ADAPT

STRUCTURAL CONCRETE SOFTWARE SYSTEM

ADAPT-PT/RC® v22

NEW FEATURES SUPPLEMENTAL MANUAL

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1 Introduction

This supplemental manual provides descriptions and instruction on ADAPT-PTRC's latest features. These new features have been introduced to meet the needs for general design capabilities.

1.1 Design Improvements

Consideration of Drop Caps and Drop Panels for punching (two-way) shear design: ADAPT-PTRC now checks two-way shear for columns at critical sections within the drop cap, drop panel, and slab. This feature is available for all codes.

User Limited DCR: The user now has the option to modify the target demand/capacity ratio to a value of their choosing. This feature is available for all codes.

Minimum Rail Length (ACI-318): ADAPT-PTRC has been improved to ensure compliance with minimum rail length requirements of the ACI code (ACI-318-19 Section 18.14.5.3). This feature is available for all ACI codes.

2 Design Improvements

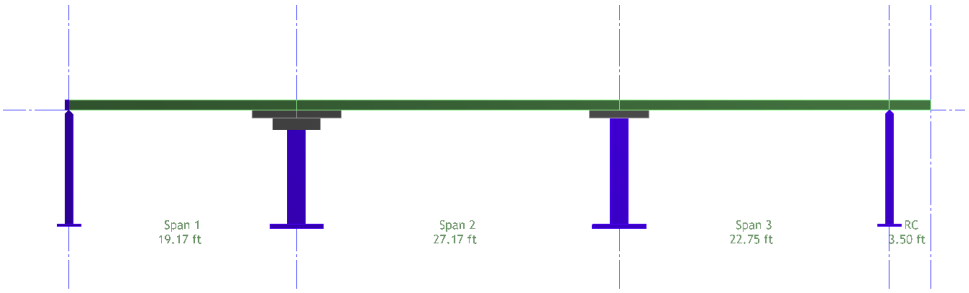
2.1 Consideration of Drop Caps and Drop Panel for punching (two-way) shear design.

In previous versions of ADAPT-PTRC when a drop cap was modeled along with a drop panel the program would check shear within the drop cap and drop panel but not continue to check the shear outside of the drop panel.

In ADAPT-PTRC v22 the program will now check shear within the drop cap, the drop panel, and finally within the slab outside of the drop cap/drop panel. This feature is available for all codes.

The interface has not changed. The user can model drop caps and drop panels the same as in previous versions of the software. The outcome of this change can be seen when viewing the punching shear reports.

In the below figure we have a three-span model with a drop cap and a drop panel modeled at Column 2.



After executing the analysis, we can view the punching shear results through the reports. Go to *Report Setup* and in the **Report Generator** dialog, select to view either the *Tabular Reports – Compact → 13-Punching Shear Reinforcement* report or the *Tabular Reports – Detailed → 30-Punching Shear Reinforcement* report. The user can see that shear is now being checked in the critical sections with an effective depth value based on the component the shear check is being done within.

30 - PUNCHING SHEAR REINFORCEMENT

Reinforcement option: Stud
Stud diameter: 0.38
Number of rails per side b: 1
Number of rails per side d: 1

Column - 1

Layer	Cond.	a	d	b1	b2	Vu	Mu	Stress	Allow.	Ratio	As	NStuds	Dist.
		in	in	in	in	k	k-ft	ksi	ksi		in2		in
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Dist. = Distance between shear studs between layers

Column - 2

Layer	Cond.	a	d	b1	b2	Vu	Mu	Stress	Allow.	Ratio	As	NStuds	Dist.
		in	in	in	in	k	k-ft	ksi	ksi		in2		in
1	1	14.19	28.38	46.37	40.37	-667.34	100.88	0.142	0.221	0.64	0.00	0	0.00
2	1	8.19*	16.38	64.37	64.37	-667.34	100.88	0.164	0.221	0.74	0.00	0	0.00
3	1	16.38*	16.38	80.75	80.75	-667.34	100.88	0.130	0.221	0.59	0.00	0	0.00
4	1	4.19*	8.37	98.37	98.37	-667.34	100.88	0.207	0.167	1.24	5.31	13	0.32
5	1	8.37	8.37	106.75	106.75	-667.34	100.88	0.190	0.164	1.16	5.31	13	0.32
6	1	12.56	8.37	115.13	115.13	-667.34	100.88	0.176	0.161	1.10	5.31	13	0.32
7	1	16.75	8.37	123.50	123.50	-667.34	100.88	0.164	0.159	1.04	5.31	13	0.32
8	1	20.94	8.37	131.87	131.87	-667.34	100.88	0.154	0.157	0.98	5.31	13	0.32
9	1	25.12	8.37	140.25	140.25	-667.34	100.88	0.144	0.155	0.93	5.31	13	0.32
10	1	29.31	8.37	148.63	148.63	-667.34	100.88	0.136	0.153	0.89	0.00	0	0.00

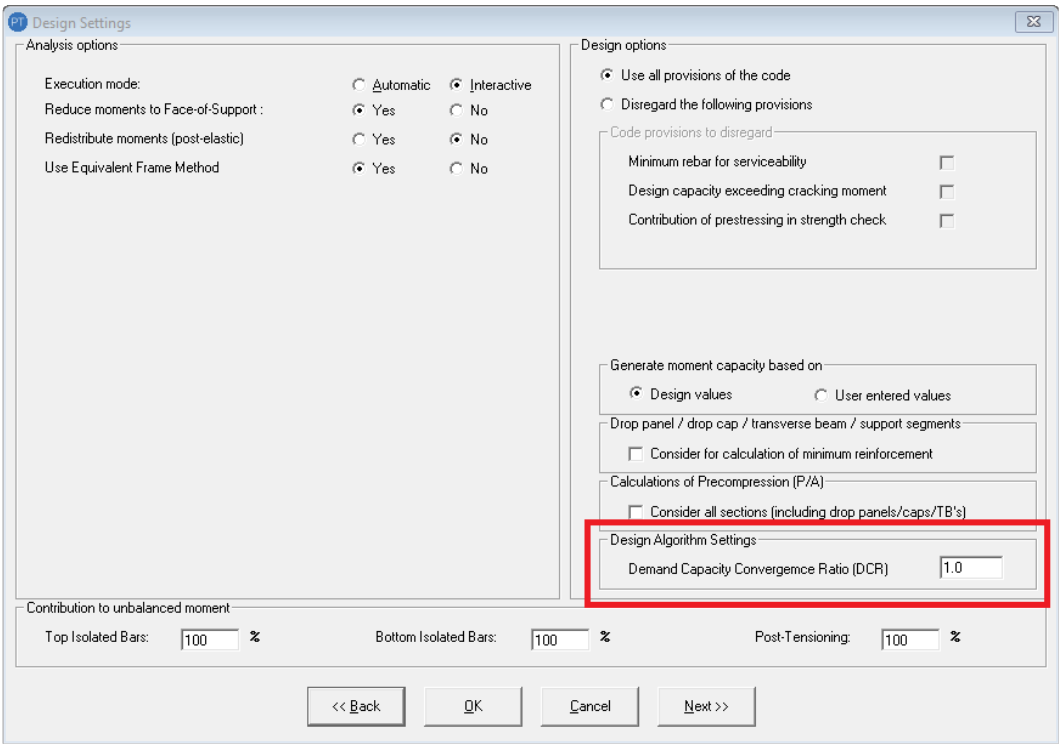
Dist. = Distance between shear studs between layers

2.2 User Limited DCR

ADAPT-PTRC now includes an option for the user to set the demand/capacity ratio (DCR) for ultimate strength design. Where moment demand exceeds moment capacity the program adds reinforcement to meet the specified DCR ratio set by the user. The default value for DCR is set to 1.0. Values more than 1.0 are allowed but would lead to a deficient design and should only be used by experienced engineers with careful consideration. Values of less than 1.0 will lead to some level of conservation.

2.2.1 To Input a User-Defined Limit for DCR

The input option within ADAPT-PTRC to limit the demand capacity ratio is the *Demand Capacity Convergence Ratio (DCR)* option. Within PTInput, open the ***Design Settings*** dialog. You can access the dialog by clicking *Next* in the ***Criteria – Design Code*** dialog, or *Back* in the ***Span Geometry*** dialog. Alternatively, the dialog can be opened by going to *Project->Design Settings…* from the menu items. Located under the *Design Algorithm Settings* section of the ***Design Settings*** dialog window is the *Demand Capacity Convergence Ratio (DCR)* input. Modifying the *Demand Capacity Convergence Ratio (DCR)* input the program will add reinforcement for ultimate strength such that DCR meets the value input by the user.



2.3 Minimum Rail Length (ACI-318)

ADAPT-PTRC now checks the minimum stud rail length requirement of the ACI-318 code (ACI-318-19 Section 18.14.5.3).

> **18.14.5.3** Required slab shear reinforcement shall provide $v_s \geq 3.5\sqrt{f_c'}$ at the slab critical section and shall extend at least four times the slab thickness from the face of the support adjacent to the slab critical section.

When checking the minimum stud rail length, if the two—way shear design leads to rail lengths less than the minimum rail length required by code, the program will add studs until the minimum rail length required by code is met.

2.3.1 To Check the Minimum Stud Rail Length

The minimum rail length check is performed when the option to *Include minimum shear reinforcement for drift* is selected. Within PTInput, open the ***Material – Reinforcement*** dialog. You can access the dialog by clicking *Next* in the ***Material – Concrete*** dialog, or *Back* in the ***Material – Post-Tensioning*** dialog when in PT mode, and in the ***Base Non-prestressed Reinforcement*** dialog in RC mode. Alternatively, the dialog can be opened by going to *Material->Reinforcement…* from the menu items. Located under the *Shear Reinforcement* section of the ***Material – Reinforcement*** dialog window is the *Include minimum shear*

reinforcement for drift option. Selecting this option will invoke the minimum rail length check.