3MURI

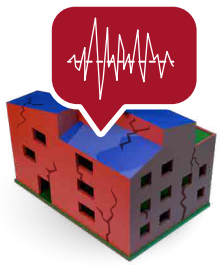
Project

Time History Module

Non linear dynamic analysis

STADATA

STRUCTURAL SOFTWARE



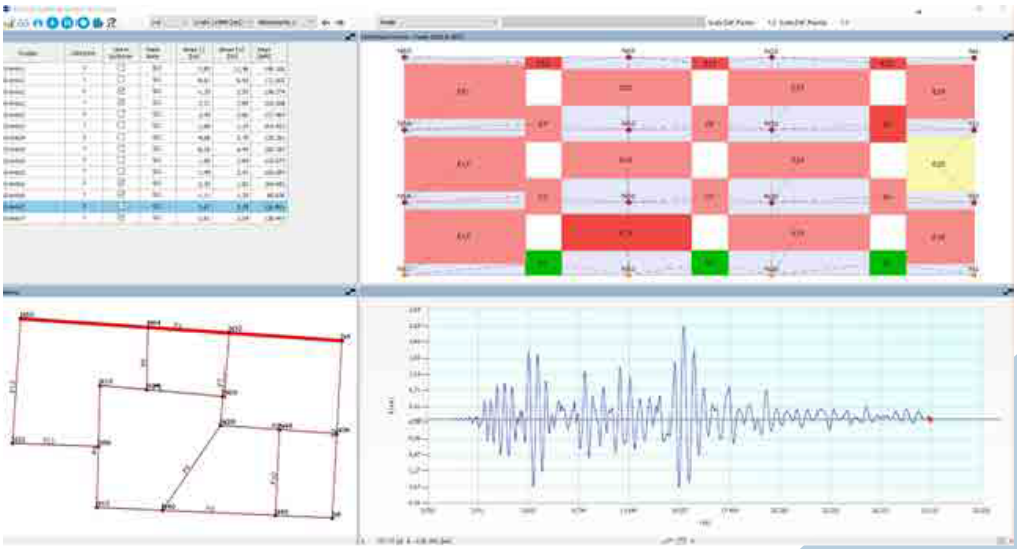
Time History Module

STA DATA is proud to introduce the new Time History module, a state-of-the-art technology for nonlinear dynamic analysis.

This tool was developed to provide highly accurate simulation of the seismic conditions that a structure might face.

Unlike traditional approaches, which apply seismic actions separately, the Time History module performs the analysis by simultaneously applying seismic actions on the X- and Y-axes using time accelerograms as input. This method not only significantly increases the accuracy of the results, but also allows them to more accurately reflect seismic reality.

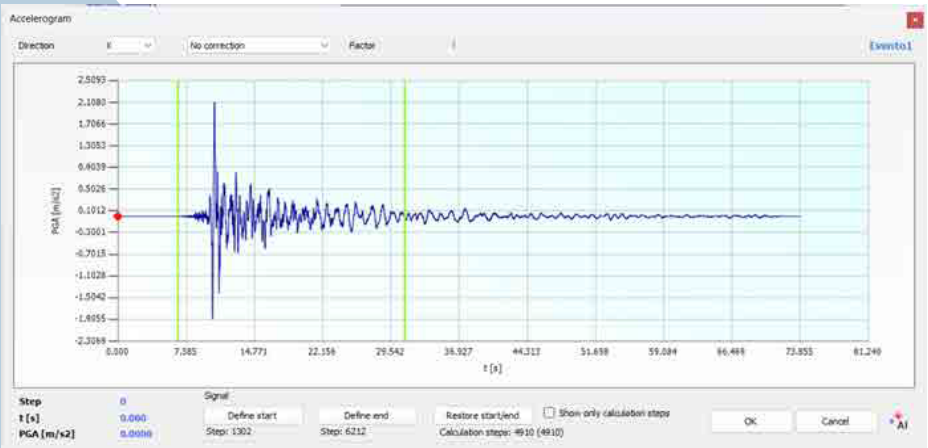
In addition, the module allows direct calculation of the maximum required displacement (d max) of the structure, without resorting to the N2 method used in nonlinear static analyses. This direct approach ensures a more accurate estimate of the displacement, thus improving the quality and safety of structural assessments.



Main Features of the Time History Module:

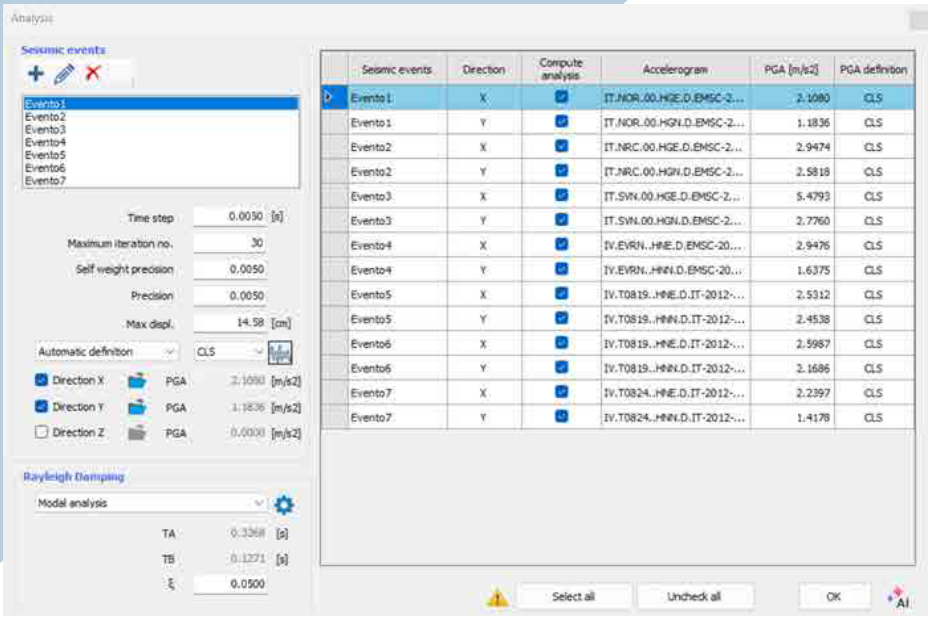
Import and Customization of Accelerograms:

Imports time accelerograms and allows controls its spectrum compatibility, with advanced options to customize this data to project-specific needs, including the ability to set new start and end steps, as well as thickening and thinning capabilities to optimize temporal resolution and computational load.



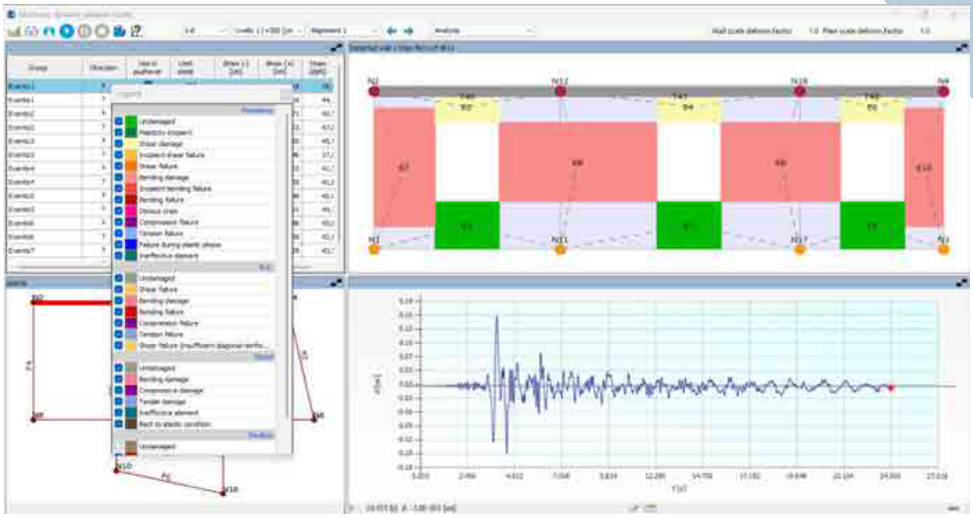
Definition of Multiple Seismic Events:

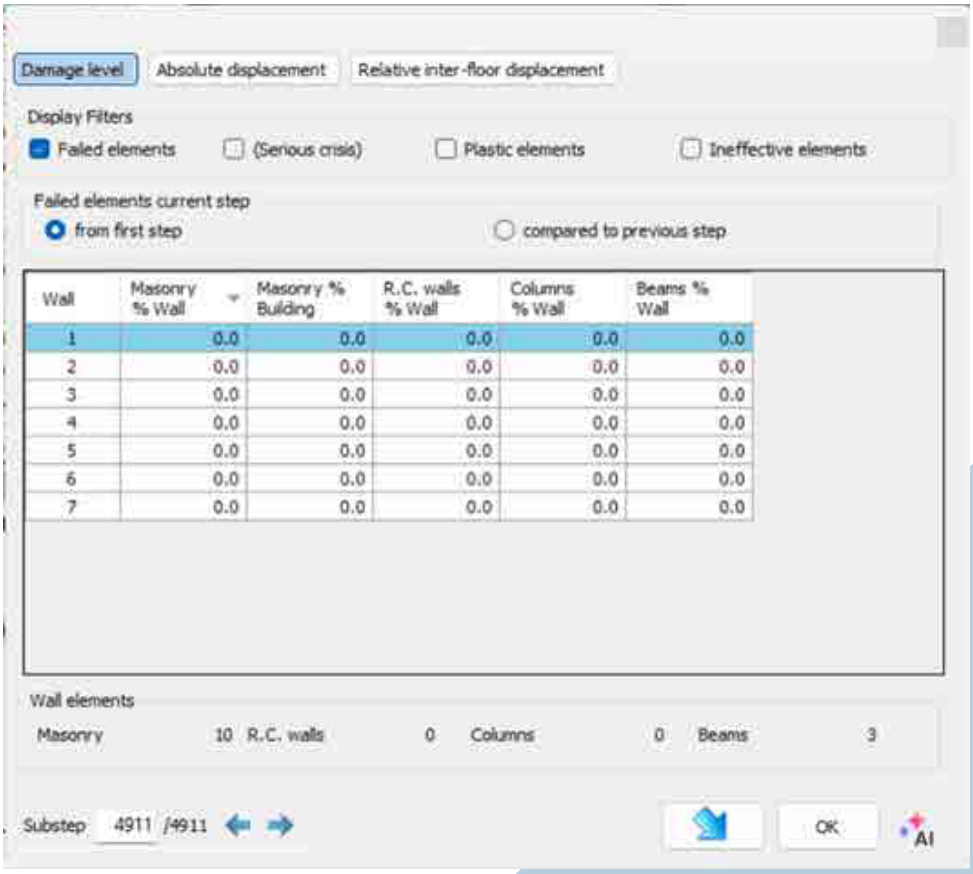
Configure and manage multiple seismic scenarios within the same project to analyze the impact of various seismic events on the structure, enabling a comprehensive seismic risk assessment.



Detailed information on damage to the structure

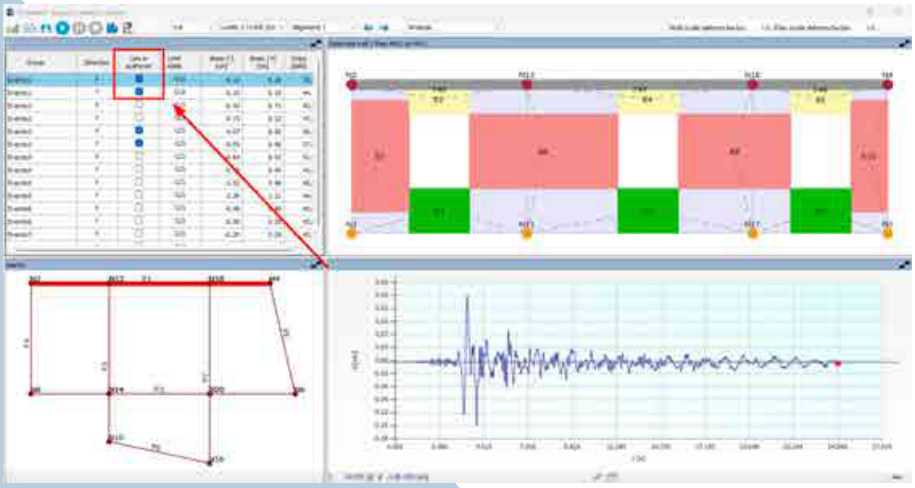
Similar to the Pushover Analysis results environment, the Time History module provides detailed and accurate information on the damage status of each element that conforms the structural model.



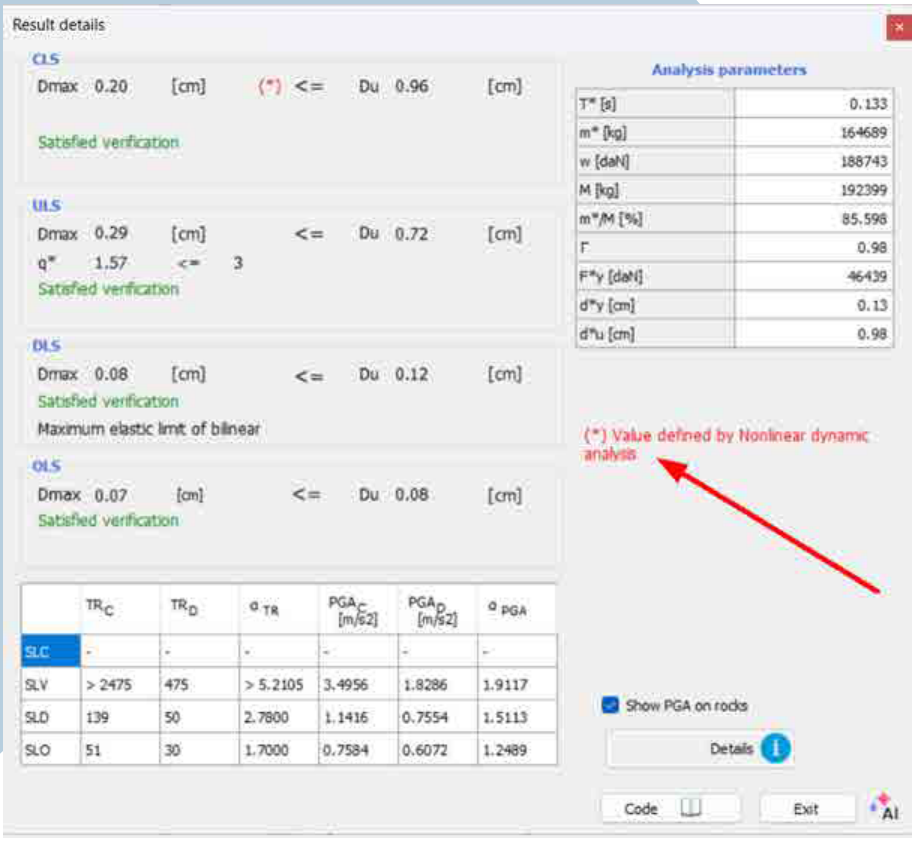


Use of Displacements in Pushover Analysis:

Integrates maximum displacements obtained from nonlinear dynamic analysis as input for Pushover analysis, providing continuity in the structural response evaluation process.

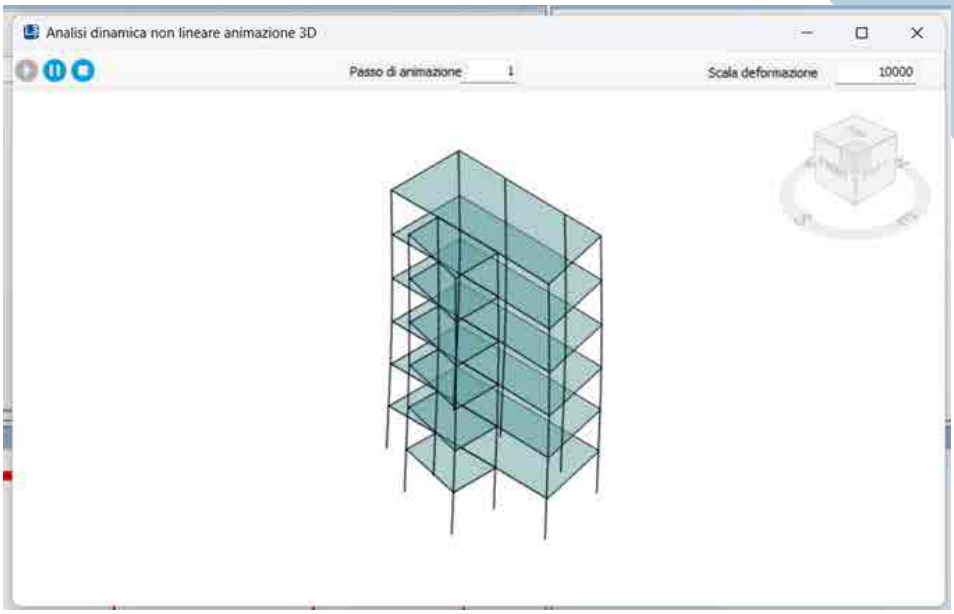


Group	Direction	Use in pushover	Limit state	dmax (-) [cm]	dmax (+) [cm]	Vmax [daN]
Evento1	X	☑	CLS	-0.15	0.16	35,468
Evento1	Y	☑	CLS	-0.35	0.19	44,125



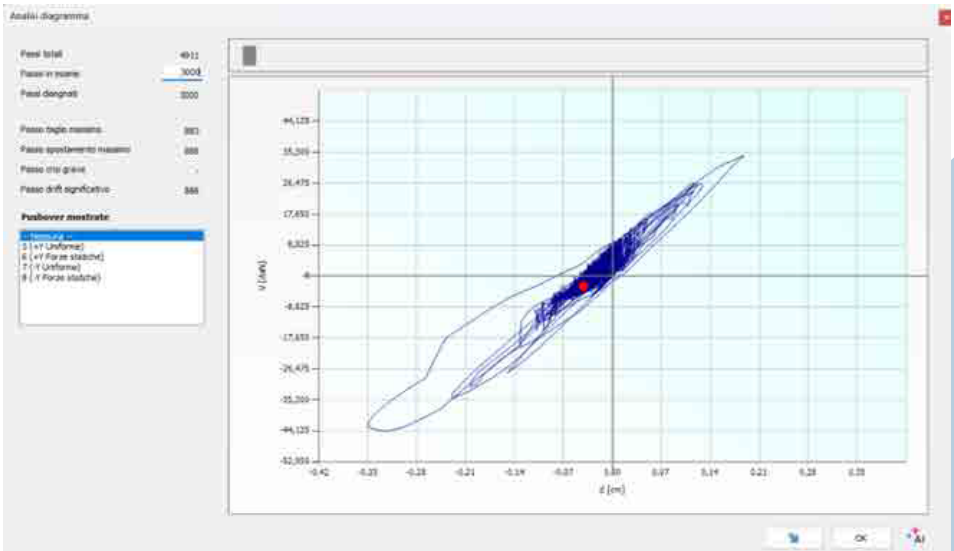
Structural Response Animation:

Displays the deformations and displacements of the structure under the action of selected accelerograms through animations, providing an intuitive and immediate representation of the seismic impact.



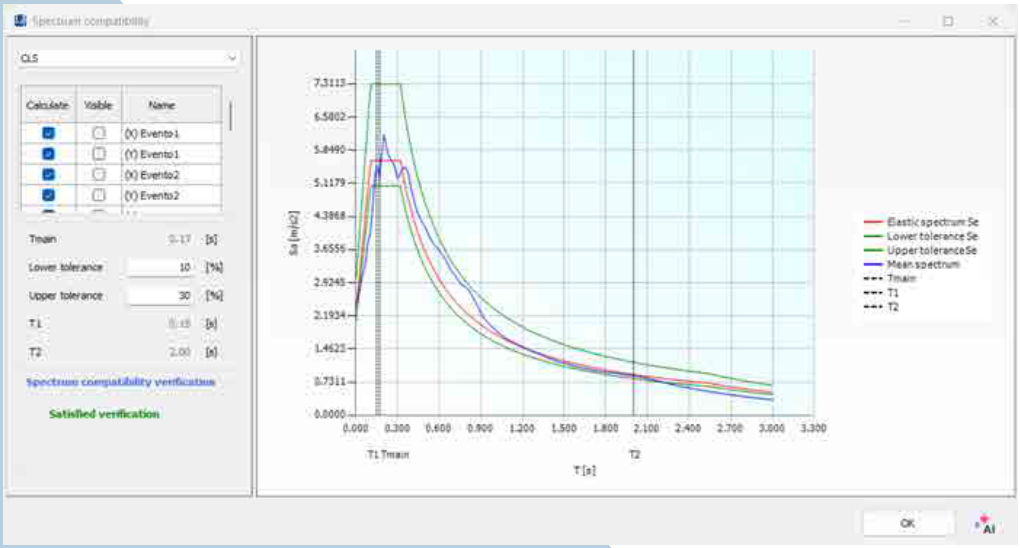
Hysteresis Cycle Analysis:

Examines the behavior of the structure through the hysteresis cycle graph, analyzing the structure's ability to dissipate energy and its elasto-plastic response to seismic events.



Compatibility Spectrum Verification.

The Time History module of 3Muri Project introduces an advanced compatibility spectrum feature, which is essential for accurate seismic analysis and regulatory compliance. This feature allows calculation of the average spectrum for the selected limit state and verification of compliance against a range of tolerances, both minimum and maximum, set by the standards or customizable by the user.



The module's graphical interface is designed to provide a clear and detailed visualization of seismic data. At the heart of this functionality is a dynamic graph that not only shows the elastic spectrum and the mean spectrum, but also allows all spectra that contribute to the averaging to be displayed. In addition, the graph highlights the upper and lower tolerance spectra, providing users with an immediate visual tool for assessing structural safety in response to seismic events.

This graphical visualization capability not only facilitates the interpretation of seismic spectra, but also improves accuracy in the design and verification of structures, ensuring that all analyses are conducted within required and customizable safety limits.

Why Integrate the Time History Module into Your Workflow?

3Muri Project's Time History module not only meets stringent regulatory requirements, such as NTC 2018 and Eurocode 8, but also offers a flexible and powerful platform to improve the accuracy of your seismic analyses. It is ideal for users and design firms that require detailed and reliable analysis of the behavior of structures during earthquakes.