



Project references

# Project References – Cable Supported Bridges



mageba



## Project references

# Index

Project	Country	Installed	Products delivered	Page
New Jinja Bridge	Uganda	2018	TENSA®MODULAR expansion joints of type LR5-LS100	3
Nipigon River Bridge	Canada	2017	TENSA®FINGER joints of Type GF (sliding) and Type RSFD (cantilever)	4
Ohio River Bridges – East End Crossing	USA	2016	TENSA®MODULAR expansions joints of types LR8 and LR11	5
Longjiang Bridge	China	2016	TENSA®MODULAR expansion joints of type LR24	6
Verrazano Narrows Bridge	USA	2015	TENSA®FINGER joints of type GF (sliding)	7
Ulsan Grand Harbor Bridge	South Korea	2008	4 x TENSA®MODULAR expansion joint LR22 4 x RESTON®SA shock absorber	8
Pont de la Poya	Switzerland	2013	RESTON®POT Pot bearing type TA / TE TENSA®MODULAR type LR-LS5 / LR7	9
2nd Penang Bridge	Malaysia	2013	TENSA®MODULAR Type LR & LR-LS TENSA®GRIP Type RS-B	10
Wazirabad Signature Bridge	India	2013	ROBO®CONTROL monitoring system	11
Port Mann Bridge	Canada	2012	TENSA®MODULAR expansion joints up to type LR11-LS and disc bearings	12
Ba Lin He Bridge	China	2009	4 TENSA®MODULAR expansion joints type LR21 with ROBO®SLIDE	13
Chong Ming Yangtze River Bridge	China	2009	TENSA®MODULAR expansion joints type LR22	14
Incheon Grand Bridge	South Korea	2009	76 TENSA®MODULAR (up to type LR24), ROBO®GRIP, ROBO®SLIDE, ROBO®CONTROL Permanent	15
Golden Ears Bridge	Canada	2009	12 TENSA®MODULAR expansion joints up to type LR17 and 4 special uplift bearings	16
Run Yang Bridges	China	2004	4 TENSA®MODULAR expansion joints Type LR10 and LR27 ROBO®GRIP	17
Lillebaelt Bridge (Denmark)	Singapore	2003	TENSA®MODULAR of type LR7 / LR16	18
Pont de Normandie	France	1995	TENSA®MODULAR expansion joints of type LR9 and LR10	19



Project references

# New Jinja Bridge (Uganda)



## Project description

The New Jinja Bridge, also known as Second Nile Bridge, has been constructed for the sake of enhancing safe traffic in Uganda. Being a crucial link in the Northern Corridor that connects Kenya with the Democratic Republic of Congo, intra-regional trade is also a huge benefit this project shall entail.

The bridge is the first cable-stayed bridge in the region, crosses the Victoria Nile and is aimed to replace the Nalubaale Bridge which was built in 1954.

This project is one of the biggest in East and Central Africa, featuring a life-span of 100 years as well as the longest single-plane cable configuration throughout Africa.

## mageba scope

mageba received an order for the design, supply and installation of its well-proven TENSA®MODULAR expansion joints featuring noise-reducing sinus plates. The fitting of these so-called “sinus plates” to the joint’s surface enables noise from over-rolling traffic to be reduced by up to 80%.

Special design and functionality features have been proven the reliability of mageba’s expansion joints over decades.

Selection of key characteristics:

- No welding in all highly stressed connections for increased durability
- Well-proven wear parts bolted in place that can be quickly and easily replaced
- All parts elastically pre-stressed for high-resistance to fatigue.

## Highlights & facts

### mageba products:

Type: TENSA®MODULAR expansion joints of type LR5-LS100  
Features: Noise-reducing sinus plates  
Installation: 2017–2018

### Structure:

City: Njeru  
Country: Uganda  
Type: Cable-stayed bridge  
Length: 525 m  
Built: 2018  
Owner: Uganda National Roads Authority (UNRA)  
Consultant: Oriental Consultants Co., LTD.  
Contractor: Joint Venture Zenitaka-Hyundai

The bridge is a key link on the Northern Corridor from Kenya to the Democratic Republic of Congo



On site bolting of the sinus plates on a mageba modular expansion joint



The sinus plates will reduce noise from over-passing traffic by up to 80%





# Nipigon River Bridge (Canada)



## Project description

Upon completion in 2017, the \$106-million Nipigon River Bridge will be the first cable-stayed bridge of its kind on the Ontario highway system. The 252 meters (827 feet) bridge will consist of three towers with cables supporting the bridge deck and a separate sidewalk for pedestrians. Nipigon River is renowned for its brook trout and the bridge is located directly in a spawning area, presenting environmental challenges.

## mageba scope

mageba will deliver all expansion joints for this bridge. This includes a 37 meter long TENSA®FINGER GF sliding finger joint accommodating both vertical (20 mm) and longitudinal (160 mm) displacements.

mageba will also provide a TENSA®FINGER RSFD cantilever finger joint which will allow a 160 mm longitudinal displacements.

## Highlights & Facts

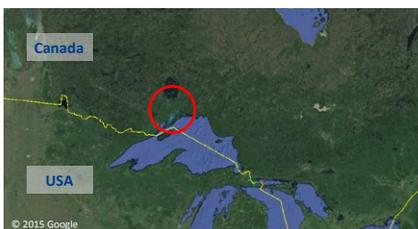
### mageba products:

- Type: TENSA®FINGER joints of Type GF (sliding) and Type RSFD (cantilever)
- Features: Vertical movements allowed
- Installation: 2017

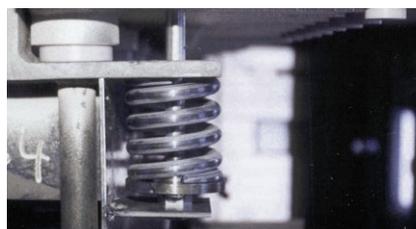
### Structure:

- City: Town of Nipigon, Ontario
- Country: Canada
- Completed: 2017
- Type: Cable stayed bridge
- Length: 252 meters (827 feet)
- Builder: Bot Ferrovia Nipigon Joint

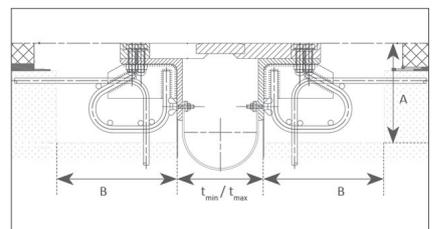
Nipigon, Ontario – Canada



Spring Sytem TENSA®FINGER GF allowing vertical movements



TENSA®FINGER RSFD cross-section





Project references

# Ohio River Bridges – East End Crossing (USA)



## Project description

The Ohio River Bridges Project in the Louisville–Southern Indiana region of the United States involves the construction of two bridges across the Ohio River – one in the metropolitan area’s Downtown neighborhood (equipped with mageba bearings), and one eight miles upstream in the area’s growing East End.

With a length of 2,500 feet (762 m), the bridge is just one part of the East End Crossing, which has a total length of 8.5 miles (13.67 km).

The overall project is financed by WVB East End Partners, a consortium involving VINCI Concessions, Walsh Investors and Bilfinger Berger PI International Holdings.

## mageba scope

TENSA®MODULAR expansion joints of types LR8 and LR11 (with 8 and 11 gaps respectively) are being supplied by mageba USA, to facilitate deck movements at two bridge axes. At each bridge axis, three separate joints are required – one for each carriageway and one for a footway. The LR11 joints can accommodate longitudinal service movements of up to roughly 33 inches (838 mm), as well as transverse and vertical movements and multi-axial rotations.

The joints were designed and fabricated in accordance with AASHTO LRFD Bridge Construction Specifications, and hot-dip galvanized in accordance with ASTM A123.

## Highlights & Facts

### mageba products:

Type: TENSA®MODULAR expansion joints of types LR8 and LR11

Movements: Type LR8: 24 inches (610 mm)  
Type LR11: 33 inches (838 mm)

Installation: 2016

### Structure:

City: Louisville, KY

Country: USA

Type: Cable-stayed bridge

Completed: 2016 (projected)

Owner: KY DOT

Contractor: Walsh Construction Co. VINCI Construction

Engineering: Jacobs Engineering

The bridge will connect Interstate 265 across the Ohio River, north of Louisville, Kentucky



3D rendering of a TENSA®MODULAR expansion joint



Bird's eye view of the construction site





# Longjiang Bridge (China)



## Project description

The Longjiang River is the largest obstacle along a new spur expressway that will branch off from the G56 to the city of Tengchong in western Yunnan Province. To get across the 300 meter deep river gorge, the engineers have designed the longest span high bridge on earth with a tower to tower distance of 1,196 meters – nearly as long as the Golden Gate Bridge. Longjiang will surpass the distance of both Aizhai and Balinghe Bridges which previously held the long span record honors among the world's highest bridges.

The Longjiang crossing will also be unique among China's big mountain suspension bridges with a thin steel box girder deck that breaks away from the traditional truss deck used on earlier bridges like Siduhe, Balinghe, Lishuihe and Aizhai.

## mageba scope

mageba took over the job of this exciting project with the development and supply of the joints with the highest movement capacity ever and the first new fuse element patented by mageba.

The movement of the joints is 1,920 mm and can provide +/-350 mm additional movement when the earthquake comes; this makes these joints the biggest movement capacity ever by mageba.

Due to difficult transport conditions the joints had to be pre-assembled in the factory, then disassembled for transport, and re-assembled on the bridge deck.

## Highlights & Facts

### mageba products:

Type: TENSA®MODULAR expansion joints (type LR24)  
Features: New fuse system  
Installation: 12/2015–01/2016

### Structure:

City: Teng Chong City  
Country: China  
Completed: May 2016  
Type: Suspension bridge  
Length: 2.470 km  
Main span: 1,196 m  
Owner: Yunnan Highway Development & Investment CO.,LTD  
Contractor: CCCC Second Highway Engineering CO.,LTD

Location of the bridge



Arrival of the joints with the biggest movement capacity ever (1,920 mm, +/-350 mm)



Installation of the joints with the patented fuse system element



# Verrazano Narrows Bridge (USA)



## Project description

The Verrazano Narrows, a body of water which separates the New York boroughs of Brooklyn and Staten Island to the south of Manhattan, is the gateway to New York City's harbor. The bridge that spans the Narrows creates a vital connection for road traffic, carrying about 200,000 vehicles per day.

The double-decked suspension bridge has a central span of 4,260 feet (1,298 m), and was the longest suspension bridge in the world from the time its upper level opened in 1964 until 1981.

Currently, it has the longest bridge span in the Americas.

## mageba scope

The bridge's existing finger joints, each accommodating enormous deck movements of 2,700 mm (approx. 9 ft) are to be replaced with new finger joints. Due to the great length of the individual fingers, they will receive intermediate support at mid-span. The challenge of designing and supplying these exceptional joints is increased by the need to tailor them to precisely match existing geometry and conditions.

Various single gap joints, also tailored to suit the existing structure, are also being supplied to accommodate much smaller movements at other locations.

## Highlights & Facts

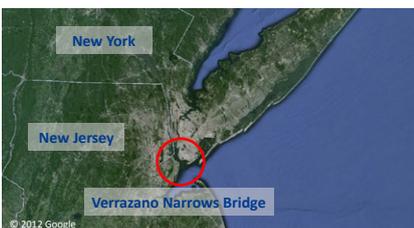
### mageba products:

Type: Sliding finger joints  
 Features: Enormous movements  
 Installed: 2015–2016

### Structure:

City: New York, NY  
 Country: USA  
 Construction: Suspension bridge  
 Type: Road bridge  
 Built: 1959–1969  
 Length: 4,260 feet (1,298 m)  
 Contractor: Tutor Perini  
 Owner: City of New York

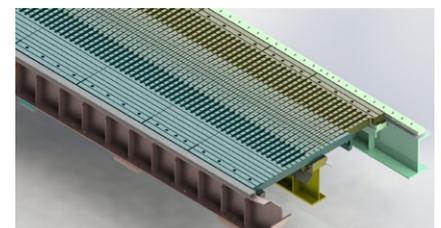
The bridge spans the Verrazano Narrows – the gateway to New York City's harbor



The bridge's sliding finger joints, designed for enormous movements, must be replaced



3D view of a new sliding finger joint, facilitating longitudinal movements of 2,700 mm (approx. 9 ft)





# Ulsan Grand Harbor Bridge(South Korea)



## Project description

The Ulsan Grand Harbor Bridge is a single span suspension bridge which will span the harbor mouth of Ulsan City in Korea.

The bridge has a main span of 1,150 m. The approaching viaducts have a span of 303 m respectively 355 m to each side of the suspended span.

The viaducts are made of traditional steel box girder and pre-stressed concrete beams.

The bridge will have 4 traffic lanes, and a 300 m wide navigation clearance of at least 60 m height.

When completed in early 2015, Ulsan Grand Harbor Bridge will have the 3rd largest span as a single-span suspension bridge in the world.

## mageba scope

mageba TENSA®MODULAR expansion joints with a movement capacity of up to 1,760 mm each were chosen due to its elastic steering system. It ensures kinematic behavior and prevents damage from constraint forces which will occur at Ulsan Grand Harbor single-span suspension bridge.

mageba Hump-Seals will be installed to drastically reduce debris falling between the joint gaps.

mageba RESTON®SA hydraulic shock absorbers were chosen to allow slow movement of the Ulsan Grand Harbor bridge, as well as to damp brisk movements (e.g. from earthquakes or from the braking of heavy road vehicles).

In normal conditions, however, they permit free movement between the structure's parts.

## Highlights & Facts

### mageba Products:

Type:	4 x TENSA®MODULAR expansion joint LR22 4 x RESTON®SA shock absorber
Features:	Joints: max. movement 1,760 mm Shock absorbers: load 3,000 kN
Installation:	2014

### Structure:

City:	Ulsan
Country:	South Korea
Built:	2008–2015
Type:	Suspension bridge
Length:	1,150 m

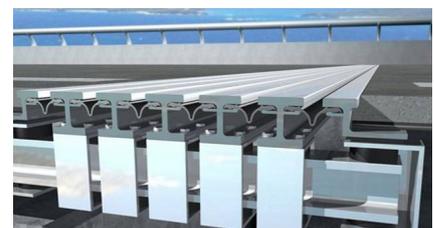
Location of the bridge in Ulsan, around the Korean South/East Sea



Testing of a RESTON®SA shock absorber in Sismalab, Shanghai



TENSA®MODULAR expansion joints 1,760 mm movement (LR22)



# Pont de la Poya (Switzerland)



## Project description

Construction of the 860 m, cable-stayed Poya Bridge commenced in 2009 and completion is expected in 2012. The 86 m cable stayed main span is supported by slender 165 m tall towers and carries two carriageways, each 3 m wide, and a 1.5 m wide central reservation for safety reasons. The project also includes a 262 m long tunnel. The total development length of the project is 1,460 m.

The Poya Bridge significantly improves traffic around the city of Fribourg, giving a great boost to the economic development of the surrounding region.

## mageba scope

mageba was awarded the contract to supply 26 RESTON®POT bearings of types TA and TE, as well as 2 TENSA®MODULAR expansion joints of types LR5 and LR7. The smaller expansion joint, which is located near to a village, is also equipped with special "sinus plates" on its surface that significantly reduces the noise generated by traffic passing over the joint. This type of expansion joint is exceptionally flexible, allowing movements in every direction and limited rotations about every axis, and is particularly suitable where large longitudinal movements must be accommodated.

## Highlights & facts

### mageba products:

Type: RESTON®POT Pot bearing type TA / TE  
TENSA®MODULAR type LR-LS5 / LR7

Installed: 2011–2013

### Structure:

City: Fribourg  
Country: Switzerland  
Built: 2009–2013  
Type: Cable-stayed bridge  
Length: 860 m  
Builder: Canton of Fribourg

The Bridge is situated near Fribourg



The Poya Bridge across the Sarine River



mageba pot bearings before delivery





# 2nd Penang Bridge (Malaysia)



### Project description

The Second Penang Bridge is the longest bridge in Southeast Asia with a total length of 24 km. It connects Batu Kawan on the mainland of Malaysia with Seberang Perai and Batu Maung on Penang Island.

It features a dual pylon cable-stayed structure with a main span of 250 m and a clearance height of 30 m above sea level. The bridge has a dual carriageway with two lanes and a separate motorcycle lane on each side, allowing motorcycles to cross the bridge safely.

The first Penang Bridge was opened in 1985 and was also supplied with mageba Tensa®MODULAR expansion joints. With this second crossing, the traffic congestion on the first bridge is significantly reduced.

### mageba scope

mageba has supplied Tensa®MODULAR expansion joints of type LR2 to LR5 for the bridge, as well as Tensa®GRIP single gap expansion joints of type RS-B.

All Tensa®MODULAR expansion joints are designed with a special seismic protection feature which allows transverse movements of up to 200 mm. Four of the Tensa®MODULAR expansion joints are Type LR-LS (featuring noise reducing surface plates), especially suitable for locations close to residential areas.

The Tensa®GRIP single gap expansion joints of type RS-B are very robust and can hence very easily cater for the 100,000 vehicles crossing the bridge every day.

### Highlights & facts

#### mageba products:

- Type: Tensa®MODULAR Type LR & LR-LS  
Tensa®GRIP Type RS-B
- Features: Anti-seismic design and noise-reducing sinus plates
- Installation: 2013

#### Structure:

- Location: Penang
- Country: Malaysia
- Construction: 2008–2014
- Type: Cable-stayed bridge
- Length: 24 km
- Builder: UEM Builders Berhad, China Harbour (CHEC)

Location of the 2nd Penang Bridge, Malaysia



mageba Tensa®MODULAR expansion joint of type LR 5 during installation



Tensa®MODULAR expansion joints of type LR-LS, ready for shipment to Malaysia





Project references

# Wazirabad Signature Bridge (India)



## Project description

A new cable stayed bridge is currently under construction across the Yamuna River in Wazirabad, Delhi. Its dramatic inclined steel pylon, at 154 m high, and elegant stay cable design, will make it a particularly attractive addition to the Wazirabad skyline.

As well as its pleasing aesthetic impact, the shape of the pylon enables it to provide, to a substantial extent, the stress balance required to support the deck.

The construction and maintenance of this remarkable structure will be supported by the real-time data provided by a sophisticated structural health monitoring (SHM) system.

## mageba scope

The ROBO®CONTROL SHM system was installed to monitor the structure's condition, behaviour and performance during both the construction and service phases.

In particular, it is designed to monitor the effects of weather, earthquakes and other environmental influences, and to detect and report any damage that may occur.

To do this, it uses a wide array of sensors (100 in total). The precisely measured data is made available to the bridge's engineers in real time, via a user-friendly interface, greatly improving the efficiency of monitoring work compared to manual methods.

## Highlights & facts

### mageba Products:

Type: ROBO®CONTROL monitoring system  
Features: 100 sensors  
Installation: 2013

### Structure:

City: Delhi  
Country: India  
Completed: 2014  
Type: Cable stayed bridge with composite deck  
Main span: 251 m  
Length: 675 m  
Contractor: Gammon JV  
Designer: Schlaich Bergermann JV

The bridge crosses the Yamuna River in the Wazirabad district of Delhi, India



A sensor on a stay cable, measuring high-frequency vibrations (up to 200 Hz)



Example of data from a ROBO®CONTROL SHM system (viewed on a tablet device)





# Port Mann Bridge (Canada)



## Project description

The Port Mann Bridge is one of British Columbia’s most significant bridge structures, carrying the Trans-Canada Highway (Canada’s Highway 1) across the Fraser River to the west of Vancouver. As part of the major Port Mann Highway 1 project, which also includes the widening and upgrading of 23 miles (37 km) of highway, the bridge has been replaced with a new structure, and was opened to traffic at the end of 2012.

The new bridge is designed for 10 lanes of traffic, and with its main span of 1,542 ft (470 m), it is the second longest cable-stayed span in North America. At 164 ft (50 m) wide, the new bridge is also the widest span bridge of any type in the world.

## mageba scope

mageba has delivered the modular expansion joints required for the entire bridge including both approaches. The joints have up to 11 movement gaps and thus can facilitate movements of up to 35 inches (880 mm). In noise-sensitive areas, several joints are equipped with noise-reducing “sinus plates” on the surface.

mageba also supplied, in cooperation with R.J. Watson Inc., disc bearings for the bridge. These are designed for loads of up to 19,000 kN and a number feature “double discs” to achieve this load capacity.

## Highlights & Facts

### mageba products:

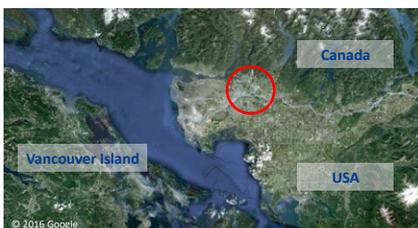
- Type: Modular expansion joints and disc bearings\*
- Features: Expansion joints with movements of up to 35 in (880 mm), some featuring “sinus plates”
- Installation: 2012

### Structure:

- City: Vancouver
- Country: Canada
- Built: 2008–2012
- Type: Cable stayed bridge
- Length: 1.37 mi (2,200 m)
- Maintained: Transportation Investment Corporation
- Contractor: Kiewit Flatiron General Partnership

\* in cooperation with R.J. Watson Inc.

Location of the bridge in British Columbia



A modular expansion joint featuring noise-reducing “sinus plates” on its surface



Disc bearings (with double discs per bearing) ready for delivery



# Ba Lin He Bridge (China)



## Project description

Carrying the Zheng Shen expressway in Guizhou Province across a deep river gorge, the Ba Lin He Bridge has a main suspension span of 1088 m and a total length of 2.2 km. At its highest point the composite deck is 370 m above the river. Sidespans are 248 m and 228 m long respectively.

The crossing was opened in 2008, completing the new expressway link between the towns of Bai Shui and Cheng Guan, and encouraging the development of Guizhou, which is relatively poor compared to China's coastal provinces.

## mageba scope

Four TENSA®MODULAR expansion joints type LR21 were required, with longitudinal movement capacity of 1,680 mm. These permit movements and rotations in all three directions. All TENSA®MODULAR expansion joints feature mageba's ROBO®SLIDE sliding materials, patented asymmetric control system for even gap distribution, and are 100 % watertight. An anti-skid coating prevents sliding on the joints when the road is wet. The weight of each expansion joint is approximately 26 tons.

## Highlights & Facts

### mageba products:

Type: 4 TENSA®MODULAR expansion joints type LR21 with ROBO®SLIDE sliding material

Features: max. movement 1680 mm

Installation: 2009

### Structure:

City: Guizhou

Country: China

Type: Suspension bridge

Length: 2,200 m

Guizhou is famous for its historic covered bridges



One of the TENSA®MODULAR expansion joints during installation



An expansion joint after positioning in the bridge deck





## Project references

# Chong Ming Yangtze River Bridge (China)



### Project description

Located near Shanghai at the mouth of the Yangtze River, since 2008 the cable stayed bridge forms a key part of the 25.5 km Chong Ming Crossing, which combines both bridge and tunnel sections. Above the main navigation channel the six lane bridge has a span of 730 m and a total length of 1,430 m. Deck height above the navigation channel is 53 m, high enough for 50,000 t bulk carriers and 30,000 t container ships to pass below. Twin steel box girder deck boxes are used, separated by a 10 m gap to minimise aerodynamic forces and connected by cross beams at 15 m spacings. Balanced cantilever construction was used for the main span. Inverted Y shaped main bridge towers sit on massive foundations made up of 60, 2.5 m diameter cast piles. Wind and live loads are significantly higher than the norm. The site is in an area frequently hit by typhoons, and the bridge is designed to take two railway tracks sometime in the future.

Shanghai is China's largest city and its economic powerhouse



### mageba scope

TENSA®MODULAR expansion joints type LR22 with a movement capacity of 1,760 mm, which permit movements and rotations in all three directions. All TENSA®MODULAR expansion joints feature mageba's patented asymmetric control system for even gap distribution and are 100% watertight. To ensure high traffic safety also during rain, the steel surface was treated with an anti-skid surfacing that is also used on aircraft carriers. Experts consider this to be one of the most durable system available.

The Chong Ming Crossing during construction



### Highlights & Facts

#### mageba Products:

Type: TENSA®MODULAR expansion joints type LR22  
Features: max. movement 1,760 mm  
Installation: 2009

#### Structure:

City: Shanghai  
Country: China  
Type: Cable-stayed bridge  
Length: 1,430 m  
Owner: Shanghai Yangtze River Tunnel Bridge Construction and Development Co., Ltd  
Contractor: CCCC Second Harbour Engineering Company Ltd.  
Engineer: Shanghai Municipal Engineering Design Institute

A TENSA®MODULAR expansion joint, ready for installation





Project references

# Incheon Grand Bridge (South Korea)



## Project description

At 12.3 km long with a main cable stayed span of 800 m, since 2008 the Incheon Bridge is one of the five longest of its type in the world. Its 33.4 m wide steel/concrete composite deck will carry six lanes of traffic 74 m above the main shipping route in and out of Incheon port and link the new Incheon International Airport on Yongjŏng Island to the international business district of New Songdo City and the metropolitan districts of South Korea's capital, Seoul.

The cable stayed section of the crossing is 1,480 m long, made up of five spans measuring 80 m, 260 m, 800 m, 260 m and 80 m respectively: height of the inverted Y main towers is 230.5 m. A 1.8 km approach span and 8.7 km viaduct complete the crossing, both constructed with precast prestressed concrete box girder decks. Foundations

are drilled piles 3 m in diameter. Total cost is more than \$1.4 bn, which is funded through a Private Partnership in Investment (PPI), the first in South Korea to involve an outside strategic investor.

## mageba scope

The Incheon bridge is equipped with 76 mageba TENSA®MODULAR expansion joints. Largest expansion joint type LR24 (movement: 1,920 mm) equipped with ROBO®GRIP anti-skid surface, ROBO®SLIDE high grade sliding material and a ROBO®CONTROL remote monitoring system. Dimensions of each modular joint type LR24 (L×W×H): 16 m × 4.9 m × 0.8 m. The large dimensions and the weight of nearly 50 tons per joint, required special measures for the transport from Europe to Korea.

## Highlights & Facts

### mageba Products:

Type: 76 TENSA®MODULAR expansion joints (up to type LR24), ROBO®GRIP, ROBO®SLIDE, ROBO®CONTROL Permanent monitoring system

Features: max. movement 1,920 mm

Installation: 2009

### Structure:

City: Incheon

Country: South Korea

Type: Cable-stayed bridge

Length: 12.3 km

Incheon bridge: Link between Incheon Int. Airport and metropolitan districts Seoul



A mageba modular expansion joint in service



TENSA®MODULAR expansion joint type LR24 ready for installation





# Golden Ears Bridge (Canada)



## Project description

The Golden Ears Bridge, near Vancouver, British Columbia, creates an important new transportation link across the Fraser River. The bridge, with three main spans each 242 m (795 ft) long, features an unusual hybrid cable stayed system designed to ensure a specified performance in the case of defined earthquake events. The bearings and expansion joints for the bridge are also subjected to such demands, making their design and fabrication an interesting challenge.

## mageba scope

### Main Span Bearings:

mageba supplied four custom-designed uplift bearings, pre-compressed for frequent load reversal. Each bearing weighs a massive 17 tons and can accommodate

a wide range of loads from 4,170 kN to -2,790 kN (uplift), longitudinal movements of 3,100 mm (122 in), transverse movements of 50 mm (2 in) and rotations of 0.039 radians about the x-axis and 0.010 radians about the y-axis.

### Expansion Joints:

In addition to the bearings, 12 TENSA®MODULAR LR expansion joints were supplied by mageba. The largest, type LR17 with 17 individual gaps, will allow longitudinal movements of 1,350 mm (53 in). The joints are also equipped with 'Fuse-Box' earthquake protection devices which prevent serious damage to the joint, and the connecting bridge structure, in the event of an earthquake. The 'Fuse-Box' also enables the modular expansion joint to continue to allow passage of emergency vehicles after a seismic event.

## Highlights & Facts

### mageba products:

Type: 12 TENSA®MODULAR expansion joints, with up to 17 gaps, and 4 special uplift bearings

Features: Uplift bearings

Installation: 2009

### Structure:

City: Vancouver

Country: Canada

Type: Hybrid cable stay design

Completed: 2009

Length: 2,410 m 1.45 mi with 3 main spans each 242 m (794 ft) long

Contractor: GCCJV (Bilfinger Berger and others)

Owner: TransLink

The bridge crosses the Fraser River near Vancouver, Canada



Preparing the special bearings for transport



Installation of LR17 expansion joint featuring "Fuse-Box" seismic protection



# Run Yang Bridges (China)



## Project description

The Run Yang – Nan Cha Bridge, opened in 2005, crosses the Yangtze River near the Chinese city of Zhenjiang. The cable supported structure, with a 1.49 km main span, total length of 2.5 km and 210 m high towers, is one of the longest suspension bridges in the world.

The exceptional structure required exceptional expansion joints to facilitate its enormous absolute deck movements, and these were supplied by mageba at the time of the bridge's construction.

Several years later, mageba was also requested to assess the bridge's larger-than-expected accumulated deck movements, in support of ongoing maintenance work and optimised long-term performance.

## mageba scope

TENSA®MODULAR expansion joints with 27 individual movement gaps (a world record) were installed in 2005, each joint facilitating 2160 mm of movement.

During the bridge's first years in service, its expansion joints and bearings were found to be suffering from accelerated wear, and the cause of this wear was believed to be very large accumulated deck movements (the total distance moved by a point on the deck during a period of time).

A ROBO®CONTROL "Portable" system was used to evaluate the movements during a two-week period. This concluded that the movements greatly exceeded expected values, and enabled the bridge engineer to optimise planning of remedial works

## Highlights & facts

### mageba Products:

Type: TENSA®MODULAR expansion joints of type LR27,  
ROBO®CONTROL SHM Portable monitoring system

Features: max. movement 2,160 mm

Installed: 2003–2009

### Structure:

City: Zhenjiang  
Country: China  
Built: 2005  
Type: Suspension bridge  
Length: 2,500 m  
Owner: Jiangsu Provincial Yangtze River Highway Bridge Construction Commanding

The bridges cross the Yangtze river near Zhenjiang



The enormous 27-gap TENSA®MODULAR joints during final assembly on the bridge due to size



View of the underside of a TENSA®MODULAR joint of type LR27, prior to installation





## Project references

# Lillebaelt Bridge (Denmark)



### Project description

The combined sections of the bridge span 1700 m with individual span lengths of up to 600 m between the pylons. The bridge was constructed between 1965 and 1970 to connect the cities of Jylland and Fynn. It is one of the main traffic routes between Germany and the Danish capital of Copenhagen and is, consequently, one of the most heavily trafficked bridges in Europe. The original roller shutter joints installed to absorb movements of the bridge were deteriorating and during the 1990's were subject to frequent repairs. That was when the Danish Road Authority decided to remove the existing roller shutter joints and replace them with new modern modular expansion joints. mageba was awarded with the contract for replacement of joints in the year 2002 and completed the job 1 year later.

### mageba scope

The refurbishment involved replacing the existing roller shutter joints with twelve new mageba modular expansion joints.

The new installations on each side of the carriageway included two modular expansion joints with an expansion capacity of 320 mm (LR4), two modular expansion joints with an expansion capacity of 560 mm (LR7) and two modular expansion joints with an expansion capacity of 1280 mm (LR16).

The replacement of the joints was carried out in 2 phases, whereby each phase was limited to 8 weeks, minimising the disturbance of traffic flow.

### Highlights & facts

#### mageba products:

Type:	TENSA®MODULAR type LR7 / LR16
Features:	max. movements 560 mm / 1280 mm
Installation:	2003

#### Structure:

City:	Middelfart
Country:	Denmark
Built:	1965-1970
Type:	Suspension bridge
Length:	1'700 m

The bridge is the main road connection between Germany and Copenhagen



Delivery of the modular expansion joint



LR16 mageba modular expansion during installation



# Pont de Normandie (France)



## Project description

Pont de Normandie is situated in north-western France and crosses the River Seine between Le Havre and Honfleur. With the main span width of 856m, pylon height of 203m, and the total length of 2,141m, the bridge is one of the longest cable-stayed bridges in the world.

Thanks to its slim and elegant construction, it is also among the most beautiful bridges in the world.

## mageba scope

The bridge is equipped with mageba modular joints type LR9 and LR10. The complete system of mageba modular joints features is elastic, force-fitted, but at the same time, movable supported. The joints allow movement and rotation in all three axes. For that reason, longitudinal movements are evenly distributed between single elastomeric profiles.

Thanks to a tough design, high-quality components and a well-functioning quality system, mageba modular joints achieve a high fatigue resistance and consequently long durability. The modular joints were installed in 1995. On-site inspections have found that there are no significant signs of wear and tear and that, even after almost 10 years of usage, the joints are in excellent condition.

## Highlights & facts

### mageba products:

Type:	TENSA®MODULAR type LR9 / LR10
Features:	max. movement 720 / 800 mm
Installed:	1995

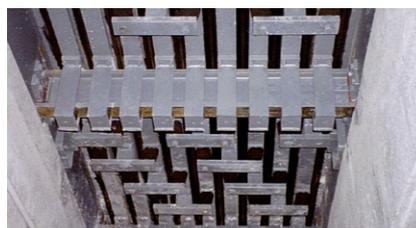
### Structure:

City:	Honfleur
Country:	Frankreich
Built:	1988–1994
Type:	Cable-stayed bridge
Length:	2'141 m

Pont de Normandie is situated in north-western France



Elastic control system of modular joint type LR9



Modular joint preserves faultless functionality even in the case of a steep longitudinal slope (here 6%)



# engineering connections® – since 1963

## Companies & agents worldwide

- Australia
- Austria
- Belarus
- Cambodia
- Canada
- China
- Chile
- Colombia
- Costa Rica
- Croatia
- Czech Republic
- Denmark
- Ecuador
- Egypt
- Estonia
- Finland
- France
- Germany
- Ghana
- Hong Kong
- Hungary
- India
- Indonesia
- Iran
- Israel
- Italy
- Kazakhstan
- Japan
- Jordan
- Kuwait
- Latvia
- Lithuania
- Mexico
- Netherlands
- New Zealand
- Nigeria
- Norway
- Oman
- Peru
- Poland
- Romania
- Russia
- Serbia
- Singapore
- Slovakia
- South Africa
- South Korea
- Spain
- Sweden
- Switzerland
- Thailand
- Turkey
- UAE
- Ukraine
- United Kingdom
- USA
- Vietnam



- Companies of mageba group
- mageba distributors / licensees

## mageba headquarters



### SWITZERLAND

**mageba sa**  
Solistrasse 68  
8180 Bülach – Switzerland  
Tel. +41 44 872 40 50  
Fax +41 44 872 40 59  
info@mageba.ch

### mageba online



Video channel  
[youtube.com/magebagroup](https://www.youtube.com/magebagroup)



Social channel  
[ch.linkedin.com/company/mageba-sa](https://ch.linkedin.com/company/mageba-sa)

## mageba companies / subsidiaries

### AUSTRALIA

**mageba (Australia) Pty Ltd**  
Eastern Creek, NSW 2766  
Tel. +61 2 8188 5850  
mageba.com.au

### CHINA

**mageba (Shanghai) Ltd.**  
Shanghai  
Tel. +86 21 5740 7637  
mageba.cn

### HUNGARY

**mageba Hungary Kft.**  
Nyírtelek  
Tel. +36 42 210 424  
mageba.hu

### SLOVAKIA

**mageba Slovakia s.r.o.**  
Košice  
Tel. +421 91 878 01 47  
mageba.sk

### TURKEY

**mageba Yapı Sanayi ve Ticaret A.Ş.**  
Çayırova / Kocaeli  
Tel. +90 262 658 23 80  
mageba.com.tr

### AUSTRIA

**mageba gmbh**  
Fussach  
Tel. +43 5578 75593  
mageba.at

### CROATIA

**mageba Adria d.o.o.**  
Zagreb  
Tel. +385 1 6142390  
mageba.hr

### INDIEN

**mageba bridge products Pvt. Ltd.**  
Kolkata  
Tel. +91 33 229 00 250  
mageba.in

### SOUTH KOREA

**mageba (Korea) Co., Ltd.**  
Seoul  
Tel. +82 31 389 2020  
mageba.co.kr

### UNITED KINGDOM

**mageba (UK) Ltd.**  
London  
Tel. +44 7598 347974  
mageba.co.uk

### AUSTRIA

**mageba gmbh**  
Wels  
Tel. +43 7242 46991  
mageba.at

### CZECH REPUBLIC

**mageba CS s.r.o.**  
Brno  
Tel. +420 541 233 042  
mageba.cz

### MEXICO

**mageba Mexico**  
Mexico  
Tel. +52 442 388 6600  
mageba.mx

### SWITZERLAND

**mageba sa**  
Cugy  
Tel. +41 21 731 07 10  
mageba.ch

### USA

**mageba USA LLC**  
New York City  
Tel. +1 212 644 3335  
magebausa.com

### CANADA

**mageba International LLC**  
Montreal  
Tel. +1 514 885 1361  
mageba.net

### GERMANY

**mageba gmbh**  
Göttingen  
Tel. +49 551 389 04 0  
mageba-germany.de

### RUSSIA

**mageba St. Petersburg**  
St. Petersburg  
Tel. +7 812 303 92 81  
mageba-russia.ru

### LATIN AMERICA

**mageba International LLC**  
New York City  
Tel. +1 212 317 1991  
mageba.net

### USA

**mageba USA LLC**  
Campbell  
Tel. +1 917 747 5022  
magebausa.com

**mageba**  
Switzerland [www.mageba.ch](http://www.mageba.ch)