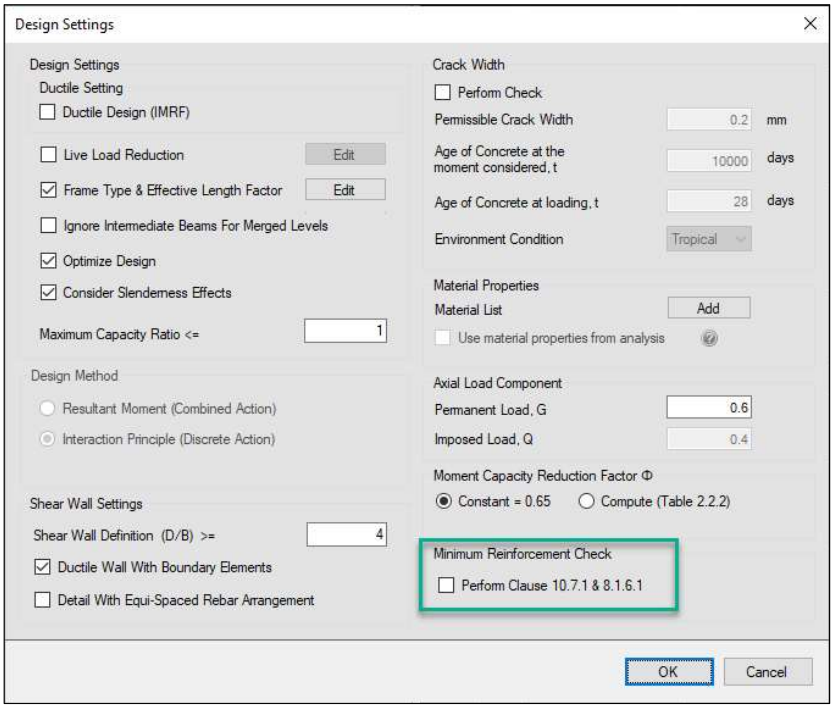
The % reinforcement (ρ) provided in the section should not exceed the above limit to make sure that the section is tension-controlled.

Column	AS 3600:2018 – New check added for Minimum percentage reinforcement for the column based on axial load

Presently, RCDC maintains the minimum percentage of longitudinal reinforcement as per the user-defined percentage value given on the design setting screen. A new check is now available to provide the minimum percentage of longitudinal reinforcement as per clauses 10.7.1 (a) and 8.1.6.1 of AS 3600:2018. After selecting a new check, the minimum percentage of longitudinal reinforcement is calculated for the maximum of the following,

1. Pt defined by the user.
2. Pt calculated as per clauses 10.7.1 (a) or 8.1.6.1.

If the axial load on the column is more than the value 0.1*f'c*Ag where f'c is the characteristic compressive strength of concrete and Ag is the gross cross-section area of the column, the minimum area of longitudinal reinforcement is calculated as per clause 10.7.1 (a). In the other case, the minimum area of longitudinal reinforcement is calculated as per clause 8.1.6.1



If the above check is selected, the minimum percentage (Pt) of longitudinal reinforcement would be a maximum of,

1. User-defined Pt on reinforcement setting screen
2. Pt calculated as per clauses 10.7.1 (a)and 8.1.6.1

If clause 10.7.1 (a) is applicable, the area of reinforcement is calculated as follows,

Ast = 0.15 N* / fsy

Where,

Ast = Minimum area of longitudinal reinforcement in sqmm.

N* = Maximum axial compressive force in all load combinations in N.

fsy = Characteristic strength of reinforcement (Longitudinal) in N/sqmm.

RCDC Output:

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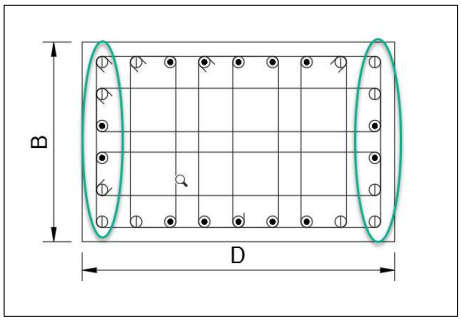
Minimum % Reinforcement (Pt) Calculation

Load Combination	=	[8] : (LOAD 1: LOAD CASE 1) +0.6 (LOAD 2: LOAD CASE 2) -(LOAD 4: LOAD CASE 4 EQ-Y)
N*max (all Combinations)	=	749.78 kN
Gross section area of column, Ag	=	350000 sqmm
0.1 f'c Ag	=	700 kN
		N*max > 0.1 f'c Ag
Pt required for N*max	=	0.06 %
Pt min (User Defined)	=	0.2 %
Minimum Pt required	=	Max(Pt Required for N*max , Pt min (User Defined))
	=	0.2 %
Pt Provided	=	2.25 %
		Hence, OK

If clause 8.1.6.1 is applicable, the minimum percentage reinforcement is checked on all tension sides in the column, independently.
The minimum area of reinforcement on each edge is calculated with the formula,
Along D (Edge B),
Ast = [αb (D/d)2 f'ct,f/fsy]Bd ……..8.1.6.1 (2)
Along B (Edge D)
Ast = [αb (B/b)2 f'ct,f/fsy]Db ……..8.1.6.1 (2)
Where,
Ast = Minimum area of longitudinal reinforcement in sqmm.
αb = Constant as per Clause 8.1.6.1.
D = Depth of the section in mm.
B = Width of the section in mm.
d = Effective depth at tension face in mm.
b = Effective width at tension face in mm.
f'ct,f = Uniaxial tensile strength of the concrete in N/sqmm.
fsy = Characteristic strength of reinforcement (Longitudinal Reinforcement).

Example:
For a rectangular column, the minimum area of reinforcement is checked on all edges, independently.
Along D (on edge B)



Reinforcement provided on edge B as marked above is calculated using the formula,
Ast = [αb (D/d)2 f'ct,f/fsy]bd

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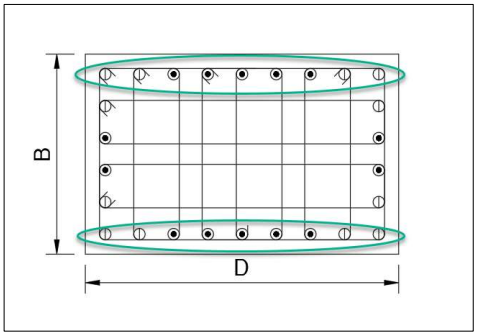
Along B (on edge D)



Reinforcement provided on edge D as marked above is calculated using the formula, Ast = [αb (B/b)2 f'ct,f/fsy]Db

RCDC Output:

Check for Minimum pt	Along D (Edge B)	Along B (Edge D)
Effective depth (d, b) (mm)	640	340
Minimum Reinforcement Required (sqmm)	αb x (D/d)^2 x fct f / fsy x B x d	αb x (B/b)^2 x fct f / fsy x D X b
	328.3	353.13
Reinforcement Provided Along Edge	4-N28	4-N28 + 2-N24
Area of Reinforcement Provided Along Edge (sqmm)	2463	3367.76

Check for total % Reinforcement (pt)

Pt min (User Defined)	=	0.2	%
Pt Provided	=	3.29	%
		Hence, OK	

For more details, please refer to the topic "Column Minimum Pt as per clauses 10.7.1 (a) and 8.1.6.1" under AS 3600:2018 code of RCDC help content.

General — Addition of 6 & 9 mm rebars for Column and Beam design in ACI (metric) and NSCP codes

New 6 and 9 mm rebars are now available in the column and beam modules of ACI Metric and NSCP design code. The purpose of adding 6 and 9 mm rebars is to optimize the quantity of the shear reinforcement using lesser rebar diameters. New diameters are available only if the user selects the Rebar diameter option on the reinforcement settings screen.

It is recommended to use 6 and 9mm rebars for the link and shear rebar. For the Main reinforcement, it is recommended to select the minimum rebar diameter specified in the ACI and NSCP design code.

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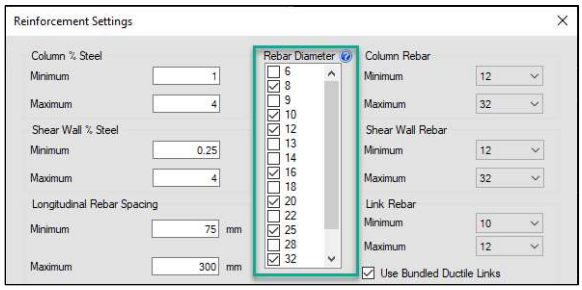
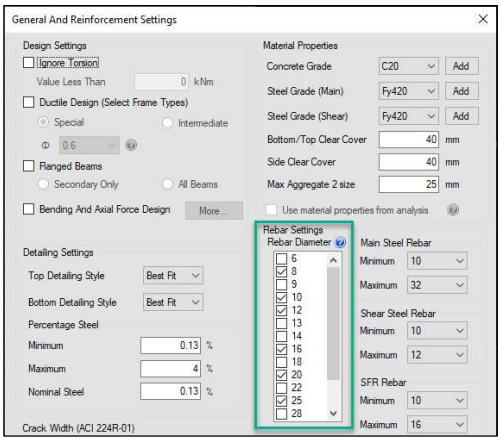


Column Module

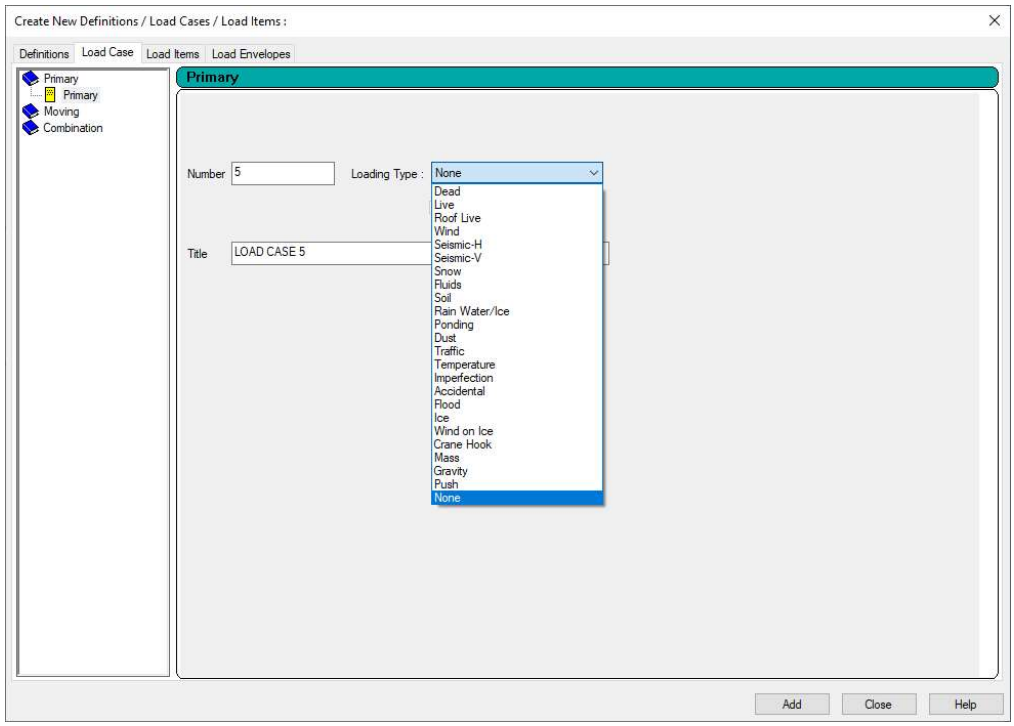


Beam Module

General — Load Type reading for load cases from STAAD

RCDC will now directly fetch the load case type defined for primary load cases in the STAAD analysis file. When the user reads the STAAD analysis file and opens the Basic load case screen, RCDC will auto-fill the load type column. Users can proceed with the auto-identified load case type or change the type as per design requirements and proceed further.

Snap showing the Load types is available from STAAD.



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RCDC will try to match the load case type available with the load case definition available in STAAD.

Sr. No	STAAD Load type	RCDC Load type
1	Dead, Crane Hook, Mass, Gravity	Dead Load
2	Live, Traffic	Live load
3	Roof Live	Roof Live
4	Wind, Wind on Ice	Wind X, Wind Y , Wind Z
5	Seismic-H	Earthquake X, Earthquake Y
6	Seismic-V	Earthquake Z
7	Snow, Ice	Snow
8	Fluid, Ponding Flood	Fluid Load
9	Soil	Soil Load
10	Rain Water/Ice	Rain Load
12	Dust, Imperfection, Push, Moving Load, None	Other
14	Temperature	Temperature
15	Accidental	Accidental
16	Load Type not defined	Blank
17	Type other than above	Other
18	Load cases created using Reference loads- load type defined	Load types same as explained above

For Earthquake load types:
STAAD provides two types of earthquake loads. Seismic-H and Seismic-V

For Seismic-H if the user defines a further sub-type in STAAD (which is not mandatory in STAAD), RCDC will differentiate whether it is Earthquake X or Earthquake Z and accordingly load case type is selected. If not defined then RCDC will by default assign Earthquake X.
Example:

```
53 65 FX 1000
LOAD 3 LOADTYPE Seismic-H  TITLE LOAD CASE 3 EQ-X
JOINT LOAD
46 TO 49 51 TO 54 56 58 TO 68 FX 5
LOAD 4 LOADTYPE Seismic-H  TITLE LOAD CASE 4 EQ-Z
JOINT LOAD
46 TO 49 51 TO 54 56 58 TO 68 FZ 10
```

Seismic-H is defined with subtype EQ-X then it will be qualified as Earthquake X in RCDC.
Seismic-H is defined with subtype EQ-Z then it will be qualified as Earthquake Z in RCDC.

The wind is either Wind X or Wind Z or Wind Y in RCDC.

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For Wind, if the user defines a further sub-type in STAAD (which is not mandatory in STAAD), RCDC will differentiate whether it is Wind X or Wind Z, or Wind Y. If not defined then RCDC will by default assign Wind X.

Example:

```
53 65 FX 1000
LOAD 3 LOADTYPE Wind  TITLE LOAD CASE 3 WIND-X
JOINT LOAD
46 TO 49 51 TO 54 56 58 TO 68 FX 5
LOAD 4 LOADTYPE Wind  TITLE LOAD CASE 4 WIND-Z
JOINT LOAD
46 TO 49 51 TO 54 56 58 TO 68 FZ 10
LOAD 5 LOADTYPE Wind  TITLE LOAD CASE 5 WIND-Y
MEMBER LOAD
4053 TO 4059 4062 4065 TO 4067 UNI GY -10
```

Wind defined with subtype as WIND-X then it will be qualified as Wind X in RCDC.
Wind defined with subtype as WIND-Z then it will be qualified as Wind Z in RCDC.
Wind defined with subtype as WIND-Y then it will be qualified as Wind Y in RCDC.

General Enhancements

The following are the enhancements made in this release to existing features.

- **ADO ID – 715843 – Crack width check is skipped when the column has only compressive forces.**
  If there is only axial compressive force present in the column (without bending moments), sections will always be under compression. For a crack-width check to perform, strain in the reinforcement and concrete is calculated for tension in the section. If there is no tension at anywhere in the section, the section would be identified as uncracked.
  If the column is loaded with only axial compressive forces without bending moments, the message of the uncracked section is displayed in the design calculation report as follows,

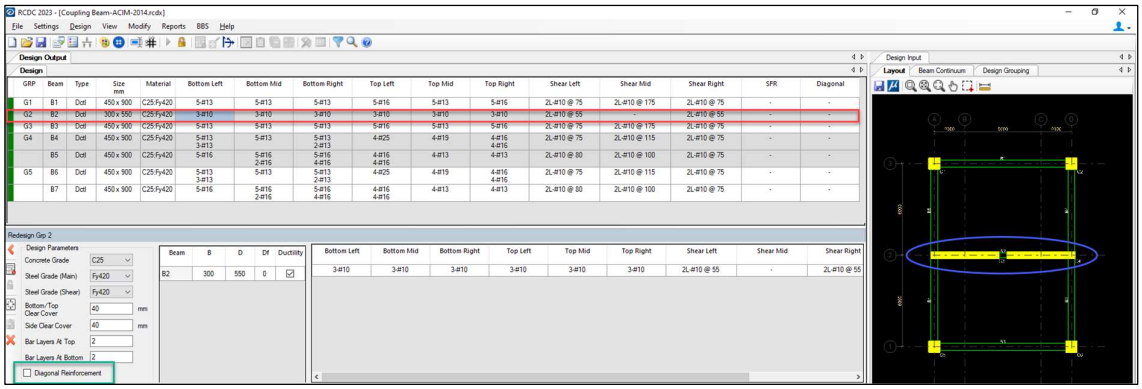
Crack Width Check as per IS 456 : 2000 + IS 13920 : 2016

Minimum corner stress in all load cases is more than Zero,Hence Section is Uncracked.

- **ADO ID – 782897 – Coupling Beam redesign workflow enhancement – ACI and NSCP code**
  For the ductile beam to qualify as a coupling beam, a few checks are applicable as per the selected design code. RCDC can identify the coupling beam based on these checks and provide the diagonal reinforcement through auto design.
  In case the beam is not qualified as a coupling beam in auto design, but the user wants to design it as a coupling beam, the option to provide Diagonal Reinforcement is available for a single-span beam. This option is eligible only if that

beam is supported on the shear walls along its length at both ends. This facility was available to Indian (IS) code coupling beam design. The same facility is now extended to ACI and NSCP design codes.

Refer to the below snap,
The beam is resting on the shear wall on both ends. The Beam B2 is qualified and designed as ductile from the auto design process. However, the option to provide diagonal reinforcement and design it as a coupling beam is available on the re-design screen.



In the design, qualification checks of coupling beams are skipped. The diagonal reinforcement is provided for the earthquake-induced shear,

Check for coupling action
Beam Designed with Diagonal Reinforcement.

Design of diagonal reinforcement

Angle with horizontal, (α)	=	39.352 deg
Shear for EQ case, Vu	=	457.8 kN
Φ	=	0.85
Vn	=	0.83 x sqrt(fck) x B x Deff
	=	1729.13 kN
Vu	<	Vn Hence Ok
Avd	=	(Vu x 1000 / (2 x Fy x sinα)) / Φ
	=	1011.18 sqmm
Reinforcement provided	=	4-#13
		4-#13 Both diagonals

- **ADO ID – 996902 – Pedestal and foundation design for steel structure – if steel columns start at the different support level**
  In a steel structure, If the steel columns start from the different support levels, RCDC was reading the columns present at the lowest level only for pedestal design. Steel column starts other than the lowest levels were skipped in the design.
  Enhancement made in RCDC to read and design pedestal and foundation for the steel structure if the steel columns start from the different support levels.

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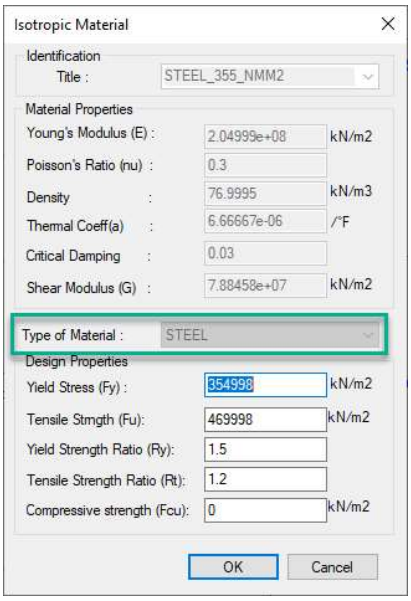
- **ADO ID – 1017440 – Reading Material Type available from STAAD to identify steel members for pedestal design.**

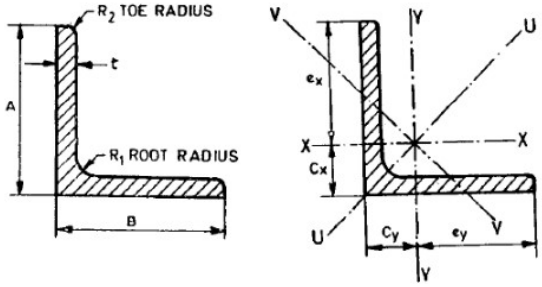
  When any material is defined, option to define type of material is available in STAAD.pro.



  Capabilities of the reading material type from STAAD to identify steel members is enhanced in RCDC. Material type other than concrete and steel will be skipped in the RCDC for column/pedestal design.

- **ADO ID – 1063599 – Pedestal design - Enhancement to read local axis (alpha) for Steel Angle Sections**

  Equal and unequal angle sections come with their own local (alpha) axis as angle sections are not symmetrical along both axes. In the image below, the angle between the axis X and U axis (or between axis Y and V) is called the alpha angle. if we want to match the local axis of the member with the global axis of the structure, the section needs to rotate by an alpha angle in the analysis file.



  RCDC is now reading the alpha angle for the angle section and accordingly positions the section for the pedestal and foundation design.

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General Defects Resolved

Following is the list of Defects resolved in this release.

- **ADO ID - 1005699 –Neutral axis (NA) angle presentation issue for circular columns.**
  For the Interaction principle (discrete action) method, RCDC shows the load angle and its corresponding NA angle in the design calculation report under the moment capacity check.

  Issue:
  For the Circular shaped column, the presentation of the NA angle was missing for IS and BS codes in the design calculation report.

  Solution:
  NA angle added for the circular column for IS and BS code. Snap from IS code is added,

Interaction Principle (Discrete Action)		
Moment Capacity Check		
Pt Calculated	=	0.41
Reinforcement Provided	=	18-T12
Load Angle	=	Tan^{-1}(Muy/Mux)
	=	66.41 deg
Corresponding NA angle (β)	=	90 deg
MRes	=	288.02 kNm
MCap	=	550.03 kNm
Capacity Ratio	=	MRes/ MCap
	=	0.52 <= 1

- **ADO ID – 1073911 - IS 456:2000 + 13920: 1993 – Crash in Column design**

  Issue:
  Using IS 456:2000 + 13920: 1993 design code if only dead and live load cases are selected and ductile design is performed for columns, and, walls, the software was crashing while performing auto design.
  The issue occurred only if E-tabs (.mdb) is selected as analysis files and ductile design is performed without selecting earthquake load cases and combinations.
  If we select earthquake load cases and perform the ductile design, it was working properly.

  Solution:
  The crashing after performing auto design in the above-mentioned case is resolved and it is working properly in the released version.

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- **ADO ID – 1074001 - IS 456:2000 + 13920: 1993 – Column design issue**
  Generally, ductile design is performed when the earthquake forces are present in the analysis file. However, In RCDC ductile links can be provided Irrespective of the load earthquake load cases. The choice is given to the user to provide ductile links irrespective of the earthquake loads present in the structure.

  Issue:
  For IS 456:2000 + 13920: 1993 design code, if earthquake load cases are not selected and ductile design is performed, ductile links were missing in the design output.

  Solution:
  The issue of ductile links missing is resolved. Ductile links are available in all design outputs of RCDC.

- **ADO ID – 1074072 - IS, ACI, and NSCP - all columns are identified as Gravity instead of Lateral frame**

  In The RCDC V11 update 6, enhancement was done to read beam end releases (Major axis and/or Minor axis moment release)for STAAD, E-tabs, and RAM SS analysis files. if the ductile design is selected, based on the beam end releases, columns are identified as lateral and gravity. If all beams resting on a particular column are released at the ends, then the column is identified as Gravity type.

  Issue:
  The issue in identifying frame type occurred when all beams resting on a particular column are not released at the ends. The column would have been identified as Lateral in RCDC but it was identified as a Gravity frame type. The issue occurred only when the analysis file is selected as E-tabs (.mdb or .accdb)file. It was working properly if the analysis file is selected as STAAD or RAM SS.

  Solution:
  Correct column frame type is identified based on the beam end release.

- **ADO ID – 1082507 - Issue in calculating Relative Displacement for column sway calculation (stability index) in the case where levels are merged**.

  Issue:
  In the case of the merged levels, the relative displacement of the primary levels was calculated wrongly in the sway index calculation. The story was identified as

sway instead of Non-sway in the stability index calculation due to an incorrect calculation of the relative displacement.
The issue was specific to ACI and NSCP design codes. It was showing the correct values for the Indian (IS) codes.

Solution:
Correct relative displacement is now calculated and used to identify the story sway index calculations.

A Snap from the design calculation report for Sway calculation is added for reference.

Sway Calculation (Stability Index)

For Global-X Direction

Level	Load Combination	Storey Height (ft)	Gravity Load P (kip)	Relative Displacements (in)	Storey Shear (kip)	Stability Index (Q)	Sway Condition
	Analysis	A	B	C	D	B x C / (A x D)	
6 ft to 18.5 ft	48	12.5	12332.61	0.36	617.8	0.048	Non Sway
18.5 ft to 28.91 ft	48	10.42	10510.06	0.47	602.1	0.065	Sway
28.91 ft to 39.33 ft	48	10.42	8703.42	0.85	566.3	0.105	Sway
39.33 ft to 49.75 ft	48	10.42	6896.79	0.92	506.4	0.1	Sway
49.75 ft to 60.16 ft	48	10.42	5090.15	1.24	419.43	0.12	Sway
60.16 ft to 70.58 ft	48	10.42	3283.53	1.2	302.89	0.104	Sway
70.58 ft to 81.00 ft	48	10.42	1476.93	1.41	154.63	0.108	Sway
81.00 ft to 91.419 ft	48	10.42	70.79	0.13	10.69	0.007	Non Sway

For Global-Y Direction

Level	Load Combination	Storey Height (ft)	Gravity Load P (kip)	Relative Displacements (in)	Storey Shear (kip)	Stability Index (Q)	Sway Condition
	Analysis	A	B	C	D	B x C / (A x D)	
6 ft to 18.5 ft	50	12.5	12332.03	0.29	111.7	0.212	Sway
18.5 ft to 28.91 ft	50	10.42	10509.44	0.36	870.69	0.034	Non Sway
28.91 ft to 39.33 ft	50	10.42	8702.75	0.65	816.83	0.056	Sway
39.33 ft to 49.75 ft	50	10.42	6896.07	0.7	728.28	0.053	Sway
49.75 ft to 60.16 ft	50	10.42	5089.41	0.96	601.39	0.065	Sway
60.16 ft to 70.58 ft	50	10.42	3282.77	0.94	433.1	0.057	Sway
70.58 ft to 81.00 ft	50	10.42	1476.17	1.12	220.82	0.06	Sway
81.00 ft to 91.419 ft	50	10.42	70.04	0.11	16.26	0.004	Non Sway

- **ADO ID – 1087154 – Performance improved in grouping Column/Levels for Big sized Files**

  Issue:
  In the earlier version for column design, if the user groups the multiple levels and the analysis file has many load combinations, RCDC was taking more time to read as well as design the columns.

  Solution:
  In this release, the time has been reduced for reading and design without affecting the existing functionality of the reading and design part. So, for the multi-story structures having multiple levels grouped and having many load combinations, RCDC will be able to perform the design process fast as compared to earlier versions.

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- **ADO ID – 1085179 - Beam with different depth – depth shown on the input differs from the depth used in the design**

  A single beam can consist of more than one analytical member in the analysis file. The facility is available to the user to model the beam with multiple analytical members with different depths in the analysis file as per design requirements. If the Beam is to be designed with varying depths, the user splits the beam into multiple analytical members and different depths are assigned. If different depths are identified for a single beam from the analysis file, RCDC considers the lowest depth for the design.

  Issue:

  If a beam is modeled with 700 and 800mm depth in the analysis file, RCDC was showing 700mm depth on the input screen however for the design it was considering the depth as 800mm. All the design outputs were generated for 800mm beam depth.

  Solution:

  The lower beam depth is used for the design as shown on the input screen. So, the beam depth shown on the input screen and the depth used in the design is now consistent.

- **ADO ID – 1105570- ACI and NSCP - Shear design - Critical forces not considered in the design**

  For the ACI code, the shear reinforcement is calculated for the combined effect of shear force and torsion. The total shear reinforcement required in a beam is a combination of reinforcement required for shear and torsion.

  Issue:

  The beam design was not handled properly for the combined effect of high shear and high torsion. The combination which was giving a higher area of shear reinforcement was not considered in the design in case there is a high torsion exists.

  Solution:

  Now the correct results are available if the beams for of high shear and high torsion.

- **ADO ID – 1106795 - Beam-Project settings import issue**

  RCDC always save the project setting file (.rcps) in the same folder where the .rcdx file is saved. In the .rcps file, settings related to design, reinforcement, load cases,

and, load combinations are stored for the same .rcdx file. The .rcps file can be used for the other .rcdx file if the same settings are to be applied.

Issue:

The .rcps file was created with ductile design settings. If the same file was imported into the other .rcdx file, the ductile design setting was not getting successful. Due to this issue, the user had to manually select the ductile design setting to perform the ductile design.

Solution:

All the settings available in the .rcps file are now successfully imported into other .rcdx files.