



Startup di



SAPIENZA
UNIVERSITÀ DI ROMA



OUR MISSION

HySafe develops and delivers high-performance, scientifically grounded solutions for mitigating risks induced by excitation sources such as earthquakes, wind, machine-induced or anthropic vibrations. Its technologies are based on advanced mechanical and structural principles, specifically designed to enhance the safety and operational integrity of systems sensitive to vibrations.

In addition to cutting-edge vibration control and stability enhancement devices, HySafe also provides customized software tools for the design and optimization of tailored solutions, as well as proprietary AI-powered algorithms for structural health monitoring and predictive maintenance. These integrated solutions are suitable for a wide range of civil, industrial, and infrastructural applications.

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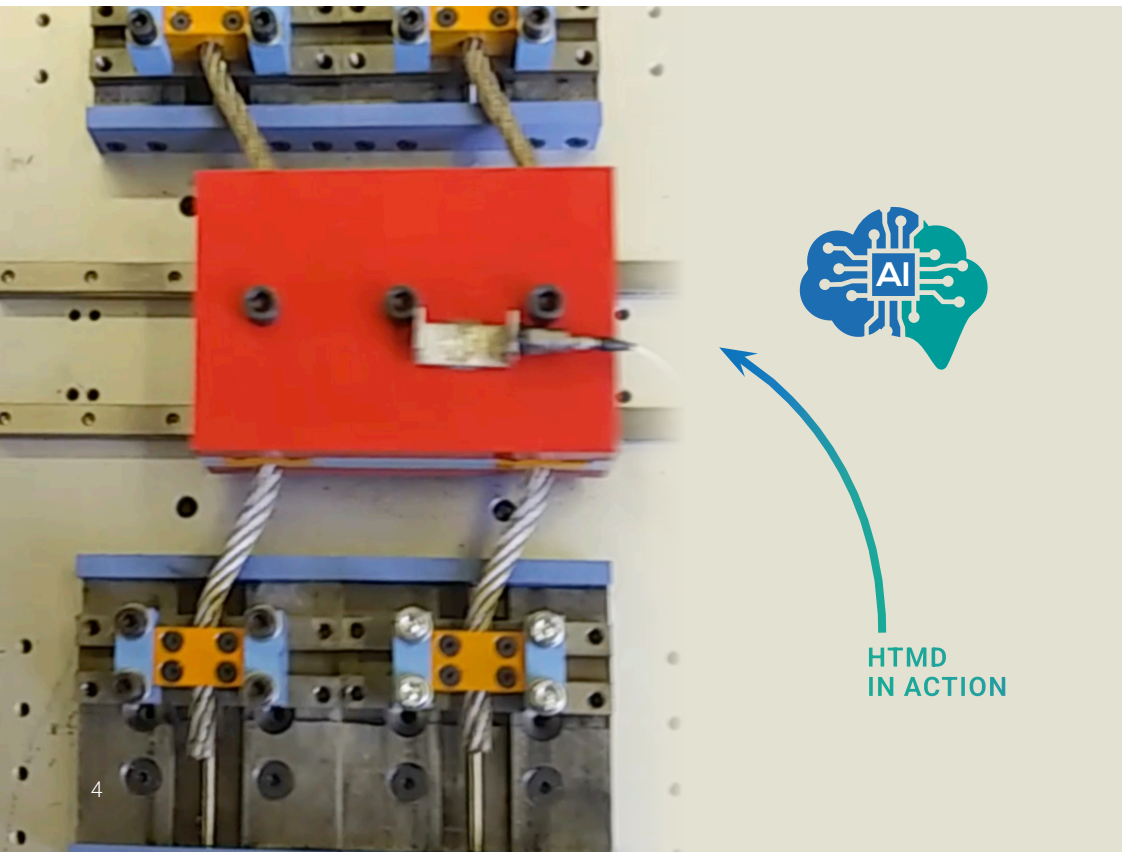
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HTMD

1. HYSTERETIC TUNED MASS DAMPER

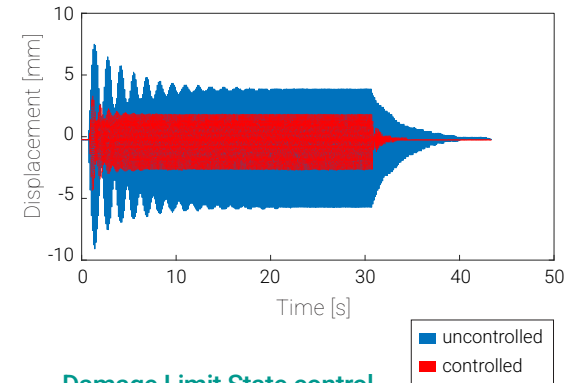
Engineered to safeguard civil and industrial structures under dynamic loading, HTMD is a breakthrough mechanical device designed to drastically reduce vibration amplitudes, ensuring both safety and operational stability. This state-of-the-art TMD features an oscillating mass connected to the host structure via steel or superelastic shape memory alloy wire ropes. When external forces excite the structure, HTMD intelligently absorbs and redirects kinetic energy, initiating controlled oscillations that generate a counteracting damping force. This targeted response effectively mitigates structural vibrations, preventing damage and extending service life.

Backed by patents EP3259489B1, WO2016132394A3, US10591014B2, and CN107864662B, **HTMD sets a new standard in vibration damping technology – precision-engineered to protect what matters most.**

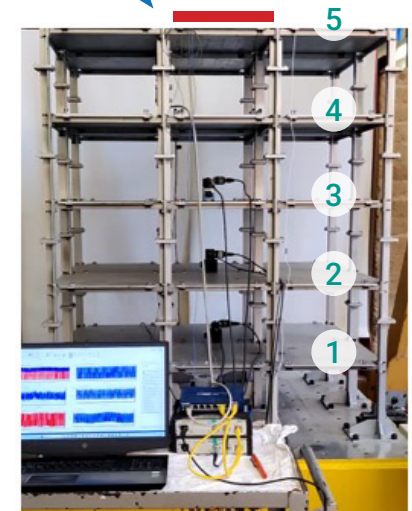
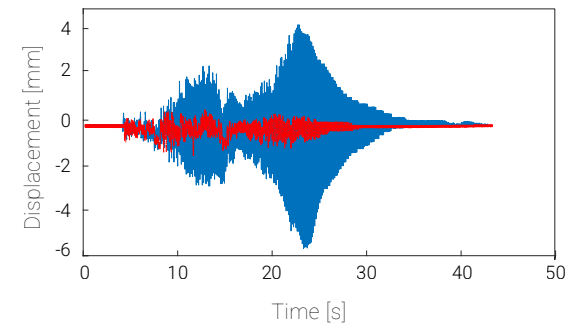


1.1 HTMD PERFORMANCE: EXPERIMENTAL TESTS

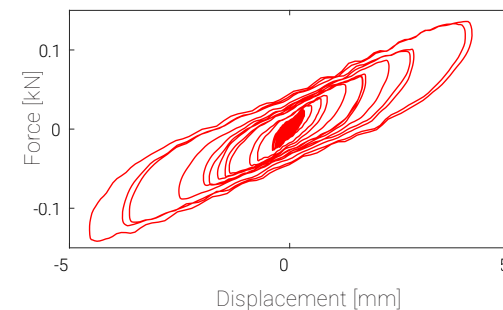
Resonance control



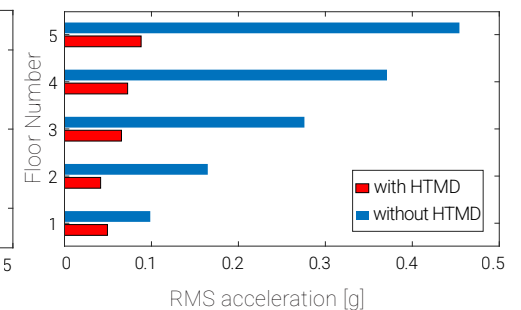
Damage Limit State control



TMD hysteresis cycles

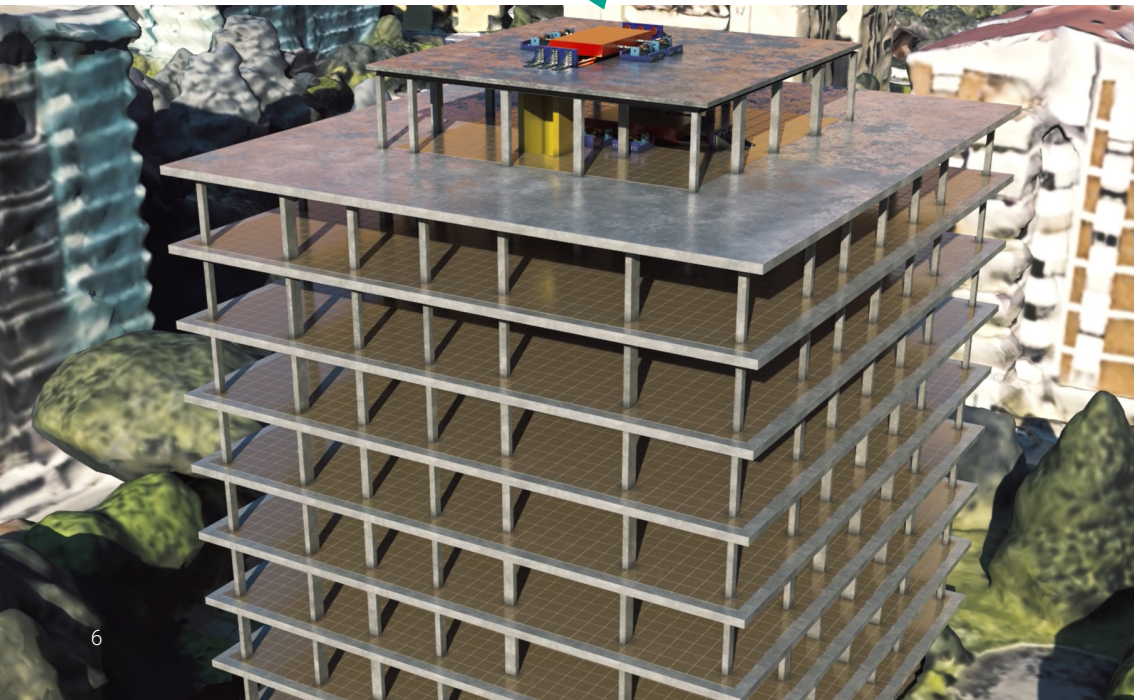
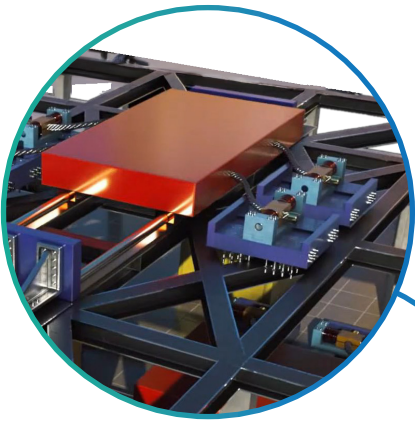


RMS acceleration per floor



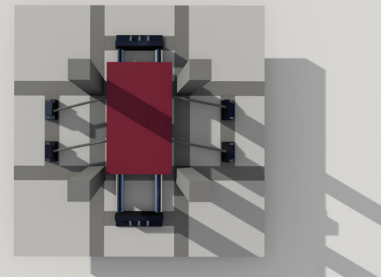
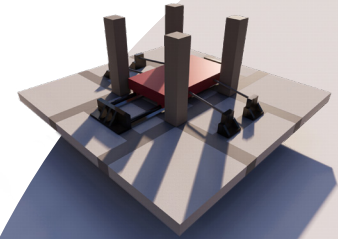
1.2 SEISMIC RETROFITTING OF EXISTING BUILDINGS

An existing reinforced concrete building seismically retrofitted using two HTMD devices installed in rooftop service rooms: no impact on private interior spaces, minimal footprint, rapid installation, and integrated sensors with AI-based self-monitoring system. The total mass ratio ranges from 2% to 5%, depending on the target limit state. The bidirectional version of our HTMD is the best solution for retrofitting buildings with limited installation space.



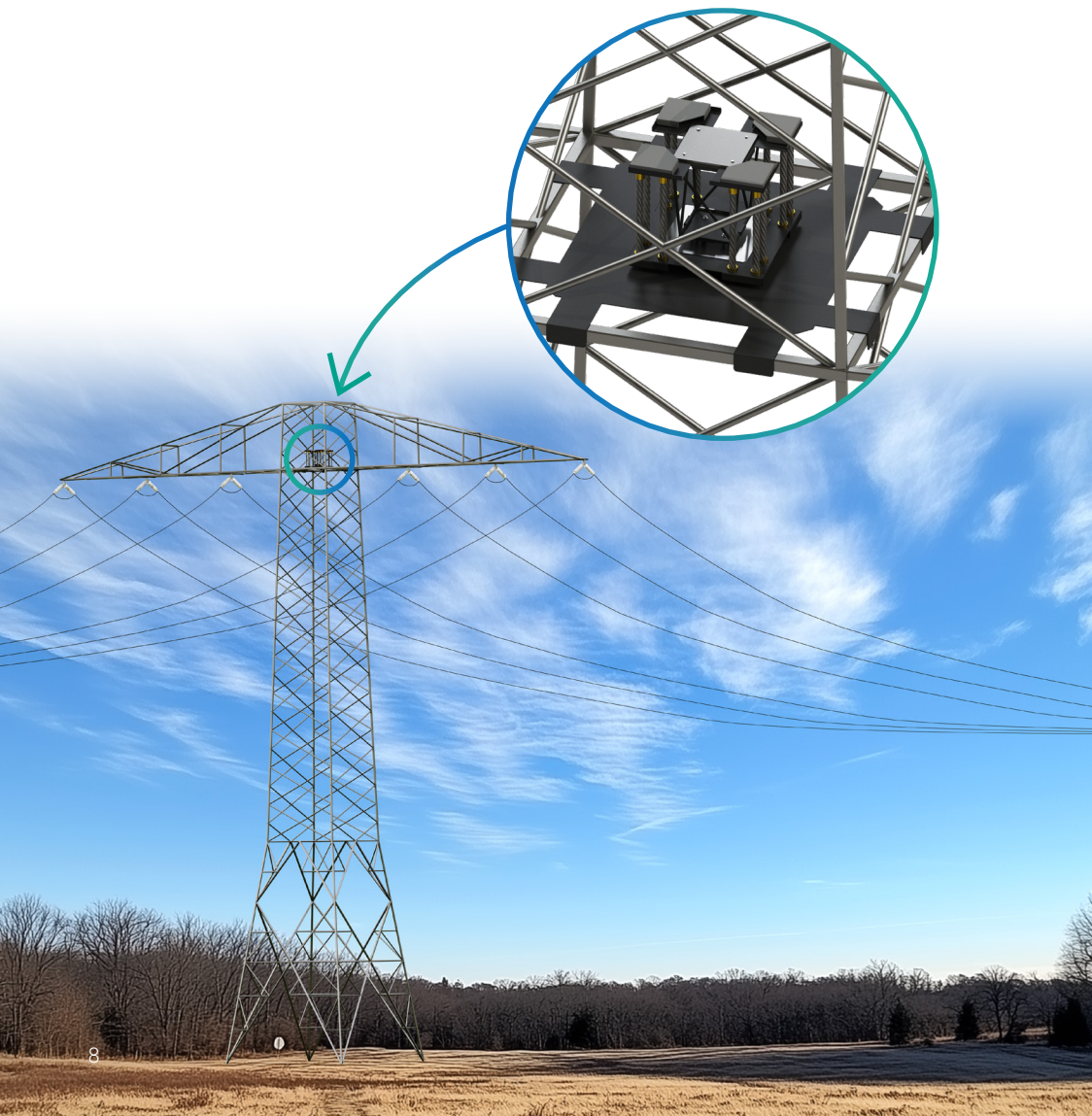
1.3 MITIGATION OF WIND-INDUCED MOTION IN SUPER-TALL CONSTRUCTIONS

HTMD's compact design makes it the perfect solution for integrating within the floors of super-slender skyscrapers, effectively enhancing comfort and structural stability under dynamic wind loads. This advanced technology is engineered to meet the evolving challenges of constructing ever-taller structures, setting a new benchmark in vibration control and structural resilience. The bidirectional version of our HTMD is available for buildings with minimal installation space.



1.4 STABILITY ENHANCEMENT OF TRANSMISSION TOWERS

A compact bidirectional version of HTMD is engineered to minimize dynamic amplification effects in power transmission towers and super-tall communication antennas, bolstering both operational reliability and structural integrity. Additionally, it proves highly effective in reducing vibrations in wind turbine blades, both onshore and offshore, ensuring optimal performance and extended lifespan.



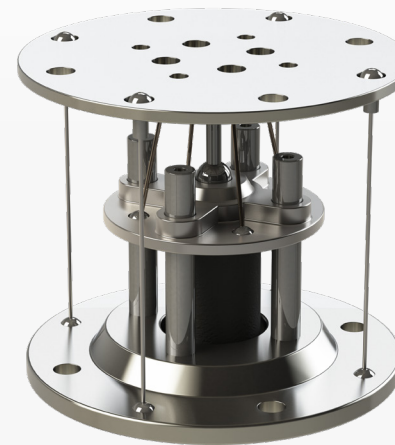
NSISO and WRISO

2. NEGATIVE STIFFNESS AND WIRE ROPE ISOLATORS: Combined solutions for advanced vibration isolation

NSISO is a negative stiffness isolator designed to be coupled with either conventional elastomeric isolators or with WRISO - a newly developed device whose design details remain confidential due to intellectual property protection.

WRISO can also be used independently of NSISO. However, when combined with NSISO, the system achieves outstanding isolation performance. Thanks to its unique characteristics, WRISO represents a new generation of isolators.

NSISO

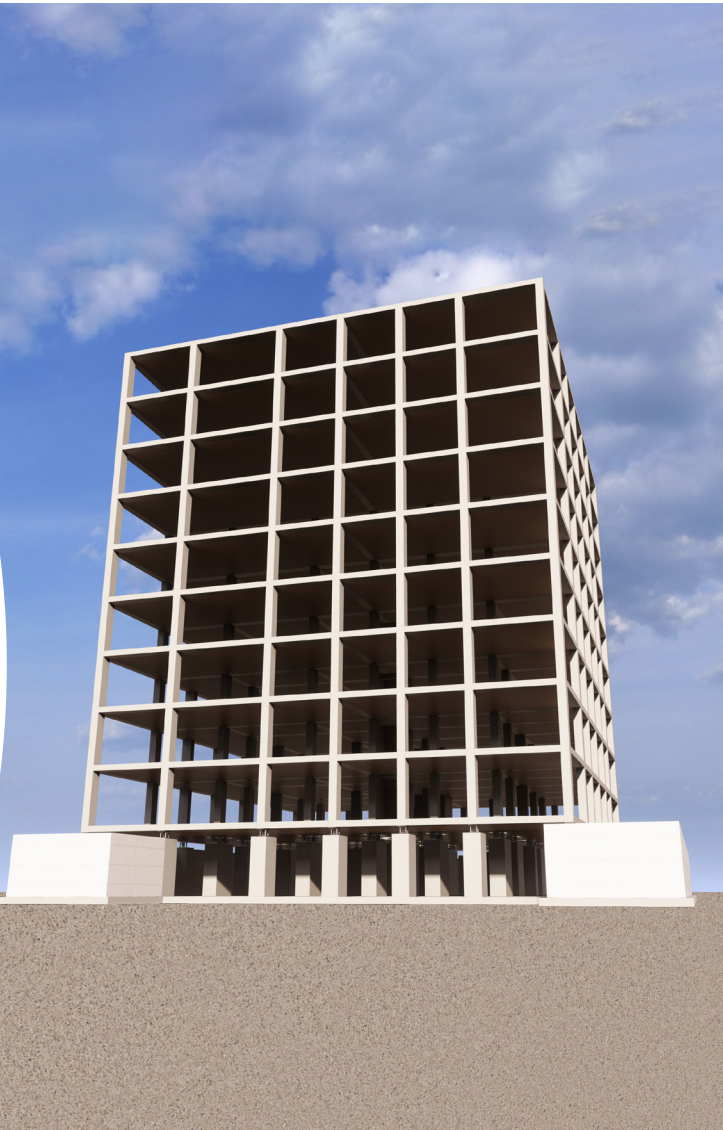
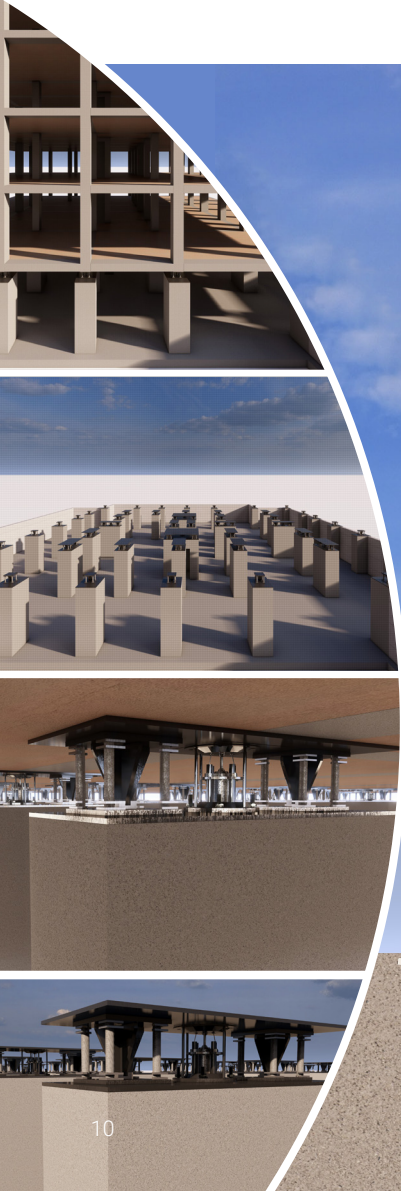


WRISO



2.1 SEISMIC ISOLATION OF BUILDINGS

WRISO effectively isolates both new and existing structures, optimizing the balance between reduced accelerations and controlled displacements. A key advantage is its ability to maintain multidirectional horizontal stiffness and damping regardless of vertical load magnitude. When integrated with NSISO, it further enhances overall isolation performance, delivering exceptional protection against ground motions.



2.2 ISOLATION OF SMALL NUCLEAR POWER REACTORS

The combination of NSISO and WRISO represents an ideal solution for critical applications where high-performance seismic isolation is essential such as in small nuclear power reactors. The operational stability of this critical infrastructure must be maintained over its entire service life under any seismic ground acceleration.



2.3 SATELLITE DEPLOYMENT ISOLATION

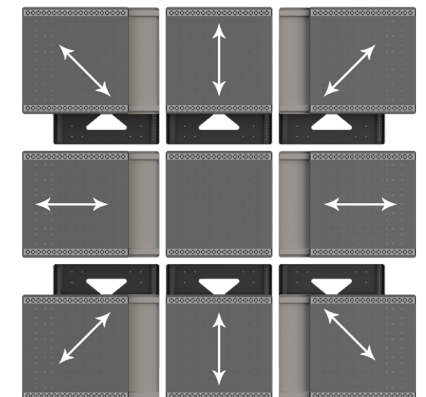
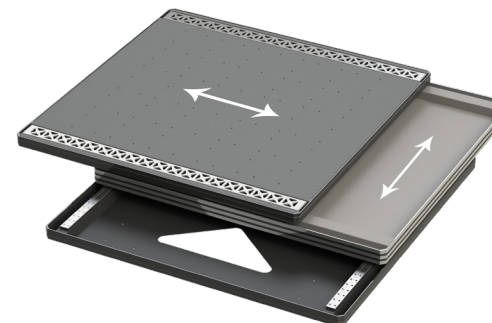
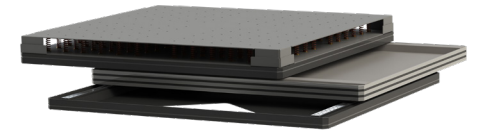
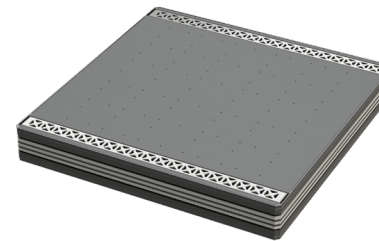
The combination of NSISO and Origami-elastomeric isolators provides effective vibration and shock isolation during satellite launch and deployment, safeguarding sensitive components and improving mission reliability under extreme launch conditions.

ISOP

3. ISOLATION PAD

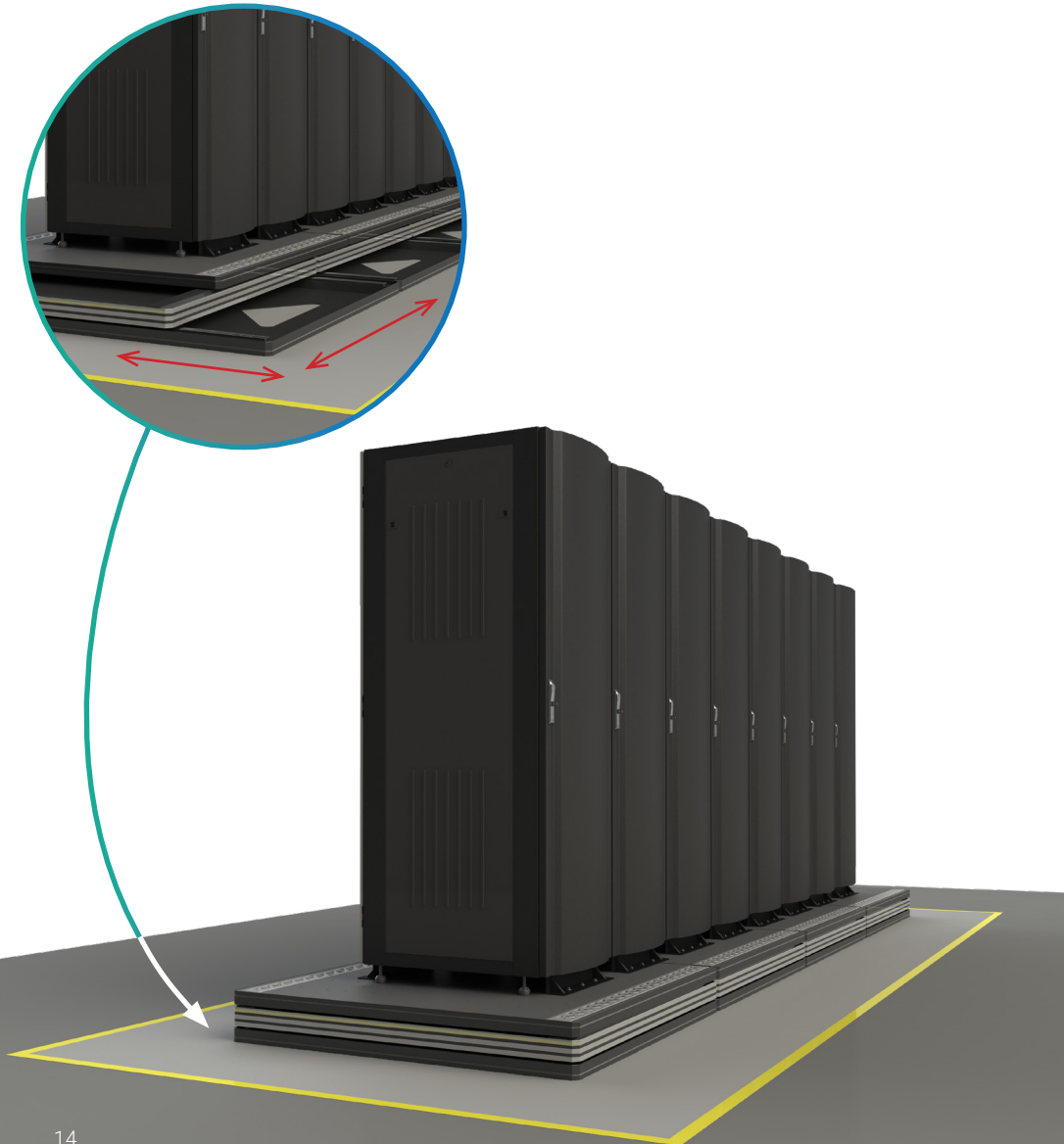
A new modular solution for protecting small to medium-sized sensitive equipment from seismic and anthropic vibrations.

ISOP is a versatile isolation system designed to protect valuable assets across all three spatial directions. It can be tailored to the specific needs of each application, making it ideal for safeguarding the integrity and functionality of medical, scientific, and industrial equipment or artworks.



3.1 DATA CENTER PROTECTION

Installed under server racks, ISOP filters out environmental vibrations and ensures stability during seismic events, maintaining operational continuity and reducing wear on critical IT infrastructure.



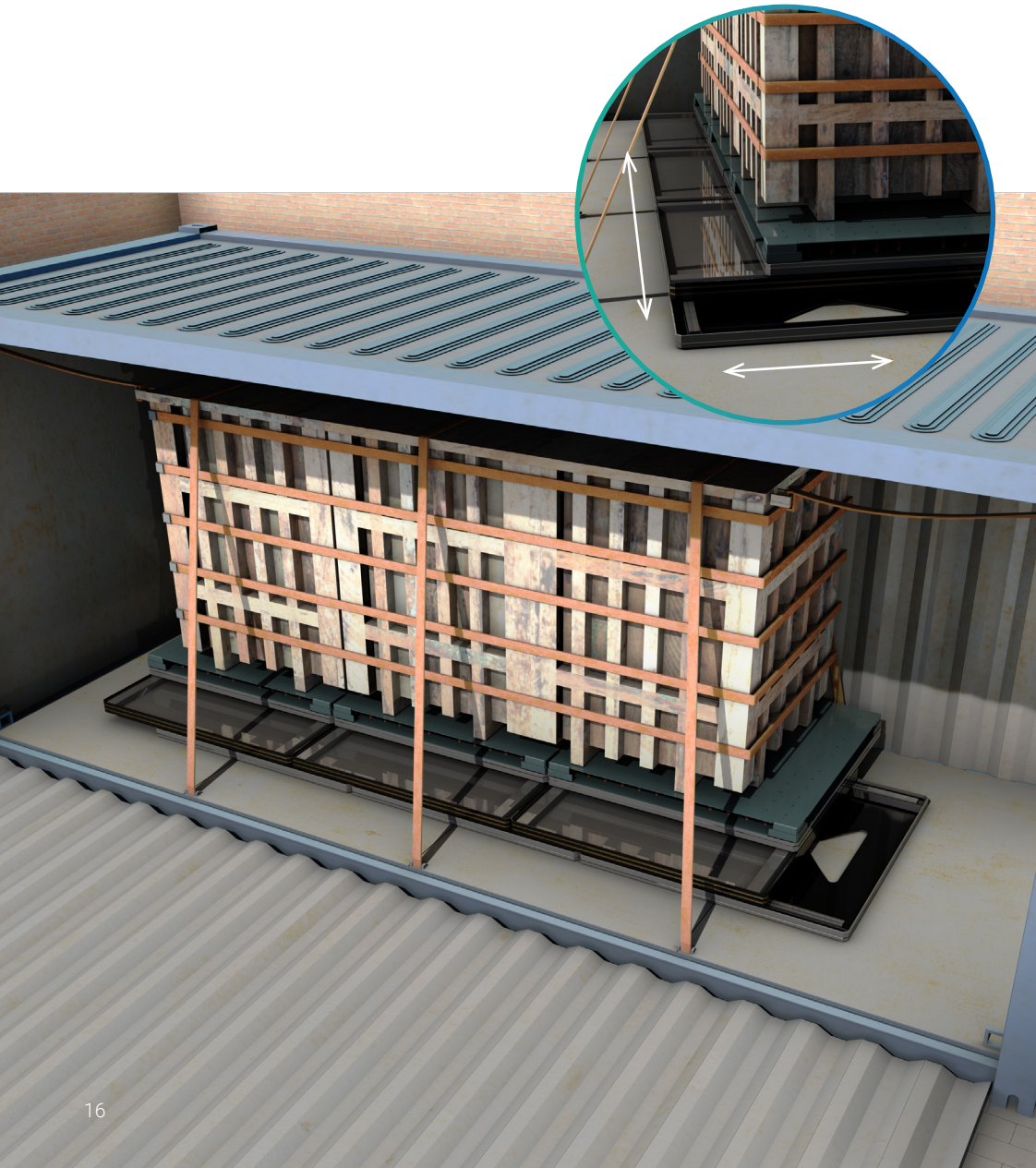
3.2 CULTURAL HERITAGE PRESERVATION

Placed beneath display cases or statues, ISOP prevents tipping during seismic events and isolates from ambient vibrations, preserving the integrity of valuable artworks over time.



3.3 SAFE TRANSPORTATION OF HIGH-VALUE CARGO

ISOP is also an intelligent solution for the safe transportation of valuable goods whose integrity may be compromised by vibrations and impacts.

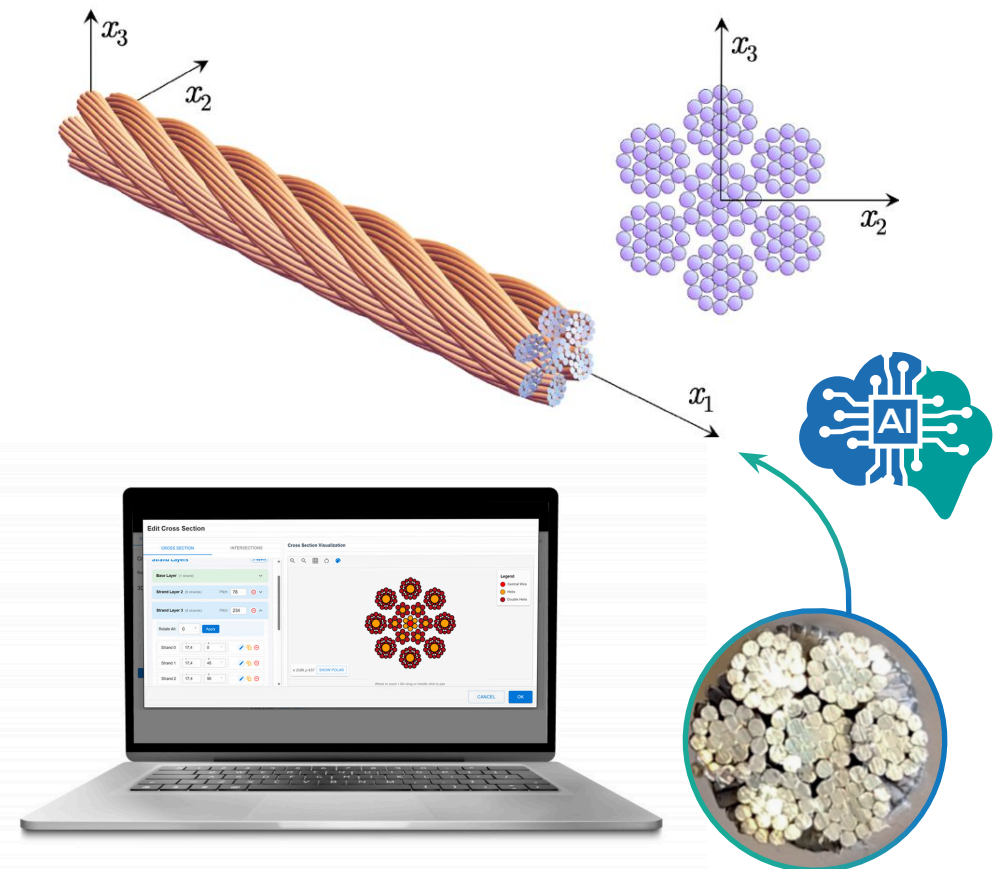


AI-Assisted Design

4. SOFTWARE FOR AI-ASSISTED DESIGN OF TMDS AND ISOLATION SYSTEMS

HySafe software leverages AI to automate design processes, optimize parameters, and predict structural responses under various loading conditions. Key software package components are:

- Physics-enhanced Artificial Neural Networks for design of hysteretic wires ropes as intelligent actuators
- Metaheuristic optimization of TMD and isolator design based on AI-powered nonlinear models of structural response under seismic waves, wind loads, impacts, wave motions.



Our Partners

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