

SAP2000 v25.2.0 Release Notes

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This document lists changes made to SAP2000 since v25.1.0, released 01-December-2023. Items marked with an asterisk (*) in the first column are more significant.

Data Files

Enhancements Implemented

*	Ticket	Description
	10382	Three new frame section libraries have been added conforming to AISC Shapes Database v16.0. These libraries are consistent with the shape properties and dimensions tabulated in AISC Steel Construction Manual, 16th Edition, 1st Printing. The new shapes database files are (1) AISC16.xml - Shapes database in US customary units, (2) AISC16M.xml - Shapes database in metric units, and (3) AISC16-A1085.xml - This database contains dimensions and properties for HSS shapes covered under ASTM A1085/A1085M and is in US customary units.

Design – Concrete Frame

Enhancements Implemented

*	Ticket	Description
*	10358	An enhancement was made to add joint-shear design for ACI 318-19 concrete frame design. Joint shear is now performed for Ordinary moment frames (OMF) in Seismic Design Category (SDC) B, for Intermediate moment frames (IMF), and for Special moment frame (SMF). The joint shear force for OMF and IMF are computed using the nominal flexural strength of the beams. SMF joint shear is computed using the probable flexural strength of the beams.
	10359	An enhancement has been made to the concrete frame design code “ACI 318-19” where the design now considers the interaction of major- and minor-direction shear forces in a column per ACI 318-19 sections 22.5.1.10 and 22.5.1.11. It is noted that if any of $V_{u,x}/\phi*V_{n,x}$ or $V_{u,y}/\phi*V_{n,y}$ is less than 0.5, or if $V_{u,x}/\phi*V_{n,x} + V_{u,y}/\phi*V_{n,y}$ is less than 1.5, this enhancement has no effect per ACI 318-19 sections 22.5.1.10 and 22.5.1.11.

Design – Concrete Shell

Enhancements Implemented

*	Ticket	Description
	10212	An enhancement has been made to the Eurocode 2-2004 concrete shell design in which the Shear Design Method 1 is reconciled for all load steps in multi-step load cases/combos. Previously, each load step was designed separately for shear. Certain load steps could be satisfied by increasing longitudinal reinforcement without adding shear reinforcement, while for other load steps longitudinal reinforcement alone was insufficient, and transverse shear reinforcement was required. However, the additional shear reinforcement required for one load step was not considered when designing other load steps, and could result in an over-conservative requirement for longitudinal reinforcement for those load steps that did not require transverse reinforcement. Now, if any load step requires transverse reinforcement, all other load steps will be re-designed with transverse reinforcement provided. The shear design will be less conservative and consistent throughout all load steps of the load cases/combos. In addition, an option is added in the Design Preference to specify whether or not to include the additional tensile forces due to shear in the design.

Design – Steel Frame
Enhancements Implemented

*	Ticket	Description
*	5882	An enhancement has been made to add the API 4F 5th Edition 2020 steel frame design for drilling and well-servicing structures.
*	9867	An enhancement has been made to add the AISC 360-22 steel frame design code which covers "ANSI/AISC 360-22 An American National Standard: Specification for Structural Steel Buildings, August 1, 2022" and "ANSI/AISC 341-22: An American National Standard: Seismic Provisions for Structural Steel Buildings, September 26, 2022."
	10315	An enhancement has been made to the steel frame design codes EN 1993-1-1:2005/A1:2014, NTC 2008, and NTC 2018 where previously a warning message was issued whenever Ved exceeded 0.5*Vplrd for any location in a column, or whenever Ved exceeded 0.5*Vplrd or Ned exceeded 0.5*Nplrd for any location in a beam. Now the design issues an error message when Ved exceeds 0.5*Vplrd for any location in a column per EC8 6.6.3(4). Similarly, an error message is issued when Ved exceeds 0.5*Vplrd or Ned exceeds 0.5*Nplrd for any potential plastic hinge location in a beam per EC8 6.6.2(2). The new behavior is more restrictive (due to EC8 code clauses) and is reported as an error instead of a warning.
	10445	An enhancement has been made in the steel frame design codes in which the value of Cw (or Iw for Euro and Indian codes) is only calculated during design if its value was not defined in the section database. The new implementation prioritizes the section database values. Previously, the design implementation ignored the Cw defined in the database and always relied on the formulas used in the design algorithms. This modification causes small changes in the results. The design verification example documentations were modified to accommodate this change.

Drafting and Editing
Enhancements Implemented

*	Ticket	Description
	10293	An error message was modified in the grid definition form to indicate when grid lines are too closely spaced. Previously the error message indicated that the grid lines were duplicated. In addition, the tolerance used to determine when grid lines are too close was unified to be two times the model auto-merge tolerance in the grid definition form, database table import, and Edit menu > Edit Points > Add Grids at Selected Points command. Using grid lines that are spaced close to the merge tolerance can cause unwanted merging of objects, hence this is not allowed.

External Import and Export
Enhancements Implemented

*	Ticket	Description
	9519	An enhancement was implemented in the DXF import to handle DXF point objects that are not connected to any other imported CAD objects. These points are now imported as SAP2000 special joints, which will not be deleted when the SAP2000 model is saved.

Installation and Licensing
Enhancements Implemented

*	Ticket	Description
	10219	The version number has been changed to v25.2.0 for a new intermediate release.

Loading

Enhancements Implemented

*	Ticket	Description
	10242	An enhancement has been implemented to expose the short-period design spectral acceleration (Sds) input for Method 1 for computing seismic coefficients when defining auto seismic load patterns per ASCE 7-22 code. Previously, Sds input was only available for Method 2.

Miscellaneous

Enhancements Implemented

*	Ticket	Description
	10444	When a model with layered-shell properties that have nonlinear or inactive material component behavior is run with a license level that does not include the nonlinear layered shell feature, a pop-up warning message will now be shown to inform the user that all layers in layered shell properties will be analyzed using fully linear elastic material behavior instead. This change is to help inform users about the program behavior, but it does not change the previous analysis behavior of layered shell properties for any license level.

Results Display and Output

Enhancements Implemented

*	Ticket	Description
	10207	Changes were made to Section Cuts drawn on screen to use consistent coordinates when a Coordinate System other than the Global was selected for the graphical display. Also, the projected coordinates shown for the drawn line in 3D are now with respect to the projection of the origin of the Coordinate System and no longer depend on the Graphics mode.

Structural Model

Enhancements Implemented

*	Ticket	Description
*	10268	A new feature has been added for assessing the serviceability of steel-framed floor systems subjected to vibrations caused by walking activities. The methodology follows the procedures outlined in Chapter 7—Finite Element Analysis Methods—of the AISC Steel Design Guide 11: Vibrations of Steel-Framed Structural Systems Due to Human Activity, Second Edition. Multiple sets of excitation can be specified, and the response can be calculated at any number of response locations in the floor system. Utilizing steady-state analysis, a walking load is applied at each excitation location and the corresponding accelerations are measured at the response locations. These accelerations are then compared to established human-comfort tolerance levels. The results are displayed in an interactive form featuring a table of key calculations and various plots for visualization of the response.

User Interface

Enhancements Implemented

*	Ticket	Description
	8546	A change was made to the Italian NTC 2008 and 2018 auto wind load patterns, removing the input Shape Factor, cp, which was redundant. The wind velocity label has also been changed from Vb to vr. These changes were propagated to the database tables and the API. The documentation has been updated, including changing the label qb to qr.
	10176	A change was made in the right-button-click information form for the various objects (joint, frame, etc.) to now report joint coordinates as cylindrical coordinates (r, t, z) when the display is using a cylindrical coordinate system. Previously they were being shown as Cartesian coordinates (x, y, z) regardless of whether the selected coordinate system uses a cylindrical or Cartesian grid system.

*	Ticket	Description
	10321	A change was made to hide the Tendon Layout Data button on the precast box and precast Super-T frame section definitions. The tendon layout data is not currently used in SAP2000. Tendon layout data for these frame sections is only supported in the CSiBridge product when the frame sections are used as part of a bridge section in a parametric bridge object.

Analysis

Incidents Resolved

*	Ticket	Description
*	10435	An incident was resolved where Frequency-Domain Time-History analyses exhibited large spurious accelerations in the beginning of the analysis which could obscure any other response. This issue occurred in both the Transient- and Periodic-history types for Frequency-Domain Time-History load cases.

API

Incidents Resolved

*	Ticket	Description
	10197	An incident was resolved for the Application Programming Interface (API) to add two new functions <code>LoadPatterns.AutoSeismic.GetASCE716_1</code> and <code>LoadPatterns.AutoSeismic.GetASCE716_1</code> where the argument <code>nDir</code> is a zero-based array, consistent with all other related API functions. In the previous functions <code>LoadPatterns.AutoSeismic.GetASCE716</code> and <code>LoadPatterns.AutoSeismic.GetASCE716</code> , <code>nDir</code> was a one-based array. These obsolescent functions are retained for backward compatibility.

Database Tables

Incidents Resolved

*	Ticket	Description
	10374	An incident was resolved where the Between and Not Between database table filters did not always work as expected.

Design – Concrete Frame

Incidents Resolved

*	Ticket	Description
	9671	An incident has been resolved for concrete frame design in which the design preference items Consider Torsion, Design for B/C Ratio, and Ignore Beneficial Pu were not imported properly through model text files.
	9943	An incident was resolved for concrete frame design code "Eurocode 2-2004" in which the beam/column capacity ratio was calculated for moment frames of DCL framing type, in addition to all moment frames of DCH and DCM framing types, as the ratio of the sum of the design moment capacities of the beams (with design values of γ_c and γ_s) to the sum of nominal moment capacities of columns (with design values of γ_c and γ_s). The calculations were correct for DCH and DCM framing types per EN 1998-1:2004 sections 4.4.2.3(4) and 5.2.3.3(2). However, the beam/column capacity ratio is not required to be calculated for moment frames of DCL framing type. This is corrected now. The previous results were conservative. This issue affected SAP2000 v24.1.0 to v25.1.0.
	10009	An enhancement has been made to the concrete frame design codes Eurocode 2-2004 and Italian NTC 2008 where now an error message is reported when a concrete column section is checked and the PMM ratio exceeds the utilization limit. The database table "Concrete Design 1 - Column Summary Data" now also displays the computed PMM ratio value even when the column is overstressed for the PMM ratio. Previously the value was blank for this case. This modification does not change the results. It is a reporting issue only.
*	10330	An Incident was resolved for Eurocode 2-2004 concrete frame design where the value of the k_c coefficient in the service cracking check may have been incorrectly calculated when the design cross-section was in compression. This was caused by using a very small positive value of the h^* parameter instead of the h^* value required by the code. This typically resulted in the k_c value of 0.4 and subsequently affected the calculated minimum area of reinforcing steel within the tensile zone. Design should be rerun in the updated version to obtain the correct results.

* Ticket	Description
* 10427	An incident was resolved for concrete frame design code ACI 318-14 in which the minimum shear reinforcement was not enforced in a concrete beam for which torsion reinforcement was requested to be considered through the design preferences or overwrites, but for which T_u was less than the threshold torsion limit T_{th} . In this case, even if V_u was significant enough to demand minimum shear rebar, the design did not enforce it. When this occurred, the design results were unconservative.
10454	An incident was resolved for the Eurocode 2-2004 and Italian NTC 2008 concrete frame design in which an error message was displayed when a model with saved design results was opened and re-designed. This error only affected frame members with Section-Designer sections, for which no results were produced. All other sections were not affected and produced valid design results. Deleting the design results or re-running analysis and design enabled results to be produced for the Section-Designer sections.

Design – Steel Frame Incidents Resolved

* Ticket	Description
* 9429	An incident was resolved for steel frame design codes where any compression/tension limits assigned to a frame member were being checked in design even when the analysis was run as linear. The design results could be unconservative when the specified limit was smaller than the axial forces obtained from the linear analysis. Now design will no longer consider assigned compression/tension limits, but rather design for the actual axial forces calculated by analysis. In order for these limits to be properly considered in design, load cases should be run as nonlinear with each load case representing the design load combination to be considered.
9849	An incident was resolved for the Chinese 2018 steel frame design code in which the slenderness-ratio limit value of non-seismic compressive braces was being checked as per $SDG=IV$, and sometimes the design would incorrectly report the error message " l_o/i exceeds seismic limit (GB50011-2010 8.3.1, JGJ99-2015 7.5.2)" for $SDG=None$. Now the design will not check the slenderness-ratio limit value of non-seismic compressive braces based on the seismic criteria (JGJ99-2015 7.5.2). This was only an error in the reported message, and no other results were affected.
10147	An incident was resolved for the Chinese 2010 and 2018 steel frame design codes in which the maximum shear stress for double channels was taken as twice the expected value. The expression of $\tau = (V * S)/(I * t_w)$ was used correctly, except that t_w should have been two times the thickness of the individual channels. The previous results were conservative.
10247	An incident was resolved for the EN 1993-1-1:2005 and Italian NTC 2008 and 2018 steel frame design codes where nonprismatic objects were not being designed.
10288	An incident was resolved when using the 'Model alive' feature and attempting to run frame design would result in an error condition. This only affected SAP2000 v25.1.0.
10297	An incident was resolved in steel frame design code "AISC 360-16" where the design mistakenly reported $P_u > P_e$ for certain instances. This was a reporting issue only and did not affect other design results. This error only affected versions v25.0.0 and v25.1.0.
10298	An incident was resolved for EN 1993-1-1:2005 steel frame design in which the PMM ratio shown using command Display > Display Design Info or reported in the design-results table was incorrect. This was due to the value of the shift of the centroid of the effective area for slender sections being incorrectly determined. This occurred only when multiple frames were designed and the previously designed frame member had a frame section that was slender and the affected frame member was not slender. This error did not affect the design results obtained by right-clicking on the member or by running the design after selecting a single member.
10304	An incident was resolved for steel frame design per the EN 1993-1-1:2005 and Italian NTC 2018 codes, and for cold-formed design per the Eurocode 3 1-3 2006 code, in which the angle of the principal axes was not shown correctly in the design report for steel angle sections and for cold-formed Z and angle sections. This was only a display issue in the report, and no design results were affected.

* Ticket	Description
10357	An incident has been resolved for the EN 1993-1-1:2005 and NTC 2018 steel frame designs in which an abnormal condition could occur when displaying the report for the deflection check of angle sections.
10413	An incident was resolved for the CSA S16-19 steel frame design code where the compactness of the web of I-sections subjected to bending about the minor axis was incorrectly determined for the case where the factored compressive load was less than 40% of the compressive strength at yielding. In addition, the condition of $(M_{fy}/S_y) > 0.9(M_{fx}/S_x)$ used to check for web compactness subjected to axial compression and bending about both principal axes was not implemented properly.

Documentation

Incidents Resolved

* Ticket	Description
10292	An incident was resolved where chapter 10 of the steel frame design manual for code EN 1993-1-1:2005 was inadvertently removed. The was a documentation error only, no results were affected.

Drafting and Editing

Incidents Resolved

* Ticket	Description
10120	An incident was resolved where attempting to delete existing joint pattern assignments using the Delete Existing Values option on the assign form was not working as intended.
10208	An incident was resolved for the Edit > Change Labels command where the Edit > Auto Relabel > Selected In List option was not relabeling the first selected row. All other selected rows were being relabeled as expected.

External Import and Export

Incidents Resolved

* Ticket	Description
9701	An incident was resolved in the import of STAAD files that contained member concentrated loads at the start of the member (zero distance). Previously the zero value in the input file was being considered as the STAAD default location, placing the load at the member midspan instead of at the start of the member.

Graphics

Incidents Resolved

* Ticket	Description
10277	An incident was resolved where the display of wind coefficients on the model did not show that values in the correct location in DirectX graphics mode. This issue did not affect Classical Plus graphics mode. Results were not affected.
10285	An incident was resolved where the display of contours could be distorted in DirectX graphics mode, particularly with larger length units like meters.
10407	An incident was resolved where displacement contours were not correct in DirectX mode after displaying stress contours.

**Loading
Incidents Resolved**

*	Ticket	Description
	9434	An incident was resolved where the linear static load case that was automatically created when a new notional load pattern is defined was being set to use the stiffness from the end of a nonlinear static load case with name "PDELTA" if such a load case already existed. Now the load case will always use the stiffness from zero initial conditions, which was already the case if no load case named "PDELTA" was present. However, the user should change the stiffness to be used for notional load cases to be the same as used for other linear load cases used in design, or include the notional load pattern directly in one or more nonlinear static load cases used for design and consider P-delta. This is not done automatically.
	9559	An incident was resolved where the forces for a wave loading with user-defined wave characteristics would be incorrect if the mud-line elevation was not specified as zero.
*	9993	An incident was resolved where tendons modeled as loads could generate unexpected moments acting on the structure where they connected to triangular area (shell) elements. This was because the offset distance between the tendon and the mid-surface of the triangular element was calculated incorrectly. The magnitude of the moment error was proportional to the perpendicular distance from the mid-surface of the triangle to the global origin. This error did not affect tendons modeled as elements.
	10152	An incident was resolved where the display of open-structure auto-wind loading was not available for ASCE 7-16 or ASCE 7-22. This was a display issue only. The loads were correctly applied to the model and considered in analysis.
	10233	An incident was resolved where some of the input text boxes on the form for defining the ASCE 7-22 auto wind load would not get populated when switching between options for the wind-exposure type.

**Results Display and Output
Incidents Resolved**

*	Ticket	Description
	9528	An incident was resolved where the value shown when moving the mouse cursor in the Stress Diagram right-click form included stress units when the shell stress display option to normalize stresses by material strength was enabled. This value should be unitless. This was a user interface issue only and did not affect results.
*	10175	An incident was resolved where the sign of the coefficients used to calculate frame shear stress due to torsion were incorrect for the box-type frame section property at stress points 5, 6, 7 and 13.
	10262	An incident was resolved where ASCE 41-13NSP pushover curves were sometimes unable to compute a target displacement for nonlinear static pushover load cases where the monitored displacement was in the negative direction. This issue only affected SAP2000 v25.1.0.
	10271	An incident has been resolved for the display of top and bottom face shell results, including stress, strain, and concrete shell design, in DirectX. Previously, for shell stress and strain results, the contour for all faces was plotted with the data of Bottom Face. For concrete shell design results, the contours for all design components were shown as zero. These contour plots in DirectX are now fixed and shown matching with the correct contours in Classical Plus graphics. This was a display issue in DirectX graphics mode only. The display in Classical Plus graphics mode was correct as were the results in the database tables.

**Section Designer
Incidents Resolved**

*	Ticket	Description
	10356	An incident was resolved for Section Designer in which the user interface would freeze upon switching the concrete model of a concrete shape to Mander-Confined when the region settings on the machine were set to use a comma as the decimal separator.

*	Ticket	Description
	10365	An incident was resolved for Section Designer where setting the "flipped" parameter to "yes" did not work when applied to angle and channel shapes.

Structural Model
Incidents Resolved

*	Ticket	Description
	10286	An incident was resolved where the frame hinge assignment could generate an error message when attempting to assign a hinge to a frame object that already had a hinge assigned to it. When this occurred, it was not possible to reassign a hinge to the frame object using the menu commands. The previous assignment was retained. Frame hinge assignments could still be changed or removed using the interactive database editor.

User Interface
Incidents Resolved

*	Ticket	Description
	4291	An incident was resolved where Section Designer would become unresponsive if the Windows "Show Desktop" command was executed while the Section Designer was open. This was a user-interface issue only.
*	10370	An incident was resolved where an abnormal termination could occur when attempting to display Hinge Results for individual fibers.