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A new roof for Verona's historic arena
sbp and gmp win international ideas competition

The engineers schlaich bergemann partner (sbp) and the architects von Gerkan, Marg and Partners (gmp) have won the international ideas competition for a roof over Verona's historic arena. The jointly developed design was the winning entry of over 80 competing submissions, and continues the many years of cooperation between the two practices.



Fig. 1: The new Arena di Verona (Copyright: gmp/a-promise)

The arena in Verona is one of the largest and best preserved amphitheaters dating from Roman times. The city's arena is nearly 2,000 years old and is an important landmark and tourist attraction with the status of a UNESCO world cultural heritage site. The arena, which was built in 30 AD under Emperor Tiberius, is nowadays used for the performance of operas and concerts. The competition brief was to design a retractable and reversible roof structure which – on the one hand – makes it possible to use the arena during bad weather and protects it against adverse environmental effects, and – on the other hand – respects the historic monument as best possible and

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interferes as little as possible with the structure and appearance of the amphitheater. The ideas competition was open to entries from all over the world, and the concept produced by sbp and gmp was successful in securing first place.

This innovative design undoubtedly reflects our experience with moveable structures and retractable roofs for historical buildings such as the Plaza de Toros de Zaragoza, the Palacio Vista Alegre Madrid, both in Spain, and the Arena of Nimes, in France.

Italy experienced schlaich bergemann partner's expertise in long and wide span roofs in our collaboration with architect Massimiliano Fuksas in the realisation of the 1,300-m long roof that covers the New Milan Trade Fair, a 4,300-m² free form steel-glass roof surface that connects the exhibition pavilions.



Fig. 2: Bird's eye perspective with closed roof (Copyright: gmp/a-promise)

Fig. 3: Historic facade with new roof (Copyright: gmp/a-promise)

Fig. 4: Bird's eye perspective with fully open roof (Copyright: gmp/a-promise)

The winning design includes a compression ring which is clearly raised above the arena and holds the retractable membrane construction. The new structure covers the entire area of the amphitheater in the shape of an ellipse and creates space for additional lighting and state-of-the-art stage technology. An intelligent mechanism, involving a fan-shaped movable cable network and the roofing membrane, protects the entire arena against bad weather, but can also be fully retracted into the compression ring when the weather is more favorable. The roof is closed in a two-step process in which the cables are moved out from their home position in the compression ring and then the membrane is extended along these cables. The designers explained this fascinating retractable construction: this configuration of a retraction mechanism is completely unique and has never been built before. Nevertheless, there are many elements of tried-and-tested retraction mechanisms in completed projects, such as the stadium in Frankfurt and the national stadiums in Warsaw, Vancouver and Bucharest, which can be re-applied and developed in this new configuration for Verona. Winches are used to move the cables from their parking positions to their extended positions along the oval compression ring. Once they are firmly attached in their final position, the cables are hydraulically pre-tensioned in the mechanical part of the parking area. Now the membrane parked in that area can be extended outwards in the shape of a star using radially acting cable winches. A few inches before the end position, hydraulic tensioners engage with the front moving trolleys and apply the required pre-tension to the membrane.

In this way the view of the open sky is unrestricted when the roof is open, preserving the open-air atmosphere. From the outside, the structure is barely visible, which means that the historic character of the Roman arena is retained. From a bird's eye view, the

closed roof appears like a protective scallop shell that gently covers the historic building.

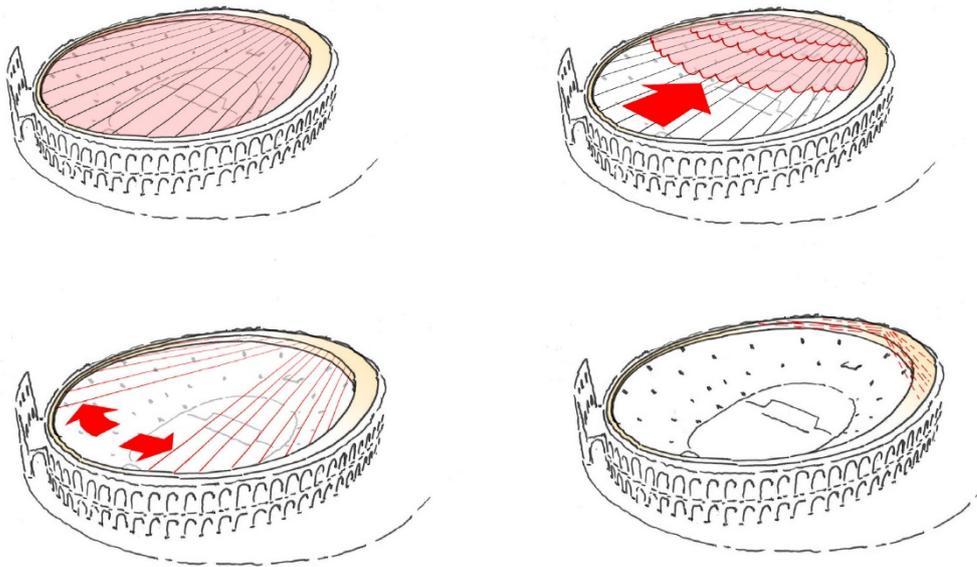


Fig. 5: moving positions of membrane roof (Copyright: sbp/gmp)

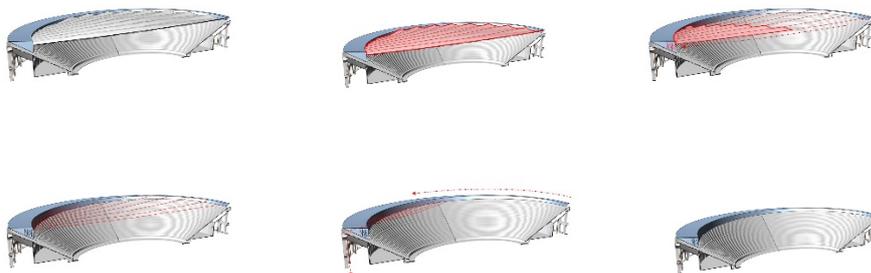


Fig. 6: Section view: moving process (Copyright: sbp)

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sbp and gmp – a success story

In the process of cooperating on many joint projects, sbp and gmp have gained extensive experience with large retractable structures with the aim of producing designs that are respectful of historic buildings. One of the numerous stadiums for UEFA and FIFA championships is the Berlin Olympic Stadium, for which a new roof was designed in a successful cooperation between the two practices. This was another project where the designers have created a symbiosis of innovative new elements with existing foundations – whilst preserving much of the original building. The stadiums in Warsaw, Bucharest and Frankfurt are further proof of the competence of sbp and gmp in creating and implementing complex designs for retractable roofs. The cooperation between the two practices has produced light-weight structures for roofs with large spans that are suitable for arenas and stadiums and are a prerequisite for completely new space models and user scenarios.

Design: schlaich bergemann partner and Architects von Gerkan, Marg and Partners
sbp Knut Stockhusen and Knut Göppert with Daniel Gebreiter and Chih-Bin Tseng
gmp Prof. Volkwin Marg and Hubert Nienhoff with Martin Glass and Nikolai Reich
Client Municipality of Verona Piazza Bra' 1

To download the pictures in HighResolution, please use the following link:

www.sbp.de/filetransfer

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Office profile of schlaich bergemann partner

schlaich bergemann partner has been working for over 30 years to share our open-minded, knowledgeable, and curious approach to design with great building industry professionals. Our teams have contributed to outstanding projects that range from innovative lightweight structures in roofs, facades, bridges, and towers to complex and unique long span designs.

Our solutions to sophisticated and complex structural problems are achieved through a holistic and collaborative approach to design, cemented by our values and respect for '*Baukultur*', the art of building.

We always believe that developing and planning the design of a structure is an opportunity to improve its performance, overall value and functionality.

At sbp we are "collaborators by conviction". Our office culture is built around collaborative work and multifaceted design outcomes. sbp is at the cutting-edge of intelligent design solutions for buildings, bridges, towers, stadia and multipurpose venues, facades, and retractable and adaptive roof structures.

Our offices operate in practically all fields of structural engineering. We engage with projects from concept to construction and our teams are available throughout the project delivery.

Our design teams are made up of experienced professionals in structural and mechanical engineering and thrive on challenging and innovative projects. We especially enjoy those that prompt the exploration of new materials and technologies to result in optimized design solutions that are efficient, economical, sustainable, and beautiful. We maintain connections with academia that further strengthens our innovative designs and experimental studies.

We share our design culture and our wide-ranging expertise to our design partners. Our understanding of the built environment broadens the possibilities during the initial design phase. The functionality, aesthetics, site, and natural and social-geographical context of a new project helps us focus on an appropriate and fitting solution for the design.

sbp's headquarters is in Stuttgart and is part of our global network of offices in Berlin, New York, Shanghai, São Paulo, and Paris.

In our iBook and on the Microsite we tell our story with moveable engineering in the hope of inspiring your vision for the future. The iBook was developed for iPad or Mac and is available for download on iTunes.

To extend the availability of the iBook to all other internet users, the company developed a micro website.

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