

MAURER || MAG

TURNING OLD INTO INNOVATIVE

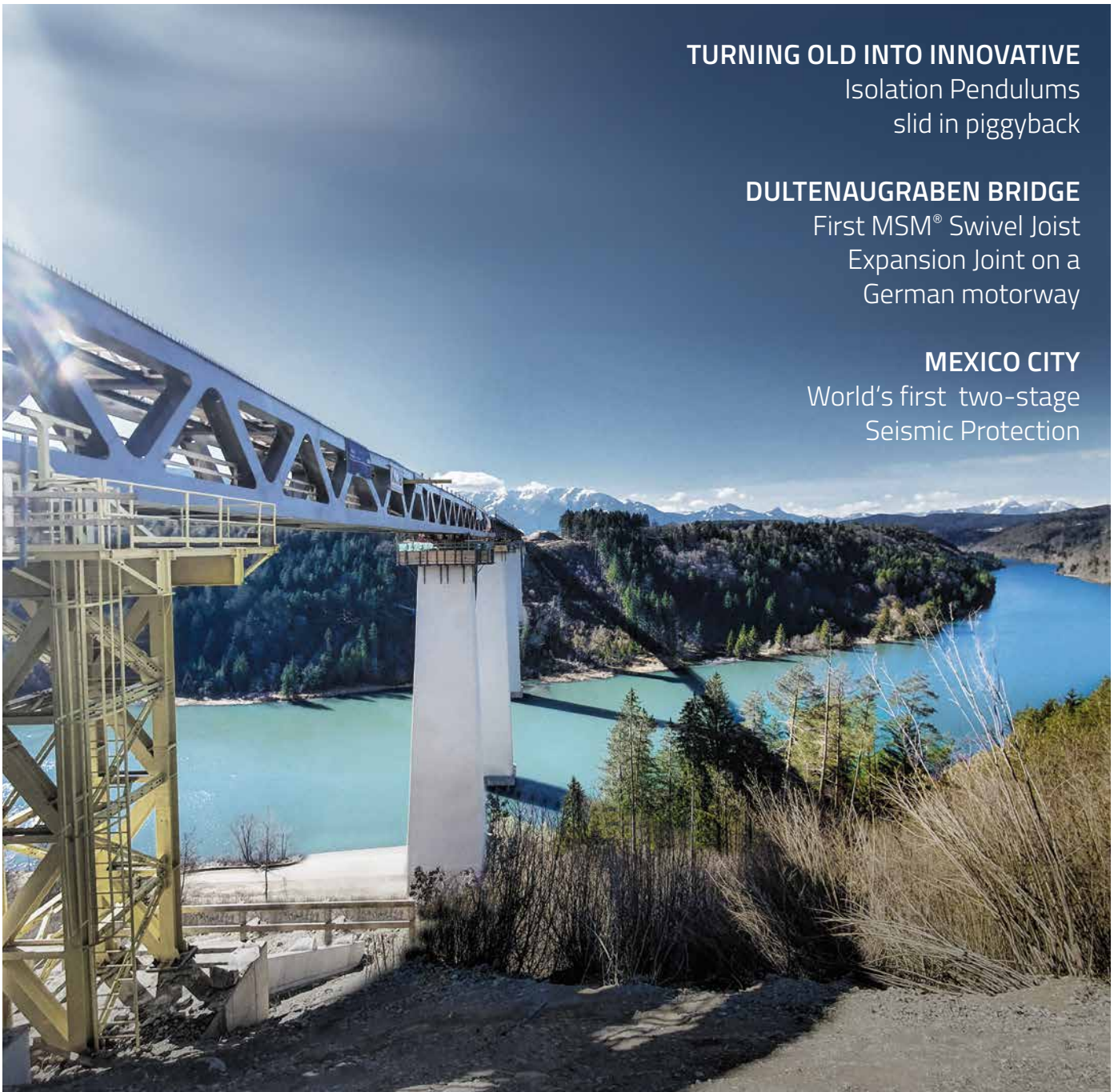
Isolation Pendulums
slid in piggyback

DULTENAUGRABEN BRIDGE

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Expansion Joint on a
German motorway

MEXICO CITY

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ISOLATORS



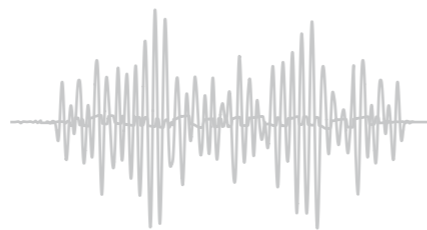
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forces in motion

Dear readers,

In this issue, we would like to give you an insight into our current projects and provide an outlook on the future of MAURER. After decades of outstanding leadership and development work, our Managing Director, Dr. Braun, is joining the Board of Directors. His work has made MAURER a global leader in the field of traffic infrastructure and structural protection.

With Dr. Braun's transition to the Board of Directors, we would like to briefly introduce our Managing Directors: Holger Redecker, part of the MAURER family for more than 28 years, will keep the company on track together with Max Meincke, who has been with MAURER for 15 years.

Despite the current global situation, characterised by crises, conflicts, and climate change, we remain determined to continue on our path.

A safe and efficient transport and structural infrastructure is essential for a better future, which is why we remain passionately committed to making our built environment safer and bringing people closer together.

Rest assured, our 1,200 employees worldwide continue to work tirelessly on innovative solutions to protect structures, and we are determined to make a positive contribution to a better world for everyone.

With best regards from Munich

Dr. Christian Braun

Max Meincke

Holger Redecker



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PRIZES FOR // MODELLING AND SIMULATION OF DYNAMIC PROPERTIES OF ROCKFALL NETS AND METAMATERIALS

Maurer Söhne Foundation honours two graduates of the Technical University of Munich

Munich. In the summer of 2023, the "Maurer Söhne Foundation" in Munich presented the sponsorship award for outstanding research in the field of structural dynamics and structural mechanics to Klaus Sautter and Tom Hicks.

The foundation annually recognises outstanding scientific theses in the field of technical dynamics. In 2023, the Maurer Söhne Foundation Award, endowed with €2,000, was granted for two outstanding research works.

Klaus Sautter received an award of €1,000 for his doctoral thesis "Modeling and Simulation of Flexible Protective Structures by Coupling Particle and Finite Element Methods." The modelling and prediction of the perfor-



Presentation of the Maurer Söhne Foundation Prize to Klaus Sautter (centre), Prof Dr. Kuroschi Thuro (right, TUM), and Dr.-Ing. Christiane Butz (Foundation). Photo: TUM

mance of rockfall nets formed the core of the research.

Prof Dr.-Ing. Kai-Uwe Bletzinger of the Technical University of Munich (TUM) supervised the dissertation. Tom Hicks received the same prize money for his master's thesis "Characterization of Dispersive Wave Propagation in Periodic Media of Different Symmetry Groups."

This work simulated and characterised the dynamic properties of metamaterials. Prof Dr.-Ing. Gerhard Müller of the TUM supervised the work. The award winners were selected on the recommendation of the Study

Prize Committee of the Department of Civil and Environmental Engineering (CEE) of the TUM School of Engineering and Design.

The awards were presented on July 14 at the CEE Department Day. Due to limited budget resources, universities rely on project research. Companies usually conduct research only in areas that are likely to result in product development. Basic research, on the other hand, is entirely open-ended and independent of economic benefits. There is currently a lack of this fundamental research, which is why the Maurer Söhne Foundation supports this area.



Presentation of the Maurer Söhne Foundation Prize to Tom Hicks (centre), Prof Dr. Kuroschi Thuro (right, TUM), and Dr.-Ing. Christiane Butz (Foundation). Photo: TUM



Photo: MAURER

PLANNING IS GOOD // MONITORING IS BETTER

The Valdebebas Bridge in Madrid was closely monitored during the construction phase

Madrid. The bearing experts from Munich developed special spherical bearings with pressure sensors. Moreover, five bearings were designed to be used as fixed points during construction and equipped with lateral guides only during the construction phase. The "Puente de la Concordia de Valdebebas" is an arch bridge connecting Terminal 4 at Madrid-Barajas Airport with the Valdebebas district in a wide sweep. With a main span of 162 m and a total length of 207 m, it has the largest span in the region. Valdebebas is a completely new district of Madrid and is expected to have 40,000 inhabitants in the future.

Spherical bearings with monitoring system

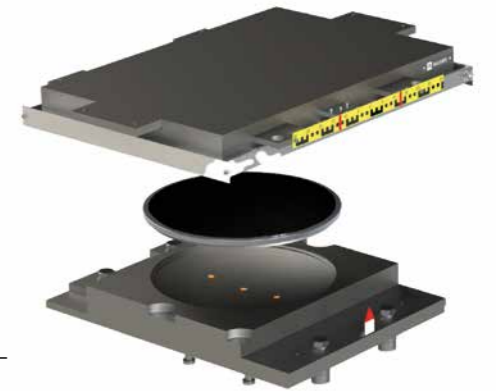
MAURER supplied a total of 22 MSM®/MSA® spherical bearings. They facilitate very large rotations about all axes while sliding with low friction. All sliding surfaces are equipped with the high-performance material MSM® (MAURER Sliding Material) which, among other things, can accommodate particularly high loads. To achieve low coefficients of friction, the MSM® discs are equipped with dimples that ensure constant and permanent lubrication of the sliding surfaces. The calottes in the centre of the bearings are made of MSA® (MAURER

Sliding Alloy), an extremely corrosion-resistant material.

However, due to the high loads, the designers did not want to rely on calculated values as usual. "This is a tendency we observe in bridge construction", explains Luca Paroli, Project Manager at MAURER. "The designers wanted to see precisely what happens during the construction phase and how the structure actually behaves."

MAURER installed a monitoring system in six of the large spherical bearings. "The special thing about it is that we are able to continually measure the pressure and read it via an internet connection at any time", Paroli says.

The sensor system measures the pressure in the bearing in real time, from which the superimposed load is



Highlighted in orange: the pressure sensors. Graphic: MAURER

calculated. The sensors are installed in a mid-position in the bearing under the calotte. The monitored bearings are positioned at key sections where the load application strongly fluctuates during the construction phase.

Variable bearings

In addition, the planners wanted one of the piers to be designed as a fixed axis during the construction phase. That is why the bearings of the P2 axis were designed to be variable, in other words: They were provided with lateral restraints, which were removed following the construction phase.



A beauty: the new "Puente de la Concordia de Valdebebas" in the northwest of Madrid. Photo: MAURER

MAURER SUPPLIES // REPLACEMENT BEARINGS FOR THE RHINE BRIDGE NEAR NEUWIED

Huge Spherical Bearings with 120 MN Superimposed Load

Neuwied. At the Weißenthurm-Neuwied bridge over the river Rhine, the worn PTFE pot bearings were replaced with spherical bearings equipped with the special sliding material MSM®. The challenge was their size: With a diameter of 2.4 m and weighing approximately 13 tonnes, they are among the largest structural bearings in Germany. They accommodate vertical loads of up to 120 MN.

“Handling alone is a challenge with bearings of this order and limited space on the bridge”, emphasises Michael Ohnheiser from MAURER. Theoretically, smaller bearings would have sufficed for accommodating the enormous loads, but the bearing size had to be adapted to the existing situation.

The Raiffeisen Bridge, built in 1978, is part of the federal road B 256. Some 46,000 vehicles cross the Rhine bridge every day.

The A-shaped central pylon supports the cable-stayed central bridge and stands on the Rhine island “Weißenthurmer Werth”. All eight bearings on both pylon piers had to be replaced, as

the PTFE in the sliding plates of the existing pot bearings was laterally pressed out due to frequent movements. MSM® spherical bearings from MAURER were installed instead.

MSM® spherical bearings in lieu of PTFE pot bearings

Spherical bearings allow rotation about all axes with low friction. All sliding surfaces are equipped with the high-performance material MSM®. Compared to conventional Teflon (PTFE), MSM® can withstand at least double the compressions. It can also accommodate at least fivefold accumulated sliding displacements and the 7.5-fold displacement velocity. The service life is specified as 50 years in the corresponding ETA. Since the limit loads are only rarely given, the bearings will actually last longer.

In order to install the modern MSM® spherical bearings, it was necessary that they precisely connect to the plates remaining in the structure. That is the only way to ensure full activation with proper load transmission of the plates into the concrete surfaces. Smaller bearings would have been



The Raiffeisen Bridge near Neuwied with the pylon on the Rhine island “Weißenthurmer Werth”. Photo: MAURER

sufficient for the superimposed load of 120 MN, but would have caused higher compressions and overloaded the existing structure. The separate cable anchorages preventing uplift forces and the steel restrainers as restraints in the longitudinal and transverse direction, also remained unchanged.

The bearings were replaced from the bridge deck in May/June using a suspended scaffold with “launching track”. The client was Landesbetrieb Mobilität Cochem Koblenz (LBM). The rehabilitation was carried out by the company aventas.bau



The new spherical bearings were replaced from the bridge deck. Photo: MAURER



Installed new spherical bearing. Photo: MAURER



Schematic representation of the building structure without façade with circumferential damper arrangement. Graphic: Narvaez Hinds



Photo: Narvaez Hinds

SAN SALVADOR // AWARD-WINNING SEISMIC PROTECTION

Building dating from the 1970s retrofitted with hydraulic dampers

San Salvador. In the course of a building conversion, diagonal steel struts with hydraulic dampers were installed for the first time in San Salvador. The MHDs (MAURER Hydraulic Damper) will prevent earthquake damage in the future and not only protect the building structure, but also the equipment and furnishings. The innovative seismic protection retrofit was awarded a prize.

The Edificio Napoleon Bolaños Melendez is the first building in San Salvador with seismic damping. It was built in the 1970s. A regional bank wanted to house its main data centre in this building. An upgrade to the seismic protection was called for as part of the renovation, since the building had suffered moderate damage during the last two earthquakes in 1986 and 2001.

The bank building’s main structure consists of concrete waffle slabs with reinforced concrete beams joining the main columns which function as earthquake-resistant frames. Originally, the plan was to install buckling restrained braces (BRBs) in selected bays. However, procuring and importing the elements proved to be problematic.

Following analysis, the commissioned engineering firm NARVAEZ HINDS concluded “that a system with steel pipe diagonals with hydraulic MAURER dampers with a capacity of 100 to 200 tonnes would actually be a much better option,”

reports company director Ricardo Narvaez. “This is because the MHDs would not only reduce the force demands on the existing building, but also dramatically reduce the accelerations to which expensive data equipment in the building would be exposed.” This, in turn, will reduce or even completely eliminate downtime after the next strong earthquake.

Hydraulic dampers prevent earthquake damage

MAURER Hydraulic Dampers for seismic protection dissipate energy by converting kinetic energy into heat in a highly efficient way. They differ from conventional linear viscous dampers in that their force development is degressive with increasing earthquake intensity, in other words: the faster the movements, the less the damper resistance increases.

On the outer shell of the building directly behind the façade

According to Ricardo Narvaez, the greatest planning challenges in San Salvador were “the exact positioning of the damper diagonals and the connection to the existing building structure”. The solution: steel struts located directly behind the façade, into which the dampers were integrated, are connected at both ends with high-strength steel rods or anchors to the building’s load-bearing columns.

Successful tests and award

The 20 hydraulic dampers were produced by MAURER in Munich. One of each damper type was tested for functionality at EUCENTRE in Pavia. Particularly owing to the special triple sealing system used, no leaks were detected following the tests.

All tests were carried out successfully according to the applicable European standards. After completion, the project was awarded first place in the PREMIO OPAMSS 2022. OPAMSS is the authority responsible for urban planning and building permits in the metropolitan area San Salvador. The prize was awarded for the use of innovative technology in the retrofitting of an old building and strict compliance with all applicable standards.



Built-in hydraulic damper: At the top with connection to the existing building structure. Photo: MAURER



The old bridge in new splendour in September 2023 following the reopening. On the left, one of the iconic lions. Photo: MAURER

TECHNICAL UPDATE FOR THE // WORLD-FAMOUS CHAIN BRIDGE IN BUDAPEST

Bearings and expansion joints were tailored towards the historic building fabric

Budapest. The world-famous Chain Bridge in Budapest was completely renovated – both in terms of its art history and its function. The greatest technical challenge was the bridge bearings. They had to fit into the existing structure and perform special functions, such as protecting against uplift forces. MAURER developed customised MSM® spherical bearings to this end.

The Chain Bridge over the Danube River in Budapest is a national symbol. Everyone in the country knows the oldest and most famous of the capital's nine bridges, and all those involved in the extensive renovation were correspondingly sensitive.

The Chain Bridge is almost 15 m wide and 380 m long. The bridge

bearings and expansion joints were replaced as part of the steel structures' repair and reinforcement as well as the strengthening of the reinforced concrete construction at the bridgeheads.

The historic structure posed a number of challenges that had to be taken into account when planning both the bearings and the expansion joints.

Bearing: special case of lifting forces

The greatest challenge was the bearings. They must be able to move in all directions, compensate for rotations and superimposed loads of up to 1,000 kN. Today, MSM® spherical bearings fulfil all of these requirements – provided

the bearings always lie precisely and coherently next to each other in the sliding surfaces.

However, lifting forces regularly occur on the Chain Bridge. These result from the fact that all suspension cables and bridge girders are made of steel and are therefore temperature-sensitive. Since the cables lengthen and shorten, the bridge rises and lowers over the course of the year. And the approximately 1-metre-high loadbearing structure also changes height by several millimetres.

The two main steel girders extend into the pylons and rest there on the bearings, albeit in a very special configuration: each support point not only has a bearing below the girder, but also

above it. Depending on the load case, the Chain Bridge either rests on the lower bearings or presses against the upper ones.

Specifically, lifting forces occur, for example, when the suspension cables shorten in autumn and the bridge rises. If a bus then crosses the bridge, very rapid load changes occur between applied and immediately lifting forces. These constant and frequent load changes lead to wear in normal bearings. In order to ensure that the bearing components are in a compressed state in every load case at all times, and especially when lifting forces occur, they were equipped with special springs and guide systems, which prevents wear. "Calculating the number and effects of bus crossings on the service life of the bearing components proved to be a major challenge," reports Project Manager Csaba Simon. The precise specification of the bearings was developed in close coordination between the client and MAURER.



No more space was available: extremely tight spatial conditions at a bearing under a steel girder. Photo: MAURER

Installation: tightness and unevenness

The installation of the bearings between July and September 2022 posed two further challenges: the support points and the connection to the old structure.

The support points in the pylon were difficult to access and there was very limited space. Only fitters of smaller height were able to work there at all. What is more, the old connecting steel structures were uneven. However, to ensure optimum load transfer from the bridge girders to the new bearings an absolutely frictional connection is required. The unevenness was levelled



Installation of an expansion joint at the renovated bridge ends Photo: MAURER

out with a special filler, a so-called cold "multi-metal".

MAURER supplied a total of 32 MSM®/MSA® spherical bearings with devices against lifting forces. The modern sliding material MSM® (MAURER Sliding Material) can absorb extremely high pressure, which is why the bearings could be built small. The MSA® sliding alloy is corrosion-resistant and extremely wear-resistant.

The upper and lower bearings differ only in size, but not with respect to their technical specification. They are up to 640 x 300 mm in size, weigh up to 113 kg and can accommodate a load of up to 1,000 kN. They can slide up to 150 mm in the longitudinal and 200 mm in the transverse direction, and rotate by 30 mrad in all directions.

Expansion joints: adapted geometry

The new expansion joints on the historic Chain Bridge were also supplied by MAURER, not least because the company is renowned in Hungary for its quality and technical expertise. For example, MAURER has supplied the largest expansion joints in the country with movements of up to 1,400 mm. In the case of the Chain Bridge, the main task was to adapt the expansion joints to the complex geometry of its historic structure.

Four MAURER DT160 HYBRID expansion joints were installed on the pylons and two MAURER D100 HYBRID expansion joints on the abutments. "DT" means that compression-shear-springs can accommodate scheduled movements deviating from the main direction of movement, which made guides for the bearings unnecessary. "Hybrid" refers to the material: the upper parts of the profiles including retaining claws are made of stainless steel, and so the expansion joint is protected against corrosion in the areas that come into contact with traffic and moisture. The expansion joints extend across the entire width of the bridge and weigh up to 2.6 tonnes.

"On the whole, a further challenge was to coordinate all the historical features, which cannot be compared with a modern new building, and the resulting complex consequences with all parties involved: from monument protection to construction and production to installation," reports Csaba Simon. "It is important to remember that most of those involved communicated in a foreign language: English was the project language, while Hungarian and German were often spoken, too."

The client was the City of Budapest (Budapest Főváros Önkormányzata) and the contractor was A-HÍD Zrt. The renovated Chain Bridge was inaugurated in August 2023.



Installed expansion joint Photo: MAURER



Jauntal bridge over the Drava River during the launching process and in March 2023. The old bridge deck is darkly visible in the centre of the picture. Photo: MAURER

FROM OLD TO INNOVATIVE

// SLIDING ISOLATION PENDULUMS SLID IN PIGGYBACK

Unique combination of bearings and dampers for railway bridge

In future, the new railway bridge over the Drava River in Carinthia, Austria, will function with a unique combination of sliding Isolation Pendulums and brake dampers. For slow and continuous movements, the load-bearing structure slides over the bearings with almost no resistance. When a train brakes or starts, specific brake dampers hold the bridge in place. The re-centring sliding Isolation Pendulums then allow the bridge to slide back again into its original position.



Lifting in the SIP® bearings using specific mounting girders. Photo: MAURER

The Jauntal Bridge will be modernised and a second track laid during the construction of Koralm Railway. The 96 m high and 430 m long railroad bridge over the Drava is one of the highest railroad bridges in Europe and went back into

operation at the end of 2023.

The new composite structure has two tracks on top and a foot and cycle path below. The two piers in the slope and both piers in the river erected as early as 1961 have been preserved. Preliminary investigations revealed that – following minor repair measures – they can still be used for vertical load transmission. However, they must not be used for horizontal load transmission resulting from braking and starting.

At that point, MAURER was able to contribute its expertise in structural protection and jointly developed a unique overall package of re-centring bridge bearings (Sliding Isolation Pendulums SIP®) and fast-acting brake dampers

(Shock Transmission Units STU) with the parties involved. All bearings and dampers fulfil the required technical service life of at least 50 years and the lowest possible coefficient of sliding friction of maximum two percent.

The steel structure of the new bridge was manufactured in three segments on-site at the pre-assembly place. The first segment was then connected to the existing bridge. In that way, the new bridge was slid in and the old bridge slid out segment by segment in the longitudinal direction.

Re-centring sliding isolation pendulums

Two sliding Isolation Pendulums SIP® were installed in each pier and two spherical bearings with a flat sliding surface in each abutment. Sliding Isolation Pendulums have a curved sliding surface that is specifically selected and adjusted to the specific application.

This curvature creates a re-centring



Bearing set in concrete prior to the lowering of the bridge. Photo: MAURER

effect and enables the system to slide back to its original position after deflection.

Lowest possible friction coefficients

It was especially important that all bearings featured the lowest possible friction coefficients so that the historic piers are loaded as little as possible. In order to meet the quality requirements in terms of the high sliding and load-bearing capacity as well as the long technical service life of 50 years, all bearings were equipped the wearresistant sliding material MSM® (MAURER Sliding

Material) combined with corrosion-resistant MSA® calottes (MSA® = MAURER Sliding Alloy). The dampers and carriageway expansion joints were installed in summer 2023. The bridge was put back into operation in December 2023.

“The realisation of such innovative ideas requires a high level of implementation competence and responsibility,” emphasises Dr Saeed Karimi, Head of the MAURER subsidiary in Austria. “We would therefore also like to thank all our partners for realising this challenging project.”

In detail, these were:

- Client: ÖBB Infrastruktur AG
- Structural Designer: KOB ZT GmbH
- Substructure Planner: ZKP ZT GmbH
- Execution of construction work: KMP ZT GmbH & Baumann + Obholzer ZT GmbH
- Construction Execution: ARGE Jauntalbrücke (SWIETELSKY AG and Donges SteelTec GmbH)



// THE MAURER EYE

When it comes to the quality of our products and manufacturing processes, Klaus Hahn and his Quality Management Team consider every aspect

No department at MAURER devotes as much attention to what enters our material stores, what happens in our production, and what leaves our sites as the Quality Management Department, abbreviated as QM.

About the QM Department

Klaus Hahn has been in a leadership position in this role for over 25 years. His team is strongly integrated into all manufacturing processes, starting with incoming goods inspection. There, they check whether specifications, quantities, tolerances, evidence, and documents have been delivered according to the order. Given that certain operational processes directly influence quality assurance, his department monitors the processing of all semi-finished products and plays a crucial role in the final inspection.

The Quality Management is 100% responsible according to

established inspection plans, which must be implemented either according to MAURER standard or customer and country requirements. This also involves acceptance by customers during pre- and final assembly, and, of course, prior to deliveries.

The department is confronted with particular challenges when it comes to what makes MAURER unique in the industry: MAURER's developments and innovations. We certainly adhere to standards and certifications for all processes within quality planning. This ensures that we achieve our quality goals.

For our new developments, the quality aspect needs to be reconsidered time and again. The Quality Management Department encounters questions such as:

1. Are internal work instructions for all parties involved available, sufficiently described,

completely or partially mentioned in other documents? If not, are additions necessary in collaboration with other departments, as well as later publication?

2. Do new inspection plans need to be created, or can standard inspection plans be used, at least partially?

3. Does the type and implementation (production) already comply with existing, mandatory standards and regulations, or are adjustments, such as in welding or testing techniques, necessary?

4. What are the requirements for documentation, with a focus on traceability, scope, etc.? In short, what are the challenges with innovative products where, apart from general standards, there is no other benchmark?

Photo: NicoElNino; Graphic: Vadim Sazhnev

Ultimately, the department stands for 100% quality control. Experts refer to this as FPC (Factory Production Control). It is a mandatory requirement with various standards and approvals, meaning that without FPC, there is no approval and no certification in the last consequence.

The basis for monitoring products and processes is always product- or customer-specific inspection plans. These plans provide in-depth details on work steps and required inspections, including the type of documentation. Well-trained, experienced personnel equipped with adequate measuring tools are a prerequisite for executing these inspections in an objective and reliable way. Klaus Hahn and his team fulfill this requirement with years of experience and continuous training.

If inspections on products during production are required, this is regulated according to the ERP system IFS.. In the IFS NCR (Non Conformity Record) process, the responsible parties or necessary decision-makers are informed, and measures are initiated.

These can be special releases, repairs, or scrap. If it turns out that a general improvement process is necessary, it also follows the pattern

"Identification of causes for quality problems":

1. Evaluation of NCR cases listed in IFS within a specific period.
2. Clustering of identified causes. Representation of frequencies and causes in diagrams.

3. NCR discussions about corrective actions with the affected departments.
4. Evaluation of corrective actions, whether successful or not, if necessary, repetition.

This work and the insights gained contribute to the creation and maintenance of quality documentations, manuals, and process descriptions of quality audits and inspections, which are then made available on the intranet, IMS. These documents are either essential for certifications or fundamental for conveying MAURER's proprietary expertise. This closes the circle. Ultimately, we can only be successful and innovative if we perfect the principle of "Learning by Doing."



Siller J., Spies R., Roth J., on the right the first person Mann Herzog J., Koch T., Hahn K. Photo:MAURER

// INTERVIEW KLAUS HAHN

Hello, Mr Hahn, what are all your responsibilities?

Klaus Hahn: "It starts with welding supervision and certification according to valid standards for Munich and to some extent the branches in India, Turkey, and with overseeing our locations in Lünen and Bernsdorf.

The same applies to the quality management of MAURER SE, for internal and external audits, customer acceptances. And I am the appointed MAURER SE representative for environmental management of our German locations."

What do you like about your job?

K. H.: "The material steel has always fascinated me, probably due to early childhood imprinting, as I grew up in a traditional village forge. Later, after studying mechanical engineering, I found the combination of welding technology and quality assurance exciting, the root cause and error research in quality assurance with the classic question: 'Why, how could this happen?'"

What are the biggest challenges in your daily work?

K. H.: Customer complaints with obvious failure of the quality department. It happens and demands full commitment

from the whole team. And it helps that we are well-coordinated and treat each other very collegially."

How high or low is the turnover in the team; are there colleagues who have been with the company for a long time?

K. H.: "The turnover is very low; some colleagues also have approximately or more than 20 years of MAURER service."

»The material steel has always fascinated me.«

Do you have time for hobbies, and if so, which ones?

K. H.: "Travelling with the motorhome, walking the dog, painting, carving, and, as a sport, Tai Chi."

How do you deal with the stress level in your job; do you have a secret recipe?

K. H.: "My secret recipe? 'EXPERIENCE.' After this long professional activity, there is virtually nothing in my area that I have not experienced in one way or another."



KLAUS HAHN // HEAD OF QUALITY MANAGEMENT MAURER SE

- 1979 High school diploma in Michelbach/Bilz
- 1988 Mechanical engineering studies at FH Konstanz
- 1994 Distance learning quality engineer/ quality technician FH Berlin
- 1996 Training as European Welding Engineer
- 1996 Employment at BAUER Schrobenhausen, Technical Sales
- 1997 Employment at Goldhofer Memmingen, Vehicle Construction Quality Assurance, Welding Supervision.
- October 1998 Employment at MAURER Söhne
- 2019 European Engineer
- 2019 Canadian Welding Engineer.
- October 2023 25th anniversary of service at MAURER

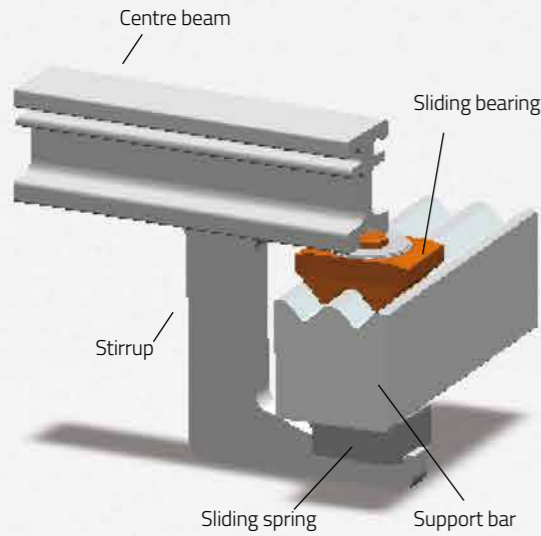


// STRUCTURAL PROTECTION IS HIS LIFE'S WORK

Dr. Braun - A pioneer of innovation at MAURER

Dr. Braun is ending his active role in the management of MAURER SE following many successful years and will remain closely associated with the company on the Board of Directors in the future

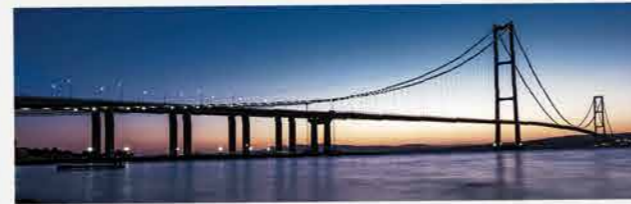
Storebæltsbroen, Denmark
Photo: istockphoto/ taranchic



The catamaran - the revolution in bridge construction. Innovative MAURER MSM® Swivel Joist Expansion Joint



The Millau Viaduct carries the A75 motorway over the Tarn in southern France and, at 2,460 metres, is the longest cable-stayed bridge in the world.



The longest suspension bridge in the world, the 1915 Çanakkale over the Dardanelles, has a main span of 2,023 metres.

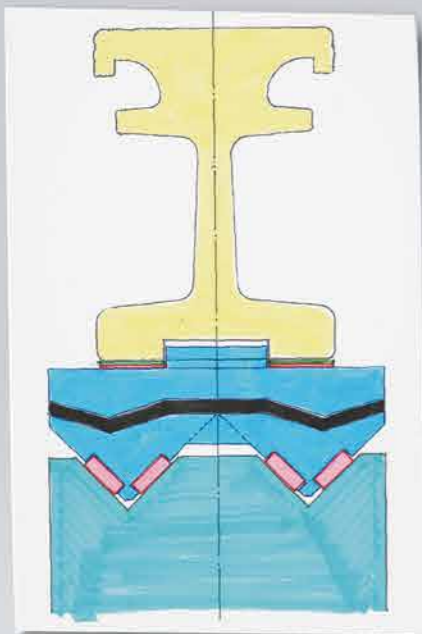


The Rio Andirrio Bridge or officially Charilaos Trikoupi Bridge is a cable-stayed bridge in Greece over the strait of Rio-Andirrio.



DR. CHRISTIAN BRAUN /MANAGING DIRECTOR MAURER SE

- 30/06/1959** Born in Brixen (South Tyrol) and grew up in Brixen, Bruneck and Meran
- 1978 to 1987** in Innsbruck
- since 1987** in Germany, first in Munich, in Holzkirchen since 1989
- since 1986** Married, two children
- 1978** Civil engineering studies at the University of Innsbruck - followed by a doctorate in technical sciences at the same faculty
- 1984 to 1987** University assistant at the Institute for Steel and Timber Construction at the Faculty of Civil Engineering at the University of Innsbruck
- since 1987** Senior employee of the company MAURER SE, formerly Maurer Söhne GmbH & Co. KG
- until 1991** Head of the design office until 1991, then Sales Manager
- 2001 to 2024** Managing Director
- 2024** Change to the Board of Directors



The "vision": first sketch of the MSM® prism guide

Dr. Braun, our longstanding technical and managing director at MAURER SE, has significantly shaped the history of MAURER and turned the company into a global technology leader in structural protection. His journey began in 1987 with a case of damage to the carriageway expansion joints of the Ahrtal Bridge, which was the starting point of his remarkable career.

The path to expansion joint excellence

During his tenure at the University of Innsbruck, Dr. Braun discovered his calling in researching the fatigue strength of carriageway expansion joints. Thus, his professional trajectory became inextricably linked to this pivotal structural element. "The expansion joints were my destiny," Dr. Braun describes this phase of his professional development. From these challenges emerged pioneering solutions and product developments that laid the groundwork for MAURER's success.

The beginnings of expansion joint development

The defective carriageway expansion joints on the Ahrtal Bridge marked the beginning of his intensive engagement with the traffic load on carriageway expansion joints in modular design. With a clear

mandate from his superior to address this issue, he collaborated with the development and design teams to research the fatigue strength of expansion joints and to develop entirely new solutions. These years were characterised by deployments beneath motorway bridges and a certain aversion to trucks. Their extreme weight, distributed over a few axles and wheels, travelling at high speed on uneven roads, and adhering to the road surface with significant traction and braking forces, particularly in uphill stretches, were the decisive dimensioning parameter for carriageway expansion joints in road bridges.

Regulations as standards

Building upon these findings, Dr. Braun played a pivotal role in introducing design guidelines for carriageway expansion joints in Germany and later in Europe. This ultimately led to a near-complete reduction

in fatigue damage on carriageway expansion joints. Regulations and standards continuously accompanied Dr. Braun's work. As an expert in expansion joints, structural bearings, and seismic protection, and as Chairman of the Boards of German and European manufacturers' associations, he represented Germany's interests worldwide.

Innovative breakthroughs in noise protection

Dr. Braun spearheaded groundbreaking developments in noise protection in cooperation with the development and design departments, including successful projects such as the introduction of the wave joint in the 2010s. This not only enabled MAURER to address the issue of noise protection, but to actively shape it and make a demonstrable difference to the products of that time. An outstanding example of this innovative strength is expansion joints with rhomboid elements, which achieve a noise reduction of approximately 50% compared to conventional expansion joints in modular design through targeted dissolution of the impact edges at the individual gaps.

Storebæltsbroen – a milestone in internationalisation

The Storebæltsbroen in Denmark became a symbol of a new era. As the first Europe-wide reference for a 25-profile expansion joint with a two-metre movement, it laid the foundation for MAURER's transformation from a national to an international company.

This journey began in 1995 when MAURER still had no significant foreign business, resulting in our presence in all the world's important markets 30 years later.

Maintaining and strengthening production in Germany has always been a guiding principle of MAURER. This motivated Dr. Braun to establish a large number of sales representations abroad.

To further strengthen local markets, production facilities were established in China, Turkey, India, and Brazil. This expansion was accompanied by the diversification of the product range to include components made from elastomer.

Focus on seismic protection and structural dynamics

Dr. Braun expanded his sphere of

influence to the development of seismic devices. The sliding isolation pendulum was established as a seismic isolator. Hydraulic dampers, reinforced elastomeric bearings with lead core, and the "Fuse Box" as seismic protection for expansion joints were introduced, combined with the company's existing expertise in vibration absorbers.. Collaboration with Prof Petersen led to the publication of the groundbreaking book "Vibration Dampers in Civil Engineering."

These activities not only paved the way for technological breakthroughs but also established MAURER internationally as a pioneer in the industry. The "MAURER Söhne Foundation," supervised by Dr. Braun, promotes fundamental research in this field.

MSM® Spherical Bearings – the supreme discipline

The invention and introduction of the sliding material MSM® (MAURER Sliding Material) were decisive milestones. MSM® was established both in Europe and worldwide as an outstanding sliding material for structural bearings. The international reputation of MAURER was underscored by MSM®, showcasing the technological progress and innovative strength of the company.

Dr. Braun's strategic establishment of the MSM® spherical bearing as the most advantageous structural bearing is testimony to his vision. While pot bearings were considered state-of-the-art 30 to 40 years ago, the MAURER bearings promoted by Dr. Braun today are not only exemplary in terms of CO₂ emissions and sustainability but also leading worldwide in technical capabilities.

Structural protection systems instead of bridge accessories

The original division name "Bridge Accessories" no longer adequately reflected the continuous expansion of the product range and its areas of application.

That is why Dr. Braun established the new division of "Structural Protection Systems" at the beginning of 2005. All products share the joint goal of protecting the structure and its users from external influences in the interplay of forces and movement. Structural protection is not just one area and it now stands for the company MAURER SE.

The future of MAURER – The MSM® Swivel Joist Expansion Joint

His legacy is evident not only in past

successes but also in forward-looking developments. The MSM® Swivel Joist Expansion Joint, also known as the catamaran expansion joint, represents the most innovative product on the market and is the result of a visionary development project involving all disciplines within MAURER. It will greatly advance our company's continued success.

Success through values – MAURER as a family business

The success story of MAURER is based not only on financial figures, however, these have also developed extremely positively under our current Managing Director and future Chairman of the Board of Directors.

For example, the order intake in the field of structural protection increased from ten million euros in the 1990s to an impressive €150 million at the beginning of the 2020s. This also reflects the journey of a company founded on family principles with now well over 1,000 employees.

The recipe for success lies in the company's five pillars: development, design, manufacturing, installation, and service in-house. Dr. Braun, as a pioneer and visionary, has decisively shaped MAURER's development and leaves behind a legacy that will influence the industry and the company MAURER SE for many years to come.

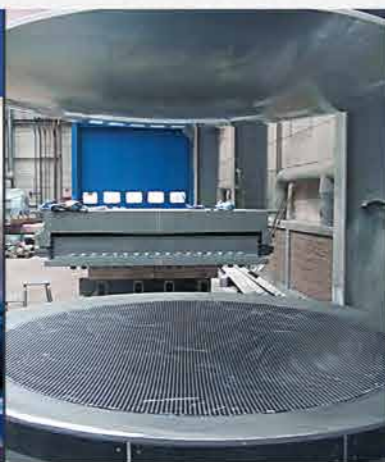


Listed façade of factory hall 1, MAURER SE on Frankfurter Ring in Munich



1996

Start of production of seismic protection systems.



2003

Development of MSM® (MAURER Sliding Material): a high-performance sliding material for structural bearings.



2004

Development of low-noise expansion joints (with rhomboid and/or sinusoidal plates).



2004

Sliding isolation seismic isolation such as New Museum, Athens.



2010

Development of the wave-shaped expansion joint XW1.



2019

Commissioning of the Munich Ferris wheel: Umadum, the Munich Ferris wheel.



2021

MSM® Swivel Joist Expansion Joint, a development of the proven MAURER swivel joist expansion joint.

THERE IS PLENTY TO DO

// RETTER TACKLES IT

It has been more than 30 years since Romania began to shed the old structures and obstacles of a planned economy spanning decades. This change was not a smooth one during the first few years, but was ultimately successful. Romania has been a member of NATO since 2004 and became a member of the European Union with the Eastern enlargement of the EU in 2007. [read more >](#)





Since then, the countries of the former Eastern bloc countries have also undergone social, political, and economic change. The aim is to achieve equal living conditions and cooperation across national, ethnic, and linguistic borders throughout Europe. Open borders and a consistently well-integrated infrastructure for all modes of transport are essential for achieving this. This requires companies and entrepreneurs who get to work. Guido Retter and his Retter Group are just that.

What started in 2006 with project management activities, as well as planning and execution tasks, has become a broad-based group of companies in building construction and civil engineering more than

18 years later, despite the pandemic and the Russian war in neighbouring Ukraine.

»This requires companies and entrepreneurs who take get to work. Guido Retter and his Retter Group are just that.«

The Retter Group relies, among other things, on the successful coordination of numerous large-

scale projects, starting with project preparation and implementation, technical and economic support, reporting, and the management of expert teams. This also includes the monitoring and management of large infrastructure projects, which are generally based on FIDIC contracts, concessions, and PPPs (Public Private Partnerships).

One of the most important fields of activity is now the expansion of motorway and railway infrastructure. And technical project expertise in the field of seismic protection (concept development, design, manufacture, and installation of seismic protection systems/ equipment and devices) is increasingly in demand.



Mr Retter, you have been doing business in Romania for almost 20 years now. A unique success story, isn't it?

Guido Retter: "If you look at the bare figures, our development, the expansion of our business fields, then - yes - you can say that."

How important is the person and entrepreneur Guido Retter for this?

G.R.: "At the beginning, it was definitely the project and management experience of my activities in Germany. For a long time now, Me and the entire Retter Group have relied on a management team and many capable colleagues who take responsibility, make decisions and move not only the company but also the entire country forward"

Where do you see challenges in the current situation here in Romania?

G.R.: "There are a whole range of them. Firstly, the pandemic has contributed to towards many projects having slowed down. Nevertheless, with the bridge in Blaj, we managed to realise one of the most impressive structures in the region in less than half the planned time. In principle, we would like to see faster approvals for construction projects that have been planned and financed for a long time, which is why we have teamed up with international partners such as MAURER SE."

This means that you also look beyond national borders

G.R.: "That is inevitable. Since the start of the Russian invasion of Ukraine, we have not only had

to deal with increased traffic and movements of people and materials, we are also struggling with rising raw material and material prices. As is the case for everyone in Europe and around the world."

But there is still a lot to do?

G.R.: "Definitely: first and foremost, we have to invest in the company's machinery and vehicle fleet. The second focus is on the environment, green technology, and environmental responsibility. Construction companies that develop programmes to support green and sustainable building standards will flourish.

A third thrust is in the earthquake safety of the existing building stock in Romania and in the planning and construction of new buildings, monuments, bridges, etc. Together with our German partner, MAURER SE, we are also perfectly positioned for this in terms of strategy, technology, and operations.

The fourth field concerns projects for the Romanian railway. As a certified supplier, we provide construction, repair and maintenance services in the field of railway infrastructure.

And finally, as a successful and growing company, we also need to

continuously expand our team. We are currently looking for new colleagues. Our staff identify with the company and share its success. This is how we are trying to create a basis for continuity, creativity, and long-term sustainable growth from the perspective of collective development."

We wish you every success in this endeavour.

G.R.: "Thank you very much and good luck."

// GUIDO RETTER CEO/PROJECT MANAGER RETTOR GROUP

- **1995 to 1999:** Bachelor's degree Graduate Engineer Faculty of Civil Engineering BUGH Wuppertal
- **1999 to 2001:** MBA in Economics, Logistics and Finance, Graduate Engineer Faculty of Economics TU Munich
- **2001 to 2002:** Consultant at Philipp Holzmann AG, Frankfurt
- **2003 to 2006:** CEO/ Project Manager Retter, consulting and management services for construction projects
- **2006:** Present CEO/ Project Manager Retter Group, Sibiu/ Bucharest



Photos: Retter



// CURRENT REFERENCE PROJECTS



Motorway A7 Ploiesti-Buzau complete construction including several bridges with MAURER LRBs and modular expansion joints.



Sibiu-Pitesti motorway, several bridges with MAURER LRBs, SIP*s.



Motorway A0, several bridges with MAURER modular expansion joints.



Since 2016, the already close collaboration between the Retter Group and MAURER has therefore entered a new phase. RETTER Project Management officially became the representative of MAURER SE in Romania in the field of seismic protection systems.

And there is plenty to do in both areas, that of transport infrastructure and structural protection. Romania is crossed by three of the pan-European transport corridors. Investment in rail transport and the condition of the roads is urgently needed. To that end, the EU also provides extensive budgets. Romania's entire road network covered around 84,185 km in 2021, of which 49,873 km are paved. The motorway network is under construction – a total length

of 2,710 km is planned, of which 947 km have been completed, and 223 km are under construction. Retter Group is always involved.

Current reference projects include:

- A7 Ploiesti-Buzau motorway, complete execution including several bridges with MAURER LRBs and modular expansion joints.
- Sibiu-Pitesti motorway, several bridges with MAURER LRBs, SIP*s.
- A0 motorway, several bridges with MAURER modular expansion joints.

Retter is particularly proud of a recently successfully completed project: the Bridge of Lies in Blaj. One of the most spectacular structures in modern Romania was built in only eight months, including the demolition of the legendary Bridge of Lies in the centre of Blaj and the construction of a new one with five lanes and two pedestrian lanes with heated footways. The result is an architectural masterpiece that brings the stories and many legends of the Bridge of Lies into the present.



Photos: Retter





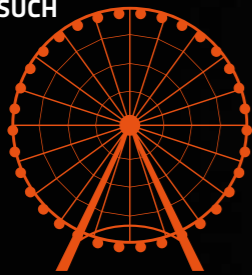
Congratulations on Your fifth Anniversary

FIVE YEARS OF UMADUM IN THE WERKSVIERTEL-MITTE

  **27** GONDOLAS
WITH **422** SEATS

THEMED GONDOLAS SUCH
AS CUDDLE, BEACH,
MEETING GONDOLA

78 m
TOTAL HEIGHT



 **30** DURATION OF A RIDE
MINUTES

ENTRY IN THE
**GUINNESS BOOK
OF RECORDS**
AS TALLEST
TRANSPORTABLE FERRIS
WHEEL IN THE WORLD



 OPERATION WITH
& GREEN ELECTRICITY
& ENERGY
RECOVERY

BREATHTAKING PANORAMIC VIEW OVER
THE ENTIRE CITY AS FAR AS THE ALPS

CULINARY RIDES SUCH AS WEISSWURST
BREAKFAST OR CREATIVE DISH FOR LUNCH



SIP®-A BEARINGS: // FIRST TWO-STAGE SEISMIC PROTECTION WORLDWIDE

Mexico City: The adaptive isolators protect patients and equipment

The world's first SIP®-A bearings were installed in a research institute in Mexico City to protect it against earthquakes. The bearings react in two stages in the event of an earthquake, and thus protect not only the structure but also the sensitive interior of the tall, narrow building. In addition, the innovative isolators saved considerable construction costs, as they facilitated building smaller foundations and a more slender load-bearing structure.

The National Institute of Medical Sciences and Nutrition in the south of Mexico City (Instituto Nacional de Ciencias Médicas y Nutrición Salvador Zubirán, INCMNSZ) is a medical teaching

and research centre where patients are also admitted.

The INCMNSZ was designed by the architecture firm Arquinteg (Mexico City) in 2018/19: with 13 above-ground floors and an underground car park with four levels.

[read more >](#)

Photo: MAURER





First installation of SIP®-A bearings worldwide in August 2021. Photo: MAURER

Mexico City is located in a seismic area and, in light of the tall and narrow design, this resulted in relatively large tilting moments. "That is why the foundation engineers consulted us as experts for seismic protection as early as the planning stage," reports Dr. Luís Pinto, MAURER Regional Manager for Mexico.

It was clear that in the event of an earthquake, the compression and tensile loads would be so high that normal foundations did not suffice. However, correspondingly large foundations would have been too expensive. It was also too narrow on site for more extensive dredging, which would then be necessary.

Instead, building isolators were installed. When an earthquake acts horizontally on the building, they decouple the visible part of the building from the underground part, causing horizontal displacements within the isolators. This results in far smaller tilting moments, which are easy and economical to transmit.

MAURER's early involvement in the planning process facilitated an innovative solution: "We normally use SIP®-D bearings in such a

case", reports Dr. Pinto.

Isolating, dissipating, re-centring, stabilising

In the event of an earthquake, SIP® bearings generally assume four functions:

- They isolate the building from its foundations and allow horizontal movements in all directions.
- They limit movements through internal friction by converting kinetic energy into heat (dissipation).
- They re-centre the building in its original position following an earthquake, as they have concave sliding surfaces.
- They transmit vertical loads.

According to Dr. Pinto, however, the special feature in the case of INCMNSZ was "that the accelerations should be kept as low as possible due to the patients and sensitive equipment." Even in the event of an earthquake, the institute should be able to continue operation under all circumstances, patients should not be injured or equipment damaged by falling parts of the

suspended ceilings. The FEMA (Federal Emergency Management Agency, US) guidelines specify a maximum acceleration of 0.3 g on each floor. This cannot be achieved with conventional SIP® bearings in view of the many floors.

At that time, MAURER already had the newly developed SIP®-A bearings (MAURER Adaptive Sliding Isolation Pendulum) in the pipeline: INCMNSZ in Mexico City was the ideal case of application. "A" stands for "adaptive", a bearing that adapts to the earthquake requirements.

Innovative step function

The basis for the SIP®-A is the Double Sliding Pendulum MAURER SIP®-D, which has been 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).

A new feature is that both sliding surfaces react differently. The bottom part of the bearing has a sliding surface with low friction. When an earthquake begins, or if it continues to be a normal earthquake, and therefore



Four of the total 34 installed SIP®-A bearings on top of the support columns. Visible at the bottom is the descent to the underground car park. Photo: MAURER

only quite small horizontal forces act, then the bottom bearing level alone isolates or moves.

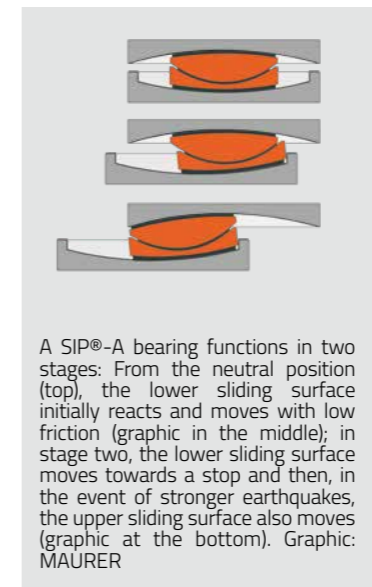
If, however, the seismic forces increase, larger displacement within the isolators is also required. At this point, the second, upper sliding surface comes into play. This has a higher friction and thus also achieves a higher energy dissipation or braking effect. As a result, the movement of the building is more reduced and better controlled.

The upper sliding surface is only activated by relatively strong earthquakes. The step effect is primarily relevant for taller structures, since with conventional bearings, which can also dissipate large earthquake energies, the initial friction, that is the resistance, is quite high. Thus, there is an initial jolt in the moment when the friction is overcome. This jolt leads to ever greater and unacceptable accelerations upwards in the building with damage to its content and the structure.

SIP®-A reacts very gently without jolting even at a lower force application. The second stage is then activated during the move-

ment. The effect of this is that the building does not move jerkily but sways gently, which reduces the acceleration below the permissible limit values even on the upper floors.

The adaptive Double Sliding Isolation Pendulums SIP®-A used in INCMNSZ have an effective pendulum radius of 600 mm.



A SIP®-A bearing functions in two stages: From the neutral position (top), the lower sliding surface initially reacts and moves with low friction (graphic in the middle); in stage two, the lower sliding surface moves towards a stop and then, in the event of stronger earthquakes, the upper sliding surface also moves (graphic at the bottom). Graphic: MAURER

This controls the isolation period such that within the horizontal movement of up to ±300 mm in all directions, the horizontal acceleration drops below 0.3 g –

even on the upper floors. A total of 34 bearings were installed with a service life of at least 50 years. They transmit vertical loads up to a maximum superimposed load of 10,900 kN.

Cost savings due to the isolators

The SIP®-A bearings saved a substantial amount of construction costs because only normal foundations were necessary. In addition, the load-bearing structure was optimised after it was clear which forces the seismic isolators accommodate.

Initially, a steel structure with large composite columns was planned. Due to the reduced seismic loads, no concrete was required at the columns. A steel structure was enough.

The first SIP®-A bearings worldwide were built in Munich in 2020 and tested at EUCENTRE in Pavia (Italy). Installation took place from April to November 2021. The inauguration of INCMNSZ is scheduled for the second half of 2024.

MSM® SWIVEL JOIST EXPANSION JOINT

// GERMAN PREMIERE OF THE MSM® SWIVEL JOIST EXPANSION JOINT

MAURER renovates the expansion joint crossing on the Dultenaugraben Bridge for the next one hundred years.

Unexpected settlements at the western bridgehead meant that the Dultenaugraben Bridge between Rheinfelden and Lörrach had to be renovated. For the first time on a German motorway, MAURER installed an MSM® Swivel Joist Expansion Joint with a movement of 550 mm. Thanks to the use of the MSM® sliding material applied in bearing construction, this expansion joint has a service life of 100 years.

The 444-m-long, eight-span Dultenaugraben Bridge is a steel composite structure with one superstructure in each direction of travel. As a section of the A 98 motorway between Rheinfelden and Lörrach, the first superstructure

with one lane in each direction was opened in 2002. The second superstructure, opened in 2010, enables two lanes of traffic in both directions.

Ten years later, the bridge had to be closed due to settlements of between 30 and 80 mm on the western abutments. The transition structures on both superstructures were renovated. These constructions, also known as expansion joints, overlap bridges bridge the gap between the bridge superstructure and the abutment.



Photo: MAURER

The gap changes in the longitudinal direction of the bridge as a result of temperature changes or loads acting on it. While it was possible to repair the expansion joint of the southern superstructure, a new construction was used for the northern superstructure.

Solution for challenging bridges

For decades, swivel joist expansion joints have been successfully installed in challenging bridges, for example in the world's longest suspension bridge at 4,608 metres, the 1915 Çanakkale Bridge in Turkey. They facilitate movements of up to three metres and possibly more, as well as rotations in all directions. This is important because the Dultenaugraben Bridge is also much less stiff due to its design as well as being located in an earthquake region.

The swivel support bars carry the parallel profiles lying on top, which are also called intermediate beams. The support bars lie at a slight angle to the direction of travel, thus ensuring that the opening and closing bridge movements are evenly distributed over the sealing elements between the steel profiles.

MAURER has fundamentally developed the swivel joist expansion joints. The support of the intermediate beams is entirely new: rather than running in simple elastomeric bearings, the profiles run in w-shaped MSM® bearings. The so-called catamaran support optimises the performance of the entire expansion joint. Thanks to MSM® and the special bear-

ing shape, the profiles slide more easily and precisely over the support bars.

This prevents restraints and increases the service life. The client was Autobahn GmbH des Bundes, and the company, Leonhard Weiss, managed the construction work.

Details of the new MSM® Swivel Joist Expansion Joint

The catamaran support (see graphic) was developed by MAURER in 2020 and is patent pending. Further development makes the system fit for the future European-wide design rules for multiseal modular expansion joints.

High forces in the guide bars

Very high forces act in expansion joints. Here, the challenge is not the vertical traffic loads, but the horizontal forces acting on the lateral guide bars of the sliding bearing. These forces not only derive from the control force of the joint, but also from the braking or acceleration forces of the vehicles. The guide bars ensure that the intermediate beams remain "on track", in other words: parallel at all times (transversely to the direction of travel) and with equal distances between them.

Given that the bridge can move suddenly within seconds, extremely high compression develops in the relatively small guide bars due to the forces. In extreme cases, a normal guide - "becomes jammed" - which can be compared with a

simple drawer that is tilted when pulled open. Such restraints lead to wear in the guide bearing. These negative effects no longer apply with the new swivel support bar.

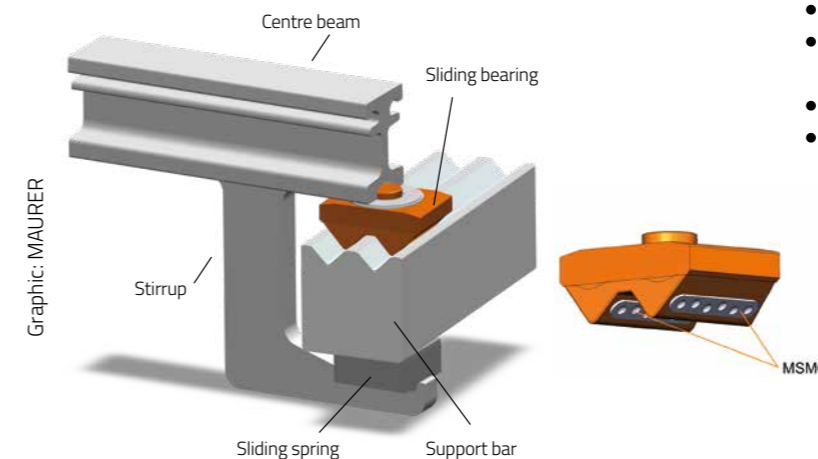
MSM® guarantees a service life of more than 100 years

MSM®: Calculated service life of 270 years

MSM® (MAURER Sliding Material) with lubrication pockets is a high-performance sliding material that MAURER has been using in bridge bearings for 20 years. It absorbs much higher compressions than the composite material previously used in swivel joist expansion joints, and has been tested for an accumulated sliding displacement of 25 km. For the bearings in the Dultenaugraben Bridge, this means a calculated service life of 270 years. However, the advantages of MSM® can only be harnessed if the sliding surfaces are in permanent contact with one another. But this has not yet been the case with the swivel support bars, since the sliding elements in the lateral guides were sometimes in contact with the left and sometimes with the right side. This resulted in a so-called gaping joint.

MAURER therefore developed a new W-shaped bearing, technical term "double prism guide". It is possible to imagine the decisive difference by visualising a catamaran: like on two "skids", the profiles easily and precisely slide over the support bars in a tilt-proof way, thus resulting in a very stable guide. An overview of the benefits of the new MSM® Swivel Joist Expansion Joint:

- Longer service life
- Less maintenance and therefore lower costs
- Less congestion
- More sustainable, as 20% less waste and 50% less CO₂ emissions compared to previous swivel joist expansion joints





NEW SIP[®]-V BEARINGS

21
in
1

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





Swivelling a SIP®-V bearing into position to protect the building core
Photos: SDA-engineering



Precise embedding in concrete of the SIP®-V bearing. 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



Photos: MAURER

Highly sensitive measuring equipment in a laboratory located next to busy traffic routes and in a seismic – nothing more difficult than that. To ensure research free from vibration here in Nove Sad, 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 a member 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 8 x 7 metres and four 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.

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

The building core now stands on four Sliding Isolation Pendulums with integrated vibration isola-

tion SIP®-V (SIP®=Sliding Isolation Pendulum). "V" stands for Vibration Isolation.

This new development combines both seismic and vibration protection in one component. To that end, we collaborated with another specialist, Getzner Werkstoffe GmbH (Austria), and pooled our competences.

Leading planner was Dr. Marko Marinković from 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).

Details on seismic protection

Basis for the SIP®-V is the Double Sliding Pendulum MAURER SIP®-D, which has been 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 ±100 mm in all directions.
- They limit movements through internal friction by converting kinetic energy into heat. Specifically, a horizontal seismic acceleration of 0.2 g 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) 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 650 x 650 x 210 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.

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.

EMERGO GROUP ANTWERP // POISED FOR THE FUTURE FOR THREE GENERATIONS

Partner for construction and industry, and active with MAURER in Belgium since 1967



When Paul De Neef founded EMERGO NV in Antwerp in 1950, the people in Belgium and Europe had just begun to turn away from the horrors of the second World War and face the future. The name he chose for his company reflected his motto: "Luctor et Emergo" Latin for: "I struggle and emerge". [read more >](#)



Photos: MAURER



EMOTEC Paul De Neef (left) and EMERGO Jozef De Neef (right). Caroline De Neef (left) – EMOTRADE CONSTRUCTION ACCESSORIES; Leen De Neef (right) – EMOTRADE GEOTEXTILES.

installation of MAURER products and system solutions.

This is largely associated with the entry of Jozef De Neef, the son of the company's founder. It was he who, in 1967, secured the first exclusive sales license for Belgium with MAURER. From then on, it was necessary to adapt to the constantly changing demands of increasing traffic and mobility, and the call for higher environmental and living standards.

In 1996, the reorganisation of EMERGO took place. Under the EMERGO HOLDING umbrella, EMOTRADE is responsible for construction accessories and geotextiles, while EMOTEC focuses on steel and bridge construction. The management of each company is shared by the company founder's grandchildren.

In EMOTRADE, Caroline De Neef is responsible for construction accessories and Leen De Neef oversees geotextiles. In EMOTEC,



Paul De Neef Junior leads the business.

Throughout the history of EMERGO, there have always been outstanding projects that indicated the direction of development.

In 1988, EMERGO was entrusted by the Thai authorities with the construction of the Fly-Overs on Rama IV of the Sathon Road in Bangkok, where MAURER ÜKO D80 and elastomeric bearings were installed.

Another landmark project is the new Theunies Bridge in Antwerp, which was opened to traffic in 2021 and is crucial for the development of one of the largest industrial areas in the Antwerp province into a pleasant living environment for housing, work, traffic, and nature. EMERGO's competence will play a significant role in realising visions for a sustainably better life.



PAUL DE NEEF // EMERGO GROUP

Mr De Neef, how does one grow into the responsibility for a family business?

Paul de Neef: "It naturally falls into place. My interest in mathematics was awakened at young age. I studied industrial engineering at EHSAL/Brussels. During the summer breaks, between semesters, I worked at EMERGO"

Since then, your typical workday has probably changed significantly, hasn't it?

P.d.N.: "It depends on how you define work. As the General Manager of EMOTEC, a part of the EMERGO Group, I try to handle everything the day demands: meetings, tracking production progress, contacts with employees, customers, authorities. One is constantly confronted with situations that require a lot of flexibility."

What attracts you to your job?

P.d.N.: "Every project, the conditions, the requirements, the people involved are always new and different. But most importantly, everyone has the same goal: to realise things and projects that are not always easy during execution."

What are the biggest challenges?

P.d.N.: "For me, it is crucial to find and retain the right people in the right places. Creating a good work-life balance for each of us in order to maintain motivation for new projects."

Do you still have time for hobbies, and if so, which ones?

P.d.N.: "Family and time with them are my greatest hobby. Travelling,, good food and drink. And when I do sports, I enjoy skiing, golf, cycling, football."

Photos: MAURER

Over 75 years later, this determination to assert oneself and rise above challenges is still evident today in the development and transformation of the EMERGO Group into a partner for construction and industry in Belgium.

While the primary source of income in the early years was the sale of plastic products for industry, EMERGO has played an increasingly significant role in civil engineering and in building, road and bridge construction as well as metal and water construction in Belgium since the mid-1960s as the exclusive partner for the distribution and



1988 IN BANGKOK

For EMERGO, 1988 was the Fly-Over in Bangkok: Rama IV Sathon Road – a special project for steel construction, as well as MAURER expansion joint D80 and elastomeric bearings.



1950 Mr. Paul De Neef (Senior) establishes EMERGO, with the motto "Luctor et Emergo" ("I struggle and emerge")

1965 Jozef De Neef second generation
1967 Exclusive sales license agreement with MAURER Munich.

1972 1996 Jozef De Neef acquires 50% of EMERGO. MAURER grants manufacturing license to EMERGO for single-seal expansion joints.

Jozef De Neef acquires 100% of EMERGO shares, new production hall in Puurs industrial estate.

1996 Reorganisation of EMERGO Holding: EMOTEC => Bridge construction accessories (MAURER)

EMOTRADE => Steel construction
=> Construction accessories
=> Geotextiles
2012 Participation third generation

ULLRICH MOLITOR // SPECIALIST CORROSION PROTECTION



When it comes to corrosion-protected multi-seal expansion joints, such as the swivel joist expansion joint for the 1915Çanakkale Bridge in Turkey, corrosion expert Ullrich Molitor is perfectly happy.

Mr Molitor, how long have you been with MAURER?

Ullrich Molitor: "I started in 1998 at Stalko, in Hohenwart. In 2002, I moved to Maurer Söhne, Munich, due to the shutdown there. On 17 August 2023, I celebrated my 25th anniversary with the company."

What is your exact title? We have only heard that you are the expert for corrosion protection at MAURER.

U. M.: "My qualification allows me to call myself a DIN-certified coating inspector III. I deal with the corrosion protection of steel structures using coating systems, and my qualifications focus on key aspects such as type of structure, type of surface to be coated and surface preparation, type of environmental conditions, type and duration of protection of the coating systems."

Can you please briefly explain what happens in your area?

U. M.: "We prepare all components for the corrosion protection to be applied; this is done using

our continuous blasting system, manual blasting cabin and spray metallisation hall. These components are then coated. This is done using two processes, airless and airmix technology. The colouring and coating thicknesses to be applied are communicated via our in-house corrosion protection guidelines."

»Without our specialists, from the machine operator to the manual blaster, to the thermal galvaniser and the coater, we would not be able to maintain our market position.«

Do you have a team to support you?

U. M.: "Our entire Corrosion Protection Department is an important cornerstone of our company. The first thing our customers see is the corrosion protection in their colouring – 'the first impression counts'.

Without our specialists, from the machine operator to the hand blaster, the thermal galvaniser and the coater, we would not be able to maintain our market position.

Externally, we work closely with an accredited testing laboratory, court-appointed experts, specialists and committees. And last but not least, we are a member of GfKORR (Society for Corrosion Protection)."

How does the process work?

U. M.: "Our design office draws up a corrosion protection plan based on the customer's requirements. This plan is made available to the relevant specialist departments following a brief review or assistance in its preparation by me. It shows: blasting, posttreatment, galvanising, coating and, most importantly, the regulations and standards to be applied."

Is this very harmful to the environment or could you say that it ultimately serves the longevity of the products?

U. M.: "Our coating materials are categorised as high-solid coating materials and are therefore very low in solvents. In terms of the VOC rating (volatile solvent

content), we see improvements every year.

This is due to the fact that innovative coating systems and improved system technology are used, and each of our applied coating systems increases longevity. The expected duration of protection is well over 25 years – thus also contributing towards sustainability."

What does your working day look like? What do you deal with on a normal working day?

U. M.: "Checking the technical feasibility of planned corrosion protection work and discussing it in the team; comparing and checking documents, supporting our sales department on the subject of corrosion protection. This includes the elaboration of systems taking into account the existing guideline and adjustments by the corrosion protection work group if necessary. And every now and then I treat myself to a coffee..."

Do the people you employ need special training and protective equipment?

U. M.: "The employee has to be willing and then the technical side will work, too. Our bridge bearing area, in particular, is subject to high demands, which we can only fulfill through further training measures.

In international competition, MAURER requires staff with the appropriate training. These include, for example, the KOR specialist and a European Thermal Sprayer (ETS). We are currently looking for trainees to become process technicians in coating technology.

And yes, protective equipment is required in all specialist areas, e.g. blasting equipment (respiratory protection helmet and leather apron) to protect against dust, mechanical impact from accelerated blasting grains and for respiratory protection."

What inspires you in your job and at MAURER?

U. M.: "The subject of corrosion protection is my pet project and I love the opportunity to achieve a visual enhancement with manageable effort.

I am proud when I see products whose components have passed through our department. In my position as production foreman FM2, I appreciate the constructive and friendly relationship with employees, where the essentials are never overlooked. Working at MAURER is characterised by mutual appreciation across all departments."

What are the biggest challenges in your day-to-day work?

U. M.: "Translating complicated customer requirements into a form that is feasible for MAURER in cooperation with the sales department."

Do you have any points of contact with foreign subsidiaries?

U. M.: "I have already had the opportunity to train and educate our colleagues in Turkey. China is currently discussing whether there should also be further training, qualification and possibly also technical support with regard to the equipment."

What do you think are MAURER's strengths?

U. M.: "The idea of 'We are a family' is a cornerstone of the company for me."

Do you have time for hobbies, if so, which ones?

U. M.: "I like to spend my free time going for walks with my wife and sometimes enjoying a glass of wine at the weekend.

I'm passionate about barbecuing and enjoy my garden, and even in my free time, I'm obsessed with corrosion protection and occasionally I provide services as a freelance expert."



Photos: MAURER

ROLLER COASTERS ON A CRUISE

AWARD-WINNING

BOLT
ULTIMATE SEA COASTER



Our roller coasters have conquered the high seas. No, we're not writing about roller coasters on the beach that dive into the waves (we've got that up our sleeve too). In fact, three MAURER roller coasters are now cruising the world's oceans as entertainment stars on cruise ships.

This has only been made possible because we bring three things together in a nutshell: outstanding engineering performance, creative pioneering spirit, and the ability to tackle and solve challenges together with the customer. This is no secret on the market: Our cruise roller coasters have won multiple industry awards.



November 2022: a birthday present

The BOLT: ULTIMATE SEA COASTER is a birthday present. The Carnival cruise line presented it as a gift to itself for its 50th birthday and crowned the new Celebration cruise liner with it. At 180,000 GT, the Celebration is the largest ship in the Carnival fleet: an XL-class cruise ship, 345 metres (1,232 feet) long and for up to 6,600 passengers. Its home port is Miami. From there, BOLT® was the first roller coaster to cross the Atlantic.

December 2023: All good things come in threes

Carnival Cruise Line lets nothing get in its way when it comes to success. The Carnival Jubilee embarked on its maiden voyage from Galveston, Texas, also with a BOLT® roller coaster.

Spike®: gear teeth to thrill ride

In technical terms, the three Sea

Coasters build on the success of the Spike Racing Coaster. The unique ride high above the ocean is made possible by the innovative Spike® drive patented thanks to MAURER Rides. In simple terms, this is an advanced gear drive.

The Spike® technology enabled its installation on board a ship in the first place. The "teeth" always keep everything under tension thus eliminating the ship's movements as well as the influences of the weather and the sea.

In addition, the extremely powerful drive turns roller-coaster passengers into real riders. They can brake or accelerate themselves anywhere on the track. Everyone creates their own individual roller-coaster experience: enjoyable or fast-paced, just as they like.

The innovative technology also withstands the challenges of a marine environment. The coasters have proven their reliability after almost three years of continuous operation at sea.



Chronology (!) of the awards

2021 Best Cruise Ship Feature

2022 Best Cruise Ship Feature

2023 Best Cruise Ship Feature

The BOLT® roller coaster was voted the best feature on a cruise ship three times in a row at the annual Cruise Hive Awards.

In 2023, the coaster received twice as many votes as the adventure activities on competing ships.

2021 Best of What's New

Popular Science Magazine's "Best of What's New" award in the Engineering category was impressively justified pointing out the first roller coaster on the high seas was not only fun, but also a masterpiece of modern engineering.

2023 Blooloop Innovation Award

Third place in the "Blooloop Innovation Award" is also highly valued, as it was awarded in the "Thrills" category. Here, the cruise roller coaster competed with all stationary roller coasters without the challenges of setting up and operating on a cruise ship.

Carnival Cruise Line

Founded in 1972, Carnival Cruise Line is part of the Carnival Corporation, the world's leading cruise company. Sister lines are Princess Cruises, Holland

America Line and Cunard Line. Carnival currently operates 26 ships and welcomes millions of guests every year for two- to 31-day voyages. In 2023, four new cruise ships were launched.



June 2021: Roller coaster and motorbike feeling on the upper deck

The Mardi Gras set sail from its home port of Port Canaveral in 2021 and was the first cruise liner with a roller coaster on the top deck. And of course, it wasn't just any roller coaster. BOLT®, the Ultimate Sea Coaster®, is a two-seater – so passengers get on a motorbike, put their foot down, and accelerate at 1.2 g to 60 km/h (38 mph) within no time. It's a fast ride over drops, dips and bends – always with a view of the endless horizon.



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