

Football Stadium Zenit St. Petersburg: Gazprom-Arena

Page 1 of 3

Uplift Forces, high loads, high rotations.

St. Petersburg, Munich. The Gazprom-Arena in St. Petersburg is a spectacular project. Being designed by the Japanese Architect Kisho Kirokawa, in respect of structural engineering it is a very demanding project. MAURER, an expert company focusing on structural protection systems, designed and delivered a variety of structural bearings, among them bearings with vertical loads of about 10,000to and with uplift forces of up to 3.5 MN.

The Gazprom-Arena seats 62,000 fans and will be the new home of the team of Zenit St. Petersburg. The inauguration is planned for 2017, and 2018 it shall also serve for the World Cup, and in 2020 for the Euro-Cup. The large round structure can be completely closed, the roof can be opened, and the lawn can be mechanically rolled out. On top of these functional challenges comes an exposed location directly at a land tongue at the estuary of the Newa into the Baltic Sea.

In total MAURER delivered more than 100 bearings, which were designed for various specifications and load cases. The specific characteristics shall be described below.

Pylon bearing with about 10,000 to vertical load

In structural respect, the stadium is separated into quarter segments. Being visible from far, eight pylons tower above the round structure and carry on cables the total roof structure. Because the pylons must be able to perform rotations without restraint, on their base point bearings are necessary. These bearings are designed for a big rotation of ± 0.025 rad as well as for an vertical load of about 10,000to.

In order to transfer these enormous loads via structural bearings with acceptable dimensions, the high-performance sliding material MSM® is indispensable. Because it can accommodate high contact pressure, the pylon bearings display of a comparatively small diameter of 1,600 mm. Generally, all stadium bearings of MAURER are spherical bearings equipped with MSM®.

Wind causes uplift forces

The outer edge of the roof structure is supported by various individual columns, as well as V-columns and reverse V-columns which each of them serve different requirements.



One of the eight pylon bearings: with a comparatively small diameter of 1,600 mm they are designed for a large rotation of ± 0.025 rad as well as for an enormous load of about 10,000 to.

Photo: MAURER



A total of 60 compression-tension spherical bearings were installed underneath of the tribune. Already in construction phase, tensile forces of -3.5 MN had to be considered.

Photo: MAURER

Press Contact

MAURER AG

Judith Klein

Head of Marketing & Communication

Frankfurter Ring 193, 80807 München

Telephone +49.89.323 94-159

Fax +49.89.323 94-306

klein@maurer-soehne.de, www.maurer.eu

forces in motion

A special role is given to 60 uplift spherical bearings. Because of the exposed location directly at the Newa Bay enormous wind loads act onto the stadium. Already during construction phase, both vertical (compression) loads of 4.0 MN had to be considered, but also uplift forces of up to -3.5 MN. This high tensile force is also to be applied for the final position, at the hand of average (compression) forces of 5.0 MN and a maximum of 11.0 MN. Correspondingly these 60 uplift bearings were designed for variable loads during construction phase and in final stage.

Such compression-tension bearings facilitate a restraint free transmission of vertical compression and tension forces, and this at each stage of rotation and translation. They were designed by MAURER. With the usage of MSM® in all sliding areas, structural displacements caused by uplift forces can be accommodated without restraint, and this continuously. MAURER uplift bearings are especially suited for complex roof structures like the one of the Zenit-Stadium, as well as for bridge structures with highly variable loads and displacements, such as railway bridges.

These compression-tension bearings were installed above and below the steel columns, on which the roof structure rests. Also in this case MSM® facilitated a construction method in small dimensions.

A further special task is assigned to 32 fixed spherical bearings. They transfer vertical loads of 7.5 MN and horizontal forces of ±500 kN in x- und y-direction.

Long history of construction

The Zenit Stadium will seat 62,167 spectators and already should have been completed long time ago. Start of construction was 2007, but the difficult subsoil and the constant design changes during construction phase delayed the progress while costs increased. MAURER was awarded the initial order end of 2013, with additional bearings to be followed in 2015. Inauguration is planned for 2017.

Text: 4,106 keystrokes

Press Contact

MAURER AG

Judith Klein

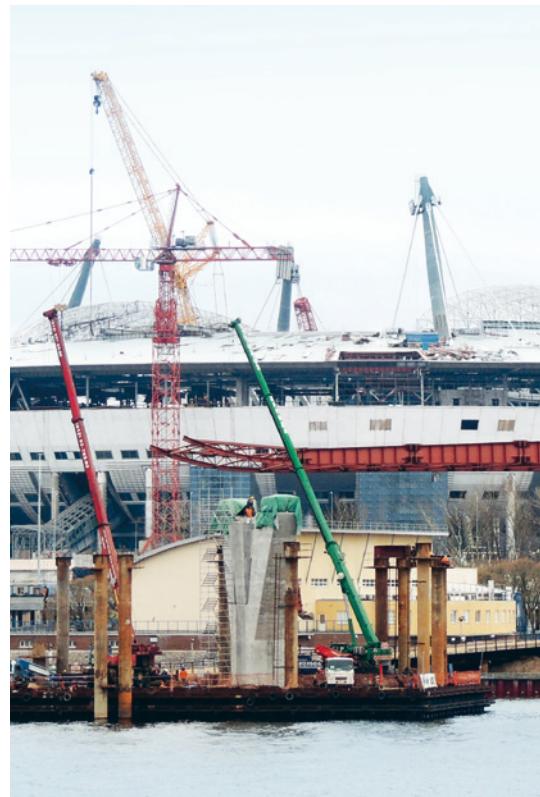
Head of Marketing & Communication

Frankfurter Ring 193, 80807 München

Telephone +49.89.323 94-159

Fax +49.89.323 94-306

klein@maurer-soehne.de, www.maurer.eu



The Zenit Stadium job site directly at the estuary of the Newa river. Clearly visible the eight pylons.

Photo: MAURER

forces in motion



Quick facts about MAURER AG

The MAURER Group is a leading specialist in mechanical engineering and steel construction with over 1,000 employees worldwide. The company is the market leader in the areas of structural protection systems, (bridge bearings, expansion joints, seismic devices). It also develops and produces professional roller coasters and Ferris wheels as well as special structures in steelwork.

Among the most notable large projects are the entire technological bridging equipment for the Russky Bridge in Wladiwostok, the world's largest cable-stayed bridge. When it comes to steelwork, our showpieces include the BMW World and Munich's Airport Terminal 2. Spectacular amusement rides include for example the Rip Ride Rockit Roller Coaster in Universal Studios Orlando, 10 Skyloops worldwide and the Fiorano GT Challenge in Abu Dhabi.

Press Contact

MAURER AG

Judith Klein

Head of Marketing & Communication

Frankfurter Ring 193, 80807 München

Telephone +49.89.323 94-159

Fax +49.89.323 94-306

klein@maurer-soehne.de, www.maurer.eu

forces in motion