

# THE BBR NETWORK



INTERNATIONAL EXPERTISE  
DELIVERED LOCALLY

Construction technology & services from the world's leading group  
for post-tensioning, stay cables and related construction engineering



# The BBR Network offers you a world of opportunity

The very latest post-tensioning, stay cable and  
related construction engineering technology

Well-trained, talented network of  
construction professionals

Internationally recognized brands

Worldwide services – representation in  
50+ countries around the globe

Sustainability and flexibility within our  
product range

Independently tested and certified  
range of technology

Embedded quality processes to  
support our service to customers

BBRVT International Ltd is the Technical Headquarters and Business Development Centre of the BBR Network located in Switzerland. The shareholders of BBRVT International Ltd are: BBR Holding Ltd (Switzerland), a subsidiary of the Tectus Group (Switzerland); KB Spenneteknikk AS (Norway), BBR Polska Sp. z o.o. (Poland) and VORSPANN-TECHNIK GmbH & Co. KG (Austria / Germany), all members of the KB Group (Norway); BBR Pretensados y Técnicas Especiales, S.L. (Spain), a member of the FCC Group (Spain).



# Driving excellence

With almost seven decades at the leading edge of construction technology, the BBR Network now extends to over 50 countries and – as the world’s leading group for post-tensioning, stay cables and related construction engineering – we have completed some of the most challenging projects on the planet. This is not a chance happening, over the years, we have worked to develop a unique blend of technology, culture and diversity which drives our success.

We have focused on sustainability in every sense – investing in people and developing innovative solutions for the long term. As a result, we have a network of well-qualified professionals, an unrivalled product range – and very satisfied customers. The specialist abilities, dedication and professionalism of our people has placed us in this market leading position. We invest both time and capital in ensuring that our global network is well-informed and motivated to provide an outstanding level of service to our customers. BBR technology – again, realized by our people – has become a benchmark for the highest standards of performance, ease of installation and finest quality. We have taken steps to ensure that our flexible range of products is suited to all markets. A collaborative approach is now embedded in our culture and this, in turn, leads to new or improved products and techniques. We listen to what our customers say, we learn from what we have been told, then – and only then – we act upon it.

**Marcel Poser, CEO**  
BBR VT International Ltd

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## The BBR Network – at a glance

- ◆ **Presence** – in over 50 countries
- ◆ **Manufacturing** – 10 manufacturing facilities around the world
- ◆ **Financial strength** – group revenue in post-tensioning, stay cables and related construction engineering exceeds CHF 300 million, over CHF 600 million including all activities
- ◆ **People** – over 250 engineers and 1,300 professionals in core activities, over 2,000 employees in all activities

Figures based on year 2009/2010



# Passport to success

The BBR Network is recognized as the leading group of specialized engineering contractors in the field of post-tensioning, stay cable and related construction engineering.

The innovation and technical excellence, brought together in 1944 by its three Swiss founders, continues today in that same ethos and enterprising style.

## Latest technology

BBR Network Members offer the latest internationally acclaimed and approved post-tensioning (PT) and stay cable technologies as well as related construction engineering, and an extensive know-how. We have developed technology that represents the state-of-the-art – it is all tested, often beyond the requirements of the various recommendations.

## Qualified BBR PT Specialists

Within the BBR Network, we are committed not only to selling components, but also to the appropriate installation of our products – in fact, this is as important as the quality of the product itself. All our network members are certified – annually – as BBR PT Specialist Companies. We arrange internal training sessions which ensure that the systems are installed in the correct way.

## Global brands

The BBR brands and trademarks – CONA, BBRV, HiAm, DINA, SWIF, BBR E-Trace and CONNAECT – are recognized worldwide.

## Highest quality

Our externally audited quality systems have been developed over many years and now, with the use of internet technology, we can offer instant information at all stages of the construction process.

## Outstanding customer service

We are committed to the highest possible levels of customer service and invest a large proportion of our turnover in continuously improving this aspect of our business.

## Established & informed management

BBRVT International Ltd is the Technical Headquarters and Business Development Centre of the BBR Network and is located in Switzerland from where it co-ordinates the activities of the BBR Network.

## Global coverage & capability

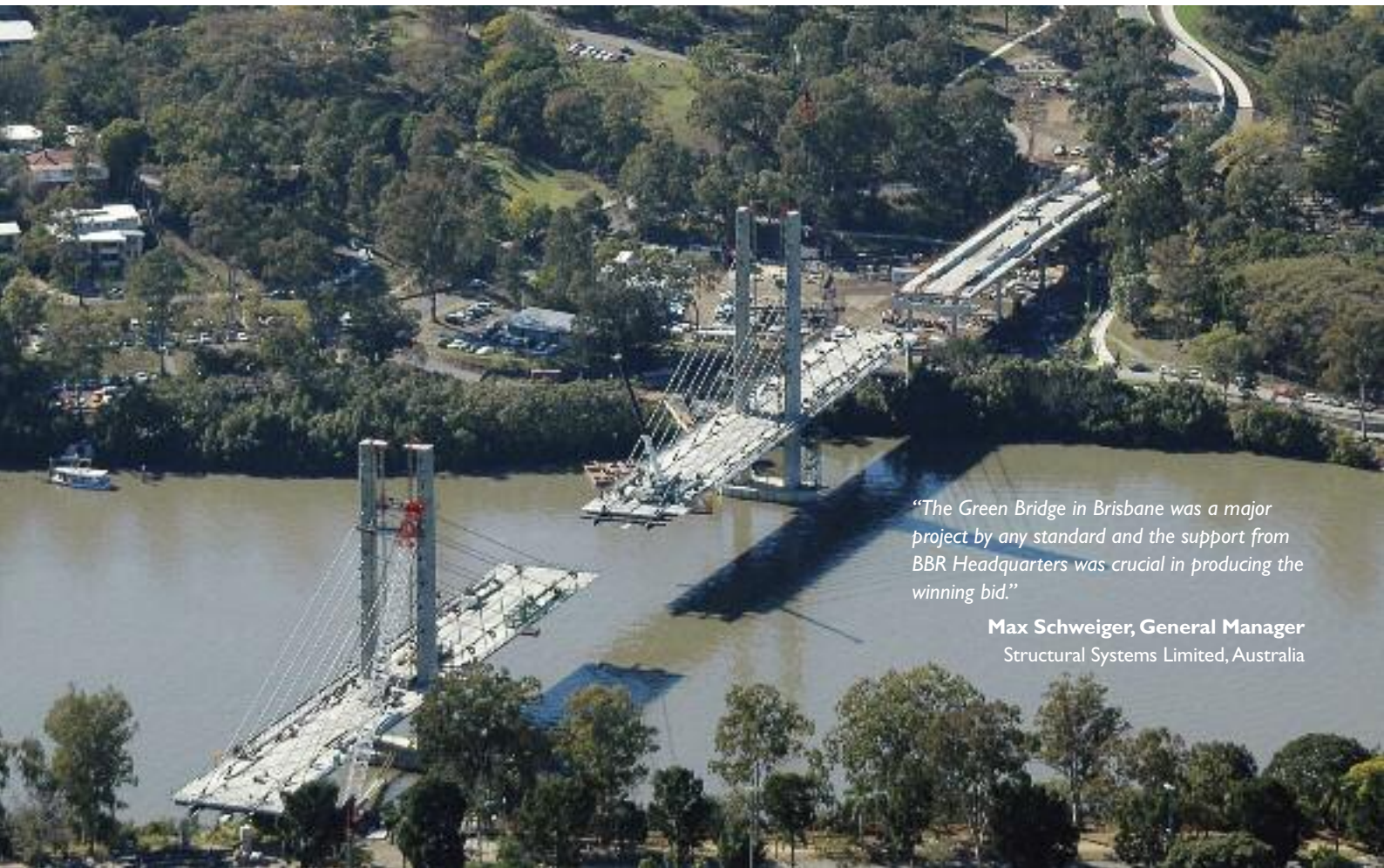
All BBR Network Members are well-respected within their local business communities and have built strong connections in their respective regions. They are all structured differently to suit the local market and offer a variety of construction services, in addition to the traditional core business of post-tensioning. Within the Global BBR Network, established traditions and strong local roots combine with the latest thinking and leading edge technology. So, when our customers hire their local specialist, they are tapping into a whole world of knowledge and experience.



*“Being both a BBR Network Member and a BBR VT International Ltd shareholder offers many advantages – to us and the rest of the BBR Network. As a shareholder, we are able to contribute to the shaping and development of BBR strategy based on our real market feedback we gain as a BBR Network Member.”*

**Svein Finstad, Managing Director**  
KB Spenneteknikk AS, Norway





*“The Green Bridge in Brisbane was a major project by any standard and the support from BBR Headquarters was crucial in producing the winning bid.”*

**Max Schweiger, General Manager**  
Structural Systems Limited, Australia

## Advantages for the BBR Network Members

- ◆ Access to latest PT and stay cable technology
- ◆ Internationally approved systems
- ◆ Professional marketing & communication tools
- ◆ Technical & commercial support
- ◆ Project specific support
- ◆ Leading edge supply chain and quality management systems
- ◆ International collaboration
- ◆ Knowledge transfer, global and regional seminars



# Our international family

BBR Network Members are all successful construction engineering companies who, as part of our international family, enjoy a wide range of advantages which support the development of their local businesses.

From technical headquarters in Switzerland, the BBR Network reaches out around the globe and has at its disposal some of the most capable engineers and technicians, as well as the very latest internationally approved technology.

## Leading edge quality systems

The quality of BBR technology is recognized throughout the world and the range is sufficiently flexible to suit all applications. We have created and now maintain leading edge quality systems. Our post-tensioning and stay cable technologies are approved to the latest international standards.

## Project support

BBR's Headquarters co-ordinates the BBR Network and provides the necessary technical know-how, documentation and marketing material, as well as technical and commercial support during the tender and the execution stage of large or complex projects, which might challenge the capabilities of an individual member.

## International family

Global relationships and co-operations create great business benefits for BBR Network Members when dealing with issues such as efficient tendering, availability of specialists and specialized equipment or transfer of technical know-how.

## Knowledge transfer

BBR VT International Ltd grants each local BBR Network Member access to the latest technical knowledge and resources – and facilitates the exchange of information on a broad scale and within international partnering alliances. Regular technical training seminars held regionally support the continued learning and knowledge of the very latest best practice. In addition, the annual Global BBR Conference



provides both a forum for the exchange of information and an opportunity to get to know other BBR Network Members informally.

## Competitive advantage

As well as the benefits of knowledge-sharing, we strongly believe that global collaborations create local competitive advantages in working within the ever-changing construction market place. The BBR Network has grown into a major global enterprise, with Members supporting each other and sharing information.

## International expertise & backing

The shareholders of BBR VT International Ltd provide valuable support, not only in shaping BBR strategy, but also in areas such as product innovation or improvement and supply chain management. This arrangement helps the wider BBR family around the globe to perform better in their own local marketplaces.

## Highest customer service

We are very proud of our international family and enjoy working with our clients to realise some of the most challenging projects in the world. We share and endorse our customer's professionalism and commitment to the highest standards of customer service.





# CREATING NEW HORIZONS

BBR Network teams around the world have realized many ambitious and award-winning projects for their clients – and secured both accolades and successes for their businesses. As well as industry and client-inspired awards, we acknowledge the achievement of individual BBR Network Members at our annual Global BBR Network Conferences.

## Bridges

**Lavant Bridge, A2 South Motorway, Austria**  
Innovative internal and external band CONA CMB PT design for the 780 m long bridge, extended the structure's lifetime.



**Storholmen Bridge, Norway**  
BBR internal PT technology was installed for the double-span (160 & 172 m) bridge off the west coast of Norway.







**Barbantino Viaduct, Spain**

Incremental launching expertise and latest European approved BBR VT CONA CMI internal PT technology were used for the nearly 1,200 m long viaduct in Galicia.

**Kampong Pandan Flyover, Kuala Lumpur, Malaysia**

The highly complex 12-span, 568 m long highway flyover scheme was designed for balanced cantilever construction using form travelers. CONA tendons were installed for the spans and cantilever to build the structure in an efficient and timely manner without any interruptions to busy traffic flows. The project was declared the BBR Project of the Year 2009.







## Buildings and Arenas

### **The Prime Minister's Office, Canberra, Australia**

The prestigious project required highest deflection slab standards which could be met by innovative CONA flat PT design.



### **Emirates Towers, Dubai, UAE**

The two towers which rise to 355 and 309 metres are some of the tallest buildings in the world and a symbol of Dubai City.





### **The Zagreb Arena, Croatia**

The simple elegant and efficient structural concept of the Zagreb Arena was recognized at the World Architecture Festival in Barcelona as the outright winner in the 2009 structural design category. The iconic structure with its inward leaning ribs demonstrated the architectural creativity which was achievable with leading-edge BBR VT CONA CMI PT concrete design.



### **Europark Shopping Centre, Salzburg, Austria**

Internal unbonded CONA CMM PT design delivered excellent static behaviour of the slab and saved valuable construction time.







### **South Hook LNG, Wales**

The United Kingdom's largest civils project using BBR CONA PT technology for cryogenic conditions has been declared the winner in the civil engineering category of the 2008 Concrete Society Awards. The judges said: "The project is of the highest standard and reflects all that is best in innovative use of concrete in civil engineering."



# Energy

### **Ross River Dam, Townsville, Australia**

Many dams worldwide require upgrading to meet revised safety standards such as the Australian Catagunya Dam and Ross River Dam – BBR Project of the Year 2008. CONA CMG 91-strand world record capacity ground anchors provided a significant increase to the dam's safety against flood and earthquake.





### **Kjollefjord Wind Project, Norway**

17 windmills were equipped with BBR ground anchors under harsh arctic weather conditions. BBR VT CONA CMX products – ground anchors, band systems, internal and external PT – are well-suited to the construction of wind farms. Wind energy as a power source is an attractive alternative to fossil fuels because it is plentiful, renewable, widely distributed, clean – and produces no greenhouse gas emissions.



### **Ringhals 2, Nuclear Power Plant, Sweden**

For continuous safety of service of large BBR tendons, regular controls are of great importance including lift-off tests and cable inspections and replacements.



### **Bellefonte Nuclear Plant, Scottsboro, Alabama, United States**

Bellefonte is one of 65 nuclear power plants in 13 countries which counts on high capacity BBR wire or strand nuclear PT tendons.







# Tanks & Silos

**MAIN PICTURE:**  
**Sugar & Clinker Silos, Poland**

The post-tensioning work of one of the largest sugar silos and a major cement clinker silo in this country included CONA CMI technology.

**Aeration Tanks, Eastern Water Treatment Plant, Australia**

BBRVT CONA CMI internal and CONA flat PT technology was the preferred choice for the four prestressed large aeration tanks which were designed and constructed for the plant south east of Melbourne.





### **Adriatic LNG Terminal, Spain-Italy**

The 180 m long, 88 m wide and 47 m high first offshore LNG terminal in the world was erected in a dry dock near Algeciras, Spain before it was shipped to its final location near Venice, Italy. Nearly 4,000 tons of prestressing steel was used.



### **Gut Grosslappen Wastewater Treatment Plant, Munich, Germany**

An innovative prestressing concept using unbonded CONA CMM design offered significant advantages to the building owner.

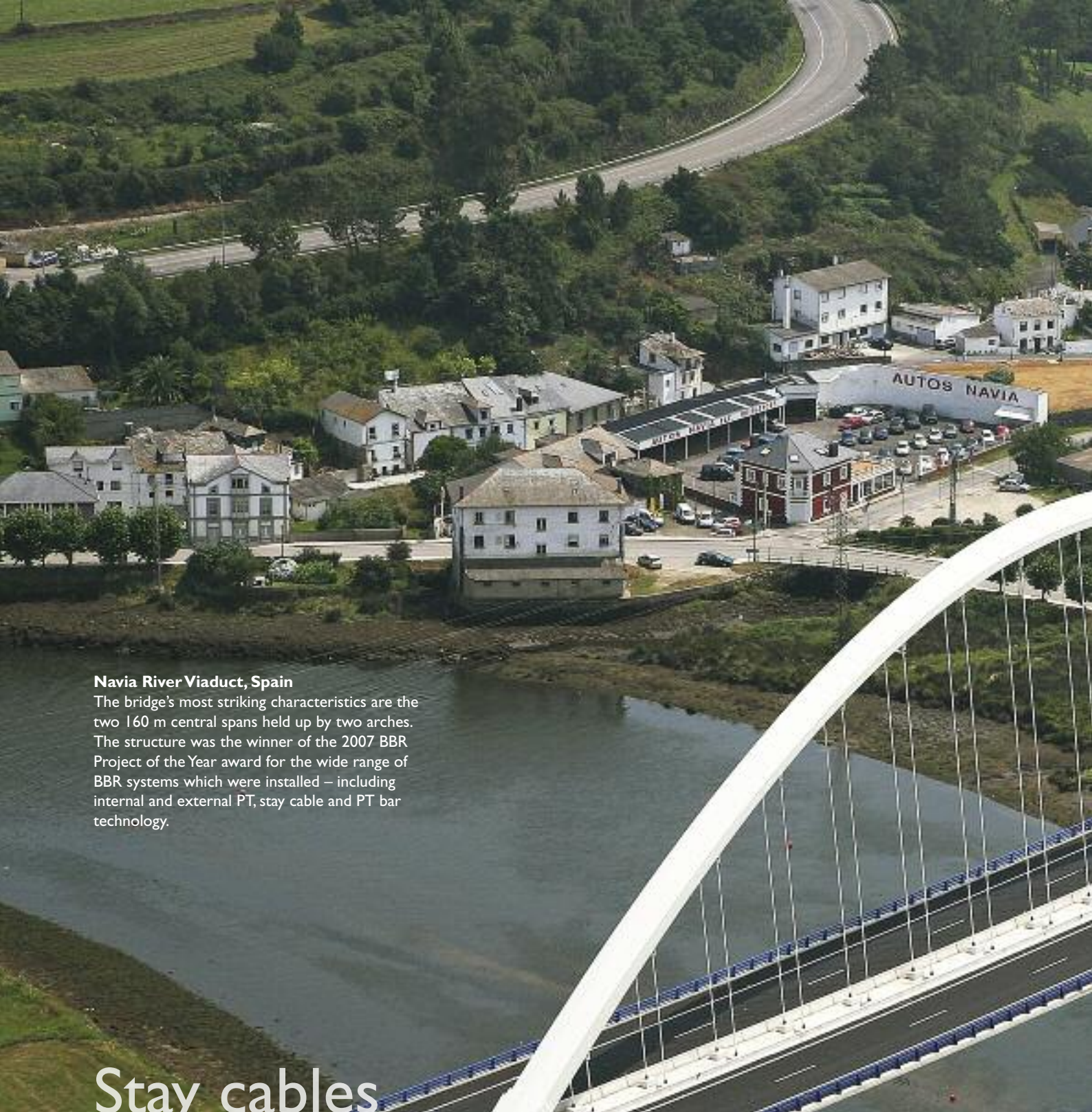


### **Silos, Shurovo Cement factory, Russia**

The Shurovo Cement works in Russia had two clinker silos and a raw meal silo, all constructed using European approved CONA CMI technology.







### **Navia River Viaduct, Spain**

The bridge's most striking characteristics are the two 160 m central spans held up by two arches. The structure was the winner of the 2007 BBR Project of the Year award for the wide range of BBR systems which were installed – including internal and external PT, stay cable and PT bar technology.

# Stay cables

### **Serreria Bridge, Valencia, Spain**

The new Serreria Bridge in the City of Arts & Sciences, designed by the internationally renowned architect and engineer Santiago Calatrava, rises to a height of 126 m – making it the highest point of the city. 29 front and four back BBR HiAm CONA strand stay cables as well as BBR Square Dampers for supplemental damping were installed. The stunning bridge was the BBR Network's 400th major stay cable structure worldwide.







**RAMA VIII Bridge, Bangkok, Thailand**

With a 300 m main span, the bridge is one of the world's longest single pylon cable-stayed bridges. This project was BBR's first application of compact CONA stay technology.



**Tatara Bridge, Japan**

The steel-concrete hybrid DINAHiAm cable-stayed bridge, measuring 1,480 m in total, has a main span of 890 m. When opened in 1999, the structure had the longest centre span in the world.







### Las Piedras Viaduct, Spain

The over 1,200 m long 20-span composite structure was executed from both abutments at the same time with the launching method.



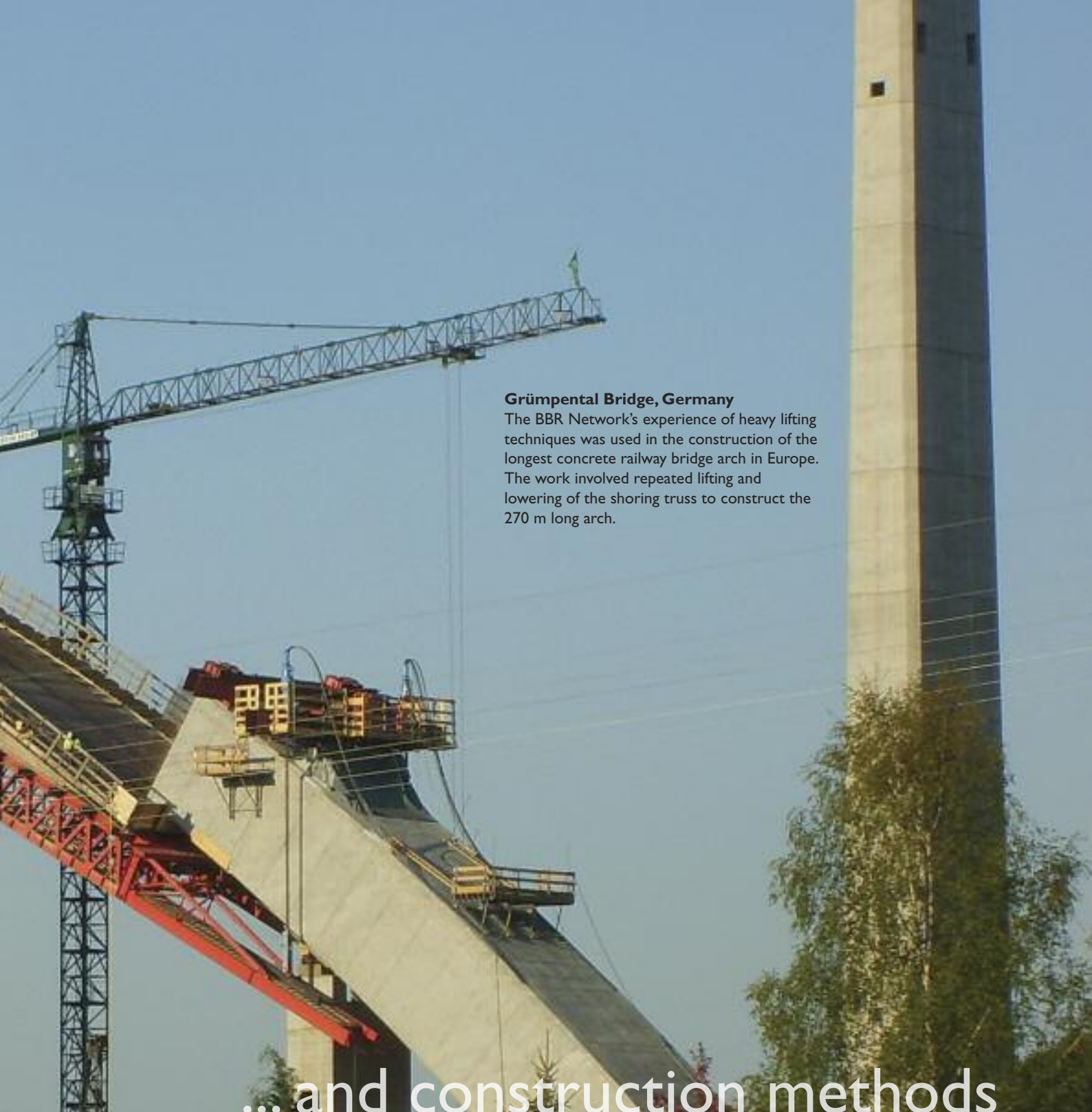
## Special applications ...

### Industrial Ring Road, Bangkok, Thailand

The clever approach of using a Moveable Scaffold System (MSS) helped to keep traffic moving in and around Bangkok while construction work was underway. The scope of work for the over 1,300 m long approach bridge included the design, fabrication and operation of the MSS, formwork, reinforcement, PT and concreting.







### **Grümpental Bridge, Germany**

The BBR Network's experience of heavy lifting techniques was used in the construction of the longest concrete railway bridge arch in Europe. The work involved repeated lifting and lowering of the shoring truss to construct the 270 m long arch.

## ... and construction methods

### **Wyszkow Bridge, Poland**

Part of the S8 pan-European route linking the Baltic countries and Poland, this PT balanced cantilever viaduct was erected with four form travelers simultaneously.



### **Floating Breakwater, Monaco**

Challenging post-tensioning work was required for the massive floating breakwater in the La Condamine Port in Monaco. The innovative project was recognized as the *fib* Award Winner for Outstanding Concrete Structures.







MRR

**Westfield London Development, United Kingdom**

The Westfield London Development – an iconic retail and leisure complex in London’s Shepherds Bush – has been the focus of major strengthening works using CFRP composites – a cost-effective technology suited to wide application for structural strengthening.





**Bridge Seismic Strengthening, New Zealand**

The new Kawarau River Bridge with its sweeping steel arch near the famous adventure capital Queenstown was strengthened to meet current seismic standards. Permanent BBR CONA rock anchors and specially designed high capacity BBRV wire tendons were installed.



**Wharf Upgrading, Auckland, Wellington, New Zealand**

Undertaking challenging remedial projects is a strength of the BBR Network – an area of special expertise relates to repair work on wharves.



**U2/6 Donaumarina Bridge, Vienna, Austria**

Vienna's 'Donaumarina' cable-stayed bridge was built in the late 1990s to fulfill three different purposes. Today, the 343 m long structure acts as a metro bridge and has been upgraded with 20 additional new strand stay cables.







## The BBR VT CONA CMX range

- ◆ BBR VT CONA CMI – internal post-tensioning system
- ◆ BBR VT CONA CMF – flat anchorage post-tensioning system
- ◆ BBR VT CONA CMM – monostrand post-tensioning system
- ◆ BBR VT CONA CME – external post-tensioning system
- ◆ BBR VT CONA CMB – band post-tensioning system





# State-of-the-art post-tensioning

A dream for engineers and architects, a delight for developers, a great tool for builders and kind on the environment – BBR post-tensioning allows almost any shape of structure to be constructed, while reducing environmental impacts, construction time, materials and costs. The many years invested in the development of new technologies for the construction industry have put the BBR Network in a market-leading position. Today, we have the best technology available – backed by the European Technical Approval ETA and the associated Certificate of Conformity we have secured. The BBR Network really is one step ahead of the pack!

BBR PT technologies have been applied to a vast array of different structures – such as bridges, buildings, arenas, dams, nuclear power stations, wind farms, cryogenic LNG tanks, silos, wastewater treatment plants, water reservoirs, marine structures, retaining walls, towers and tunnels.

## **BBR VT CONA CMX** – latest internationally approved post-tensioning technology

Rather than just revamping our existing product range, we have created some completely new technology which incorporates current market needs with all the advances and knowledge gained over the past 60 years. The newly developed BBR VT CONA CMX family has been tested to the most stringent international testing specifications – those of the European Technical Approval Guidelines ETAG 013 which often go further than other testing requirements, such as those of the Post-tensioning Institute (PTI) or American Association of State Highway and Transportation Officials (AASHTO). The European approved BBR VT CONA CMX post-tensioning range – the PT system for the 21st century – is used worldwide by the BBR Network. Its modular design means that a BBR VT CONA CMX PT kit can easily be configured to match special requirements.

## **European Technical Approval ETA and CE marking**

Post-tensioning kits for use in the European Community are required to have an ETA which is based on a set of defined testing procedures which must be fulfilled – including static tensile tests, fatigue tests and load transfer tests. Once the PT systems are placed on the market, they are subjected to Factory Production Control FPC, as well as

independent and continuous surveillance. Post-tensioning kits must be installed by trained PT Specialist Companies – such as Members of the BBR Network – ensuring a professional and system-conforming installation. All requirements are strictly followed by the BBR Network and ensure the highest level of product quality and installation, including best health and safety standards.

**BBR VT CONA CMI**  
– internal bonded or unbonded PT system  
CMI is internationally the most up-to-date and advanced multi-strand PT system, ranging from 1 to 73 strands. Re-stressable, exchangeable or electrically isolated CMI tendons can be offered, as well as tendons for cryogenic and nuclear applications.

**BBR VT CONA CMF**  
– flat anchorage slab PT system  
CMF comes in small sizes and is the perfect internal PT solution for thin concrete sections, such as slabs.

**BBR VT CONA CMM**  
– monostrand PT system  
CMM tendons are individually HDPE sheathed and greased/waxed and are therefore the ideal easy-to-use PT range for internal unbonded applications.

**BBR VT CONA CME – external PT system**  
CME is the ultimate multi-strand solution for PT outside of structural members and offers a wide range from 1 to 73 strands.

**BBR VT CONA CMB – band PT system**  
The double HDPE sheathed and greased/waxed approach of the CMB system makes it the perfect ready-to-use PT solution for special external applications.

## **Compact, fast & green**

CONA CMX products continue to promote faster construction programs through early strength concrete stressing which reduces the construction cycle time – the earlier you can stress, the earlier you can build. Alternatively, a lower quality, cheaper or possibly recycled concrete can be used. CONA CMX technologies remain the benchmark for compactness in the anchor zone. Our systems use the least amount of space in the anchor zone, thus environmental impact and materials are minimized. Furthermore, a wide product range and size offering promotes the use of only what is really needed, also reducing materials and transportation. We ensured that we understood what the market wanted and then we delivered a solution to meet those requirements.

## **Additional BBR PT systems**

The BBR PT cables are one of the earliest and most reliable post-tensioning systems. This parallel wire PT system was developed by BBR in 1944 and has since been continuously advanced. Furthermore, the BBR CONA, CONA compact, CONA multi, VT, CONA single and CONA flat post-tensioning systems have been applied very successfully for many decades.

### *PHOTOGRAPHS:*

**1. Bridgewater Place, Leeds, United Kingdom**

*BBR flat post-tensioning allowed more storeys to be accommodated and a vast reduction in steel content.*

**2. Kulmbachtal Bridge, Germany**

*The motorway bridge design is based on an innovative 'hybrid construction method' incorporating CONA CMI and external CMB tendons.*

**3. Caja Madrid Tower, Spain**

*Designed by world-famous architect Norman Foster, the 250 m high skyscraper was erected using internal BBR multi-strand PT technology.*





## Staying power

Some of the most dramatically beautiful architectural designs and technically excellent feats of engineering provide a reliable service, on a daily basis, to thousands of people around the world – many such creations have been realized with the use of state-of-the-art BBR stay cable technologies. In 2010, the BBR Network celebrates its golden anniversary – and over 400 major projects – in the stay cable technology arena.

Whether for transportation, energy, communication or sporting infrastructure, over the last 50 years the BBR Network has delivered a wealth of enduring and magnificent cable-strayed structures around the world. While many cable suppliers built their first major cable supported structure in the late 1970s and early 80s, BBR stay cable technology was used for the first time in the late 1950s and, since those days, we have followed on with milestone-after-milestone and continue to set the standard in the field of stay cables. BBR was the inventor of high amplitude fatigue resistant wire, strand and also carbon stay cables – and carried out the world's first projects. We are the company who started it all!

### **BBR HiAm CONA and more – elegance and strength**

The BBR HiAm CONA parallel strand stay cable system is unrivalled anywhere on the

planet. Developed by our own engineers in Switzerland, its wide range – tendon capacity 200 – 60,000 kN, advanced water tightness, high corrosion protection, simple installation and superior fatigue resistance – 'HiAm' stands for high amplitude fatigue resistance – makes it attractive for the most challenging of projects. Designers and architects have particularly welcomed the compactness of the anchorage system which allows them greater scope to produce a sleeker and more striking structure. The BBR DINAH/HiAm wire stay cable system – composed of 7 mm wires – complement the BBR stay cable family.

### **Benchmark for test performance**

BBR stay cable systems are the benchmark in terms of test performance and BBR stay cable technology has regularly fulfilled higher testing and performance criteria – even years before such testing conditions were adopted and specified in codes and recommendations.

#### PHOTOGRAPHS:

##### **1. Sydney Tower, Australia**

The 309 m high tower stands together with the Sydney Opera House and the legendary Sydney Harbour Bridge as one of the famous city center landmarks. Its unique supporting net structure, composed of DINA stay cables, sets it apart from the crowd.

##### **2. Sunnigberg Bridge, Switzerland**

The scenic Sunnigberg Bridge in the skiing resort of Klosters was designed by the legendary Swiss Engineer Christian Menn and was opened to traffic in 2005.

##### **3. Schillersteg, Stuttgart, Germany**

World's first application of high amplitude fatigue resistant BBR wire stay cables – opened 1960.

##### **4. Viaduct Cordel de Sax, Spain**

The nearly 1,500 m long viaduct for Spain's new high speed railway was built with a Moveable Scaffolding System.

##### **5. Bernabeu Stadium, Madrid, Spain**

Special sliding and heavy lifting engineering expertise was applied for the reconfiguration of Sydney's Olympic Stadium and the expansion of Bernabeu, home to the world famous Real Madrid football team.

##### **6. Perth Bunbury Highway Bridges, Australia**

The dual carriageway relied on BBR Network's launching skills and alleviated congestion around the city of Mandurah.





## And there's even more!

The BBR Network has extensive experience of construction methods, such as heavy lifting, launching, balanced cantilever, advanced shoring and other temporary construction systems and techniques. BBR ground anchors, BBR VT TOBE pot bearings, BBR WIGAbloc weighing technology, PT bars, expansion joints, MRR and many more related construction engineering services complete the BBR Network's offering.

### Construction methods

The bridge construction method plays a significant role and should be considered during the preliminary design period, with the help of the BBR Network. The construction method depends mainly on topography and influences bridge cross-section design as well as span.

Basically, four major techniques are employed, along with conventional falsework. In addition, a wide range of different or adapted methods are used.

- ◆ **Balanced cantilever** – the use of the free cantilever method using form travelers is recommended where it is difficult or impossible to erect scaffolding.
- ◆ **Advanced shoring** – the advanced shoring method, or Moveable Scaffold System (MSS), has been developed for multi-span bridges.

- ◆ **Launching** – the incremental launching method is particularly suited to the construction of continuous post-tensioned multi-span bridge structures.
  - ◆ **Heavy lifting** – heavy lifting or sliding is a hydraulic lifting technique especially developed for extremely heavy loads for any kind of structural components.
- BBR Network Members all over the world maintain a specialized bridge construction equipment fleet for any type of bridge design.

### ... and more

- ◆ **BBR ground anchors** – the BBR Network provides a wide range of strand, wire or bar ground anchors which can be installed in rock or soil and secured by injecting with cement grout. BBR anchors, including CONA CMG, have been the largest and longest installed anywhere around the world and our technical expertise in the field is internationally recognized.

- ◆ **BBR VT TOBE pot bearings** – the CE-marked BBR VTTOBE pot bearing family consists of three types – fixed, multidirectional and unidirectional.
- ◆ **BBR WIGAbloc load cells** – this proven sensing technology with many years of application measures compression forces.
- ◆ **PT bars** – PT bar systems are ideal for the economic application of PT forces on relatively short tendons. They are simple to use and lend themselves to many applications.
- ◆ **Expansion joints**, a complete range of MRR and further related construction engineering services are also available.

The BBR Network has a proven record in all construction techniques and related engineering services for all stages – from preliminary design through to final execution.





## BBR PT Specialists – customer focused approach

- ◆ Investment in customer service
- ◆ Qualified, certified BBR PT Specialists
- ◆ Selection & assessment process
- ◆ Continuous education
- ◆ Knowledge transfer, motivation & networking
- ◆ Annual Global BBR Conference



# Our people and culture

Our people are defined by their expertise and also by their willingness to go the extra mile. We invest in our people and then protect that investment by helping them to grow and extend their abilities.

A carefully considered supply chain process and well-trained, experienced staff are of vital importance in delivering the highest installation standards for our clients, therefore we invest a significant portion of our turnover in service.

## Highest customer service standards

BBR PT Specialists are qualified and certified to assemble and install European approved and CE-marked BBRVT CONA CMX PT kits. They are responsible for compliance with all regulations set out in the relevant approvals for our PT kits, for complying with the respective standards and regulations in force at the place of use, for ensuring a professional execution of PT works and for endorsing all safety-at-work and health protection regulations. The official BBR PT Specialist certificates can be viewed and downloaded from the BBR Network website [www.bbrnetwork.com](http://www.bbrnetwork.com).

The BBR PT Specialists are under the continuous supervision of BBRVT International Ltd – the ETA Holder – and are experts in all post-tensioning tasks, such as:

- ◆ Logistics and supply of a complete PT kit to the construction site
- ◆ Full assembly and installation service on site
- ◆ Quality assurance.

Although they may have different organizational structures – suited to best serving their local markets – BBR PT Specialists all maintain technical, logistics and site operation departments. Together, this team takes professional responsibility for the project – from design to completion – dealing with and reporting on technical, logistical, safety and best practice issues along the way.

## Learning environment

The BBR Headquarters continuously educates the PT Specialists in post-tensioning and stay cable technology – covering systems, quality assurance procedures and correct installation techniques.

To keep the BBR Network up-to-date, regular practical and theoretical training courses are organized in various regions of the world for technical, logistics and site staff. All training sessions are concluded with an exam and are fully documented. Sometimes, training sessions are also witnessed by independent institutes or authorities. After the training courses, attendees are responsible for cascading the knowledge to colleagues within their own organizations by arranging local internal training sessions. In addition to training required by the ETA Holder, local training visits are made to the PT Specialist's location – such as for introductions or updates to our product systems, quality assurance or logistics procedures.

A culture of continuous education within the BBR Network ensures a high quality execution of post-tensioning and associated work for our customers.

## International inspiration

The Global BBR Conference takes place once a year, with delegates coming from all around the world to share knowledge and experiences, while learning more about the BBR Network's latest progress and plans. Achievements are recognized through the BBR Annual Awards which include Project of the Year and prizes for Engineering Reports, usually presented at the BBR Gala Dinner. The BBR Charity Golf Tournament encourages further social networking in a relaxed atmosphere.

*"The annual Global BBR Conference and knowledge exchange meetings give all BBR Network Members a great opportunity to always stay a step ahead. Of course, we all enjoy the social side of the BBR Network too – particularly the BBR Golf Championship."*

**John Mo, Director**

BBR Construction Systems Pte Ltd, Singapore







## Setting the standard

- ◆ Independent testing & monitoring
- ◆ European approved BBR PT systems
- ◆ Testing beyond requirements
- ◆ BBR Factory Production Control
- ◆ Traceability
- ◆ Certificate of Conformity, CE Marking
- ◆ Trading & QA platform BBR E-Trace



# Quality matters

The BBR Network pursues the ambitious goal of providing not only the finest approved Swiss technology, but also the best service and installation capabilities to their customers around the globe. Our strong focus on quality assurance helps to make these aspirations a reality.

A rigorous independently-monitored testing and certification regime, along with an established Factory Production Control (FPC) system, combined with BBR E-Trace – our internet-based trading and quality assurance program – all make a contribution towards keeping the BBR Network one step ahead.

## Benchmark testing

Extensive research, testing and development efforts place the BBR Network at the forefront in the field of post-tensioning and stay cable applications. All of the system components are subjected to the most stringent testing and quality assurance (QA) procedures, based on internationally recognized codes and recommendations.

Our commitment to testing has helped us develop a range of products which have become international benchmarks. Our products have been tested – in independent and approved laboratories – with parameters exceeding the traditional requirements.

## BBR Factory Production Control

In 2005, we implemented the BBR FPC system which provides highest product quality standards – and full component traceability, the most direct way of ensuring quality.

Traceability is the process of recording information relating to the changes made at every point in the life of a component – starting from the raw material through production, storage, supply to the PT Specialist, storage in stock, supply, storage and installation on site. Our goal is the 'cradle-to-grave' collection of component data.

Compliance with the complete FPC system is audited by an independent approved or 'notified' body and any non-conformity must be rectified prior to the CE Marking. In addition to our continuous audits and testing of the products, the approved body continues to exert full control during the validity period of our approvals.

These provisions guarantee proper quality and compliance of the kit components delivered to site.

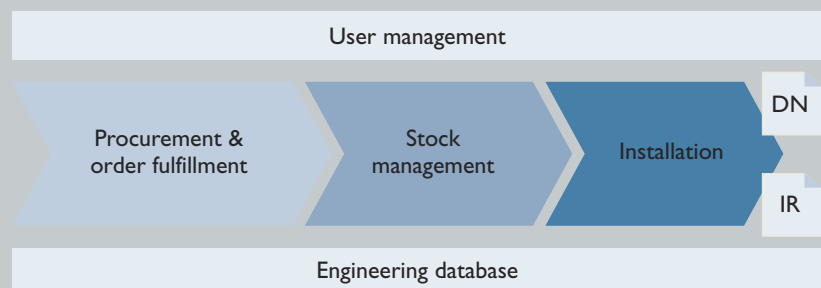
## Trading & QA Platform

BBR E-Trace – our internet-based software – links all members of the Global BBR Network including BBR PT Specialists, BBR Component Manufacturers (CMs) and ETA Holder; BBR VT International Ltd. This comprehensive e-commerce platform leads users through the quality process, ensuring that each step is documented and recorded.

Our investment in quality assurance is a continuous process covering the entire life of our products and services. We listen, we learn and we implement.



The platform facilitates the everyday work of all BBR Network Members and also supports effective supply chain management.



**Engineering database** – containing a powerful and continuously updated engineering database of all our systems.

**Procurement and order fulfillment** – PT Specialist users can procure BBR components (parts) from our selected CMs, as well as checking and comparing prices and corresponding delivery times.

**Stock management** – stock and order progress can be viewed, at any time, along with all individual Quality Certificates.

**Installation** – individual construction project sites are opened and parts delivery (DN) and installation (IR) recorded, thus Definite CE Marking is issued. Project reference sheets or lists can also be generated.

**User management** – only trained users within PT Specialists and CM organizations can access.

**Communication** – contact database and shared tools facilitate efficient communication and swift decision-making.

**Quality management and document control** – the user is led through the required quality process, each step is documented and recorded for later tracking and viewing.

**Traceability** – facility to track, identify and instantly trace all parts, no matter what their current status – at any time.





## Excellence through experience

- ◆ State of the art post-tensioning, stay cable and related construction engineering technology
- ◆ Dedicated, well-trained BBR PT Specialist Companies
- ◆ Well-known technology brands
- ◆ Global reach – a presence in over 50 countries
- ◆ Versatile product range suited to any local application
- ◆ Independently tested and certified technology
- ◆ Leading edge quality processes



# Innovative traditions

With approaching 70 years of continuous leading-edge development in the field of post-tensioning, stay cables and related construction engineering, the BBR Network continues the innovative traditions of its founders.

*"The founding fathers of the BBR Network would be very proud that the flame they lit and kindled is being held aloft by their successors – who are making it glow even more brightly all around the globe."*

**Bruno Valsangiacomo, Chairman**  
BBR VT International Ltd, Switzerland  
and son-in-law of BBR founder member,  
Antonio Brandestini

The BBR story began during the Second World War, when materials were in short supply – the import of steel was difficult and, with reduced energy availability, cement was a precious commodity. Determined to use their ingenuity to overcome these limitations, the three BBR founders explored the savings to be made by using pretensioned reinforcement for concrete support girders.

During the 1950s and 1960s, BBR developed a complete range of prestressing and post-tensioning systems, ground anchors and stay cable anchorages, cover all structural engineering applications.

From the very early days, construction engineering firms around the world were keen to participate in the success of BBR's designs and technologies. It was recognized that not only a license to use the designs and sell the specialist equipment was necessary, but also that an effective process for knowledge transfer was needed to support best practice in the use and especially installation of BBR technologies. Thus the BBR Network was born and, today, it operates in over 50 different countries.

Since the early applications more than 60 years ago, there have been many stories to tell of BBR successes and innovation. Today, BBR technology has been applied to thousands of projects around the world – including more than 400 stay cable structures. And the BBR success story will continue with yet more innovative new technology and projects – always staying one step ahead!



- 1944** Company founded by Max Birkenmaier, Antonio Brandestini and Mirko Robin Ros
- 1945** BBR's first product, the pretensioned small beam, was brought to market
- 1948** Button head wire post-tensioning system BBRV patented
- 1952** Construction of first major bridge project – the Andelfingen Viaduct for Swiss Federal Railways
- 1960** First bridge to be built using parallel HiAm wire stay cables, Stuttgart, Germany
- 1965** Prestressing of nuclear power vessels around the world started
- 1972** World's first application of BBR HiAm strand stay cables at Olympic Stadium in Munich
- 1972** Development of BBR CONA PT system
- 1987** Construction of world's longest transit skytrain-only bridge – ALRT Skybridge, Canada
- 1996** World's first bridge constructed using carbon stay cable technology
- 2005** Launch of latest European approved BBR VT CONA CMX PT series
- 2008** Introduction of BBR HiAm CONA strand stay cable system
- 2010** BBR celebrates 50 years in the stay cable technology arena.



