SAP2000 v23.3.0 Release Notes

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This document lists changes made to SAP2000 since v23.2.0, released 19-May-2021. Items marked with an asterisk (*) in the first column are more significant.

Design – Aluminum Frame
Enhancements Implemented

*	Ticket	Description
*	430	An enhancement has been made to add aluminum frame design according to EN 1999-1-1 (2007) "Eurocode 9: Design of aluminum structures - Part 1-1: General structural rules."

Documentation
Enhancements Implemented

*	Ticket	Description
	6837	The Auto Hinge Assignment Data help topic was updated to include reference to ASCE 41-17 hinges.

External Import and Export
Enhancements Implemented

*	Ticket	Description
*	7068	An enhancement has been made to the import and export of data exchange .EXR files. EXR files exported from ETABS v19.2.0 (and newer) and SAFE v19.0.0 (and newer) can now be imported into SAP2000, and .EXR files exported from SAP2000 can now be imported in ETABS v19.2.0 and SAFE v19.0.0.
	7097	An enhancement has been made to the import of DXF files to name imported objects after their original AutoCAD handles.
	7188	An enhancement to the export of load combinations to .EXR files has been implemented. Load combinations that refer to other load combinations or to load cases that group load patterns are now developed into their constituent load patterns and exported in that form. Previously, they were exported without including their constituent load combinations or their load cases that grouped load patterns with the omissions reported in the log file. In addition, load cases are no longer exported to the .EXR file. Previously, load cases grouping several load patterns were exported as load combinations.
	7189	An enhancement has been implemented for the import of .EXR files with the following improvements. (1) For Revit wall elements imported from .EXR files, the section properties of the imported SAP2000 area objects are now of type Shell-Thin instead of the previous Shell-Thick type. (2) The .EXRlog file reporting the import events now includes a list of the changes made to the SAP2000 model when the model has been exported to Revit and is being re-imported, or when the model has been initially imported from Revit and is being re-imported.

Installation and Licensing
Enhancements Implemented

*	Ticket	Description
*	6870	The version number has been changed to v23.3.0 for a new intermediate release.
	7152	The software and installation have been updated to use Microsoft .NET Framework 4.8. The API will continue to use .NET 4.7.1 to avoid a breaking change.

Analysis
Incidents Resolved

*	Ticket	Description
*	6875	An incident was resolved where concrete column auto hinges from ASCE 41-17 Tables 10-8 and 10-9 were computed using axial force values of zero when the 'P Values From' option was set to 'Case/Combo'. The analysis results were consistent with the generated hinge properties viewable in the Frame Hinge Property Data form (Define menu > Section Properties > Hinge Properties).
	6978	An incident was resolved where the shear center insertion point was not accounted for in frame objects with cold formed section properties.

API
Incidents Resolved

*	Ticket	Description
	7020	An incident was resolved for the Application Programming Interface (API) for the function RespCombo.GetCaseList when using the cross-product API. If the API client did not initialize the CType array passed into the function, it would be returned as null. Now the API will initialize the parameter and return the data as expected.

Data Files
Incidents Resolved

*	Ticket	Description
	6835	An incident was resolved where the plastic modulus values were not being calculated correctly for aluminum angle sections imported from the AA2020 section libraries. The correct plastic section modulus values have now been calculated and included as part of the angle section data in the section library.
	7003	An incident was resolved where interactively editing the editable data for frame sections imported from XML section libraries would result in a file/section not found error upon applying the changes to the model. When this happened, the section being edited was replaced with a default general section. This issue, which did not affect sections imported from PRO section libraries, has now been addressed.
	7174	An incident was resolved to correct the coefficient of thermal expansion values for concrete materials in the Indian and Spanish material libraries. Models that added materials from these libraries will have produced results consistent with the coefficient of thermal expansion shown in the material property definition.

Database Tables
Incidents Resolved

*	Ticket	Description
	6081	An incident was resolved where some errors could occur after applying user-defined table and field names to a model. This only affected retrieving database tables and did not affect analysis or design results.
	7055	An incident was resolved where section cuts saved from the Draw > Section Cuts command produced incorrect results when later displayed in tables if the section cut was drawn when a comma decimal separator was used in the Windows regional settings. In this case, the group created for the saved section cut was incorrect, and often produced zero results.

Design – Cold Formed Frame
Incidents Resolved

*	Ticket	Description
	6930	An incident has been resolved in which the K factor method in the preferences for EN 1993:2006 cold formed design had an extra option (Method Both) if the selected steel frame design code was either Italian NTC 2008 or Italian NTC 2018. In addition, the number of buckling curve options in the overwrites for EN 1993:2006 cold formed design was reduced if the steel frame design code was Indian IS 800:2007, BS5950 2000, SP 16.13330.2017, or SP 16.13330.2011. The buckling curve for flexural buckling about the minor axis due to axial compression for sway and braced cases was displayed incorrectly in the right-click design report, but the calculated design results were not affected.
	6948	An incident has been resolved in which the cold-formed frame design EC 3 1-3 2006 produced a failure condition without a message or excessive D/C ratio shown in the design report. In addition, a lower limit of 12 inches or 305 mm is included to determine the unbraced length at the ends of the member for the aluminum frame design according to AA 2015 and AA 2020, and cold-formed frame design according to AISI 2016 and EC 3 1-3 2006.
	7056	An incident has been resolved where several design results were displayed incorrectly in the design report including the D/C Net Ratio in the right-click form and tabular table, and the error message regarding n_pl = NEd/(NRk*GammaM1) in the tabular table. In addition, exporting design data tables to Excel was also fixed.
	7169	An incident has been resolved for Eurocode cold-formed frame design in which the effective section properties were not calculated based on the sign of the maximum moment over the length of the member for the design that governs the maximum moment and lateral-torsional buckling moment strength. Previously, the effective section properties were always computed based on the sign of the moment at the section being considered.
	7196	An incident has been resolved cold formed design results were significantly different for members that were manually divided into multiple smaller frame objects instead of using a single frame object to represent the member. This affected all aluminum and cold formed frame design codes. Models with manually divided members should be reviewed.

Design – Steel Frame
Incidents Resolved

*	Ticket	Description
	6995	An incident was resolved in the NZS 3404 steel frame design where the design details sometimes incorrectly reported the Noz value as non-zero when it should have been zero. This was a reporting issue only and did not affect the design results.
	7069	An incident has been resolved in which the mono-symmetry constant was not always calculated correctly for section designer sections. This constant is used in Eurocode 3-2005, NTC 2008, and NTC 2018 steel frame designs as zj, and AA 2015 and AA 2020 Aluminum Frame Designs as beta_x.
	7150	An incident has been resolved to correct the sign and value of the mono-symmetry constant used for calculation of the elastic critical moment (Mcr) in Eurocode 3-2005, Italian NTC 2008 and NTC 2018 steel frame design. Additionally, the Mcr is also corrected to be calculated using the moment of inertia about minor principal axis instead of that about minor geometric axis for Eurocode 3-2005, Italian NTC 2008 and NTC 2018 steel frame designs.

Documentation
Incidents Resolved

*	Ticket	Description
	6834	An incident was resolved to correct the Help topic "Joint Element Output Convention" to indicate that the joint reactions are reported with respect to the joint local axes instead of the global coordinate system. This was a documentation change only and did not affect results.

Drafting and Editing
Incidents Resolved

*	Ticket	Description
	4220	An incident was resolved where in DirectX graphics mode and using the rectangular area drawing tool the snaps were approximate causing the drawn area coordinates to be slightly off.
	4361	An incident was resolved where the dashed selection lines for a triangular area may have shown an inverted area in some cases.

External Import and Export
Incidents Resolved

*	Ticket	Description
	1491	An incident was resolved where frame members with a double angle section were not being exported to Perform3D.
	7015	An incident was resolved which affected the import of IFC files containing escape sequences specifying non-ASCII characters encoded per the ISO 8859, ISO10646 and Unicode standards, resulting in certain files not being imported. This affected all versions of SAP2000 capable of importing IFC files. When this occurred, nothing was imported, and the import log file identified the problematic entities. IFC files containing characters encoded per the ISO 8859, ISO10646 and Unicode standards can now be imported. Characters encoded per the ISO 8859, ISO10646 and Unicode standards include all characters in current use.
*	7021	An incident was resolved where the import of DXF files could terminate if the DXF file only had objects drawn on layer 0.
	7117	An incident was resolved which affected the import of .EXR files generated from Revit projects containing floor elements consisting of an unfilled deck. Such floor elements were imported as shell objects with a section whose thickness was the total thickness of the Revit deck type. This incident affected all versions of SAP2000 capable of importing .EXR files, and when it occurred, the results agreed with the model.
	7187	An incident affecting the import from .EXR files of Revit floor elements with a metal deck component has been resolved. When a Revit floor element with a metal deck component had its deck span direction oriented at an angle other than 0 or 90 degrees, and also featured a re-entrant corner at the end of its first edge, the imported area object was incorrectly rotated, with the rotations of axes 1 and 2 around axis 3 reversed from the correct value.

Graphics
Incidents Resolved

*	Ticket	Description
	4341	An incident was resolved where in DirectX display mode restoring full view after having zoomed in would not bring all objects in the view and some objects may appear cut.
	4846	An incident was resolved where the arrows displaying loads on solids would not size correctly in DirectX views.
	5450	An incident was resolved for DirectX views where zooming in/out using toolbar buttons for stepped zooming would recenter the display.
	5732	An incident was resolved where trapezoidal loads on frames would not display correctly in DirectX views. No results were affected.
	5741	An incident was resolved for DirectX views where the back faces of shells would always show in gray color instead of the group color when showing items by group colors.
	5957	An incident was resolved where in DirectX view the rubber band zoom did not always work correctly.
	6867	An incident was resolved where the location of hinges on a frame element may not have been shown in the correct location along the member when in DirectX view.
	6871	An incident was resolved where uniform loads on frames would not display in the correct offset location if the frame element had offsets and the option to display the frame in the offset position was selected.

*	Ticket	Description
	6873	An incident was resolved where the "Display>Show Misc Element Assigns" menu item might show frame property modifiers existing on elements that had no modifiers. This was a display issue only and did not affect analysis.

Loading
Incidents Resolved

*	Ticket	Description
*	7041	An incident was resolved where temperature and strain loading was incorrectly applied to solid elements with local axes different from default axes when applied in a nonlinear static, staged-construction, or direct-integration time-history load case. Solid elements using default local axes (aligned with global axes) were not affected. No other types of load cases were affected, including linear load cases and nonlinear modal (FNA) time-history load cases. When this error occurred, results could differ significantly between affected nonlinear load cases and linear load cases subjected to the same loading.

Results Display and Output
Incidents Resolved

*	Ticket	Description
	538	An Incident was resolved where rotational ground-acceleration loading was not being included when reporting absolute displacements, velocities, and accelerations for joints or generalized displacements in modal time-history load cases, linear and nonlinear (FNA). This only affected the reported absolute values, which were identical to the relative values. All other results (relative motion, forces, stresses, energies, etc.) were correct. Translational ground-acceleration loading was not affected. Direct-integration time-history results were not affected.
	4573	An incident was resolved where right clicking on an area element to view the detailed contour of shell results in DirectX view would sometimes not work correctly.
	4897	An incident was resolved where in some cases when displaying virtual work on screen the display would miss some objects.
	4905	An incident was resolved where the contour colors representing the displacements in deformed shape views of extruded frame elements were slightly off when using DirectX graphics mode.
*	6899	An incident was resolved where the form "Section Cut Stresses & Forces" that is shown after drawing a section cut always displayed zero for the integrated forces. Correct section-cut forces were still available via the database table "Section Cut Forces - Analysis" by saving the section cut after drawing it and before closing the form.
*	6900	An incident was resolved where the database table "Total Energy Components" was unable to be displayed, presenting an error message instead. This issue affected version 23.2.0 only.
	6988	An incident was resolved to correct plane element display issues where: (1.) Results were not displayed or, in some cases not fully displayed, on plane elements consisting of only three nodes. (2.) Plane elements were not displaying in standard graphics when plotting results. (3.) In DirectX graphics mode labels were not plotting on plane elements. These were all display issues and did not affect analysis results. Shell elements were not affected, only plane and asolid elements.
*	7080	An incident was resolved where cable-force results for response spectrum load cases were incorrectly reported in the database tables and displayed in the graphical user interface (GUI) when results for one or more linear static case were requested at the same time as the response spectrum case(s), either directly (in database tables) or indirectly (by means of a load combination). Only results from the catenary cable element were affected. Cables modeled as frame elements were not affected.
	7120	An incident was resolved where using region settings with a comma as the decimal separator caused the display of some design information and results to not display correctly due to a conflicting comma delimiter. The delimiter between items has now been changed to a semicolon (;). This was a results-display issue only and did not affect the calculated design results.

Structural Model
Incidents Resolved

*	Ticket	Description
	6911	An incident was resolved where the section definition form was not getting populated when importing a section with a duplicate name from the XML section library file(s).
	6916	An incident was resolved where, when a frame hinge was assigned at the position where a frame object was to be auto-meshed, the program could fail to generate the hinge as a separate link element. This issue only affected models where the analysis model for nonlinear hinges was set to "Model Hinges as Separate Link Elements" (Analyze menu > Analysis Model for Nonlinear Hinges). This issue occurred rarely but, when it occurred, the affected hinges would not be considered during analysis and would not be present in the list of hinge properties (Define menu > Section Properties > Hinge Properties) or the Object Information (right-click) form. The issue could be resolved by moving the hinge slightly away from the mesh point.
	7045	An incident was resolved where, when an ASCE 41-17 auto-generated hinge was created using Tables 10-8 and 10-9 (Concrete Columns) and with the option "Controlled by Inadequate Development or Splicing" (Assign menu > Frame > Hinges), the Force/SF value at the C-point would be set equal to 1 and the LS and CP acceptance criteria values in the hinge properties would be set to 0 (zero). This had resulted in a hinge property with no post-yield stiffening affect. This behavior is now corrected so the auto-generated hinge has a 10% post-yield stiffness.

User Interface
Incidents Resolved

*	Ticket	Description
	6817	An incident was resolved where the "Properties of Object" floating form that is displayed when using the Quick Draw Secondary Beams command did not correctly update its content when the spacing option was changed.
	6868	An incident was resolved in the user interface when right-clicking an area object to display the Properties of Object form, and then modifying or assigning the wind pressure coefficient data to the area. The form accessed from the Properties of Object form was missing the dropdown list for specifying the distribution option.
*	7062	An incident was resolved in which an abnormal termination could occur when attempting to open the report setup form. This only affected some models and could be worked around by exporting the model to a text file and importing it back in.