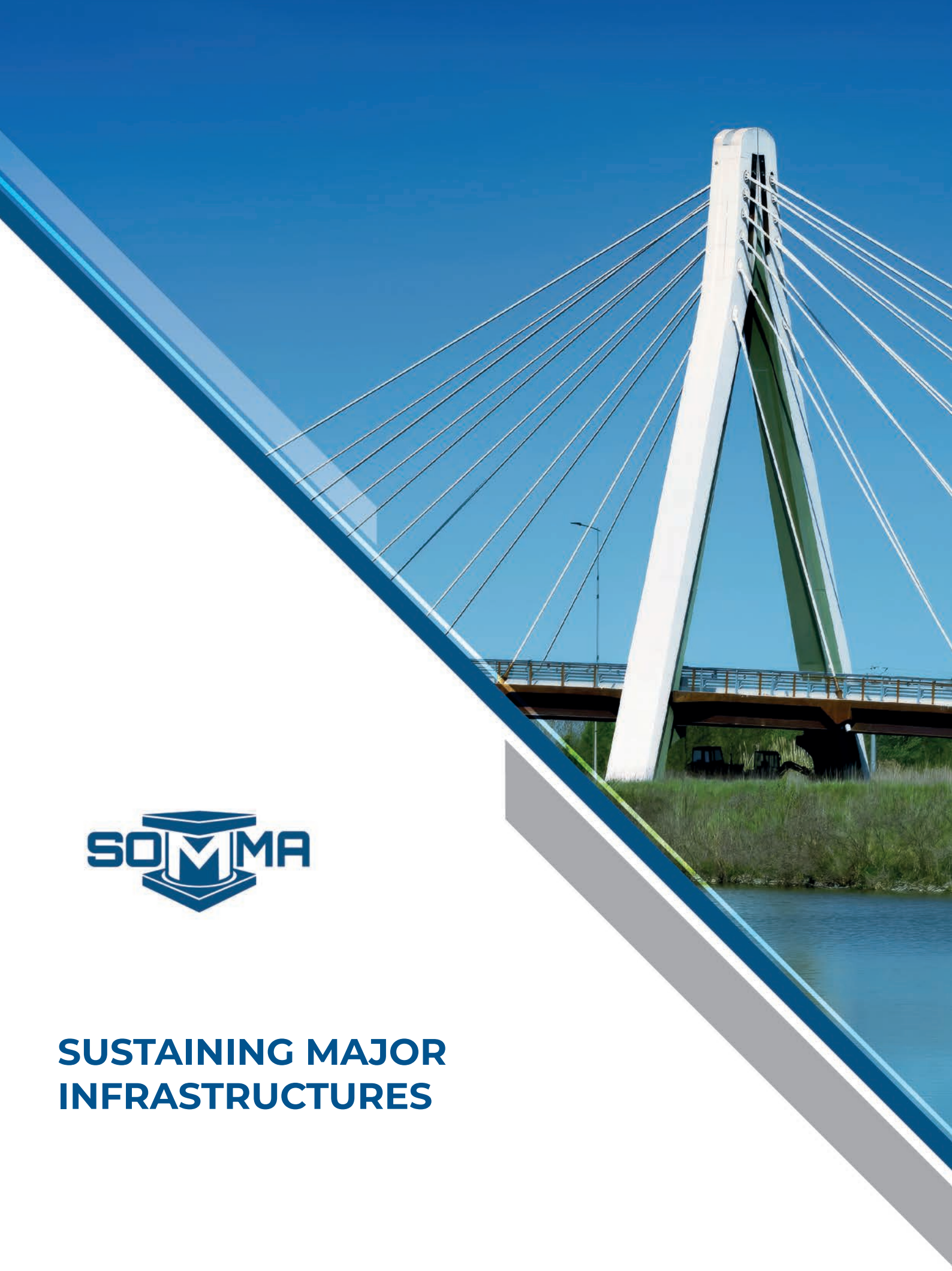


SOMMA

# SUSTAINING MAJOR INFRASTRUCTURES

# OUR COMPANY

**SOMMA** is an esteemed Italian engineering company, specializing in the design and production of structural bearings, restraints, road and rail expansion joints, and anti-seismic devices. With years of experience, **SOMMA** is renowned for its technical prowess and the high caliber of its team.

The **SOMM**A brand is now globally recognized as a guarantee of quality and reliability. Its products have contributed to the construction of many important works on every continent. **SOMMA** devices have played a crucial role in the completion of major projects, such as the 'Museum of Tomorrow' designed by renowned architect Santiago Calatrava in Rio de Janeiro, and the GIBE III dam in Ethiopia, the largest dam in Africa.

**SOMMA**'s dedication to quality is reflected in its certifications: CE Certification according to EN 1337 and EN 15129 standards for the design and production of bearings and anti-seismic devices; Quality management system certification according to ISO 9001:2015 and ISO 45001:2018, both awarded by BUREAU VERITAS.

**SOMMA** products have received approvals from various governmental bodies worldwide, including: Italian Railways (RFI-ITALFERR), Algerian Railways (ANESRIF), Romanian Authorities (ADVIZ TECNIC), and numerous others globally.

Innovation is at the heart of **SOMMA**'s operations. The company focuses on enhancing the performance of existing products and developing new technologies.

**SOMMA** collaborates with universities, research institutions, and scientific laboratories to drive innovation in complex projects.

**SOMMA** holds several patents, underscoring its commitment to research and development in anti-seismic protection devices, structural devices, and expansion joints.

In summary, **SOMMA** is a leader in the engineering sector, known for its quality products and innovative solutions that contribute to major infrastructural advancements worldwide.

The sister companies of **SOMMA** are **SMWALL** and **SISMART**.

**SMWALL** is specialized in reinforced earth. Over the years, **SMWALL** has carried out numerous projects both in Italy and in Mediterranean countries.

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

SOMMA

# STRUCTURAL BEARINGS

Structural bearings are devices that permit rotation between two structural elements while transmitting the necessary loads. They can be designed to prevent any movement (fixed), allow movement in only one direction while transmitting load in the other (guided), or allow movement in all directions within a plane (free).

There are various types of structural bearings, including pot bearings, spherical bearings, elastomeric bearings, cylindrical bearings, and special bearings.


## POT BEARINGS

ERGOFLON DISC are pot bearings which allow rotations up to ±0.02 rad around any horizontal axis, through the deformation of the elastomeric disc into the pot basement. The bearings are designed to be used to be used as hinges (fixed) or one single direction (guided) or all plan directions (free). The connection to the structures can be made with mechanical anchors or with resin.

## ELASTOMERIC BEARINGS

ESAFLON are elastomeric bearings, produced through a vulcanization process and made by an alternation of rubber layers and steel plates. They are designed to allow movements in any horizontal direction and rotations around any axis thanks to elastic deformation.

ESAFLON bearings have low horizontal stiffness and high vertical stiffness.

## SPHERICAL BEARINGS

ERGOFLON SPHERE are spherical bearings which allow rotations up to ±0.055 rad around any horizontal axis, through the coupling of a convex surface and a concave one with the interposition of a couple of low friction material and stainless steel. The bearings are designed to be used to be used as hinges (fixed) or one single direction (guided) or all plan directions (free). The connection to the structures can be made with mechanical anchors or with resin.

## SPECIAL BEARINGS

The bearings can be integrated by other devices capable of giving the bearing additional features.

The anti-lift bearings are equipped with elements that react to vertical tensile load.

The steel bearings with elastic response add a horizontal stiffness allowing small elastic movements.

# EXPANSION JOINTS

## MAT EXPANSION JOINTS FOR SMALL AND MEDIUM MOVEMENT

## SM

SM MAT expansion joints consist of one or more central steel bridging plates alternating with lower steel plates. Between the upper and lower plates, there are deformable rubber elements that allow movement through their deformation. The upper plates are those that support the vertical load.

The joint is fixed to the deck by mechanical anchors.

Along with the joint, a rubber flashing is provided for the collection and drainage of water.

The SM expansion joints comply to EAD 120110.

## MAT EXPANSION JOINTS FOR LARGE MOVEMENT

## MEG

MEG MAT expansion joints consist of a central steel bridging plate vulcanized with rubber that covers it. The plate supports the vertical load. On one or both sides, there are deformable rubber elements that allow movement through their deformation.

The joint is fixed to the deck by mechanical anchors.

Along with the joint, a rubber flashing is provided for the collection and drainage of water.

The MAT expansion joints comply to EAD 120110.

## CANTILEVER EXPANSION JOINTS

## PT – PTW

PT – PTW Cantilever expansion joints consist of two opposing plates having the internal profile worked to form staggered combs, with the possibility of interpenetrating to allow the required displacements.

The joint is fixed to the deck by mechanical anchors.

Along with the joint, a rubber flashing is provided for the collection and drainage of water.

The PT - PTW expansion joints comply to EAD 120111.

# ELASTOMERIC ISOLATORS ISI AND ISI-P

The ISI type elastomeric isolators consist of an alternation of rubber layers and steel plates joined together through a vulcanization process.
The internal steel plates increase the vertical stiffness of the bearing without altering its horizontal stiffness. The devices are completed with external plates to connect them to the structure.

The ISI-P type elastomeric isolators are ISI type with a central lead core. The lead core allows the device to achieve higher levels of damping, up to 30%.

The rubber layers have dissipative capacity, and they can be made of three different compounds:

- “Soft” - G = 0.4 MPa
- “Normal” - G = 0.8 MPa
- “Hard” - G = 1.4 MPa

# DISPLACEMENT DEPENDENT DEVICES AIOS - RED - HBF

Displacement dependent devices (DDDs) are non linear devices which use the hysteretic properties of the steel to dissipate energy.

AIOS bearings are a combination of structural bearings and “C” Shaped Elements. Under normal service loads, the “C” elements remain elastic. However, under higher horizontal loads, such as during seismic events, they yield and dissipate energy.

RED devices are unidirectional dissipative restraints used in bridges and viaducts. Their primary function is to dissipate energy through the yielding of a uniquely designed “half-moon” element, allowing them to accommodate significant displacements.

The HBF device is an element to be inserted into new or existing bracing systems to them dissipative behaviour.

The DDDs are often used for retrofitting and seismic improvement of existing bridge or viaduct (AIOS and RED) or building (HBF). They increase the strength and the stiffness of the structure.

# FLUID VISCOUS DAMPERS MC – MCL

The Fluid viscous damper MC - MCL type is a velocity dependent device that dissipates energy under impulsive loads and can allow slow displacements with low reaction force or restrict them.

The behaviour of the device depends on the speed according to the following law:

$$F = Cv^{\alpha}$$

Where:

F is the force

C is the damping constant

v is the velocity

α is a value between 0.08 and 0.5.

The behaviour is symmetrical with respect to the intermediate position in both reaction and displacement. This functionality is due to a piston inside a steel jacket that divides two chambers containing hydraulic fluid connected via a valve.

Two spherical hinges connect it to the structure, allowing rotation around any axis.

The device acts like a connecting rod, transmitting forces only along its axis, and can be equipped with an additional valve (MCL type) to allow minimal reaction during slow movements.

# SHOCK TRANSMITTER UNIT ROD

The Shock Transmitter Unit ROD type is a temporary fluid dynamic restraint system that allows slow displacements with low reaction force and acts as a fixed constraint under impulsive loads.

Its behaviour is symmetrical with respect to the intermediate position in both reaction and displacement. This functionality is due to a piston inside a steel jacket that divides two chambers containing hydraulic fluid connected via a valve. For slow movements, the fluid's viscous properties allow displacement; for impulsive loads, the valve between the chambers obstructs the flow, blocking the piston.

Two spherical hinges connect it to the structure, allowing rotation around any axis.

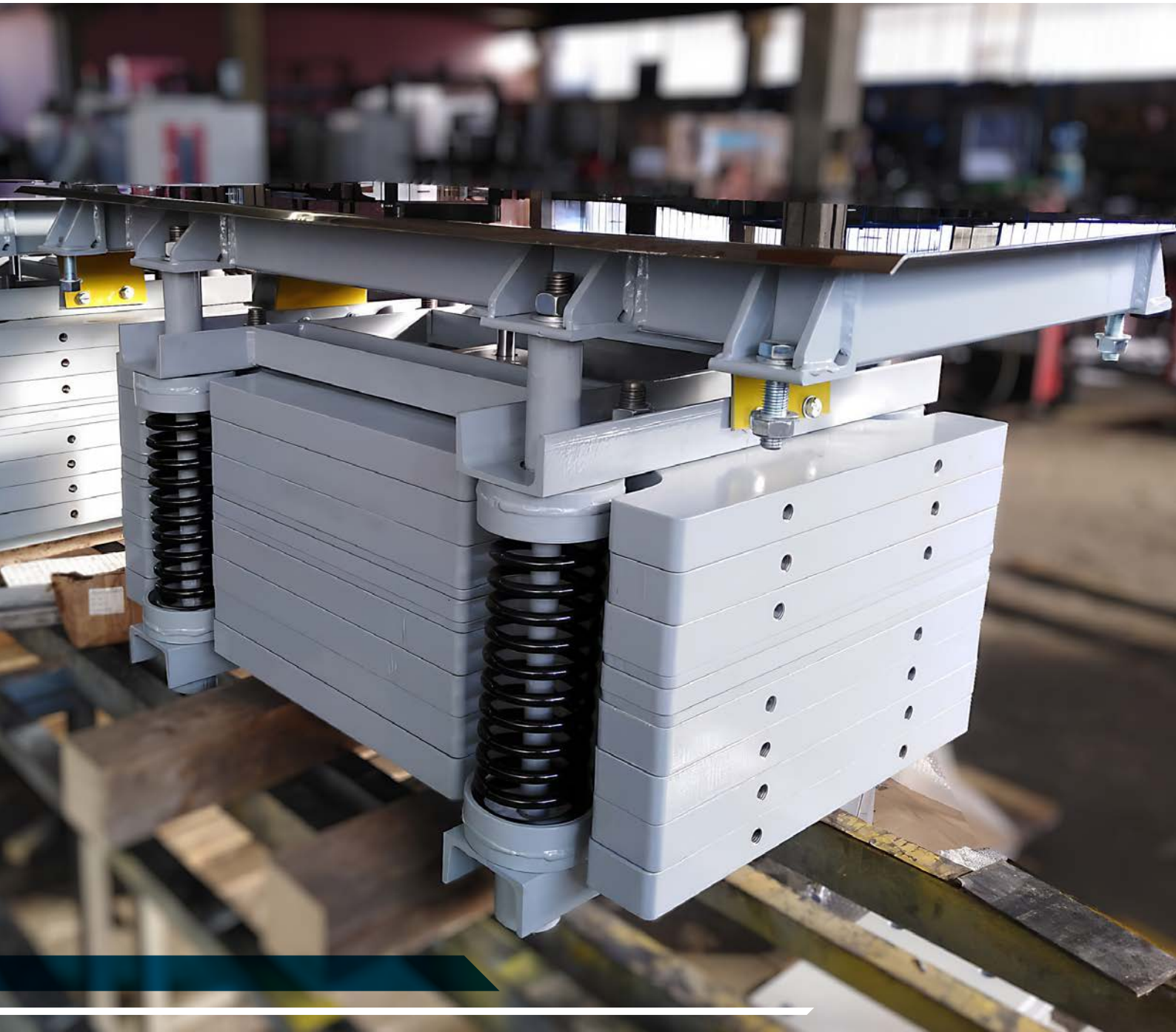
The device behaves like a connecting rod, transmitting forces only along its axis.

# TUNED MASS DAMPER - DMA

Tuned Mass Dampers DMA type are devices applied to particularly flexible structures such as tall buildings or walkways to attenuate vibrations caused by wind, earthquakes, pedestrian traffic, or other dynamic actions.

A DMA can be a device consisting of a mass, a spring system, and a damper, which is installed on the structure to mitigate the effects of dynamic actions. Alternatively, it can be a more complex system that utilizes part of the structural mass, disconnecting it from the rest of the structure using a system of springs and dampers. In such a case, it is a Non-Conventional DMA and it can be likened to an isolation system installed at a level other than the base.

Each device or system is customized for the specific case, both in terms of performance and geometry. It is possible to create both horizontal and vertical DMA, depending on the critical actions of the structure on which they are installed.



# HORIZONTAL RESTRAINT
# RL/RT – EPL/EPT – EFL/EFT

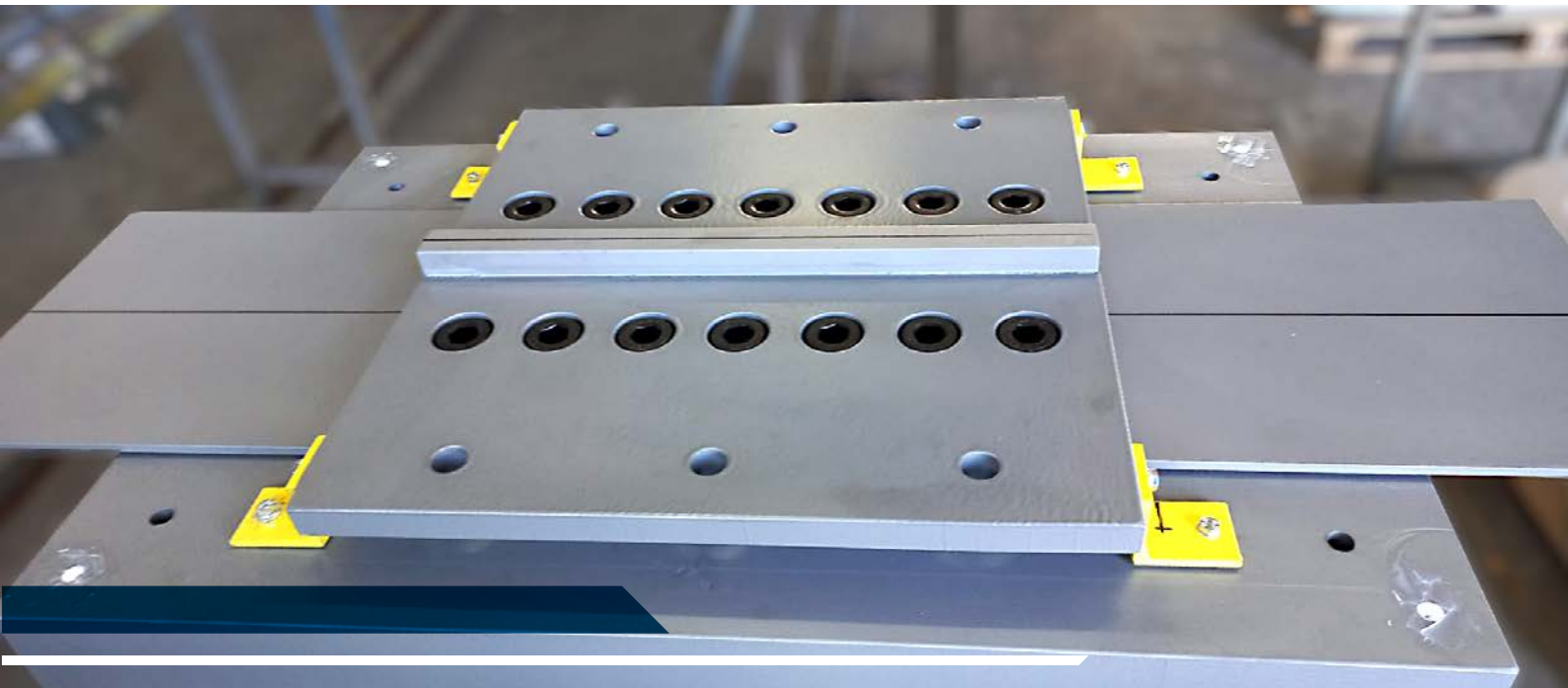
Restraints are devices commonly used on bridges and viaducts to resist horizontal loads, rather than supporting vertical loads. They can be classified into permanent and temporary types.

## PERMANENT RESTRAINTS

- RL/RT – Elastomeric restraints produced through a vulcanization process and made by an alternation of rubber layers and steel plates.
- EPL – Guides that allow movement in the desired direction while preventing orthogonal displacement by transmitting forces.

## TEMPORARY RESTRAINTS

- EFL – Same as EPL but equipped with calibrated fuses that break at specified loads, allowing unrestricted movement.



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