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spSlab v5.50 - Upgraded August 2018
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New Features:
1. Introduced new spReporter module with the following features, for generating, viewing, exporting and printing reports
   (a) Program text results output in formatted tables, modernized headings and titles along with diagrams including a report cover page and table of contents
   (b) Export and print options in a panel to customize reports
   (c) Option to preview the report in pdf/word or text formats
   (d) Option to select between small, medium or large font sizes for the report
   (e) Options for printer selection and customization of printer properties
   (f) Options for print settings including paper size, orientation, margins and range
   (g) Option to export the customized report in .docx, .xlsx, .pdf, .csv or .txt formats
   (h) Option to directly print the customized report in .docx, .pdf or .txt formats
   (i) An Explorer panel to organize contents in a tree view for easy navigation between data tables
   (j) Option to include/exclude parts of the output to customize the report
   (k) Easy navigation options within the explorer tree view
   (l) Option to collapse or expand the explorer tree view
   (m)Explorer panel location options based on user preference
   (n) Option to keep explorer configuration based on user preference
   (o) Option to toggle explorer On/Off
   (p) Large preview area to evaluate the generated report
   (q) Standard navigation options in the report preview
   (r) Toolbar for easy and quick access to commands and options
   (s) Page viewing options for the report preview
   (t) Zoom and pan options in preview area
   (u) Select and copy data options from the report preview
   (v) Standard navigation options in report preview via page numbers and buttons
   (w)Settings dialog box to set or modify preferences

2. Introduced new spResults module with the following features, for viewing and exporting input and output data
   (a) Program results output in formatted data tables
   (b) Viewing area to display data tables including associated notes and titles
   (c) Option to toggle On/Off display of table notes
   (d) Manual adjustment of data table column widths
   (e) Ascending or descending sort option for each column in data table
   (f) Select and copy option from the data table
   (g) Standard navigation options within data tables

(h) Toolbar for easy and quick access to commands and options
(i) Auto adjust table option to fit column widths in the viewing area
(j) Capability to switch to default/maximum permissible column widths
(k) Option to export data table being viewed in .txt .csv or .xlsx formats
(l) Standard navigation among data tables using table numbers and buttons
(m)Settings dialog box to set or modify preferences
(n) An explorer panel to organize contents in tree view for easy navigation between data tables
(o) Standard navigation options within the explorer tree view
(p) Option to collapse or expand the explorer tree view
(q) Explorer panel location options based on user preference
(r) Option to keep explorer configuration based on user preference
(s) Option to toggle explorer On/Off

3. Added independent font options for printed outputs

Enhancements:
1. Provided additional web based resources and online help options in the help menu and disabled all options related to context help.
2. Optimized the diagram in print preview to cover maximum available space in the paper for clarity in printing.

Resolved Issues:
1. Resolved the issue of double image generation in PDF files created from print preview.

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spSlab v5.00 - Upgraded December 2015
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Code Features:
1. Added support for ACI 318-14 design standard in Metric and English units.
2. Added support for CSA A23.3-14 design standard in Metric and English units.

Enhancements:
1. Added offset capability for Longitudinal Slab Bands for modeling edge/exterior equivalent frames as well as interior equivalent frames with differing width-L and width-R values.
2. Added offset capability for Longitudinal Beams for modeling edge/exterior equivalent frames as well as interior equivalent frames with differing width-L and width-R values.
3. Improved reporting of short and long term deflections by providing extended summary in new Deflection Results section and by detailing long-term and strip

deflections by segments along the span allowing more transparency into displacements resulting from dead, live, sustained live, and total.

4. Resolved various issues related to deflection calculations:
    a. Added sustained load as a load level in deflection calculations
    b. Accounted for location in calculations of maximum long-term deflections
    c. Accounted for moment sign when calculating moment of inertia for cracked sections
    d. Accounted for non-prismatic members when averaging effective moment of inertia

5. Provided a new default Solve Option for calculation of Circular Critical Shear Perimeter for Circular Supports connecting with a Flat Soffit. The equivalent square perimeter procedure given by ACI-ASCE Committee 426 Report is used for all other conditions

6. Improved reporting of reinforcement by providing development lengths tables in design results of top and bottom bars designed for flexure

7. Provided a check to warn when bar cut-off location is in tension zones and shear capacity does not satisfy ACI-318, 12.10.5.1

8. Added indication of location of critical section for flexure and display the corresponding moment value in Moment Capacity graph similar to Shear Capacity graph

9. Provided a comparison table for applied and design moments detailing the required reinforcement by segment along the span

2. 10.Documented the status of section capacity compared to applied moment and the corresponding governing pattern and load combination for maximum positive and negative moments

3. 11.Included a warning message and report if flexural demand exceeds the flexural capacity in investigation mode

4. 12.Revised minimum thickness calculations for systems defined as two-way but having a ratio of long to short span greater than 2 to be calculated as for one-way construction for deflection control including for cantilevered spans.

5. 13.Enhanced zoom in, zoom out, and pan options in active screens

Resolved Issues:
1. Implemented full consideration of drop panel depth for flexural design at discontinuous slab band ends.
2. For two-way floor systems designed in accordance with CSA A23.3-2004, revised calculation of corner columns one-way shear resistance to take advantage of phi factor of 0.65 instead of 0.60.
3. Provided warnings when features such as drop panels or bands are neglected in one-way shear resistance calculations.
4. Resolved issue with program hanging and/or producing many steel layers in order to resist very large bending moments
5. Revised calculation of strip deflections in two-way slabs to correct the deflection values overestimated in the column strip for the first exterior span.

6. Included impact of transverse slab bands and transverse beams stiffness to more accurately arrive at effective span stiffness and remove conservatism from deflection estimates when compared with similar spans with drop panels

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spSlab v3.60 - Updated April 2013
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Resolved Issues:
1. In investigation mode where required shear capacity provided by stirrups, V_s, exceeds $4\phi\sqrt{f_c'}\,b_w d$ and user-provided stirrup spacing exceeds the halved ACI code maximum, the shear capacity – instead of previously used $4\phi\sqrt{f_c'}\,b_w d$ – is now reduced to $0.5\phi V_c$ resulting in lower beam shear capacity
2. Shear and torsional capacity in segments between support face and critical section for shear at span ends is now investigated explicitly rather than assumed to be the same as at the critical section for shear. In cases where shear reinforcement is reduced or discontinued between support face and critical section for shear, this may lead to insufficient shear and torsional capacity reported by program in the vicinity of supports.
3. For lightweight concrete beams, the lambda factor is now included in V_c to calculate the shear force threshold that triggers the halved ACI code maximum stirrup spacing potentially resulting in smaller stirrup spacing requirements
4. In investigation mode, to ensure that flagging of exceeded shear capacity in text results report matches the graphical results, text output now includes more segments where shear capacity is checked against the shear force
5. Improved program ability to recognize and flag in results report special conditions, such as stirrup area below minimum condition and inadequate stirrup spacing condition, encountered in shear design and investigation
6. For a single span model, the effective moment of inertia was modified to include only the effect of the midspan section instead of previously used midspan and right end sections. In single and multi-span beams, fixed ends are now treated as continuous end conditions. Depending on beam geometry and loading, the changes introduced in calculating $I_{e,avg}$ can potentially result in a lower $I_{e,avg}$ and higher deflections.

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spSlab v3.50a - Updated May 2012
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Maintenance release to update installation procedure for systems with 64-bit version of Windows 7

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spSlab v3.50 - Upgraded December 2011
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Code Features
1. Added support for ACI 318-11 design standard in English and Metric units.

Enhancements
1. Revised punching shear capacity calculation for critical sections with variable depth. Instead of conservatively using the minimum depth, the revised calculations are based on the weighted average depth along the perimeter
2. Revised default value of rupture modulus, fr, to half of its value for deflection calculations of one-way slabs and beams in accordance with the 3rd Update of CSA A23.3-04
3. Implemented several improvements clarifying program output
4. Improved calculations of bar development length resulting in reduction of the development length for some cases

Resolved Issues
1. Corrected output section for column axial forces and moments to remove double reduction for patterned live loads
2. For CSA Standard, corrected calculation of Beta factor for shear capacity of slab bands by categorizing slab bands as special members based on their overall depth rather than on depth below the slab
3. Revised program to preserve column capital dimensions when slab band option is selected
4. Restricted slab band option shown in General Information window only for CSA A23.3-04 standard
5. Revised program to terminate solution when drop panels extended outside of slab in the direction of analysis
6. Resolved several issues related to program output, installation, and checking for updates

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spSlab v3.18 - Updated February 2011
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Resolved Issues:
1. For column along the longitudinal edge, adjusted location of punching shear critical section to be based on the drop panel thickness rather than slab thickness only.
2. For punching shear calculations around circular supports, based on literature recommendations adjusted equivalent square support dimensions to produce the same perimeter rather than the same area as the circular support.
3. For supports with column capitals, adjusted locations of critical section for flexure design from column face to capital face for interior supports and to one half of capital projection for exterior supports.
4. Allowed reduction of torsional moment to 0.67*Tcr from full value if compatibility torsion is selected simultaneously with combined M-V-T design per CSA A23.3-04 code.
5. For combined M-V-T design, enforced bar sizes reported in Top Reinforcement table match bar sizes reported in Top Bar Details in all cases.
6. For CSA code, corrected the application of the 50 mm limit to clear effective concrete cover to be measured from bar surface rather than from bar center in calculation of maximum reinforcement spacing derived from crack control requirement.
7. Applied correction to deflections and internal forces for models with triangular and trapezoidal loads.
8. Relaxed minimum shear reinforcement requirements for beams meeting certain geometrical criteria stipulated by ACI 318 and CSA A23.3-94 standards. For details, refer to section One-Way Shear Analysis of Longitudinal Beams and Slab in Chapter 2 of spSlab Manual.
9. Corrected design for negative flexural reinforcement in members with depth changing at edges of drop panels, transverse beams, or transverse slab bands. This correction may lead to an increase in required area of flexural reinforcement in rare cases where the smaller moment away from the face of support acting on a shallower section requires more steel than the higher moment at the face of support acting on a deeper section.
10. In Results Report, corrected Input Echo section with respect to reporting the presence of a cantilever on the right hand side of the model. This correction has no impact on analysis and design results.
11. Upgraded program documentation to address changes in the program and other editorial issues.

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spSlab v3.12 - Updated September 2010
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Maintenance update to correct factors used for minimum area of transverse reinforcement calculations in metric units per ACI 318M-08 and ACI 318M-05 found in versions 3.10/3.11 and improve context sensitive help for some elements of the graphical user interface.

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spSlab v3.11 - Updated April 2010
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Resolved Issues:
1. Revised interpretation of CSA A23.3 length of attached torsional member, Lt, used in calculations of torsional stiffness, Kt, at exterior supports. Refer to spSlab Manual, Chapter 2 section on Equivalent Frame Method for details.
2. Reduced amount of reinforcing required over supports by correcting spacing requirements for reinforcement placed within b_b band for two-way slabs designed per CSA A23.3.
3. Corrected width of tension zone for calculation of minimum reinforcement area in beams that are part of two-way systems when T-Section beam design option is selected.
4. Corrected section width in calculation of development length for bottom bars in beams that are part of two-way systems when T-Section beam design option is selected.
5. Included ribs outside of solid block in width of the compression zone when calculating negative reinforcement over supports in two-way joist systems.
6. Improved input validation checking against longitudinal slab bands and drop panels in the same span.
7. Revised Manual and Help documentation to enhance description of various program features and to resolve several typographical and formatting issues.

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spSlab v3.10 - Updated January 2010
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Enhancements:
1. Adjusted ACI 318-08 metric factors for concrete shear capacity and minimum shear reinforcement calculations.
2. Revised minimum shear requirements for special members per ACI 318-08.

3. Revised normal weight concrete limit in development length calculations per ACI 318-08.
4. Revised lambda factors for lightweight concrete.
5. Revised minimum thickness calculations for two-way systems for ACI code.
6. Improved development length calculations for structural semi-low density concrete for CSA code.
7. Improved calculations of reinforcement concentration over supports required per CSA code.
8. Improved calculations of modified gamma_v and gamma_f factors for corner and edge columns for ACI code.
9. Improved calculations of reinforcement required for flexural transfer of unbalanced moment over supports.
10. Allowed more economical design of slabs in systems with transverse beams by assuming face of the support at beam edge if beam is wider than column.
11. Improved calculation of moment distribution factors for systems with longitudinal beams.
12. Improved calculations of moment distribution factors in models with transverse and longitudinal slab bands in selected spans only.
13. Improved interpolation of moment distribution factors at span ends over wide (wall) supports in systems where column strip width and middle strip width are not equal.
14. Revised Manual and Help documentation to increase accessibility, enhance description of new program features and reflect added functionality.
15. Provided access to software manual directly from the Help menu.
16. Revised text output for increased clarity and consistency.

Resolved Issues:
1. Exceeding combined M-V-T capacity of bottom bars in certain design cases
2. Column reaction equal to zero for systems that include lateral loads and moment redistribution
3. Applying default load combinations when switching design codes and no load cases are defined.
4. Applying default load combinations when switching design codes and SELF and/or DEAD load cases are not defined
5. Providing results for combined shear and torsion in investigation mode.

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spSlab v3.00 – Upgraded April 2009
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Code Features:
1. Added support for ACI 318-08 design standard in English and Metric units.
2. Added further support for CSA A23.3-04 floor systems with slab-bands in selected spans including combinations of slab-bands with drop panels.

3. Updated Lambda factor calculations for lightweight concrete for consistency with latest standards and other StructurePoint programs.
4. Updated calculations for the following issues:
    a. Minimum slab thickness limits in joist construction
    b. Minimum slab thickness for lightweight concrete construction
    c. Minimum beam/one-way slab thickness
    d. Minimum slab-band thickness
    e. Minimum shear strength and reinforcement to address size effect of special members in ACI and CSA standards
5. Introduced unified treatment of effect of slab bands and beams in the transverse direction.
6. Introduced new option to consider drop panel thickness in one way shear capacity calculations.
7. Introduced new option to adjust γ_f factor to optimize punching shear resistance with unbalanced moment transfer.
8. Introduced new option to distribute shear forces to the column and middle strips based on the flexural forces distribution coefficients.
9. Incorporated new formulas for development and splice length in both English and Metric units.
10. Enhanced checking of structural integrity reinforcement and detailing requirements intended to mitigate the potential progressive collapse.

Enhancements:
1. Added new option to incorporate beam flanges to achieve higher economy for two-way slab systems with beams. Slab may be subjected to lower forces and have less reinforcement.
2. Added new option to incorporate beam depth in transferring negative moments over support.
3. Allowed two-way joist systems (Waffles) to provide and warning but complete analysis and design results when rib spacing and geometry are not code compliant.
4. Allowed punching shear check for one-sided drop panels.
5. Introduced new distribution factors for wall supported two-way slabs
6. Provided easier and faster access to software manual directly from the Help menu.
7. Improved shear and torsion capacity charts, various dialog windows, bar spacing requirements and significant digits for redistribution coefficients and development length constants
8. Renamed pcaSlab, also formerly known as ADOSS, as **spSlab** to better relate and support the registered trade name of the publisher, StructurePoint, formerly PCA's Engineering Software Group.

Resolved Issues:
1. Corrected display of calculated axial forces and moments for circular columns modeled over beams.

2. Corrected calculation of clear span in the transverse direction.
3. Corrected error in calculation of self-weight bound by punching shear critical section.
4. Incorporate consistent use of unbalanced critical width for models with drop panels
5. Eliminated the occurrence of SELF load case in the span table

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pcaSlab v2.51 – Updated January 2009
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Resolved Issues:
1. Editorial corrections in Startup Defaults dialog box and text output

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pcaSlab v2.50 – Upgraded December 2008
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Code Features:
1. Added support for CSA A23.3-04 design standard

Enhancements:
1. Provided capability to modify moment distribution factors
2. Provided capability to modify column strip width
3. Reported moment distribution factors and strip widths in text output
4. Added SNOW load by default in load cases and load combinations
5. Provided capability to add and remove self weight from both ultimate and service load combinations
6. Included self weight and live load patterns in text report
7. Included live load pattern selection and an option to display load units in graphical load view
8. Improved punching shear calculations
9. Removed drop panel validation when a CSA standard is selected
10. Provided capability to copy a set of stirrups from left side of a beam to the right
11. Provided capability to modify location of first stirrup
12. Improved placement of stirrup segments
13. Improved calculation of additional width due to stirrup bend
14. Improved calculations of distance from extreme compression fiber to centroid of longitudinal tension reinforcement in Design and Investigation modes
15. Reported segmental reinforcement requirements
16. Allowed one flexure bar in joist beams
17. Flagged flexural reinforcement if provided steel area in design mode exceeds maximum allowable
18. Added a warning and a flag for deep beams to indicate that additional design and reinforcement detailing is required

19. Provided capability to start design from the maximum bar size rather than minimum
20. Included rib spacing validation for waffle slabs
21. Clarified input parameters for ribs
22. Updated and enhanced manual

Resolved Issues:
1. Corrected overestimated stirrup material take-off
2. Increased accuracy of self weight calculations for metric unit system
3. Self-weight is now included in load combination results for column axial forces
4. Corrected calculations of solid head self weight in joist systems
5. Corrected minimum slab thickness for slabs with transverse beams on discontinued edge per CSA code
6. Corrected integrity reinforcement calculations per CSA standard by using specified rather than factored loads
7. Implemented calculations of moment distribution factors for slab systems with beams between all supports for CSA A23.3-94. Previously ACI 318-02 factors were used.
8. Eliminated Memory Allocation Error happening during flexure investigation of a failed design
9. Resolved Memory Allocation Error shown for systems with transverse beams extending beyond end cantilevers
10. Corrected standard drop panel dimensions for first and last columns with no cantilevers
11. Corrected punching shear resistance around corner columns for CSA A23.3-94 standard
12. Corrected shear resistance for sections with effective depths greater than 300 mm for CSA A23.3-94 standard
13. Corrected load patterning for shear forces
14. Eliminated Memory Allocation Error happening randomly for beams with moment redistribution
15. Corrected minimum reinforcement calculations for beams with flanges in tension per CSA A23.3-94 standard
16. Corrected bottom reinforcement selection issue resulting in one bar (instead of two) that extends to the support in some cases
17. Supplemented maximum spacing limit requirements for one-way slabs to include provision 7.6.5 per ACI 318
18. Corrected punching shear and deflection issues occurring in some two-way systems having drop panels and longitudinal beams
19. Removed inadvertent flagging of torsion results occurring occasionally in torsion section of design results
20. Corrected axial forces and moments report to include results for circular columns
21. Resolved issue with inadvertent very small positive bending moments occurring intermittently on cantilevers

22. Corrected issue with values of lambda factor for long-term displacements for some sections with compressive reinforcement
23. Corrected bar development length for flexure design per CSA standard
24. Corrected weight of bar #15 in CSA G30.18 bar set
25. Corrected location of critical section for positive bending moments not to approach span ends closer than face of supports
26. Adjusted location of critical section for one-way shear in slabs supported by transverse beams
27. Removed error checking for support width in one-way systems
28. Resolved issue in Torsion Capacity view for mixed systems with beams and one-way slabs
29. Eliminated overlapping of Frame and Engineer labels in printout

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12-15-2006 pcaSlab v2.00
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New Features:
1. Supports ACI 318-05
2. Includes calculation of long-term deflections

Enhancements:
1. Check for Updates command is added
2. The installation file is digitally signed by pcaStructurePoint
3. If all network license tokens are in use a warning message is now displayed
4. Improved reactions report
5. Properties of cracked sections are now reported
6. Flexural capacity now increases gradually over the development length of reinforcing bars
7. Side cover can be modified
8. Distance between bar layers can be modified
9. Number of stirrup legs in the design mode can be controlled
10. Steel requirements for structural integrity are now implemented for beams and one-way systems
11. 80 (previously 40) character long descriptions are now allowed in General Info
12. Consistent coordinate system for loads and displacements is now introduced with axis Z pointing downward
    Note: This may require changing the sign of prescribed displacement if they were entered into the data file using pcaSlab/pcaBeam v1.5x

Resolved Issues:
1. Incomplete data resetting from previous solution
2. Incorrect data validation for spans with beams
3. Increased number of additional bars for unbalanced moment transfer by flexure at support adjacent to cantilevers

4. Overestimated reinforcement bar lengths
5. Incorrect values of Gamma_v factor
6. Consideration of drops at end columns for punching shear and negative reinforcement calculations in cases with or without end cantilevers
7. Incorrect pattern selection for punching shear calculations
8. Incorrect bar spacing for top reinforcement
9. Effective width and one tenth of span length are not taken into account for bar spacing in one way systems
10. Incorrect value of concrete modulus of rupture for the CSA standard when imported from ADOSS files
11. Incorrect values of column and shear forces for point loads located very close to a support
12. Reversed signs of support loads
13. Shear capacity jump in case of the first stirrup having zero area
14. Freezing of the program in some situations e.g.
    (a) solving a model which contains a drop panel with a zero length on one side
    (b) displaying combined shear and torsion capacity diagram for some models
15. Wrong bar size selected to calculate d' for the transfer of negative unbalanced moments by flexure
16. Top reinforcement selection for a simple beam with no negative moments
17. Incorrect moment capacity display in cases with no bars and no moments
18. Double support loads shown in load view
19. Incorrect reporting of solution options in the input echo
20. Problems with file association for slb files in Windows environment
21. Glitches in the Input Wizard
22. Incorrect stiffness of equivalent column for columns above the slab
23. Calculation of flexural capacity fy = 87 ksi and above
24. Slight overestimation of flexural capacity for CSA
25. Neglecting effective width when calculating flexural capacity
26. Clearing of moment redistribution flag when switching from one way beam system to two way system
27. Neglecting bottom continuous bars in material takeoff for some models
28. Using slab cover for flexural capacity of a beam
29. Reporting bars covering the whole span as short bars (long should be reported)
30. Calculating capacity as if only one layer was used when flexure design results in two layers of bars
31. Converting two layers of bars to one layer when switching from design to investigation mode
32. Not taking stirrup diameter into account when calculating bar spacing in beams
33. Issues related to calculations of effective moment of inertia for cracked members
34. Default max bar spacing for CSA increased to 500mm from 450mm
35. Excessive reinforcement for one-way slabs due incorrect calculation of minimum spacing per CSA crack control requirements

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01-12-2006 pcaSlab v1.51
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Enhancements:
1. pcaSlab can now import PCA-Beam v1.0x data files. See "Notes on PCA-Beam v1.0x data file import" below.
2. Maximum bar spacing in beams and one-way slabs now takes into account crack control requirements.
3. pcaSlab now performs the calculations of corner reinforcement for two-way slabs per section 13.3.6 of ACI 318-99 and ACI 318-02 codes. Previously these calculations were performed only for the CSA code.

Resolved issues:
1. Issue of missing longitudinal torsional reinforcement details for some specific design parameters has been resolved.
2. Setting moment redistribution factors larger than 0 for cantilevers by copying redistribution factors from internal supports or by adding and removing spans has been disabled.
3. If beams/one-way systems and CSA code are selected, then the automatically calculated value of the concrete rupture modulus now defaults to 0.5*fr. However, if the full value has to be used, as for one-way slabs, then the default value has to be manually overwritten by the user.
4. For CSA code the minimum area of flexural reinforcement in beams is now correctly calculated based on the depth of the member instead of the effective depth (as for ACI).
5. Load combination numbers are no longer switched for M-ve and M+ve in the text output under Segmental Moment and Shear – Envelopes.
6. Overflow error in torsion design for load cases with no live load has been eliminated.
7. A "#" character can now be safely used in the text input fields. However, it is not allowed to start a text input with "###".
8. In investigation of one-way shear, pcsSlab now uses the provided steel diameter and cover rather than assuming these values from design parameters.
9. In investigation of punching shear, pcsSlab now uses the provided steel diameter and cover rather than assuming these values from design parameters.
10. For two-way slabs, if a beam is wider than the column strip -- which is often the case if a banded beam system is modeled as a two-way slab -- then the solution is now aborted. Previously it was continued with the column strip width set to zero. However, moment associated with the column strip was then missing as middle strip and beam strip moments did not add up to the total moment obtained from the equivalent frame solution. To analyze banded beam system, one-way/beam option has to be selected in pcaSlab.
11. Maximum spacing requirements in negative reinforcement bands over supports for the CSA code have been corrected.

12. Bottom continuous bars are now taken into account when checking transfer by flexure of the positive unbalanced moments.
13. An issue that in some cases could cause underestimation of punching shear stresses for external columns has been resolved.
14. Updates (mainly sections on Reinforcement Selection, Additional Reinforcement at Supports, Integrity Reinforcement, Corner Reinforcement) and minor editorial changes have been applied to the manual.

Notes on PCA-Beam v1.0x data file import:
1. PCA-Beam v1.0x supported ACI 318-89 and CSA A23.3-84 standards which are not supported in pcaSlab. By default pcaSlab will assume ACI 318-99 or CSA A23.3-94 standards respectively.
2. PCA-Beam v1.0x allowed cantilevers with zero dimensions. However, they are not allowed in pcaSlab, so a warning will be displayed when such cantilevers are imported. They will have to be then removed or their dimensions will have to be corrected before the analysis can be preformed.
3. The center segment of a three-lapped top continuous bar entered in PCA-Beam v1.0x will be ignored if its size does not match any of the right or left segments. This is because pcaSlab does support lapped bars and it does support top discontinuous bars.
4. The first stirrup in the span will be moved 3in [75mm] away from the face of the column (below) regardless of the first stirrup location set in PCA-Beam v1.0x. This is due to fixed location of the first stirrup assumed in pcaSlab.
5. PCA-Beam v1.0x load cases including lateral loads consist of two patterns: Left-to-Right and Right-to-Left. In pcaSlab, these two patterns will be converted to two separate load cases: Lat-L and Lat-R.
6. Due to slightly different input validation rules in pcaSlab and PCA-Beam v1.0x, it may happen that a valid PCA-Beam file will not run in pcaSlab. Similarly, it is also possible that files that failed in PCA-Beam v1.0x will run in pcaSlab.

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07-07-2005 pcaSlab v1.50
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License codes for pcaSlab versions 1.00 through 1.11 will not work with this release. This release is considered an upgrade and requires obtaining a new license code.

New features:
1. Analysis, design and investigation of beams and one-way slab systems
2. Torsion analysis and design of beams (equilibrium and compatibility)
3. Moment redistribution in beams and one-way slab systems
4. Improved licensing including:
   - multiple entries (each on a separate line) are allowed in the lshost.txt to achieve license server redundancy

- LAN keyword can be specified in the lshost.txt file to instruct the license manager to search for a license in the local area network (within the same subnet)
- complete licensing information displayed in the About box
5. User interface enhancements including:
   - font selection is available for the text and the graphical output
   - reinforcement labels can now be rotated to fit better in the graphical output
   - reinforcement lengths are now be displayed in the graphical output
   - load factors can now be automatically reset when the code selection changes
6. Enhanced documentation including:
   - context sensitive Help
   - reformatted and updated manual

Resolved issues:
1. Shear capacity for the last stirrup in a span has been corrected
2. Text results of column axial forces and moments now include all load cases
3. An issue that sometimes caused the program to start minimized has been resolved

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03-02-2005 pcaSlab v1.11
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Corrections & Improvements:
1. Minimum slab thickness for CSA A23.3-94 code has been corrected to account for drop panels. Previously, the minimum thickness was conservatively calculated in all cases like for flat plates and slabs with column capitals.
2. Location of load coming from self-weight of a drop panel has been corrected. Previously, if there was no right cantilever, the load from the right drop panel in the last span was incorrectly applied at the left side of the span.
3. Maximum spacing of flexural reinforcement has been corrected not to exceed two times the slab thickness according to ACI codes 318-02 and 318-99 (provision 13.3.2).
4. Help file can now be opened on all systems and for all users from within pcaSlab.
5. Program does not stop the analysis if a drop panel is smaller than a column. It displays a warning and disables punching shear check at the support where this condition occurs.
6. Results for triangular and trapezoidal loads have been corrected.
7. Top reinforcement spacing for the left zone of a cantilever has been corrected. Previously the value of SpReq was in some cases inconsistent with the strip width and with the number of bars.
8. Code selection combo box on General Information dialog box displays now all items (design codes) and there is no need to scroll.

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pcaSlab - V1.10 - October 2003
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Changes as a result of ACI 318-02 Design Code
1. The user dialog interface was modified to accommodate the selection of ACI 318-02 both in customary and metric units.
2. Automatic generation of default load combination factors implemented. Wind and Earthquake load cases were enabled by default.
3. The limit number of load combinations was increased to 20 to accommodate ACI-318-2002 requirements.
4. The combination factors for default ACI 318-02 project were defined.
5. Strength reduction factor for flexural resistance was implemented for tension, transition and compression controlled sections (function of eps_t).
6. Strength reduction factor 0.75 was implemented for shear
7. Maximum area of reinforcing steel for ACI 318-02 was expressed in terms of tensile stress eps_t=0.005.
8. The requirement for minimum shear reinforcement 11.5.5.3 (Eq.11-13) was implemented in addition to the old requirement.
9. Additional example files were provided for ACI 318-02.

Changes related to CSA A23.3 design code
1. Integrity Reinforcement calculations and output were added to the program.
2. Corner Reinforcement calculations and output were added to the program.
3. Corner shear calculations and output was added to the program.
4. Banded reinforcement calculation procedure was redesigned/improved.

Corrections of Previous Versions of the Program
1. Correction was done to the required minimum slab thickness.
2. Correction was done to the dialog window "Solve Options". The label regarding free edge distance from critical punching section was modified.
3. Correction was done to implement the requirement of ACI-318 section 13.6.4.3 for wide supports (walls). It was assumed that uniform distribution will be done for wall width equal total strip width. For support/strip width ratio in the range0.75-1.00 linear interpolation was implemented to assure smooth modification of distribution factor as the support width changes.
4. In dialog window "Colors" selection of border line thickness was implemented.
5. Correction was done to the input validation of geometric dimensions in metric unit system. The purpose of modification is to round maximum and minimum limit values, wherever appropriate.
6. Modification was made to user selectable maximum reinforcing ratio. The default and limit values were changed to 5%.
7. Modification was made in procedure which imports ADOSS input files. This corrects the selection of the reinforcement table.

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09-17-2003 - Corrections of previous versions of the program

1. Correction was done to the calculation of Asmax for ACI 318-99 code. In calculation of Asmax = 0.75 * Rho-bal * bd the factor of 0.75 was restored.
2. Correction was made in the formula for section moment capacity for CSA code. Before the correction the program used factor Alpha1 set to 0.85 after the correction the program uses Alpha1 formula.
3. Correction was done to the procedure, which imports data from ADOSS program. This correction fixes a problem with creating additional (extraneous) load combinations.
4. Modification was done in shear capacity graph for beam elements. This correction fixes the discontinuity in shear envelope curve.
5. Correction was done in calculation of the weight of stirrups (material take-off). This fixes the initialization error resulting in excessive value of stirrups weight.
6. Correction was done to the calculation of equivalent stiffness for models having beams. This corrects the problem of lack of symmetry in symmetrical models having beams of significant depth.
7. Modification was done to vertical scaling of reinforcement drawing. The purpose is to prevent drawing beyond window edges. Excessive scale will automatically adjusted and will override the default and/or manual setting.
8. Modification was made in the algorithm calculating the lengths of top reinforcement. This change corrects excessive lengths for certain designs with beams.
9. Modification was made in the algorithm which calculates the moment capacity. The change corrects the interpretation of development length when generating the capacity profile.
10. The ultimate strain for reinforcing steel for CSA code was changed from 0.003 to 0.0035.
11. Correction was done to the calculation of self weight of transverse beam.
12. Correction was done to the calculation of bar spacing in beams having multiple steel layers.
13. For sections exceeding maximum allowable reinforcing index, the capability for calculating compression rebar was implemented. This feature is functional for main flexural reinforcement as well as unbalanced moment reinforcement. The selection checkbox that allows activating the feature was implemented in window "Solve Options".
14. Modification was done to enable input of negative (upward) load magnitudes.