

## New SIP®-V-Bearings Protect Sensitive Laboratory

### BioSense Research Institute Novi Sad: Vibration isolation and seismic protection in one component.

Novi Sad. Highly sensitive measuring equipment located next to busy traffic routes and in a seismic area: To protect the laboratory, MAURER developed the new SIP®-V-bearing in collaboration with Getzner Werkstoffe GmbH. In one component, four SIP®-V isolate the highly sensitive building core of the BioSense Institute in Novi Sad against two load cases that could not be more different: high-frequency vibrations and earthquakes.

The BioSense Research and Development Institute was founded in Belgrade in 2015, and is part of the University of Novi Sad, where the new building has now been constructed. It is considered a pioneer in the field of digital and sustainable agriculture. Micro and nano electronics, sensor design, and cellular agriculture are some of its scientific fields; the laboratory area located in the institute's new building is accordingly sensitive.

The requirements for the BioSense research building for sustainable agriculture were clear: Inside, the new building has a small building core with a floor plan of 8x7 metres and 4 floors with a height of approximately 17 metres. This core accommodates complex and expensive laboratory instruments and microscopes. They must be protected against ground vibrations caused by traffic and earthquakes. The other parts of the institute building have normal requirements.

### MAURER Sliding Isolation Pendulum with integrated vibration isolation SIP®-V

The building core now stands on four Sliding Isolation Pendulums with integrated vibration isolation (SIP®-V).

This new development combines both seismic and vibration protection in one component. To that end, two specialists collaborated and pooled their competences: MAURER SE (Munich) and Getzner Werkstoffe GmbH (Austria). The lead planner was Dr. Marko Marinković of SDA-engineering. A bearing made of the dynamically highly effective material Sylodyn® (= vibration isolation) was embedded in the sliding lens (puck) of the classic Double Sliding Pendulum Bearing SIP®-D (= seismic protection).



The BioSense Institute in Novi Sad in February 2023.  
Photo: SDA-engineering



Swivelling a SIP®-V-bearing into position to protect the building core.

Photos: SDA-engineering

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### Details on seismic protection

Basis for the SIP®-V is the Double Sliding Pendulum MAURER SIP®-D, which is used since 2004. It has two ("D" for double) concave main sliding surfaces and one sliding lens (puck) and is equipped with the sliding material MSM® (= MAURER Sliding Material).

SIP®-bearings have four functions in this project:

- They isolate the building from its foundations and allow horizontal movement of up to  $\pm 100$  mm in all directions.
- They limit movements through internal friction by converting kinetic energy into heat. Specifically, a horizontal seismic acceleration of 0.2g is at least halved.
- They re-centre the building core in its initial position following an earthquake, as they have concave sliding surfaces.
- They transmit vertical loads of up to maximum 4,000 kN.

### Details on vibration isolation

To protect the BioSense laboratory against daily micro vibrations of the ground, such as those caused by traffic and noise, a Sylodyn®-bearing of Getzner ([www.getzner.com](http://www.getzner.com)) was embedded in the sliding lenses (pucks) of the four SIP®-bearings.

Sylodyn® has been used to isolate structures worldwide for more than 25 years. The closed-cell elastomer prevents disturbing vibrations and secondary airborne sound. The Sylodyn® HRB HS types in particular provide high-performance vibration protection in the smallest space and were therefore optimally capable of being integrated in the Sliding Isolation Pendulum SIP®-V. The vibration isolation shields vibrations of at least 15 Hz.

The Double Sliding Isolation Pendulums SIP®-V measure 650x650x210 mm and have a service life of more than 50 years.

### Dynamic earthquake and vibration tests

To guarantee the function of the new bearings, they were tested according to EN 15129 at EUCENTRE in Pavia, Italy. All vibration damping parameters, that is, natural frequency, effective damping, and load capacity were proven.

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Precise embedding in concrete of the SIP®-V-bearings. Brushes protect the sensitive sliding lens (puck) against dust.

*Photos: SDA-engineering*



One of the four hydraulic dampers to protect the narrow building core against tilting.

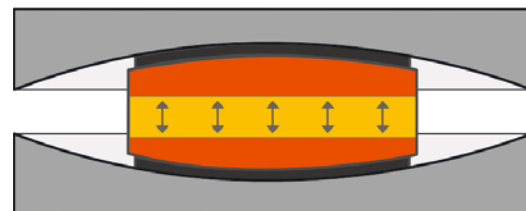
*Photo: SDA-engineering*

### Dampers protect against tilting

To prevent the slender structure of the building core from tilting, MAURER also installed four hydraulic dampers on the top floor in order to support the tilting moment.

The SIP®-V-bearings were installed in December 2021, the dampers in March 2022. The new BioSense Institute became operational in April 2023.

Text: 4.391 keystrokes



A SIP®-V-bearing performs two tasks in one: Seismic protection through the curved sliding surfaces (orange/grey), vibration isolation through the Syldyn® in the core of the sliding lens (yellow).

*Graphic MAURER*

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### Quick facts about MAURER SE

The MAURER Group is a leading specialist in mechanical engineering and steel construction with over 1,000 employees worldwide. The company is market leader in the area of structural protection systems (bridge bearings, roadway expansion joints, seismic devices, tuned mass dampers, and monitoring systems). It also develops and produces vibration isolation of structures and machines, roller coasters and observation wheels as well as special structures in steel construction.

MAURER participates in many spectacular large-scale projects worldwide, like, for example, the world's biggest bridge bearings in Wazirabad, earthquake-resistant expansion joints for the Bosphorus bridges, tuned mass dampers in the Baku and Socar Tower, or uplift bearings for the Zenit Arena in St. Petersburg. Complete structural isolations range from the Acropolis Museum in Athens to the new major airport in Mexico. Spectacular amusement rides include, for example, umadum – the Munich observation wheel, the Rip Ride Rockit Roller Coaster in the Universal Studios Orlando, or the worldwide first duelling roller coaster at the Mirabilandia Park in Ravenna.

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