

S-FRAME R10.0

Improved Seismic and Dynamic analysis features

- New Analysis Option: Nonlinear Time History Analysis with support for geometric and material nonlinearity. For the dynamic analysis of nonlinear models for example those with cables and/or nonlinear spring elements or supports. This analysis type is also required for seismic dynamic analysis which includes ductility behavior.
- New Direct Analysis Method: S-FRAME now supports the rigorous second-order analysis required by the new AISC 360-10 specification that accounts for both P- Δ and P- δ effects. Notional loads are calculated and applied at each beam-column intersection for all gravity load 'strength' combination and for non-gravity load 'strength' combinations that exceed B2 deflection limits. Both axial and flexural stiffness are automatically reduced to account for out-of-plumbness and τ_b can optionally be computed to further reduce the flexural stiffness of all 'Lateral Force Resisting Members'. S-FRAME performs all these calculations in a single analysis run; no need for multiple runs!
- New Element: 'Multi-Linear elastic' Link-beam element. This new element is used in conjunction with the new Nonlinear Time History Analysis for advanced seismic analysis including ductility behavior.
- New Analysis Option: Multi-Support Base motion Time History analysis. This is required for example for the seismic analysis of long span bridges or structures with large footprints where supports may require different input accelerograms.
- New Feature: One or more dynamic Time History load cases can now be included in load combinations in the same way as static cases. This makes production of static and dynamic load combinations much easier and is added in response to requests from our user-community.
- New Feature: Automatic time history response charts. A response graph is automatically produced for any joint in the structure, enabling rapid assessment of the nature and magnitude of the structure's response to dynamic loading.
- New Feature: Automatic response spectrum. Following a time history analysis, a response spectrum for any joint in the model can be automatically produced and written to file. This can be used for the simpler separate analysis of components or machinery at certain points or levels in a structure.
- Improved operation: For Time History Analysis, all time steps are now automatically output both graphically and numerically when a primary Time History case is selected (individual time steps can also still be viewed) thus making the assessment of time history results more efficient.

Improved modeling, organization and results

- New Feature: Pier Element Tool. Wall Integration Lines can now be grouped to produce a 'pier' for finite element modeled sections composed of multiple panels/plates such as shear walls (C-shapes, T-shapes, boxes and more). Integrated overall sectional force results are automatically calculated and output both numerically and graphically. For FE-modeled shear walls these pier results can be used directly for example for sectional design forces in S-CONCRETE.
- New Feature: Continuous Member Tool. The engineer can graphically assemble Physical Members from existing analytical members. Can be used to quickly convert existing analytical models to physical models which; produce more immediately useful results, facilitate design checks and link more effectively with AEC 3D BIM tools such as Autodesk Revit Structures.
- Improvement: Enhanced organizational folders. Objects can now be added to or removed from existing folders that are already populated by the addition of "Add To" and "Remove From" commands. This

feature is added in response to requests from our user-community to make organizational folders even more powerful.

New technology utilization for more powerful and efficient analysis

- S-FRAME's new 64-bit analysis engine harnesses the power of 64-bit Windows operating systems to access much more RAM and to use it more efficiently (see table below). This makes possible the solution of very large models which could not be solved at all with the previous 32-bit solver and/or operating systems.

Physical Memory Limits: Windows 7 (source Microsoft)

The following table specifies the limits on physical memory for Windows 7.

Version	Limit in 32-bit Windows	Limit in 64-bit Windows
Windows 7 Professional	4 GB*	192 GB
Windows 7 Home Premium	4 GB*	16 GB

*only around 2GB actually available to a program process

- Parallel Processing (multi-thread) capability. Addition of multi-core support to S-FRAME's SPARSE analysis engine accesses the parallel processing capability of the latest multi-core processors for potentially much faster analysis especially of large models and/or for advanced analysis.

Improved interoperability (support for BIM)

- Completely re-written and much enhanced bi-directional Autodesk Revit Structures Link supports Revit Structures 2011 and 2012 and both 32-bit and 64-bit versions. The link supports the following model aspects:
 - ✓ Load cases and combinations
 - ✓ Slabs and Walls of any shape and thickness, and material properties including rectangular holes for walls and holes of any arbitrary shape for slabs.
 - ✓ Material Properties
 - ✓ Member releases and supports (boundary conditions)
 - ✓ Steel section shapes are automatically mapped to Revit families.
 - ✓ Custom sections produced by S-FRAME's tapered section tool
 - ✓ Use of Revit's unique member ID's to avoid duplication and improve round-tripping.
 - ✓ Unit conversion
- Updated link for TEKLA Structures supports the new 64-bit versions.