

# > | < ISAAC

ANTISISMICA







ISAAC antisismica is an Italian company born from the research project started in 2016 at the university of Politecnico di Milano. Specialized in the development of smart solutions for seismic protection and structural monitoring, **ISAAC patented the first active technology for the seismic protection of both new and existing buildings.**

The goal is to protect people's safety, well-being and comfort, so that they can safeguard their own peace of mind. That is why ISAAC's products are accessible to everyone and in any context, thanks to non-invasive and easy-to-use technologies.

ISAAC already made important partnerships with the world of technological research and innovation and aims to revolutionize the way to protect buildings from earthquakes by promoting the culture of prevention and making the protection of existing buildings assets, the comfort and the life of inhabitants possible and accessible.

Operating according to environmental, ethical and professional principles complying with the highest governance criteria, ISAAC is committed with its entire team to protect the built world, its value and its qualities, offering its genius and its competences at the service of public and private institutions of the construction industry.

#ProtectValues

## Patented technology

Software  
to support the design

Collaborations  
with universities and research centers

Partnership  
with sector major players

Sector trade fairs  
national and international

Client support  
from estimation to intervention

Webinars  
and seminars

+1000mq  
for the production

+200mq  
of offices and laboratories

# The anti-seismic technology

ISAAC's patented anti-seismic technology is classified as an **Active Mass Damper**, according to the standard ISO3010:2017.

These systems allow the improvement of the **structural behaviour of the building that needs protection during a seismic event** by installing one or more machines on top of the structure. In this way, invasive structural interventions can be avoided inside the building.



Active Mass Damper systems, in case of an earthquake, apply a considerable amount of forces on the building and **minimize the oscillation** of the structure thanks to a major **dampening effect**.

ISAAC's technology **records the acceleration** of the building, through its accessory monitoring system, consisting of accelerometric sensors installed on appropriate points of the structure. The acceleration data sampled during the seismic event is then processed by a mainframe which, thanks to proprietary state-of-the-art **control algorithms** developed thanks to more than 30 years of research in the field of **Smart Structures**, calculates in real time the **force** that has to be provided on the structure in order to minimize damages to structural and non-structural elements. The control force is generated by moving a mass that counteracts the movements of the building.

The solution is characterized for being **modular** and allows the installation of standard machines and sensors in **various configurations** depending on the

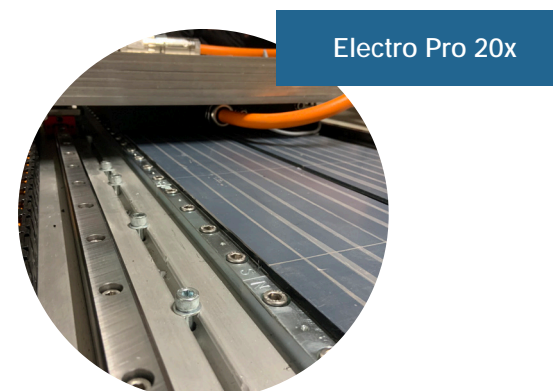
size of the building and/or the seismic improvement desired. In this way, it is possible to get a tailor-made solution for the building that needs protection from seismic events, exploiting economies of scale for the production of active control systems.

The system is **installed on top** of the building: on the flat roof or on the last floor, in case of a pitched roof. This allows to **avoid worksites** inside the building, **reducing troubles** for the inhabitants.

The structure is constantly monitored over time, making potential diagnostic interventions easier over the course of its life cycle.

ISAAC antisismica provides designers with **free software** for the execution of structural analysis, including AMDs effects.

Thanks to its know-how in the design of Active Mass Damper systems for seismic protection interventions, ISAAC proposes itself as a technological partner and **supports the client in the whole design process.**



Electro Pro 20x



Software



# Technical benefits

The use of seismic response control systems (ISO 3010:2017), such as the active systems proposed by ISAAC, allows not only the **seismic retrofit** of existing buildings, but also the **increase in dynamic performances** of new buildings. In fact, the application of this type of systems allows to **contain the damages** that can occur to structural and non-structural elements, even on structures made in accordance with the Technical Regulations on Constructions. ISAAC's technology is able to **take a portion of the incoming energy** brought by the earthquake into the structure and to **absorb** it by moving active masses. The final effect obtained on the building is the **increase of its damping capacity**, which results in a **reduction of displacements** experienced by the structure and therefore in a reduction of the damages. To install the system, **it is sufficient to work outside** the building, on the roof. As a result, the inhabitants don't have to move out of their homes and the owners can keep benefitting of the structure even during

the worksite phase. This determines a **significant reduction of realization time and costs**, comparing the system to interventions with traditional techniques.

## Continuous monitoring

The **accelerometric sensors** installed, belonging to the **monitoring plant** of the system, record **h24** the real time **dynamic response** of the building, after any kind of input, natural or anthropic (seismic event, traffic or wind).

The processing of recorded data provides a **dynamic identification** of the structure, allowing the monitoring of its natural frequencies, dampings and vibration modes. Such information is essential to **control the state of conservation** of structural and non-structural components, and makes diagnostic analysis easier in case of critical issues, which could happen over the course of the life cycle of the building.



## COMFORT

- Non-invasiveness
- Better adaptability
- Ease mental anxiety
- Less vibration discomfort



## INNOVATION

- Smart structure
- More design freedom
- Exclusiveness



## SAFETY

- Earthquake damage control
- Protection of content of the building
- 24/7 structure monitoring
- Reduction of earthquake shock



# Economical benefits



Reduction of  
repair cost



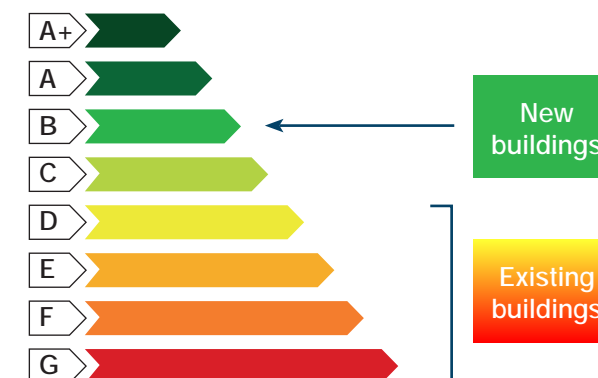
Increase in real  
estate value



Reduction of  
opportunity costs

The economical benefits can be related to the **repair costs avoided** during the life cycle of the construction (Direct Loss), which are expressed through the conventional **EAL** parameter, or Expected Average Annual Loss (called PAM in Italy, as for Perdite Annuali Medie Attese), conceived for the classification of the seismic risk of buildings. As per the Decree of the Ministry of Infrastructures and Transports n° 58/2017 and subsequent amendments, the EAL parameter represents the expected average repair cost of the damage caused by earthquakes that occur over the life of the building, expressed as a percentage of costs of reconstruction of the structure per year. It can therefore be compared to an **annual depreciation of the property**, which can be reduced thanks to an improvement of the performance of the building equipped with ISAAC's systems, increasing the lifetime of the structure. Besides Direct Losses, **Indirect Losses** are usually associated to a seismic event: all those costs caused by the **social consequences of interrupting the activities** of the building.

ISAAC's technology produces savings both on direct costs related to the expected **damage** for construction (repair cost), and indirect **social costs** related to the interruption of activities.





# Electro Pro 20x: electric AMD

Electro Pro 20x is a new generation active and electric system for the control of seismic response, that protects the structure and avoids the damages generated by medium intensity earthquakes. In fact, these represent the main cause of damages to non-structural elements and of temporary unavailabilities of the building.

Electro Pro 20x is made up of fully electric machines, equipped with linear synchronous motors with permanent magnets. The system is light, compact and its length varies depending on the characteristics of the building, making the application possible also on high and flexible structures. The delivered force of 20kN allows the system to be applied in an even more modular way, qualifying Electro Pro 20x system as the ideal solution to protect the building from low intensity and frequent earthquakes. It is also suitable for vibration control of the building, to increase housing comfort and ease mental anxiety. The system can satisfy several performance requirements for a wide range of structures.

## Which components make up Electro Pro 20x?

### Linear synchronous motor

The linear synchronous motor is made up of magnetic stators upon which a linear forcer moves, delivering a maximum peak force of 20 kN.

### LiPo batteries

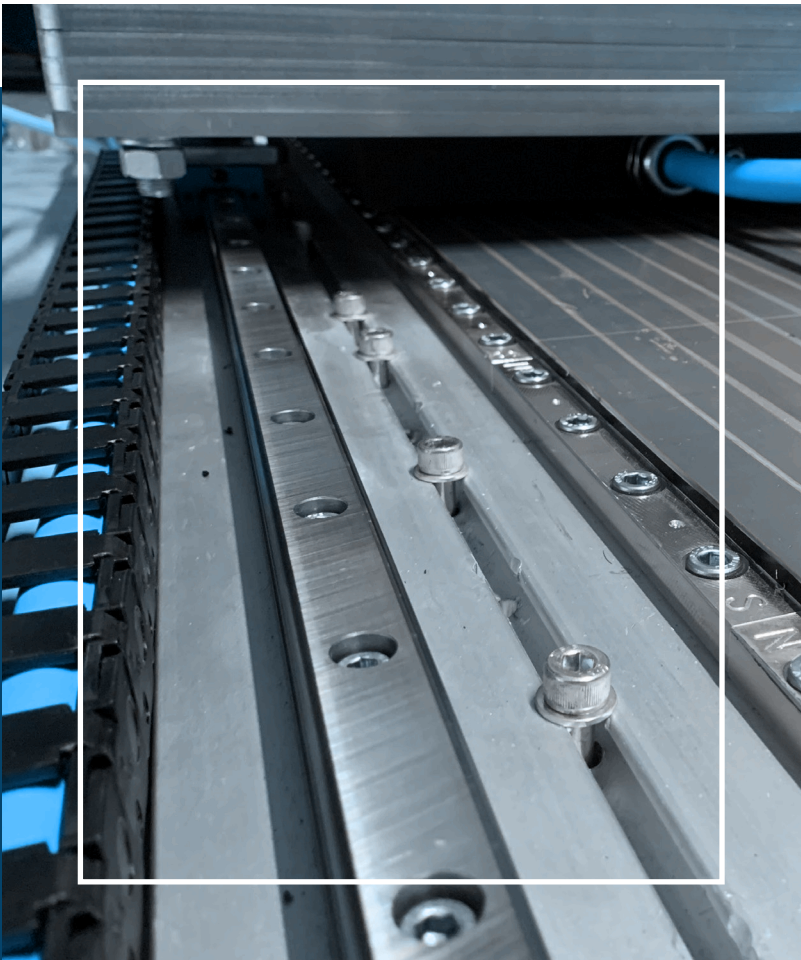
Each linear synchronous motor is powered by LiPo Batteries allowing the driving motion under any operative condition, even in case of blackout.

### Driver

Each linear synchronous motor is controlled by a driver with a feedback control position loop, using a linear absolute encoder to measure the actual motor position.

### Central control unit

The overall Electro Pro 20x system is connected to the PLC, a Real-Time industrial control unit, which elaborates the data coming from the sensors, installed on the building, and defines the optimal control force to be applied by each linear synchronous motor.



SIZE  
0,67\*L\*0,70  
meters



WEIGHT  
From 450kg  
to 1100kg



Perfect for the installation on r.c. or steel buildings.

MODULAR

NON-INVASIVE INSTALLATION





## From the design to the worksite: how to install ISAAC's systems.

### PRELIMINARY DESIGN

In order to support the design Studio in the design of the technical solution to reach the seismic improvement required, **it is necessary to provide the FEM model of the building, as well as the technical documentation.**

ISAAC will be in charge of making preliminary calculations aimed to study the feasibility and the cost of the intervention.

When the preliminary design is completed, a technical report and an economic offer will be made.

### EXECUTIVE DESIGN

ISAAC will carry out dynamic analysis, together with the design Studio, in order to create an optimized and realistic structural model of the building, taking into account also the non-linearity of structural and non-structural elements.

This will be followed by:

- Time history analysis.
- Ultimate sizing of the system and estimation of the number of machines to be installed.
- Definition of the post-intervention seismic risk category.

At the end of this phase, the design report will be presented to the customer.

The design can already be done with SAP2000, Midas GEN, Straus7, SeismoStruct and OpenSees.



### SUPPLY

ISAAC takes care of the quality check and the supply of each machine and of the whole system.

### INSTALLATION

On the worksite, ISAAC will supervise the installation of the machines and will handle directly the installation of sensors, the wiring of machines and the verification of the software system.

## Technical assistance and software.

ISAAC supports the engineering Studio when designing the technical solutions to **grant the best result** of seismic retrofit and during the on site installation of the system. Together with the customer, ISAAC's technical team defines the number of standard modules that make up the system and their position on top of the building.

ISAAC developed AMDesign and ISAACtool, software for the analysis and the design of seismic retrofit intervention with an active control system. The **software are distributed** to the designers **for free**, so that they can approach the Active Mass Damper technology and also **autonomously pre-dimension** the seismic retrofit intervention with AMD systems.

### ISAACtool

ISAACtool is a stand-alone software developed to **facilitate and speed up the work of designers.**

Thanks to ISAACtool, the designer can **explore the benefits of adopting technological solutions such as active control systems** for seismic improvements. The software automatically generates a lumped-element model of the structure, starting with a few input data using an Excel file, and executes modal and time history analysis, as well as vulnerability assessments.

### AMDesign

AMDesign is the **plug-in software of SAP2000®** developed by ISAAC antisismica, in collaboration with CSI Italia, to support the designer during the structural design with Active Mass Damper (AMD) systems.

The software allows to calculate the AMD control forces according to ISAAC's control algorithms, simulate the dynamic behaviour of the structure, promptly check the results and improvements obtainable through the adoption of an Active Mass Damper. The Load Cases can be saved directly on SAP2000® to carry out vulnerability assessments.







## Contacts

ISAAC srl  
+39 02 50021099  
Via Magolfa 27, Milano  
info@isaacsrl.com  
isaacantisismica.com  
  
VAT number 10142270965

## National and international case studies

ISAAC has already conducted many preliminary design cases, both on national and international territory. ISAAC carries out customized technical-economical feasibility studies for the supply of the AMD technology needed for your case of seismic retrofit intervention. Contact us for a tailor-made solution!

▲ Feasibility studies carried out by ISAAC.



# Your safety is our priority.

---

"Protect the safety, the well-being and comfort of people. Everyone should benefit from the possibility of safeguarding their own serenity. This is the reason why we make sure that the products of ISAAC are accessible to all and in every context, thanks to non-invasive technologies that are simple to adopt, so that the seismic protection could become an ordinary practice"



+39 02 5002 1099



[info@isaacsrl.com](mailto:info@isaacsrl.com)

