S A D S

What's New

Version 16.0

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Table of Contents

1 Introduction of SADS 16

1.1 Overview

SADS 16 is developed according with Code of Practice for Structural Use of Concrete 2013. All Core Programs -- BEAM-2013, COLUMN-2013 and WALL-2013 -- are changed to meet the requirement of CoP 2013. All Core Programs are submitted to BD for approval. Other modules -- slab module, beam-column joint module, lintel beam module, etc. -- are changed also to meet the requirement of CoP 2013.

1.2 General Requirement.

The following requirements are added.

1. **Clause 1.2:** The dead load and imposed load sued in SADS are met the requirement of Code of Practice for Dead and Imposed Loads 2011.
2. **Clause 3.2.1:** The ribbed steel reinforcing bars is in grade 500B and grade 500C.

1.3 Beam Design

The following changes are applied to beam design.

Clause 6.1.2.4 (c):
When

$$\frac{d'}{x} > 1 - \frac{2.175 \times 10^{-3}}{\varepsilon_{cu}},$$

the compression stress should be calculated from figure 3.9.

Clause 9.4.4:
Cantilevered structures, especially those projecting over streets, should be detailed in such a manner that they may be demolished or replaced without affecting the safety and integrity of the main structure of the building.
For example, one continuous beam with cantilever at both ends should be analyzed in following 4 cases.

- Continuous without cantilever.
- Continuous with cantilever at both ends.
- Continuous with cantilever at left end only.
- Continuous with cantilever at right end only.

The output moment and shear envelop is taken from the worst case in 4 cases. The reinforcement is calculated from the worst envelops.

Clause 9.9.1.1:
The extent of critical zone of beam is taken from the column face over a length to 2 times the beam depth.

Clause 9.9.1.1(a):
The centre to centre of stirrups along beam span shall not exceed:

1. Inside the critical zone: the larger of 150mm or 8 times the longitudinal bar diameter.
2. Outside the critical zone: the smaller of least lateral dimension of cross section of beam or 12 times the longitudinal bar diameter.

Within critical zone, the spacing between stirrup legs across any section shall not exceed the smaller of 20 times the diameter of stirrup or 250mm.

1.4 Column Dsign

The following changes are applied to column design.

Clause 9.9.2.1 (d):
For laps and type 1 mechanical couplers in a column, the centre of the lap or coupler must be within the middle half of the storey height of the column

Clause 9.9.2.2:

1. Add 1/6 column clear height requirement for calculating critical zone of column.
2. Increase the minimum diameter of links to 10mm.
3. For rectangle column, centre to centre spacing of links shall not exceed 8 times the longitudinal bar diameter and 150mm.
4. For circular column, centre to centre spacing of links shall not exceed 8 times the longitudinal bar diameter and 150mm.
5. Remove the requirement of the minimum spacing of ?of lateral dimension.

1.5 Wall Design

The following changes are applied to wall design.

Clause 9.9.3.3:
Add the calculation of axial compression ratio:

$$N_{cr} = \frac{N}{0.45 f_{cu} A_c}$$

Where:

$N = 1.4G_k + 1.6Q_k$

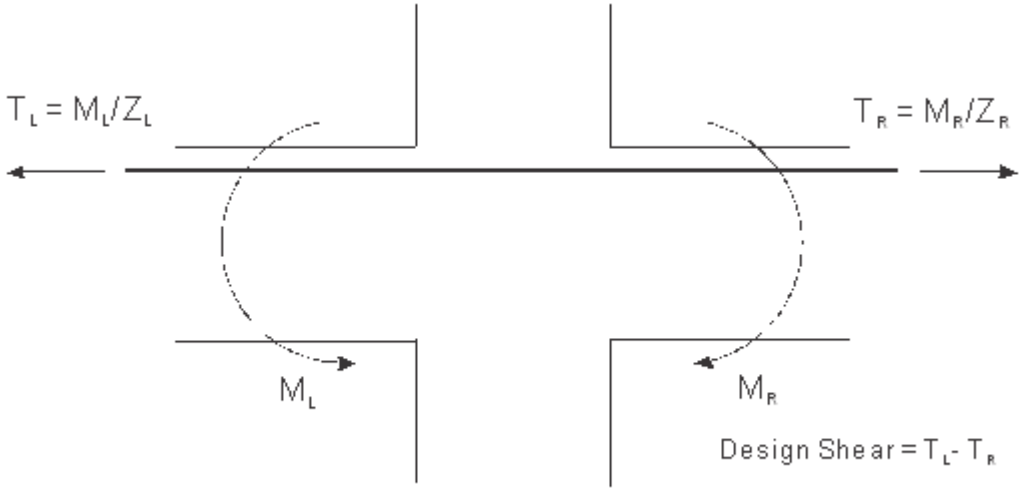
f_{cu} – is the characteristic strength of concrete

A_c – is the gross area of concrete section

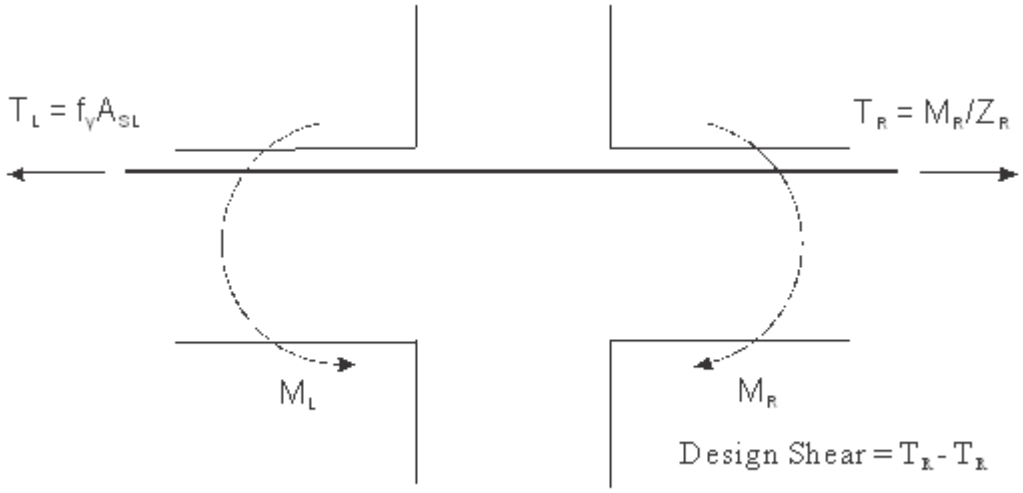
1.6 Beam-column Joint Design

The following requirements are applied to beam-column joint design.

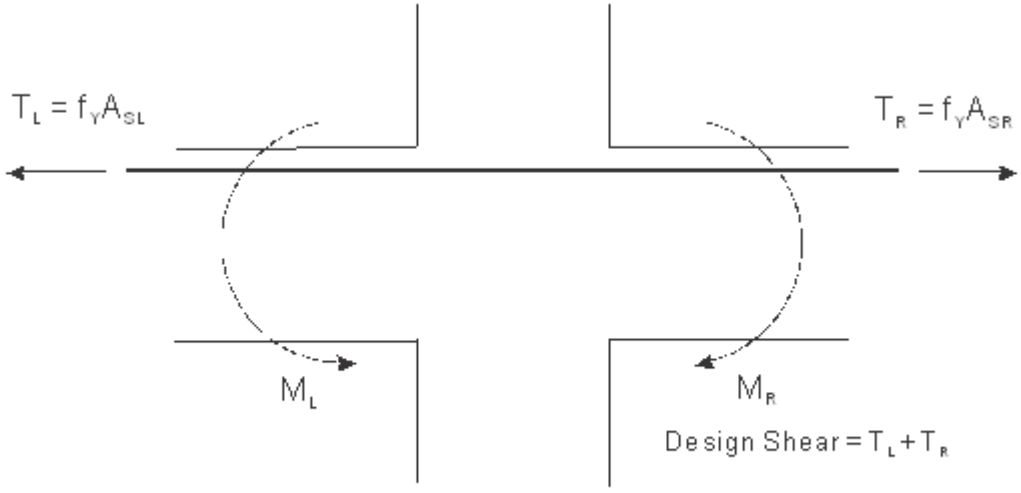
Clause 6.8.1.2: The application of design force on a column beam joint is clarified as in the following diagrams. In the diagrams, A_{sL}, A_{sR} are the provided reinforcement areas and z_R is the lever arm of the beam at the right. T_L induced is assumed to be stronger than T_R. So they should be reversed if T_R is stronger instead.



General Case when beam / column not lateral load resisting



When frame is lateral load resisting but no reverse to sagging moment at right



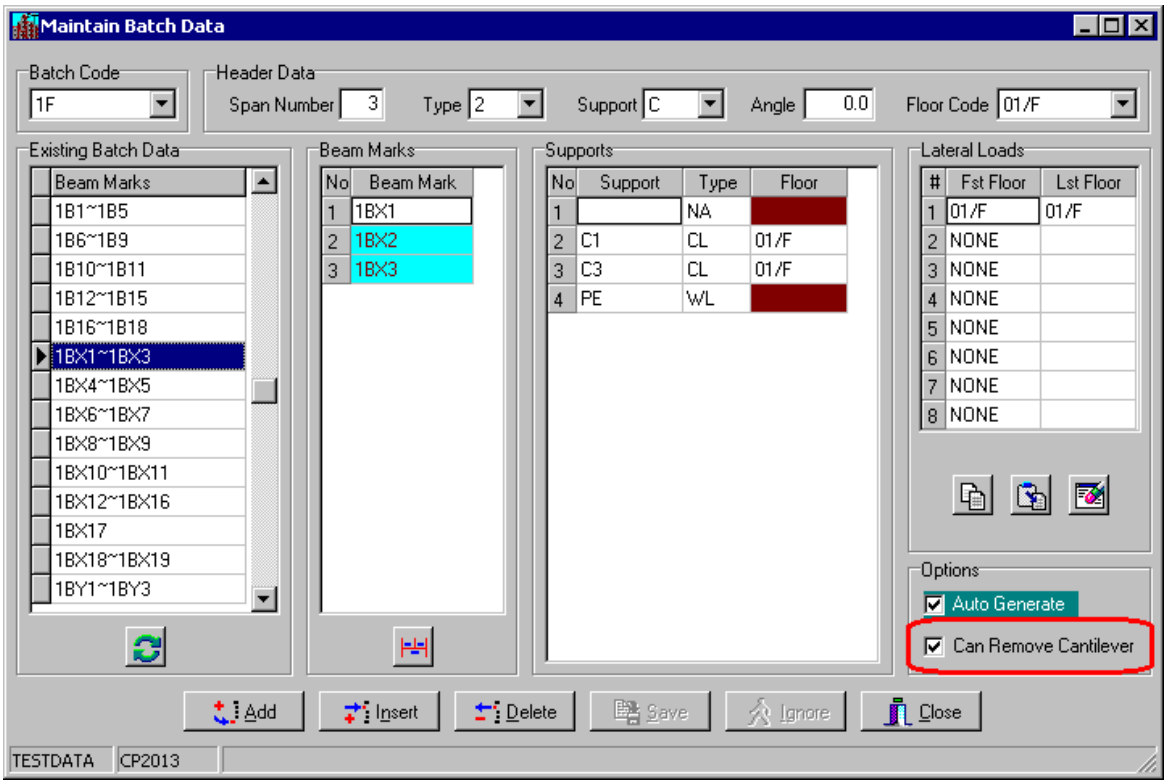
When frame is lateral load resisting with reverse to sagging moment at right

Clause 6.8.1.5:

1. Adding a coefficient 0.8 to A_g in the denominator of equation 9.72 as the original provision is from the New Zealand Code using f_c';
2. Clarifying that $C_j = 1$ if the joint has beam in only one direction;
3. Clarifying that $C_j = 1$ if N is negative, i.e. column in tension.

1.7 Change in Batch Data

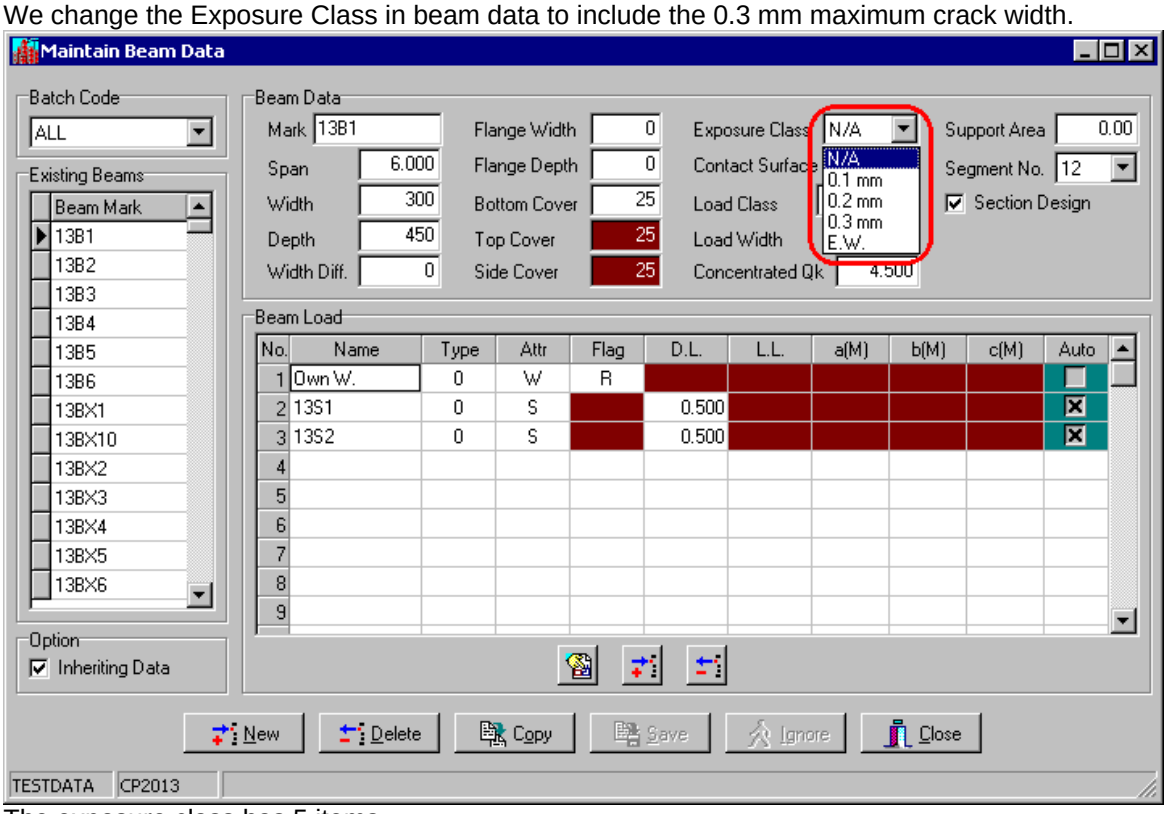
We add "Can Remove Cantilever" check box for batch data of beam with cantilever.



If you check this check box, SADS will perform beam analysis and design according Clause 9.4.4 of CoP 2013. If you are sure that this cantilever is never removed, you may un-check this check box.

1.8 Changes in Beam Data

We change the Exposure Class in beam data to include the 0.3 mm maximum crack width.



The exposure class has 5 items.

1. N/A -- No crack checking is needed.
2. 0.1 mm -- The maximum crack width is 0.1 mm.
3. 0.2 mm -- The maximum crack width is 0.2 mm.
4. 0.3 mm -- The maximum crack width is 0.3 mm.
5. E.W. -- Exposure to watering cantilever beam.