

# SAP2000® Version 17.0.0 Release Notes

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**Notice Date: 2014-07-28**

This file lists all changes made to SAP2000 since the previous version. **Most changes do not affect most users.** Incidents marked with an asterisk (\*) in the first column of the tables below are more significant.

## **Changes from v16.1.1 (Released 2014-05-22)**

### **Graphics**

#### **Enhancements Implemented**

*	Incident	Description
*	42430	The animation capabilities in DirectX graphics mode have been enhanced. Specifically, the animation option is now available for deformed shape plots when in DirectX graphics mode, and the video (AVI) capture will use DirectX graphics when in DirectX graphics mode. Additionally, the video capture can include a graph of the input time function with a moving dot indicating the time at which the deformed shape is plotted.
*	22433 38540 40873 44245 44275 47456 48696 48888	The graphical user interface has been improved in terms of responsiveness for larger models when using the GDI+ graphics mode. When memory limitations are encountered using DirectX graphics mode the graphics mode reverts to GDI+.

### **Modeling**

#### **Enhancements Implemented**

*	Incident	Description
*	65232	An enhancement was implemented to add the Russian material properties library.

### **Analysis**

#### **Enhancements Implemented**

*	Incident	Description
*	47496	The speed of nonlinear direct-integration time-history analysis has been significantly increased for models containing nonlinear dampers having fractional exponents on the velocity term. This is due to improved rate of convergence for nonlinear iteration. There has been no change to the actual force-velocity or force-displacement behavior of the damper link element. The response for models run in previous versions may differ very slightly from that of the current version due to the resulting change in the process of iteration. Such changes can be expected to be on the order of the convergence tolerance for the load case. In particular, the response reported for Analysis Verification Example 6-005, "Link - Damper Element under Harmonic Loading" has changed by up to 0.00113% from the previously published values for SAP2000 version 16, but this has no effect on the validity of the example.

*	Incident	Description
*	64466	The iteration algorithm for nonlinear direct-integration time-history analysis has been enhanced to improve the rate of convergence and to reduce the time of analysis for certain models. Models run in the new version should produce the same results as in the previous version, subject to minor variations approximately within the convergence tolerance. Larger differences may be observed for ill-conditioned or sensitive models, but in such cases the new results should generally be better. In particular, the response reported for Analysis Verification Example 2-019, "Shell - Large Bending Displacements" has changed by up to 0.00153% from the previously published values for SAP2000 version 16, but this has no effect on the validity of the example.
	65587	Nonlinear static analysis, including staged construction, has been enhanced to allow the use of the line-search algorithm during iteration. This feature was already available for nonlinear direct-integration time-history analysis. Line search is helpful for models where the stiffness changes significantly from one step to the next, particularly in cases where the model is stiffening. The line-search option is only available under force control and when event-to-event stepping is not used.
	67283	The iteration strategy for nonlinear static and nonlinear direct-integration time-history load cases has been made more adaptive to typically improve convergence behavior and to reduce the time of analysis. User-specified limits on the number of constant-stiffness and Newton-Raphson iterations are used to guide the iteration, but may not be strictly observed: the number of iterations actually performed may be more or less than specified. Line search, when enabled, is not used when the convergence rate is good. Models run in the new version should produce the same results as in the previous version, subject to minor variations approximately within the convergence tolerance. Larger differences may be observed for ill-conditioned or sensitive models.

## Frame Design

### ***Enhancements Implemented***

*	Incident	Description
	67170	An enhancement has been made to the cold-formed steel frame design using "AISI-LRFD 96" and "AISI-ASD96" codes where the PMM demand/capacity ratios are now reported in more detail. Also the interaction equation for moment and shear interaction is now reported only when the shear is significant. The design is not affected.

## Results Display & Output

### ***Enhancements Implemented***

*	Incident	Description
	63976	Printing has been enhanced to offer a preview window when printing from the model windows, graphs, Section Designer, and design details. The print-preview window allows control of margins, layout, and headers and footers. Minor cosmetic printing errors have also been resolved that affected line quality, margins, grids, labels, but that did not affect results.

**External Import/Export  
Enhancements Implemented**

*	Incident	Description
	67675	<p>Several enhancements and corrections have been implemented for the import and export of IFC Structural Analysis View files:</p> <p>(1) When an IFC load group included a general coefficient or individual coefficients for its loads, the coefficients were not applied and SAP2000 did not issue a warning. When this occurred, the results agreed with the model. The coefficients will still not be applied to the loads in the imported SAP2000 load pattern but SAP2000 now reports a warning in the import log file.</p> <p>(2) When an IFC load case included both loads and load groups, SAP2000 load patterns were created for the IFC load groups and another load pattern for the IFC load case itself, but the SAP2000 load case did not contain the load pattern created for the IFC load case. This did not affect the import of IFC load cases made of loads only, or load groups only. When this occurred, the results agreed with the model as imported. IFC load cases including both loads and load groups are now imported as SAP load cases containing all the relevant load patterns.</p> <p>(3) When an IFC load case included a general coefficient for its loads and load groups the global coefficient was not applied. When this occurred, the results agreed with the model as imported. The products of the general coefficient and individual coefficients are now applied, and if the coefficients applied to the loads in the IFC load case vary, several SAP2000 load patterns are created to group the loads which share a same coefficient in the load case.</p> <p>(4) Load combinations defined in IFC 2x3 Structural Analysis View files were incorrectly imported with all the load cases in the load combination assigned a factor of 1.0. Load combinations defined in IFC 4 Structural Analysis View files were correctly imported. When this occurred, the results agreed with the model as imported. Load combinations are now imported with the correct load case factors for both IFC 2x3 and IFC 4 Structural Analysis View files.</p> <p>(5) The temperature unit was incorrectly exported which could result in incorrect values of the coefficient of thermal expansion for materials in applications that import material properties from IFC.</p> <p>(6) The mass density unit was incorrectly exported when the database units of the SAP2000 model were pound and foot, which could result in incorrect values of the mass density for materials in applications that import material properties from IFC. The mass density unit was correctly exported for all other SAP2000 model force and length unit combinations.</p> <p>(7) Load combinations are now exported to 2x3 Structural Analysis View files. Previously, they were only exported to IFC 4 Structural Analysis View files. They can now be exported to either.</p> <p>(8) Nonprismatic frame sections are now supported, provided the type of section (e.g., rectangular) is the same at the start and end of the frame section. If the SAP2000 nonprismatic section has multiple segments, the internal sections are ignored and a single segment between the start and end section is assumed. For such a case, it is recommended to divide the member into single-segment members before exporting. When exporting to an IFC 4 structural analysis view files, nonprismatic SAP2000 frame objects are exported as IfcMaterialProfileSetUsageTapering, and in the case of an architectural coordination view file, as 'Body' IfcShapeRepresentation of type 'AdvancedSweptSolid'. When importing an IFC 4 structural analysis view or architectural coordination view file, any IfcStructuralCurveMember, IfcColumn, IfcBeam, and IfcMember entities with a profile defined by an IfcMaterialProfileSetUsageTapering is imported in SAP2000 as a nonprismatic section.</p> <p>(9) The user now has the option to export only part of an SAP2000 model by selecting members prior to using the IFC export command and choosing the Model Selection option in the Create IFC File form.</p>

*	Incident	Description
	67847	<p>An incident was resolved where STAAD notional loads defined with a negative factor were imported with a default unrelated positive SAP2000 load ratio instead of the specified STAAD factor. When this occurred, the results agreed with the SAP2000 model as imported. STAAD notional loads defined with a positive factor were correctly imported. STAAD notional loads are now imported with the specified STAAD factors. In addition, the following enhancements have been made to the import of STAAD files: (1) STAAD input files do not contain any temperature unit specifications and it is up to the user to specify material coefficients of expansion and temperature loads in consistent temperature units. When the length and force units specified in the STAAD file are metric units instead of U.S. Customary units, SAP2000 now assumes that the temperature unit is degree Celsius. This did not affect results in any way since SAP2000 previously imported both material coefficients of expansion and temperature loads assuming both were defined in degrees Fahrenheit, which meant the temperature units were consistent between the two. (2) When a STAAD file includes STAAD members with section properties defined as tees cut from wide flange sections, SAP2000 attempts to generate a standard tee section designation based on the halves of the numbers listed in the wide flange section designation. When the wide flange section designation included odd numbers, (such as for example W460X177), SAP2000 generated fractional numbers (such as WT230X88-1/2) instead of the decimal ones listed in standard section catalogs, and as a result, SAP2000 did not identify the tee sections. When this occurred, a warning was issued in the log file indicating that the original tee section had been replaced with a default section and the results agreed with the SAP2000 model. SAP2000 now uses decimal numbers when attempting to generate standard tee section names. (3) SAP2000 previously replaced any unidentified standard section properties imported from a STAAD file with default section properties and issued a warning to that effect in the log files. SAP2000 now instead displays the Frame Properties form, letting the user import and specify replacement sections.</p>
	68414	<p>Several enhancements have been made to the import of SDNF files: (1) SDNF version 3.0 files can now be imported. Previously, only version 2.0 files could be imported. (2) When SAP2000 does not recognize a section profile name in the SDNF file, the Frame Properties form is displayed allowing the user define or import a replacement section. Previously, the section profile was imported with the unrecognized name and default properties and a warning was issued. The section profile is still imported with the unrecognized name and default properties if the user cancels out of the Frame Properties form without specifying a replacement section. (3) When SAP2000 encounters a problem reading the SDNF file, the warning message displayed now includes the line number of the problematic line.</p>

**Miscellaneous  
Enhancements Implemented**

*	Incident	Description
	62771	The SapReportContents.xml file has been updated such that the default report will now contain the latest lateral loading and/or design codes if they are used in a model.
	65732	The version number has been changed to v17.0.0 for a new major release.

## User Interface and Display Incidents Resolved

*	Incident	Description
	40767 47100 52561	An incident was resolved in which words on certain forms could be truncated when certain Windows font size and screen resolution settings were used.
	62723	An incident was resolved in which the Design > Concrete Frame Design > View/Revise Overwrites command was enabled even when there were no frames selected.
	65600	An incident was resolved for the Load Case Data - Response Spectrum form for defining where the Scale Factor field for Absolute-type of Direction Combination would be hidden behind the Mass Source field after clicking the Modify/Show button to view or change the definition of a response-spectrum load case. This did not occur when a response-spectrum load case was first defined, or if a load case was changed to response-spectrum from some other types. The value of the absolute scale factor was not changed when this occurred, and no results were affected.
	66323	An incident was resolved in which the right-click 'Properties of Object' form would sometimes have an issue on the Loads tab where the scrollbar was not present to scroll down the list of loads.
	66892	An incident was resolved where the moving-load paths did not recognize frame objects with names that included lower case letters.
	67342	An incident was resolved where the form for defining the link properties of a Friction Spring Damper (command Define > Section Properties > Link/Support Properties) used the incorrect units for the values of Pre-compression Displacement and Stop Displacement in the calculator.
	68078	An incident was resolved in which a runtime error was sometimes generated when changing parameters in the Multi-step Video File Creation form.

## Graphics Incidents Resolved

*	Incident	Description
	59077	An incident was resolved for the command View > Set Display Options > View Type where certain frame sections did not always display at all when shown in extruded view, even though they displayed correctly in standard view. This problem could occur when the model was first opened, but then would resolve itself after the deformed shape was shown. No results were affected in any case.
	59466	An incident was resolved where the restrained joint that is automatically created to represent the grounded end of a single-joint link object was being shown when plotting analysis results (deformed shape, forces, stresses, etc.) even when the corresponding link object was not shown and was not present in the model for the given load case and step due to staged construction. This was a graphical display issue only. No results were affected.
	60633	An incident was resolved where area objects were sometimes not displayed in the extruded view when using the DirectX graphics mode. No results were affected.
	63641	An incident was resolved in which an error was generated when displaying frame projected distributed loads on a frame that was parallel to the axes of the coordinate system used to assign the load. This was a display issue only and did not affect results.
	64694	An incident was resolved in which the graphical display of gravity projected area loads was shown with an incorrect sign. This was a display issue only and did not affect results.
	67339	An incident was resolved where the extruded shape for some frame sections were not filled at the ends of the members, and the cross-section of the pipe shape showed a small anomaly. This was a minor graphics issue and no results were affected.

## Modeling Incidents Resolved

*	Incident	Description
*	64700	An incident was resolved in which a runtime error was generated when manually requesting the built-in concrete frame design combinations for the Chinese 2010 code. Some of the combinations would be generated, but not the complete set. Design results were consistent with the load combinations actually generated and selected for design.
	65036	An incident was resolved in which changing joint coordinates from the Properties of Object form obtained by right-clicking on an object did not work correctly when the active coordinate system was a user-defined coordinate system.
	67525	An incident was resolved in which an error was sometimes generated when converting a cylindrical grid system to a general grid system.

## Loading Incidents Resolved

*	Incident	Description
*	61464	An incident was resolved where the wind load calculated using the Italian NTC2008 code was always computed as zero at joints located at the bottom-most elevation subjected to wind. This had no effect on the structural response if the joints were restrained.
*	61933	An incident was resolved where in some cases a tendon defined with circular (not parabolic) curves and modeled using loads could have the tendon loads applied in the wrong direction. This did not affect tendons modeled as elements.
	61934	An incident was resolved in which the NTC 2008 response spectrum definition was not working when defined based on latitude/longitude or island and the computer settings were set to use a comma (,) as the decimal separator.
*	62304	An incident was resolved where the default load combinations created by the program for the Italian NTC2008 code were assuming the load factor for Superimposed Dead loads the same as for Dead loads. The factors for Superimposed Dead loads should have been higher. This affected only the default load combinations for this code.
*	65423	An incident was resolved where the location-dependent parameters (SS, S1, PGA, etc.) calculated for certain response-spectrum functions could be incorrect after importing a model from tables in a text file (.b2k, .sbr), Excel spreadsheet, or Access database file. When this occurred, the values of these parameters would appear correct if viewed in the form using the command Define > Functions > Response-Spectrum Functions, but would still be incorrect if the Cancel button was clicked. Clicking the OK button would save the corrected values. The actual values of these parameters used for analysis could be seen in the database tables for the definition of the response-spectrum functions, and the computed acceleration values could be seen in the database tables for response-spectrum modal information. This error affected functions defined from location data for the following codes: IBC 2006, IBC 2009, IBC 2012, NCHRP 2007, AASHTO 2007, and AASHTO 2012. It did not affect functions defined directly using the load parameters (such as SS, S1, PGA, etc.). It did not affect newly defined functions or functions in models that were saved and re-opened, only models imported from table files.
	65775	An incident was resolved in which the self-weight of joist sections would change if the associated material self-weight was changed from the standard self-weight of steel.
	66007	An incident was resolved for wave loading where the calculation of the wave apparent period may fail and give an error message in certain cases when currents were specified at multiple elevations.
	68292	An incident was resolved in which certain large time history functions read in from a file were unable to be converted to a user defined time history function.

## Analysis Incidents Resolved

*	Incident	Description
*	18225	An incident was resolved where the results for linear direct-integration time-history analysis could be incorrect when the stiffness used was from the end of a previous nonlinear static (or nonlinear direct-integration time-history) load case and stiffness proportional damping was considered. This could occur when the stiffness of the structure was significantly different from the unstressed stiffness due to yielding of the material, P-delta effects, or time-dependent stiffness change. It was not affected by staged-construction in the absence of these nonlinear effects. When this error occurred, it was usually obvious because the magnitude of the solution would increase exponentially with time. Note that divergent solutions are still possible in certain models when the stiffness matrix is sensitive, such as when there are very large and very small stiffnesses present in the model. This is particularly possible under ground displacement loading, which tends to excite high-frequency response. This can usually be resolved by using a small negative value of the Hilber-Hughes-Taylor alpha parameter, which filters out high-frequency noise.
	31259 41613	An incident was resolved for direct-integration time-history analysis of layered shells in which there was a small error in the contribution of the of stiffness proportional damping to the stiffness matrix. For linear direct-integration time-history analysis, the solution tended to be under-damped, which could cause the solution to grow exponentially over time. When this occurred, the effect was obvious. For nonlinear direct-integration time-history analysis, this error could result in more iteration and slower convergence, but the results were not affected to within the convergence tolerance. This error did not affect models for which the net stiffness-proportional damping was zero for layered shells.
	35874	An incident was resolved where the initial stiffness used for nonlinear degrees of freedom in multi-linear links (elastic and plastic) was taken to be zero until deformation occurred. This had no significant effect on loaded degrees of freedom, but could cause the stiffness for any degree of freedom that was not loaded in a nonlinear load case to be zero for any subsequent linear load case that used the stiffness from the end on the nonlinear load case, or for any linear load case starting from zero.
	52028	An incident was resolved where reactions were not being reported for joints supported by one-joint links in staged-construction load cases if the link was not present in the last stage of the load case. When this occurred the reaction was reported as zero, even though the one-joint link itself showed a force response. This error did not affect other types of load cases, and it did not affect the structural behavior or any other type or response in the affected staged-construction load cases.
*	61989 64550	An incident was resolved where spring supports assigned to frame, area, and solid objects were not added with the objects in a staged-construction load case except when the objects were added as part of group ALL. When this occurred, the error was obvious because of the lack of expected support. Spring supports were properly included in all other types of load cases.
	62187 64172	An incident was resolved where the major bending moments (M3) due to member loads were not being fully released when both M2 and M3 releases were specified at the ends of a frame object with a section property having a non-zero cross moment of inertia I23. When this occurred the error was obvious because the reported M3 moments at the released ends were non-zero. This error did not occur when there were no M2 releases at either end or there were no M3 releases at either end. The bending stiffness was not affected, hence this error had little effect on the overall structural response. Small non-zero M3 moments at the released ends affected the reported moments and could have a small effect on the adjacent members. Only L sections, Section Designer sections, and general sections can have non-zero values for I23. Affected versions are v15.2.0 to v16.1.1.
	63709	An incident was resolved for the link/support object of type T/C Friction Isolator (double-acting friction-pendulum isolator) where the nonlinear iteration could have difficulty converging during the analysis of nonlinear static or nonlinear direct-integration time-history load cases when a non-zero gap opening was specified for the link property. When the convergence failed, results were unavailable. Otherwise the results would be accurate to within the convergence tolerance unless the model was ill-conditioned.
	64200	An incident was resolved where the stiffness used to enforce edge constraints on area objects with layered shell properties was based on the homogeneous material, membrane thickness, and plate

*	Incident	Description
		thickness rather than the material and thickness of the actual layers. The homogeneous material and thicknesses are not directly visible in the definition of the layered shell property, but can be seen and modified in the table Model Definition > Property Definitions > Area Section Properties > Area Section Properties. The effect of this error is generally insignificant. If the homogeneous values used were much too small compared to the actual layer properties, edge constraints may have been poorly enforced, and the effect would be obvious from the deformed shape and force/stress plots. However, the effect is localized. If the homogeneous values used were much too large compared to the actual layer properties, numerical sensitivity could result, primarily affecting convergence behavior for nonlinear analysis. The behavior of the layered shell elements themselves was not affected by the homogeneous values, only edge constraints if actually present on the edges of the layered elements.
*	64319	An incident was resolved where mass source specified from load patterns was not accounting for loads assigned to joints. Loads assigned to frames, shells, and other types of objects were being used to generate mass from load patterns. This error was introduced in version 16.0.0.
	65568	An incident was resolved where the initial stiffness used for iteration on multi-linear links (elastic and plastic) during nonlinear static and nonlinear direct-integration time-history analyses was taken to be zero. This could affect the rate of convergence for these types of analyses at the first load or time step, but did not affect the results to within the convergence tolerance. This is because the initial stiffness is used only for performing iteration, not for determining the actual force-deformation behavior of these elements. Nonlinear modal time-history (FNA) analysis was not affected.
	67920	An incident was resolved where the analysis could terminate prematurely with an error message in the uncommon case where constraints were applied to auto-meshed area objects and the meshed joints were the majority of the joints in the model. When this occurred, no results were available.

## Frame Design Incidents Resolved

*	Incident	Description
	42645	An incident was resolved for aluminum frame design using AA-ASD 2000 and AA-LRFD 2000 codes where C1 and C2 factors for Channel shapes with multiple point loads were taken as 0.0. The new vales of C1 are taken from section 4.9.4.3 which is applicable to simply-supported cases. The new approach is more rational than the previous one. The previous one was unconservative for several cases as it lead to slightly larger values of rye and reduced values of Lb/rye.
	56194	An incident has been resolved in cold-formed steel frame design using AISI-ASD96 and AISI-LRFD96 codes in which the effective section property calculation became inaccurate when the original database unit was in meters because of a tolerance issue. The calculation did not manifest this error when the original model was in mm units.
	56360	An incident was resolved for steel frame design using the ASCE 10-97 code in which the moment capacities Me, Myt, and Myc for single-angle sections were being calculated as too small, leading to over-conservative results.
	59031 59888	An incident was resolved for concrete frame design and steel frame design where design preferences were not properly initialized if the design code was changed from Italian NTC 2008 to Eurocode and a Country was not explicitly selected by the user. In this case subsequent design results could be incorrect, or a runtime error could be generated when viewing design details. This only occurred if the Country was left as CEN Default after changing the code from Italian NTC 2008.
	61186 63064 66375	An incident was resolved in steel frame design per AISC 360-10 in which the program was issuing an error message while designing each member. This was caused by the option of second order effect as "no modification". When this occurred, no results were available for the affected frames.
	62191	An incident was resolved for steel frame design per the Eurocode 3-2005, Italian NTC 2008, and Indian IS 800:2007 codes in which reported design error messages were sometimes reported incorrectly. This did not affect computed design results, and it had no effect on members where no



*	Incident	Description
		design error messages were reported. Only the text of the error messages, when present, could be incorrect.
62193		An incident has been resolved for steel frame design using the EC 3-2005 and NTS 2008 codes for angle shapes in which the reported KL/r was not consistent with the calculated Ncr values. The values of Ncr were correct. This was a reporting issue only. No design results were affected.
62314		An incident was resolved for steel frame design using the Eurocode 3-2005, Italian NTC 2008, and Indian IS 800:2007 codes where the effective section property I <sub>minor,eff</sub> was not being calculated correctly for slender channel shapes. It was assigned a very small non-zero value, which made the stress ratio very large. When this occurred, the error was obvious.
62627		An incident has been resolved for steel frame design using the EC 3-2005 and NTC 2008 codes where the beam/column capacity ratios were calculated over-conservatively in the seismic check. The effect of the axial force in reducing the column moment capacity was exaggerated.
62981		An incident was resolved for the Chinese steel frame design in "Chinese 2010" code in which the ratios of N,M-maj and M-min were all zero in the Steel Stress Check Information form whereas in all other places the ratios were correct including in the details. This was a display issue only. Also the concrete frame design details display has been enhanced by adding e0 in the display. This is an enhancement in the display only.
63167		An incident has been resolved in concrete frame design affecting all concrete frame design codes where the PMM ratio reported in the message reporting failure was not the enveloping ratio of all the stations and all load combinations. This happened only when a section failed and the D/C ratio exceeded 1. This was a reporting issue only.
63672		An incident has been resolved in steel frame design using "Italian NTC2 2008" and "EC 3-2005" codes where the D/C ratios displayed in the GUI were sometimes not correct. This is caused by the presence of very small axial force which can be considered as tensile or compression based on positive or negative values. The error was conservative.
64701		An incident was resolved for the Chinese 2010, GB 50010-2010 concrete frame design in which the Gamma_RE(M) and Gamma_RE(V) values were being truncated in the output sheet for beam design details, making them appear as if they were 0.
64982		An incident was resolved in steel frame design in "AISC 360-10" code in which the width-thickness ratio limit for moderately ductile members was not being imposed correctly. Rather the limit for highly ductile members was being used.
65050		An incident was resolved for concrete frame design per the Chinese GB 50010-2010 code in which the moment amplification factor eta as reported was too big. This occurred when the eccentricity was zero or near zero, or when the option for enforcing the minimum eccentricity was false and the bending moment was near zero. Even though the factor computed was large, its net effect was small because the moment was small.
67777		An incident was resolved where the right-button-click information form could, in some cases, erroneously show the EA and EI modifiers to be zero for some steel frame objects when the design code was set to AISC 360-10 or AISC360-05/IBC2006. The error could also occasionally cause a runtime error. The values of the modifiers were actually correct as could be seen in the database tables and design details.
67782		An incident was resolved in the Indian version of the program in which the steel frame design code choice "Indian IS 800:2007" automatically changed to its older incarnation "Indian IS:800-1998" during the opening of old files and during changing the codes in the form. This only affected the Indian version of the program.
67997		An incident has been resolved for steel frame design using the AISC 360-10 ASD design code where the beam/column capacity ratios were checked inconsistently. Now a factor of 1.5 based on the ASD design provisions is being checked. This affects only special moment frame joint checks per ASD provisions. LRFD provisions are unaffected.
68332		An incident has been resolved in which design forces for some load combinations were not obtained for frame design when one of the load combinations selected for design included a moving load case. The design results would report zero utilization ratios for the affected combinations.

## Results Display and Output

### *Incidents Resolved*

*	Incident	Description
	33973	An incident has been resolved where the constraint name, as reported in the .OUT file with the constraint centers of mass, was being trimmed to 7 characters. Now the limit is 32 characters. No results were affected.
	60343	The command File > Print Setup has been updated to use the latest Windows utilities to communicate with printers. This will help to resolve most incidents where error messages were being generated when using the Print Setup command with certain printers. It is still possible that Print Setup may not work with some products in some environments, as this is a Windows and print-driver issue.
	62283	An incident was resolved where the Section Cut forces over partial cuts through area elements would, in rare cases, give incorrect results. This happened when the mesh on the side included in the cut was not aligned with the mesh on the side that was excluded, and one or more of the joints included in the cut were not connected to elements on the other side. When this occurred the forces would take a jump and were obviously incorrect.
	68260	An error was corrected where in certain rare cases the bookmarking in the Word file created for the report might be incorrect.

## Database Tables

### *Incidents Resolved*

*	Incident	Description
	66457	An incident was resolved where the General Reference Line tables sometimes did not import correctly when added to an existing model.
	68266	An incident has been resolved in the database output tables in which error messages were shown and the database analysis result tables were empty if (1) the multi-valued response combos option is set as correspondence, and (2) one of the reporting load combos or one of the containing combos in the reporting load combos was not of linear add combination type.

## Data Files

### *Incidents Resolved*

*	Incident	Description
	63446	An incident was resolved where in rare cases with models having general grids a runtime error could be generated during display. When the error did occur the results were unaffected.

## Application Programming Interface

### *Incidents Resolved*

*	Incident	Description
	65188 66695	An incident was resolved where Ritz modal load cases when created through the Open API would produce an error message when the analysis was run. When this occurred, no results were available for the Ritz load case or any load case that depended upon it.
	64612	An incident was resolved where the Open API could be used to add Load Patterns with blank names.

## External Import/Export

### *Incidents Resolved*

*	Incident	Description
*	49386	An incident was resolved where export of response spectrum loads to SAFE was not correct.
	65035	An incident was resolved in which load cases were sometimes incorrectly exported to SAFE.

*	Incident	Description
	67472	An incident was resolved that addressed several issues with the export and import of applied loads to and from CIS/2 files. (1) During export, the name of the pound-force unit was incorrectly written out as LBF. It is now correctly written out as POUND. (2) When applied loads were to be exported only for selected load cases, loads for other load cases would sometimes be exported instead, or no loads at all would be exported when the other load cases did not include any applied loads. When this occurred, the CIS/2 load cases of any exported loads did match their original SAP2000 load cases. No error occurred when all the SAP2000 load cases were selected, as all the applied loads were then exported. (3) Several unit-related issues affected the import of frame-member concentrated and distributed loads from CIS/2 files. The locations of the loads on the member could be incorrectly read, which meant that the loads were applied on part of the frame member, or in the wrong location on the frame member, or not applied at all. This occurred when the length units in the CSI/2 file were feet or a metric unit other than meters; or when the vector defining the orientation of the underlying line in the CIS/2 files had a length different than unity; or when the frame member to which the load was applied was not aligned with the global X axis. Additionally, when the length unit of the CIS/2 file was feet or a metric unit other than meters, the magnitudes of distributed frame members loads were incorrect. When any of these issues occurred, the results agreed with the model as imported. CIS/2 frame load locations and magnitudes are now correctly imported irrespective of the length unit in the CIS/2 file.
	68311	An incident was resolved to correct and improve the following items related to the import of STRUDL models: (1) SAP2000 can now process STRUDL lists where some of the list components are STRUDL groups, ranges of STRUDL joints, members, or elements with alphanumeric labels (as in 'A1' to 'A25'), and STRUDL lists which specify all STRUDL joints, members, or elements, with or without a restrictive "BUT" clause. (2) SAP2000 can now process STRUDL joint specifications in which the X, Y, and Z coordinates are tagged with an "X", "Y", or "Z" label and specified in a sequence other than the usual X, Y, and Z sequence. (3) SAP2000 can now process the STRUDL "GENERATE JOINTS" command, including the "GENERATE BETWEEN" variant of the command, and the "GENERATE MEMBERS" command. (4) SAP2000 can now process the "ELEMENTS" option of the STRUDL "DELETIONS" command. In addition, in the case of the "MEMBERS" option, SAP2000 previously deleted random members. When this occurred, the results agreed with the SAP2000 model. SAP2000 now deletes only the members specified in the list argument of the STRUDL command. (5) SAP2000 can now process the restrictive STRUDL "ALL BUT" clause of the STRUDL "CONSTANTS" command. This clause assigns a value of the material property currently assigned for some specified members or elements and another for all the remaining members or elements. Previously SAP2000 assigned a single value of the material property to all the members or elements. When this occurred, the results agreed with the SAP2000 model. (6) The limit of a maximum 100 STRUDL load conditions and 150 STRUDL load combinations has been removed. SAP2000 can now import a number of STRUDL load conditions and combinations that is only limited by the total amount of memory on the machine (including physical and disk based memory). (7) SAP2000 can now process STRUDL "FORM LOAD" commands and creates corresponding SAP2000 load cases which combine the SAP2000 load patterns created for the STRUDL Load Conditions specified in the command with the input factors. (8) SAP2000 can now process STRUDL load conditions with alphanumeric names – as opposed to numbers. Previously, when SAP2000 encountered such load conditions, the STRUDL model was not imported. (9) SAP2000 can now skip several STRUDL command options from STRUDL commands that are not relevant to the creation of a SAP2000 model, such as STRUDL "OUTPUT" command options. Previously, when SAP2000 encountered such options and did not recognize them, the STRUDL model was not imported.

**Documentation  
Incidents Resolved**

*	Incident	Description
	62966	An incident has been resolved in the documentation of the steel frame design code AISC 360-05 where limits of lambda_p for axial-only cases for singly- and doubly-symmetric I-shaped members were shown. These cases only need lambda_r limits. This was a documentation issue only.

*	Incident	Description
	66301	An incident was resolved in which the 'Calculation of Wave Load Values' technical note had an error in the equation for calculating the concentrated compressive load at objects ends. The documented equation for "P" was missing a multiplication by "h". This was a documentation issue only. The loads were being correctly calculated.

**Installation and Licensing**  
***Incidents Resolved***

*	Incident	Description
	52099 62434 68268	An incident was resolved for the Basic and Plus license levels of the product where a nonlinear static load case could not be continued from the end of another nonlinear static load case or staged-construction load case. This error was introduced in v15.2.0. Now the correct behavior is enforced. Basic, Plus, and Advanced levels should be able to consider a staged-construction case having only a single stage starting from zero conditions, and nonlinear static cases should be able to continue from this case and from other nonlinear static cases. Nonlinear cases in Basic and Plus should be able to consider the following nonlinearities: P-delta, tension/compression-only frames, tension/compression-only springs, gaps, hooks, and cables treated as frames with P-delta and tension-only behavior. The Ultimate license level can run staged-construction load cases that contain multiple stages and/or that continue from the end of another nonlinear static, staged-construction, or direct-integration load case.
	63467	An incident was resolved in which the SAP2000 settings folder was sometimes not being created in the user's local folder on machines running later versions of Windows. This prevented various settings from being saved when SAP2000 was closed and from being recovered when SAP2000 was next started. No results were affected.