EN

S2OMA

Software Solution

Operational Modal Analysis

> Analyze the measured response of the structure to dynamic actions



100%
MADE IN ITALY



NATIVELY
INTEROPERABLE



STANDARD
COMPLIANT

S2X SRL

WHAT IS OMA?

It is a technique for the experimental analysis of the dynamic response of structures aimed at identifying their relative modal parameters.

WHAT IS IT FOR?

Operational Modal Analysis (OMA) has several applications in civil engineering. The most common are:

01 Validation and calibration of Finite Elements Models

02 Identification of the possible causes of excessive vibrations

03 Evaluation of the effectiveness of maintenance interventions

04 Non-invasive estimation of tensile

05 Damage identification

DEEP TECH

WHY S2-OMA?

100% MADE IN ITALY

S2-OMA is the first 100% made in Italy software specifically developed for the output-only modal analysis in the time as well as frequency domain. The software is among the most complete of this type on the market, and it definitely holds the most diversified set of OMA methods: this makes S2-OMA a state-of-the-art software for OMA.

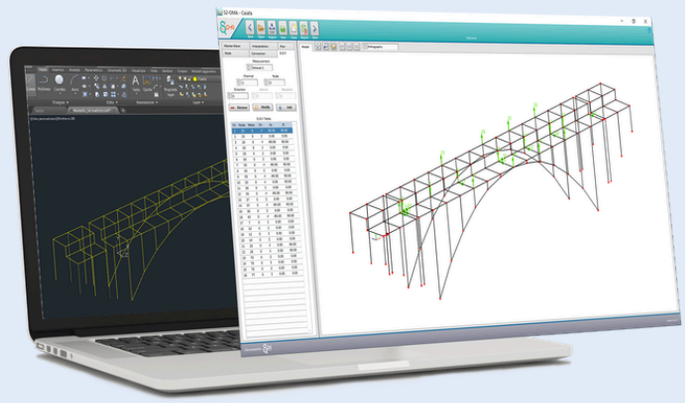
USER-FRIENDLY

An intuitive interface guides the user through the entire analysis process, from data loading to geometry definition, up to test report generation.

STANDARD COMPLIANT

S2-OMA is a powerful and versatile software already compliant with the most recent standards and codes (DM 204/2022, UNI 10985, UNI/TR 11634, IOMAC Guidelines for OMA in civil engineering)

MAIN FEATURES



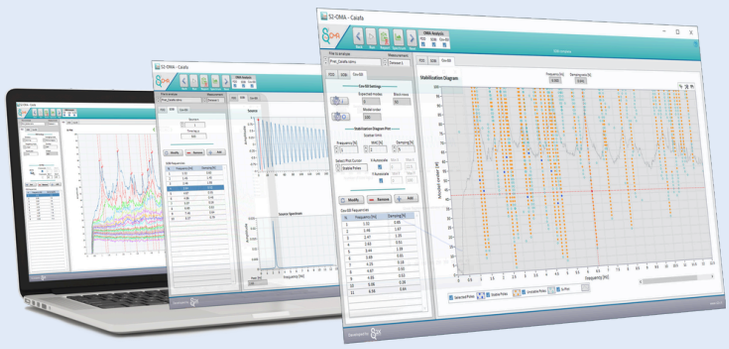
IMPORT OF GEOMETRY

Quick input of structural model and test layout. Simplified import of models in .dxf format



MULTI-LAYOUT ANALYSIS

Process multiple datasets and merge the mode shape vectors obtained from different tests.



OUTPUT-ONLY MODAL ANALYSIS

Well-established operational modal analysis procedures in the time as well as frequency domain are implemented in the software.

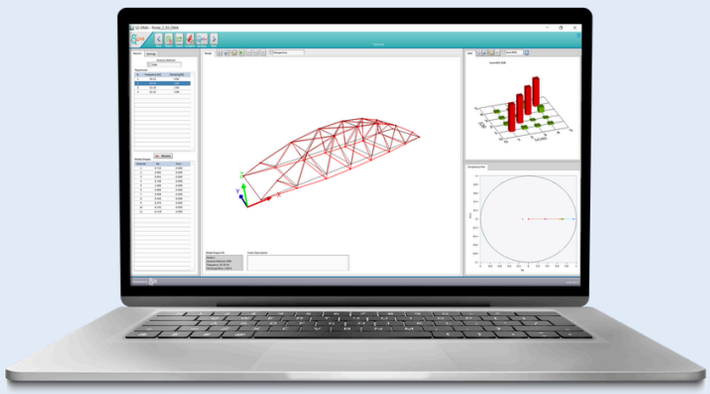
FORMATO DATI

You can upload data from most common file formats:

***.tdms, *.lvm, *.csv, *.txt, *.dxd**

VISUALIZATION AND VALIDATION

State-of-the-art visualization and validation tools, such as animated mode shapes, MAC, AutoMAC, CrossMAC and are available Complexity Plots.



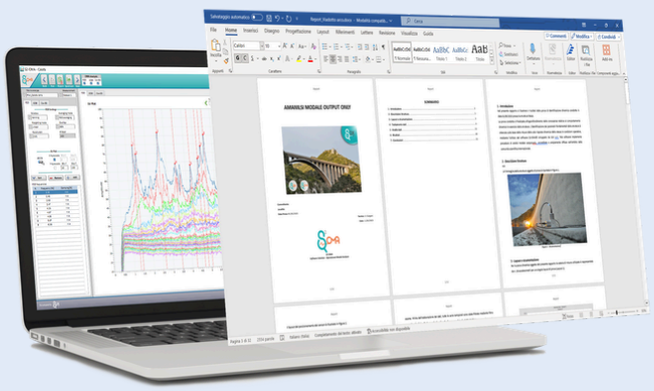
AUTOMATIC MODE PAIRING AND CORRELATION

The software includes tools for a very simple while effective mode pairing. They are particularly useful to evaluate the correlation with the results of FE models following an intuitive approach.



AUTOMATIC REPORT GENERATION

The software is able to automatically generate the test report in editable format. The content of the report is highly customizable. The report is avilable in Italian and English



TECHNICAL ASSISTANCE AND UPDATES

Technical assistance is available in Italian and English, via phone, e-mail or video call.Tec nical assistance and updates for one year are included for all licenses. Video tutorials are also available on the S2X YouTube channel.

TECHNICAL DETAILS

License type	BASE	INTERMEDIATE	ADVANCED
Data loading			
Data import from different files formats (.tdms, .txt, .csv, .lvm, .dxd)	✓	✓	✓
Geometry			
3D model drawing	✓	✓	✓
3D model import from a .dxf file	✓	✓	✓
Data processing			
Plot time series	✓	✓	✓
Data statistics	✓	✓	✓
Decimation	✓	✓	✓
Data filtering	✓	✓	✓
Data analysis			
Natural frequency estimation	✓	✓	✓
Damping ratio estimation	–	✓	✓
Mode shape estimation	✓	✓	✓
Non-parametric analysis in the frequency domain	✓	✓	✓
Power spectral density matrix	–	✓	✓
Coherence functions	–	✓	✓
Non-parametric in the time domain	–	✓	✓
Parametric analysis in time domain	–	–	✓
Support of multi-layout tests	–	–	✓

License type	BASE	INTERMEDIATE	ADVANCED
Validation			
Animated modal shapes	✓	✓	✓
User-selectable views of modal shape	✓	✓	✓
Complexity Plots	✓	✓	✓
AutoMAC	✓	✓	✓
CrossMAC	–	✓	✓
MAC with numerical mode shapes (FEM)	–	–	✓
Automatic mode pairing and correlation	–	–	✓
Report			
Results exported in text format (.txt)	✓	✓	✓
Automatic report generation in editable format (.docx) in IT and EN	–	–	✓
Export results to S2-VIEW	✓	✓	✓

NATIVELY INTEROPERABLE

S2-OMA was designed and developed to be natively interoperable with other S2X software including: S2-SHM for Structural Health Monitoring and S2-DDA for data acquisition. It also supports the main data formats commonly returned by other off-the-shelf measurement systems.

APPLICATION EXAMPLES



BRIDGES AND VIADUCTS

Modal analysis of bridges and viaducts also in multi-layout configuration.



CABLES AND TIE RODS

Identification of the fundamental modal parameters for the non-invasive estimation of the tensile load.



HISTORICAL STRUCTURES

Test results can be used for validation and calibration of numerical models, seismic vulnerability assessments, identification of the causes of excessive vibrations.

RECENT PUBLICATIONS

- Notarangelo M.A., Gargaro D., Fabbrocino G., Rainieri C. (2024). Making Vibration Data Processing an Easy Task: Industrial Software Solutions for OMA and SHM. Proceedings of the 10th International Operational Modal Analysis Conference (IOMAC 2024), Naples, Italy. Springer, Lecture Notes in Civil Engineering, vol 514, pp. 456-467.
- Gargaro D., Notarangelo M.A., Fabbrocino G., Cosenza E., Rainieri C. (2024). Operational Modal Analysis of a Bridge Subjected to Perceptible Vibrations. Proceedings of the 10th International Operational Modal Analysis Conference (IOMAC 2024), Naples, Italy. Springer, Lecture Notes in Civil Engineering, vol 515, pp. 236-244.
- Rainieri C., Cieri L., Fabbrocino G. (2023). Monitoring the modal parameters of a historical belfry in earthquake prone region. Proceedings of the 10th International Conference on Experimental Vibration Analysis for Civil Engineering Structures EVACES 2023, Milan, Italy.
- Sun Q., Rainieri C., Ren W.X., Yan W.J., Fabbrocino G. (2023). Automated operational modal analysis of bell towers subjected to narrowband input. Structures, Vol. 54, pp. 78–88.

HOSPITAL AND STRATEGIC STRUCTURES

Evaluating possible dynamic interaction effects, supporting advanced numerical simulations.



PEDESTRAIN BRIDGES

Evaluation of possible vibration problems due to pedestrian-structure interaction.



WIND TURBINES

Identification of modal parameters in operating conditions and at rest.



RECENT PUBLICATIONS

- Lubrano Lobianco A., Del Zoppo M., Rainieri C., Fabbrocino G., Di Ludovico M. (2023). Damage Estimation of Full-Scale Infilled RC Frames under Pseudo-Dynamic Excitation by Means of Output-Only Modal Identification. Buildings 2023, 13, 948.
- Notarangelo M.A., Gargaro D., Sandoli A., Fabbrocino G., Prota A., Cosenza E., Manfredi G., Rainieri C. (2023). Monitoring the vibration response of the School of Engineering Main Building at University of Naples “Federico II” to an “earthquake of joy”. Proceedings of The 10th International Conference on Experimental Vibration Analysis for Civil Engineering Structures EVACES 2023, Milan, Italy.
- Celano T., Ceroni F., Fabbrocino G., Rainieri C., Casapulla C. (2022). Thermographic investigations and dynamic identification tests for non-destructive structural assessment and enhanced FE modelling of a historical iron-strengthened masonry church. Journal of Civil Structural Health Monitoring.

WHAT IS IT?

S2-VIEW is an interactive viewer of the results of Operational Modal Analysis by the S2-OMA software.



WHAT IS IT FOR?

Uploading test results in S2-VIEW gives the final user the opportunity to interact with information usually reported in print in the test report.

WHY?

Make the results of your OMA analyses accessible to third parties, allowing them to visualize and interact with animated mode shapes, and evaluate the correlation among test results obtained by different OMA methods as well as the correlation between experimental and numerical modal properties. The latter can be directly uploaded by the user.

S2-VIEW can be downloaded for free



WE SIMPLIFY
COMPLEX DATA PROCESSING



www.s2x.it

HEADQUARTER:
P.le M. Scarano n. 6
86100 Campobasso (CB)
Tel. +39 0874 426431
info@s2x.it

V.2_26_09