



SEISMIC PROTECTION SYSTEMS FOR CULTURAL HERITAGE **SOMMA FOR ART**

SISMART was born for the protection against vibrations of artworks. The specially designed devices have already been applied to several artworks in Italy.

VIBRATION AND EARTHQUAKE ISOLATION OF ART OBJECTS

Within the MONALISA project Somma, together with “La Sapienza” Rome University and ENEA have designed, produced, tested and installed a platform supported by four vibration isolation devices.

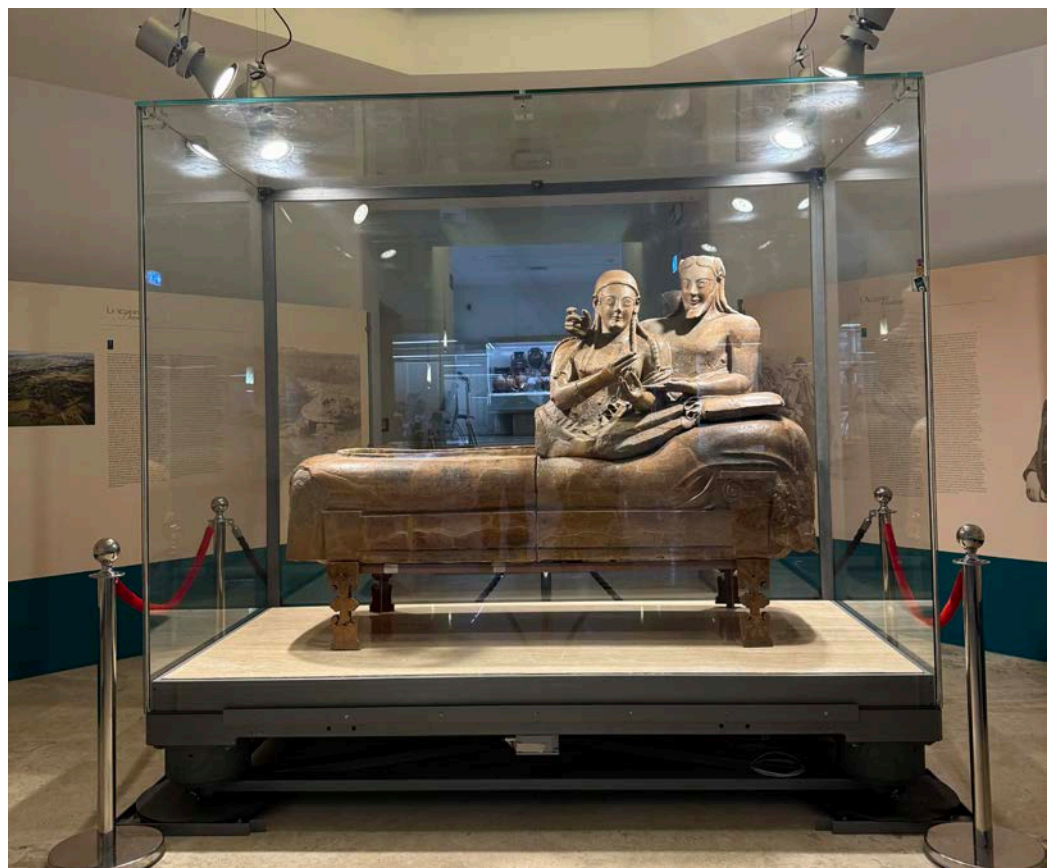
The platform was designed specifically to protect the “Sarcofago degli Sposi”, a masterpiece of Etruscan art kept in the National Etruscan Museum of Villa Giulia in Rome, from the vibrations caused by vehicular and road traffic, but also from possible earthquake events.



Weighing operation to verify and confirm the mass of the theca and the Sarcophagus.



The entire platform, loaded with a three-dimensional Sarcophagus' replica and a steel frame that reproduce the glass case mass, was subjected to tests on the shaking table at the "Casaccia" Laboratory of Enea, to simulate the conditions of service (traffic vibrations) and earthquake.



Installation at National Museum of Villa Giulia in Rome

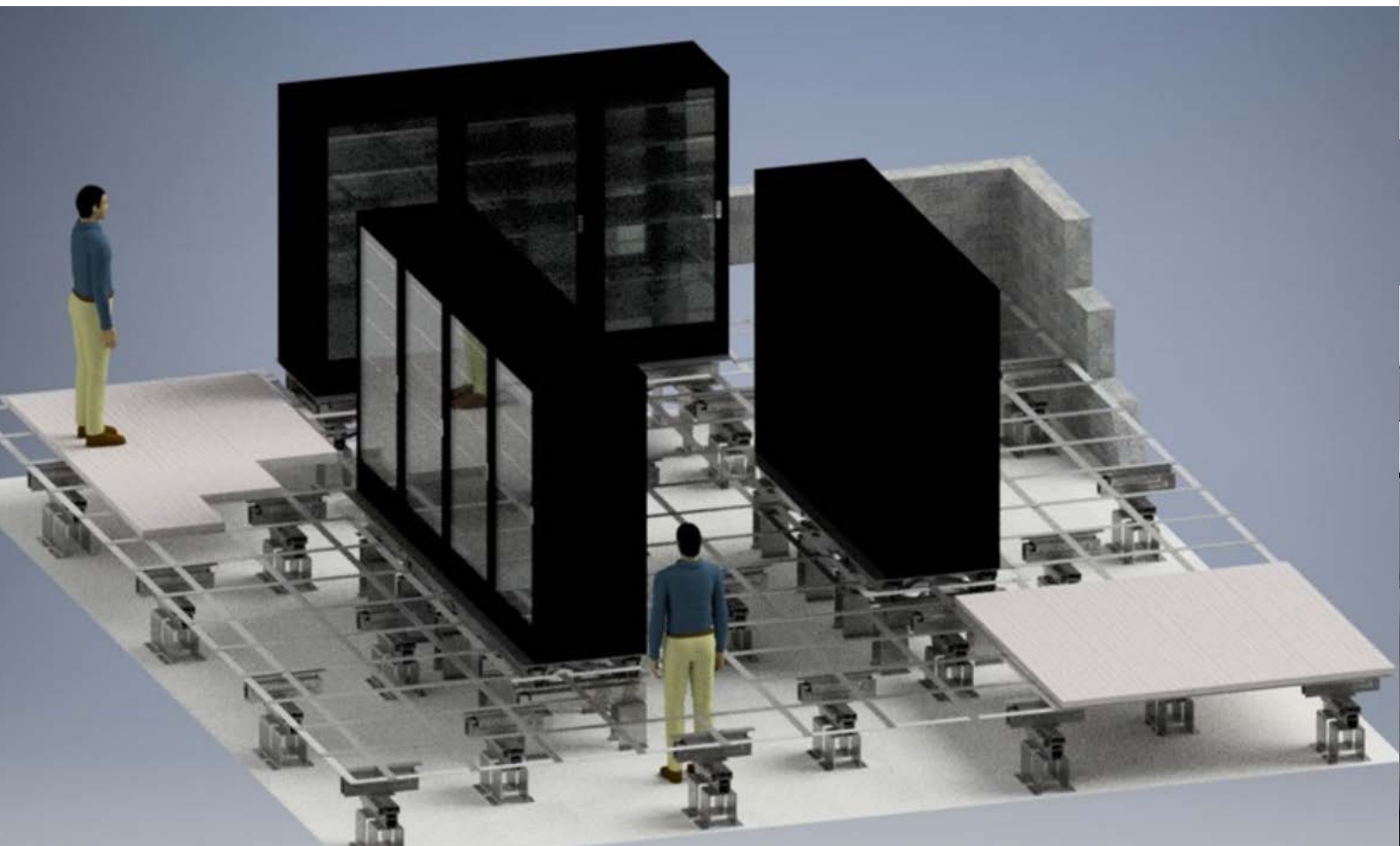
SEISMIC ISOLATION OF HIGH VALUE OBJECTS - KSJ DEVICES

Innovative technology for seismic isolation and for the prevention of damages to works of art, goods, high value and/or strategic assets for public safety, caused by earthquakes. The KSJ device is a passive articulation joint with longitudinal and transversal translation.

The KSJ system uses steel components designed as a cinematic articulation to decouple the horizontal motion of the ground from the structure. It is a completely made of steel, it's a mechanical solution without wearing parts or degradable materials and maintenance free.

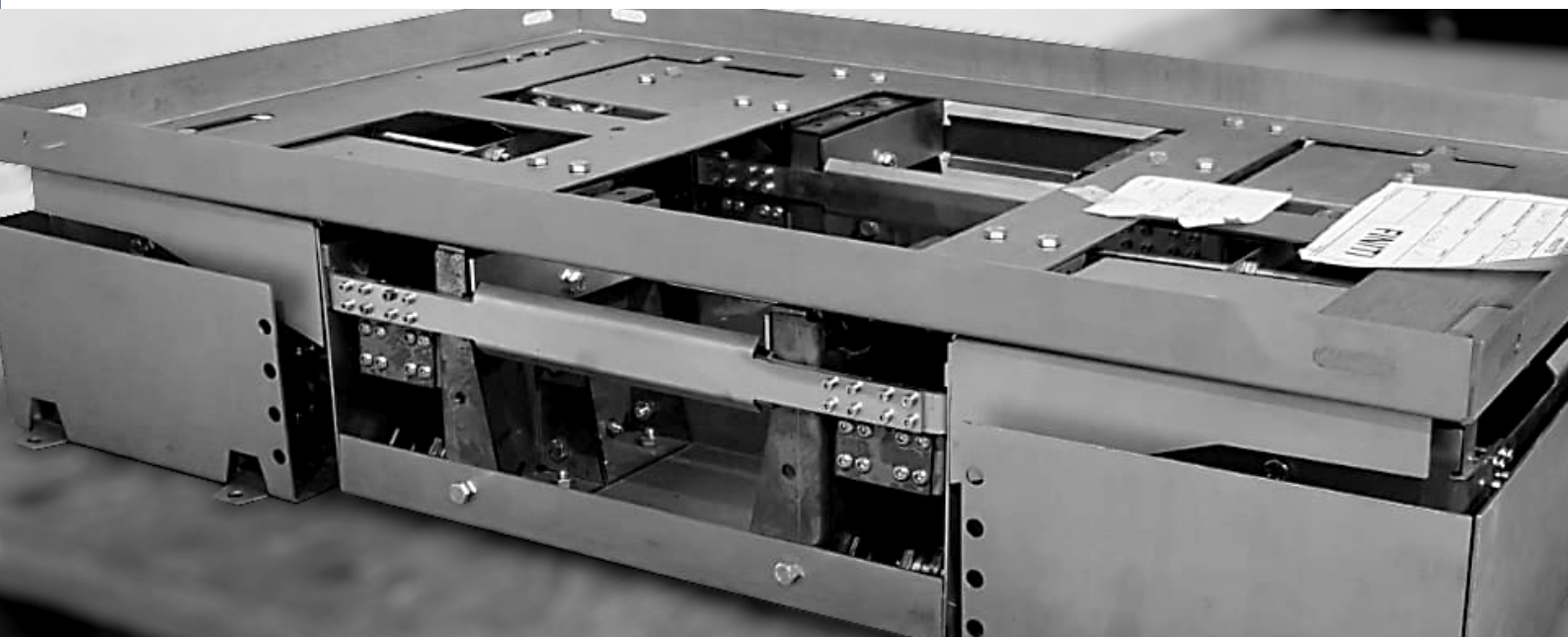
KSJ BASEMENTS and/or Anti-seismic devices allow non-structural isolation of:

- cultural heritage and/or sensitive areas, such as statues, artworks and/or cultural heritage in general;
- auxiliary and emergency equipment, such as generators, UPS and electrical racks for hospitals, data centers etc.;
- gas and water distribution systems and sub-services for Smart Cities.





Isolation simulacrum Goddess of Morgantina. Tests carried out on the shaking table at L.E.D.A. (Laboratory of Earthquake Engineering and Dynamic Analysis – University of Enna Kore) .



SEISMIC ISOLATION AND PROTECTION OF HISTORIC MASONRY BUILDINGS



TORRE CIVICA DI RIETI

The seismic improvement intervention was carried out with an unconventional TMD “tuned mass damper” system. The existing roof slab was removed and replaced with a new roof plate made up of a lightweight reinforced concrete slab disconnected from the perimeter walls. The structure described above is supported by a metal reticulate structure and the whole system is connected to the new roof slab and to the lower level floor using elastomeric seismic isolators. The system described, TMD, allows the creation of seismic damping with tuned masses and allows the control of the vibrations of the structure. Compared to other seismic protection systems, this solution did not require the execution of reinforcement interventions on the entire structure with consequent expensive and invasive works. In fact it reduces the seismic action due to the mass of the device which acts in counter-phase with respect to the oscillation of the building caused by the earthquake.



MONUMENTO ALLO SCUGNIZZO

“Monumento allo Scugnizzo delle quattro giornate” Naples, work of art by the sculptor Marino Mazzacurati. The Monument was positioned on a newly-built reinforced concrete base resting on an isolation system, made with elastomeric isolators and sliding devices.

PALAZZO DELL'EMICICLO

Palazzo dell'Emiciclo: Historic building - the construction started in the 17th century as the convent of S. Michele. The current configuration was completed in 1888 to become Palazzo delle Esposizioni. At the present this is the head quarter of the Council of Abruzzo Region.



PALAZZO EX GIL

Palazzo ex GIL: Historic building - years of construction 1929-1932. It was built to be the headquarters of the Gioventù Italiana del Littorio.

At the present this is the headquarter of the Gran Sasso Science Institute.



These buildings, heavily damaged by the 2009 earthquake, were retrofitted with a seismic isolation system external to the structure. A new foundation and a new curb were created under the masonry, disconnecting the structure from the ground. The seismic isolators were placed between the foundation and the curb. With this intervention a total seismic retrofit was obtained, which will prevent any damages and therefore no costs for restoration in the eventuality of future seismic events.

Furthermore, it was completed the architectural and functional conservation of the buildings, which is essential for all structures under the protection of Cultural Heritage.

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