



# **S A D S**

**What's New**

**Version 15.0**

**Gold Sun**

**November 2012**

# Table of Contents

Foreword	0
<b>Part I Introduction of SADS 15</b>	<b>1</b>
1 Overview .....	1
2 New Load Code 2011 .....	1
3 New Concrete Code 2013 .....	1
4 Smart Mapping and Generating .....	2
5 Checking Reinforcement .....	2
6 Alternative Floor .....	3
7 Auto Generate Field for Slab Data .....	5
8 Edit Slab Bar Sketch .....	6
9 Add Column Data .....	7
10 Add and Change Batch Data .....	8
11 Design Moment for BC Joint .....	8
12 Maximum Crack Width .....	9
13 Input Data with Keyboard Only .....	10
14 Block Region .....	12
<b>Index</b>	<b>0</b>

# 1 Introduction of SADS 15

## 1.1 Overview

**SADS 15** adds and enhances following new functions.

1. Change according with Code of Practice for Dead and Imposed Loads 2011.
2. Change according with Code of Practice for Structural Use of Concrete 2013.
3. Add smart mapping and smart generating when linking ETABS and **SADS** data.
4. Add and enhance checking reinforcement in all design sub-command.
5. Add alternative floor.
6. Add auto generate field in slab data.
7. Add slab edit sub-command.
8. Add new information to column data.
8. Add and change information in batch data.
10. Add design BC joint using moment at the edge of support.
11. Add extended flag to column data.
12. Add the ability of inputting data by keyboard only.
13. Add block region in master data.

## 1.2 New Load Code 2011

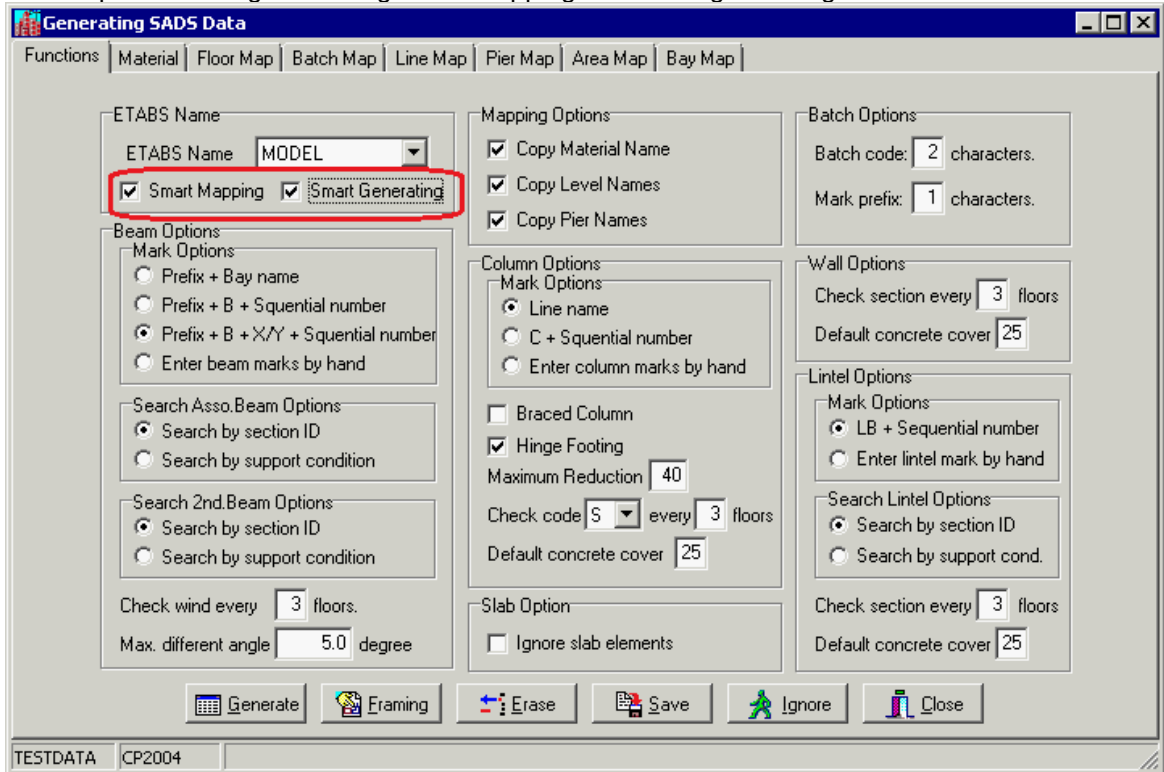
We implement Code of Practice for Dead and Imposed Loads 2011 to **SADS 15**. Please refer to Code of Practice for Dead and Imposed Loads 2011 In **SADS** version 15.0

## 1.3 New Concrete Code 2013

We implement all the changes of Code of Practice for Structural Use of Concrete 2013 to **SADS 15**, except the checking of fire limit state.

## 1.4 Smart Mapping and Generating

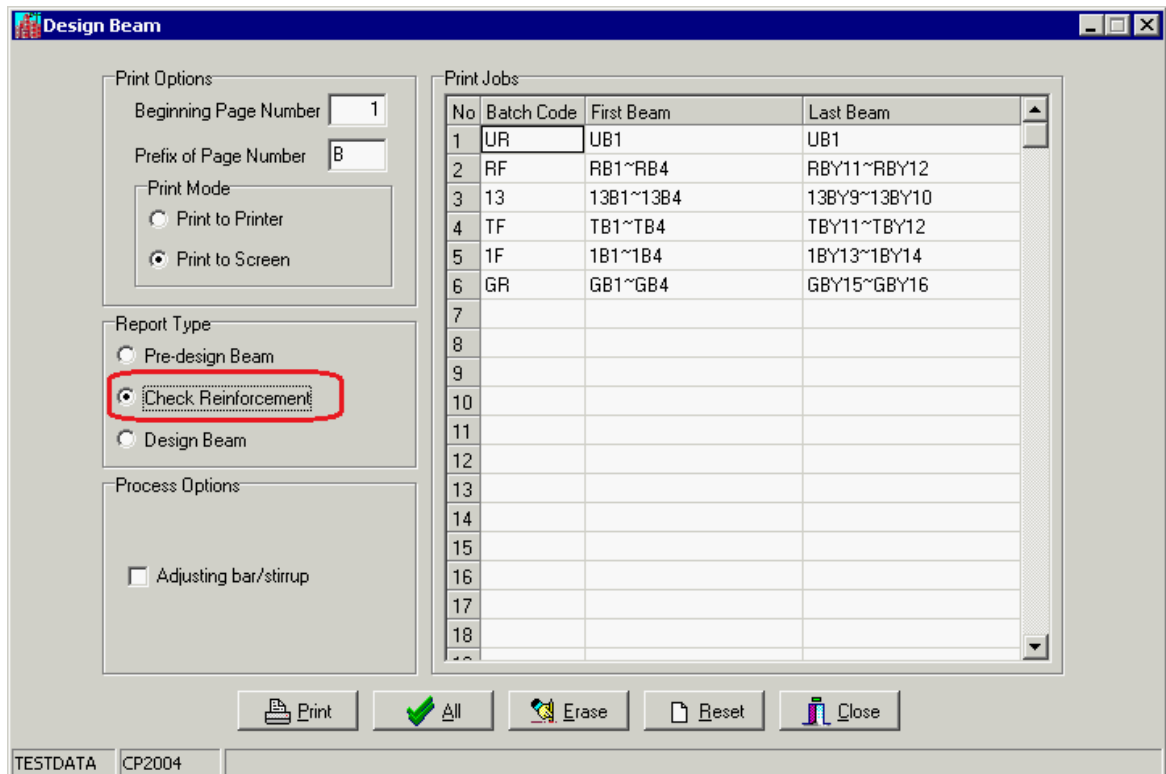
We enhance Generating **SADS** Data and Linking ETABS Data Sub-command in **SADS 15**. The most important change is adding smart mapping and smart generating.



Please open the **SADS** Demonstration Version 15 for detail information and more new features and new enhancements.

## 1.5 Checking Reinforcement

In **SADS**, there are 6 design sub-commands, Slab Design, Beam Design, Column Design, Beam-Column Joint Design, Wall Design and Lintel Beam Design. These sub-commands are implemented checking reinforcement function in **SADS 15**. For example, the Beam Design Dialog box is shown as below.



When you run any design sub-command, **SADS** checks the reinforcement strictly. If **SADS** finds any reinforcement that not meet the requirement of CoP2004, it will interrupt the report printing immediately. You need to fix the problem and start the report printing from the broken point. So, the good solution is eliminating all possible error before you print the design report.

In **SADS 12** and older version, there are Checking Only options in beam design, column design and wall design sub-command. These options check the reinforcement area only. **SADS 15** expands the checking to bar diameter and spacing, and provides more detail information about the found errors. You may try to change you data after you run pre-design sub-command, and then run checking reinforcement sub-command to see how **SADS** presents the errors.

## 1.6 Alternative Floor

In ETABS, you may define a point located below a level using DZBelow value. In **SADS**, you must locate this point in a floor. This floor is defined as alternative floor in **SADS**. **SADS 12** can not process this kind of point and can not recognize line (column), bay (beam) and area (slab) that included this kind of points. **SADS 15** expands the ability of mapping with ETABS data.

**Floor Information**

Floor Data

No	Fl.Code	Floor Name	Alternative	Level	Cl.Cover	Wl.Cover	Cl.Concrete	Wl.Concrete	Batch C.
1	UR/F	UPPER ROOF	<input type="checkbox"/>	51.800	25	25	C40	C40	UR
2	RF/F	ROOF FLOOR	<input type="checkbox"/>	48.600	25	25	C40	C40	RF
3	13/F	13TH. FLOOR	<input type="checkbox"/>	45.400	25	25	C40	C40	13
4	12/F	12TH. FLOOR	<input type="checkbox"/>	42.200	25	25	C40	C40	TF
5	11/F	11TH. FLOOR	<input type="checkbox"/>	39.000	25	25	C40	C40	TF
6	10/F	10TH. FLOOR	<input type="checkbox"/>	35.800	25	25	C40	C40	TF
7	09/F	9TH. FLOOR	<input type="checkbox"/>	32.600	25	25	C40	C40	TF
8	08/F	8TH. FLOOR	<input type="checkbox"/>	29.400	25	25	C40	C40	TF
9	07/F	7TH. FLOOR	<input type="checkbox"/>	26.200	25	25	C40	C40	TF
10	06/F	6TH. FLOOR	<input type="checkbox"/>	23.000	25	25	C40	C40	TF
11	05/F	5TH. FLOOR	<input type="checkbox"/>	19.800	25	25	C45	C40	TF
12	04/F	4TH. FLOOR	<input type="checkbox"/>	16.600	25	25	C45	C40	TF
13	03/F	3RD. FLOOR	<input type="checkbox"/>	13.400	25	25	C45	C40	TF
14	02/F	2ND. FLOOR	<input type="checkbox"/>	10.200	25	25	C45	C40	TF
15	01/F	1ST. FLOOR	<input type="checkbox"/>	7.000	25	25	C45	C40	1F

Global Change

Old Code:  New Code:

**Important Note:**  
If beam, column, wall and lintel data have been input, the floor code in the grid can not be changed directly on the grid, otherwise some data can not be retrieved from database. Please use global change to change this floor code.

TESTDATA CP2004

If you find a point below a level in ETABS and its DZBelow is non-zero, you may define an alternative floor for this point. Only one alternative floor can be added below one floor, i.e. one alternative floor can contain many DZBelow points with different DZBelow value. Using alternate floor, you are able to map ramp in a building from ETABS to **SADS**. **SADS 12** cannot map ramp structures.

## 1.7 Auto Generate Field for Slab Data

For performing smart generating **SADS** data, we add Auto Generate field in slab data.

The screenshot shows the 'Maintain Slab Data' window with the following data:

Section	Field	Value
Batch Code	Batch Code	RF
	Batch Code (Mark and Type)	RF
Mark and Type	Slab Mark	RS1
	Slab Type	2
	Slab Mark (Existing Slabs)	RS1
Dimension	Thickness	130
	Bottom Cover	15
	Top Cover	15
	Short Span	3.000
	Long Span	0.000
Check Crack	Exposure Class	C
	Tension	0.000
Loading	Finishing	1.250
	Partition	0.000
	Live Load	2.500
	Min. Live Load	0.000
	Point Load (DL)	0.000
	Point Load (LL)	0.000
	U.D.L. (HA)	0.000
	K.E.L. (HA)	0.000
	Dynamic Load	0.000
Uplift Load	0.000	
Option	Inheriting Input Data	<input checked="" type="checkbox"/>
Generate Data	Auto Generate	<input checked="" type="checkbox"/>

This Auto Generate data are also added to batch code data, beam batch data, beam load data, column data, column beam data, wall data, wall load data, lintel data and lintel load data. Please refer to **SADS** Demonstration for detail information.

## 1.8 Edit Slab Bar Sketch

in **SADS 12**, there is no way to edit the bar sketch of slab. **SADS 15** adds this new sub-command to Slab Module.

**Edit Slab Reinforcement**

Batch Code: RF

Existing Slabs: Slab Mark, RS1, RS2, RS3, RS4

Two way slab RS4: 2 L.E.Continue

Section	Bar Size	Spacing	Required Area	Ratio
Short Span Top Bars	Y 10	@ 140	487	1.151
Long Span Top Bars	Y 10	@ [Redacted]	[Redacted]	[Redacted]
Short Span Bottom Bars	Y 10	@ 190	369	1.119
Long Span Bottom Bars	Y 10	@ 250	289	1.085

Span Effective Depth Ratio

Actual: 46.154 > Allowable: 36.507 ???

Buttons: Save, Ignore, Close

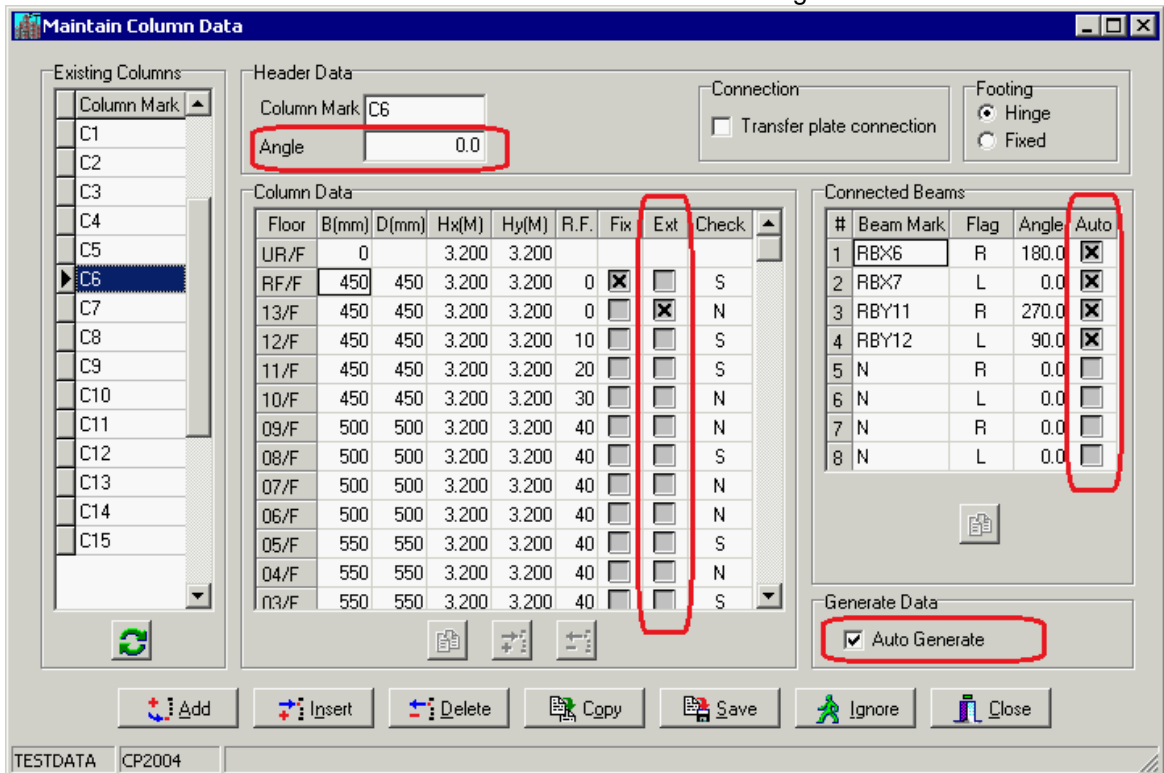
TESTDATA CP2004

This new sub-command allows you to edit the amount of bars for fixing the problem of span effective depth ratio of a slab that the thickness can not be increased. For example, the span effective depth ratio of slab GS3 is larger than allowable value, you can change the provided bars Y10@190 to Y12@170 of short span bottom bars. SADS re-calculates the ratio and shows the new ratio = 47.577.





## 1.9 Add Column Data

We add new fields to column data for more function in column design.

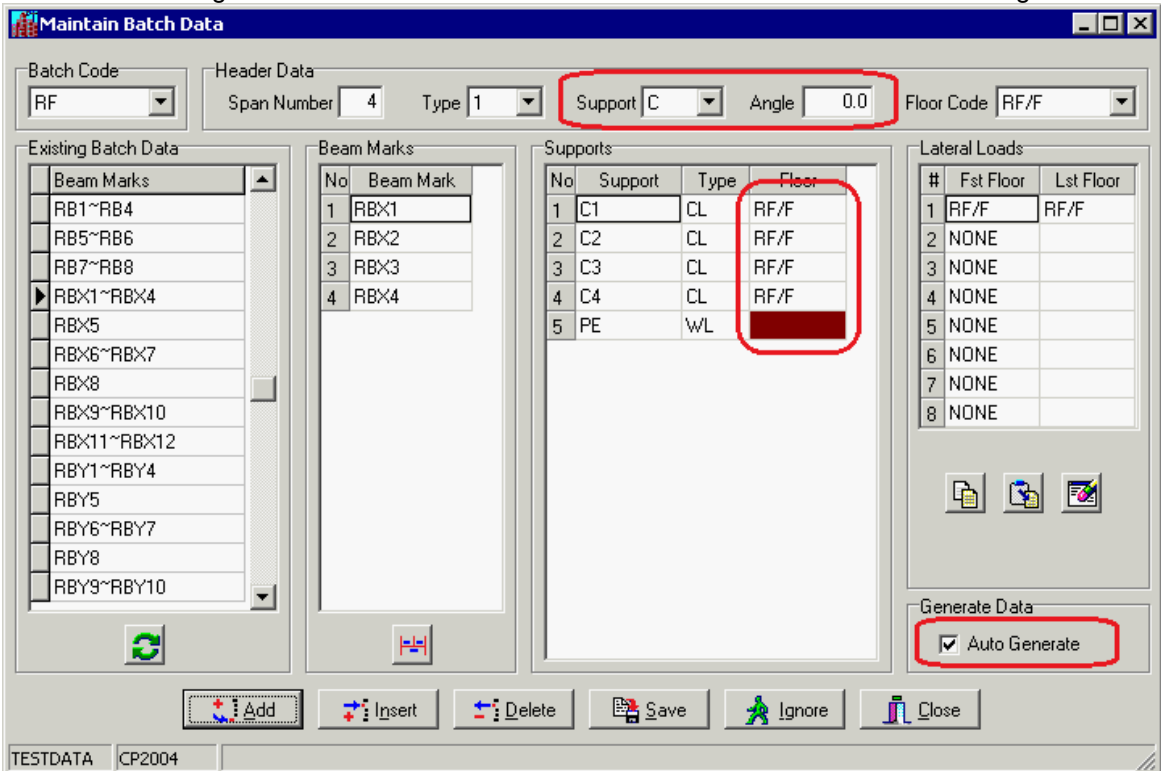


We add following data to column data table.

- **Angle:** This angle is the inclined angle between B side and global X-axis. This angle is consistency with the angle in ETABS.
- **Ext:** If a column pass through a floor with no slab and beam connection, we consider 2 column segments at upper and lower floor as one column. The lower segment has no slab and beam connection and you should check the Ext check box.
- **Auto:** If the connect beam is generated by Generating **SADS** Data Sub-command the Auto check box is check automatically. **SADS** uses the value of the field to perform smart mapping function.
- **Auto Generate:** The function of the check box is same as Auto check box. It is applied to column data.
-  and : You can use these 2 button to add or delete column on alternative floor.

## 1.10 Add and Change Batch Data

We add and change the batch data for more accurate and more function in beam design.



We change the Direction field in **SADS 12** to Support and Angle fields in **SADS 15**. The possible values of Direction are N, B, X and Y. The possible values of Support are N, B and C. In **SADS 12**, you can set the direction to X if the continuous beam in X-X direction and set to Y if the beam in Y-Y direction. There is a simplified assumption in **SADS 12** and older version. If the direction of continuous beam is not in X-X and Y-Y direction or the inclined angle of column is not equal to zero, the stiffness of column supports are not calculated accurately. **SADS 15** replaces the Direction X by Support C and Angle = 0, Direction Y by Support C and angle = 90. **SADS 15** can set Angle to actual direction of continuous beam and assign the actual inclined angle of column. **SADS** will calculate the stiffness of column supports based on these 2 angles correctly. We add Floor field in Beam Support Table. This field is useful if the continuous beam is a ramp that may across multiple floors. Finally, we add Auto Generate check box. When this batch data is generated by Generating **SADS** Data Sub-command, this check box is checked automatically. The smart mapping function between ETABS and **SADS** uses the value of this check box.

## 1.11 Design Moment for BC Joint

In **SADS 12**, the design moment of BC joint is taken at location that used by beam design sub-command. Usually, the location is define at  $0.666xB$ . But, requirement of the beam design and BC joint design may be different. So, **SADS 15** add one option that allows you to take the moment at the edge of support for designing BC joint.

The screenshot shows the 'Master Data' window with the 'Joint' tab selected. The 'Beam-Column Joint' section contains several options:
 

- Check All Joints
- Use HKIE Method
- Force Factor: 1.25
- Max. Deviation Angle: 1.000
- Diam. 10 to 40 (Vertical Shear bars)
- Min. Space: 80 mm
- Design Moment at Support Edge (highlighted with a red box)
- Allowance of bar area: 1.000

 The 'Ductility Detailing' section includes:
 

- Enforce Ductility Detailing
- Exclude Members not Contributing in Lateral Load

 Below are 'Beam Options' and 'Column Options' with their respective reinforcement ratios and critical zone lengths. A 'Close' button is at the bottom.

If you check the Design Moment at Support Edge check at Joint page of Master Data window, SADS takes the moment at the edge of support for designing BC joint.

## 1.12 Maximum Crack Width

In SADS 12, the maximum crack width of column and wall are set to 0.3 mm. We add a new setting to allow users to change this value to 0.2 or 0.1 mm.

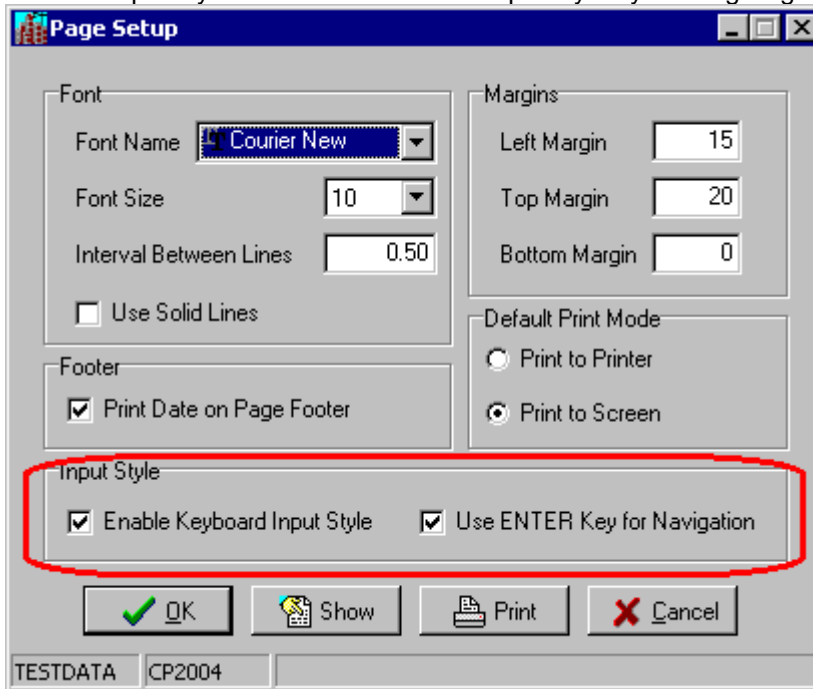
The screenshot shows the 'Master Data' window with the 'Column' tab selected. The 'Serviceability' section contains the 'Crack Control' options:
 

- Crack Control
- Factor: 0.000
- Max.Width: 0.2 (highlighted with a red box)

 Other sections include 'Moment Factors', 'Main Bars', 'Links', 'Moment Calculation', 'Bracing', 'Options', 'Circular Column Checking', and 'Axial Load Options'. A 'Close' button is at the bottom.

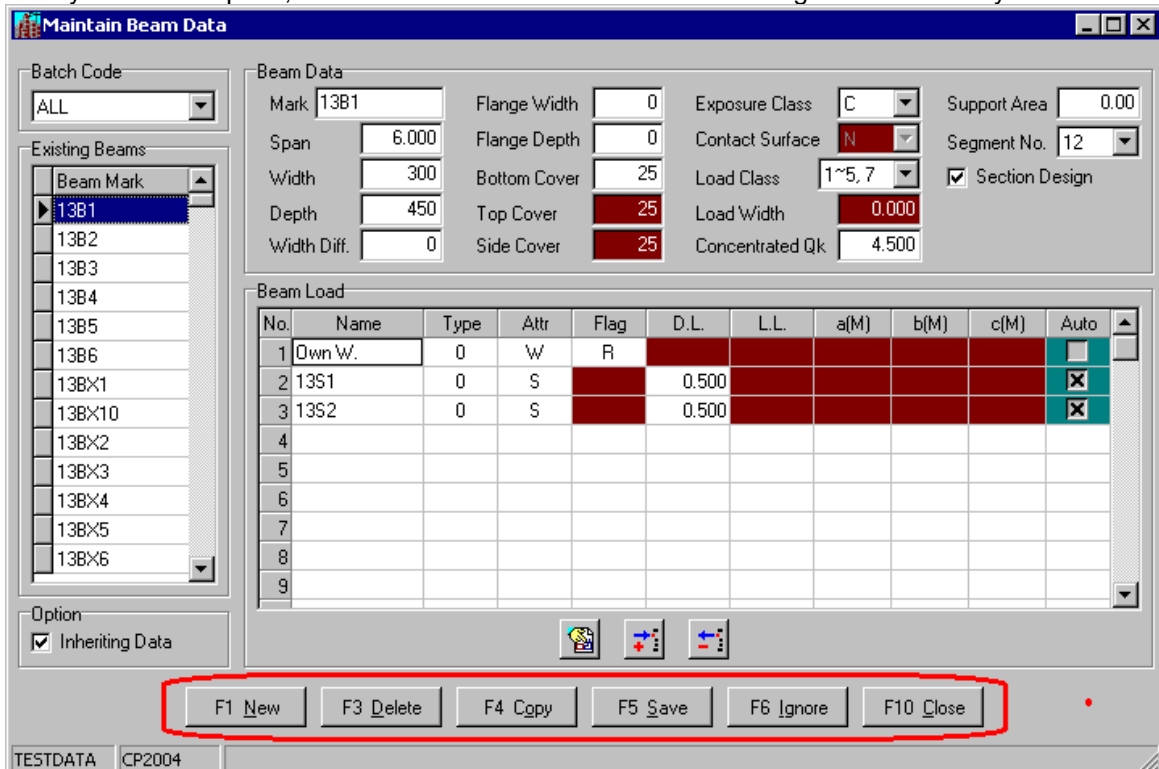
## 1.13 Input Data with Keyboard Only

When you are thinking about to increase the performance of data input, using keyboard only is a good idea. You don't use keyboard and mouse interactively. If you was SADS v6 user, you may love this input style. You can enable this input style by running Page and Input Setup command.



Currently, this input style is implemented to Maintain Slab Data Sub-command and Maintain Beam Data Sub-command. If we find this input style is really useful, we can extend to other data input sub-command.

After you set this option, the data forms of slab and beam are changed a little bit only.



Because we use function keys F1 to F10 to perform necessary action, we mark the function keys number to buttons.

For example, we need to change the segment number of beam 1BX2 from 24 to 16, the

operations are listed as below.

1. Run Maintain Beam Data Sub-command. the input data form of beam is displayed as above.
2. The focus is on Batch Code combo box.
3. Hit ENTER key, the focus move to 13B1 in Existing Beams list box.
4. Type in 1BX2 by keyboard, SADS uses increment search to locate the focus to 1BX2. You don't need to scroll down the scroll bar by mouse to find out the 1BX2 beam.

**Beam Data**

Mark: 1BX2    Flange Width: 0    Exposure Class: C    Support Area: 63.00

Span: 12.000    Flange Depth: 0    Contact Surface: N    Segment No.: 24

Width: 800    Bottom Cover: 50    Load Class: 1~5, 7     Section Design

Depth: 1800    Top Cover: 50    Load Width: 0.000

Width Diff.: 0    Side Cover: 50    Concentrated Qk: 4.500

**Beam Load**

No.	Name	Type	Attr	Flag	D.L.	L.L.	a(M)	b(M)	c(M)	Auto
1	Down W.	0	W	R						<input type="checkbox"/>
2	100WALL	0			8.520	0.000				<input type="checkbox"/>
3	1S5	3	S				6.000	6.000		<input checked="" type="checkbox"/>
4	1S2	2	S		0.500		0.000	6.000		<input checked="" type="checkbox"/>
5	1S2	2	S		0.500		6.000	6.000		<input checked="" type="checkbox"/>
6	1B6	1	B	L			3.000			<input checked="" type="checkbox"/>
7	1BY4	1	B	R			6.000			<input checked="" type="checkbox"/>
8	1BY5	1	B	L			6.000			<input checked="" type="checkbox"/>
9	C202/F	1	C				6.000			<input checked="" type="checkbox"/>

Option:  Inheriting Data

F1 New    F3 Delete    F4 Copy    F5 Save    F6 Ignore    F10 Close

TESTDATA CP2004

5. Hit ENTER key until Segment Number combo box gets focus. You don't need to use the mouse to select 16 from the drop down list box. You can type in "16" (2 characters) from keyboard and the text on combo box is changed to 16.
6. Hit the function key F5 to save the modified beam data.
7. Hit the function key F10 to close the window.

You may try to input a new beam data by hitting function F1. Please note, you can type in necessary characters to any combo box, you can hit the space bar on keyboard to toggle the on/off of check box. All data entry can be done without mouse. But please be remember, all mouse functions are still available, even you have selected Enable Input Style option. Please try for your experience.

## 1.14 Block Region

We move the Block Region from Generate SADS Data Sub-command to Master Data for general purpose.

The screenshot shows the 'Master Data' dialog box with the following sections and settings:

- Available Diameters:** A table with 8 rows. Row 1 is selected.
 

No	Diameter
1	6
2	8
3	10
4	12
5	16
6	20
7	25
8	32
- Concrete Cover:**
  - Measured to Main Bar
  - Measured to Stirrup
- Marking Beam Section:**
  - Width x Depth
  - Depth x Width
- Lateral Load Direction:** A table with 12 rows.
 

No	Wind	Dynamic	Soil
1	X		X
2	Y		Y
3	U		
4	V		
5			
6			
7			
8			
9			
10			
11			
12			
- Position of Lateral Bending Moment:**
  - Center of Support
  - Edge of Support
- Options:**
  - Designation of high tensile bar: Y
  - Density of reinforced concrete: 24.0
  - Consider flange of beam in analysis
  - Automatic print description
  - Print core program information
  - Print BD reference number
  - Bi-direction of wind and dynamic load
  - Enforce PNAP 173
- Shear Value:**
  - Calculated by M/L Formula
  - Taken from Analysis Output
- Block Region for Inclined Members:** (Highlighted with a red rectangle)
 

Block from  to

At the bottom of the dialog, there is a 'Close' button and a status bar showing 'TESTDATA CP2004'.