

Case study

Infrastructure & Cities Sector Low and Medium Voltage Division

Regensburg (Germany), June 15, 2012

Top marks for technology

Complete technical overhaul for the Bolshoi Theater

The task of reconstructing the State Academic Bolshoi Theater in Moscow was one of Herculean proportions, with renovation work on the world famous theater and Russian national symbol lasting from 2005 to 2011. The facade and interior were restored to their original conditions, and this work went hand in hand with the complete technical renovation of the rooms and stage area. This involved incorporating proven systems from Siemens.

More than any other institution, the Bolshoi is a symbol of Russian culture and is one of Moscow's main attractions. It was founded in 1776, when Prince Peter Urusov was granted sole rights to present plays, masquerades, balls and other amusements for a period of ten years by Catherine the Great . It acquired its current appearance in 1856 after extensive rebuilding work took place in the Russian Classical style following a fire. In 2005 the Russian Federation's ministry of culture gave the go-ahead for the country's most famous theater to be reconstructed. Between 50 and 70 percent of the building was deemed to be beyond repair. In other words, the restoration and reconstruction of the theater presented a major challenge, especially as the work was followed with great interest by the government and public alike.

Complex challenges

The reconstruction work affected the main theater building on Theater Square, the Aleksey Stepanovich Khomyakov building (reopened October 2011) and the operating and storage facilities with the administration building on Plechanowa Street (reopened December 2011). The renovation of the famous main building on Theater Square posed some particularly complex questions. The ensemble, architects and culture ministry representatives worked closely together to come up with a solution aimed at preserving the historical legacy while at the same time being technically innovative. Studies to test the condition of the building's foundations and walls, precise measurement of the rooms, and other preliminary work lasted through to the fall of 2009, when the large-scale restoration work began, which for the next two years would involve over three and a

half thousand professionals on a daily basis. The objectives were to effect a scientifically rigorous restoration of the auditorium and a complete reconstruction of the stage area, including further excavating the underground space and maintaining the building's historic facade as an architectural landmark. At the same time the building was to be equipped with all the latest in-room and stage technology.

Uniform solutions

The decision to charge Siemens with supplying the technical equipment was the result of careful analysis of systems currently being used in the world's top theaters. References here included the Scala in Milan, the Archimboldi Theater in Italy and the Semper Oper in Dresden. Working closely with Siemens contacts in Russia, Germany, Austria and Italy, the utilization service of the Bolshoi Theatre produced the technical requirements of the equipment needed for the extensive reconstruction project.

The main focus here was placed on continuity of the solutions, ensuring maximum reliability, cost effectiveness and optimum health and safety levels. In practical terms, this meant fitting the transformer stations with 8DJ20 gas-insulated switchgear and GEAFOL transformers, which along with the benefits of being extremely reliable and low-maintenance, also have the advantages of being very efficient to run, occupying a minimum of space and having a modular design. SIVACON 8PS power distribution boards and components for electrical distribution, power connectors and lighting systems were used for low-voltage current distribution. These components have communications capability and guarantee a simple and uniform distribution of power while maintaining the highest possible levels of safety for operators and equipment. They are highly efficient and flexible to use. The system was supplemented and optimized by the inclusion of components for automation, including easy-to-use control mechanisms to reliably operate the complex stage technology (e. g. revolving stage, convertible underground area, special stage lighting systems) and guarantee a constant micro-climate in all the theater's rooms. The resulting optimization of energy efficiency was a major factor in reducing operating costs.

Conclusion

Siemens Totally Integrated Power solutions have been tried and tested in the world's most important theaters for years, ensuring uniform power distribution. Since 2011 they have now also been proving their quality at the Bolshoi Theater in Moscow.

The **Siemens Infrastructure & Cities Sector** (Munich, Germany), with approximately 87,000 employees, offers sustainable technologies for metropolitan areas and their infrastructures. Its offerings include integrated mobility solutions, building and security technology, power distribution, smart grid applications, and low- and medium-voltage products. The Sector comprises the Divisions Rail Systems, Mobility and Logistics, Low and Medium Voltage, Smart Grid, and Building Technologies. For more information, visit <http://www.siemens.com/infrastructure-cities>

The **Siemens Low and Medium Voltage Division** (Erlangen, Germany) serves the entire product, system, and solution business for the power distribution infrastructure of public utilities, municipal utilities, and industrial facilities. The Division is responsible for providing reliable power supply equipment for conventional and regenerative power plants as well as intelligent, compact switching stations for distribution networks in metropolitan and rural areas. In addition, the Division supplies energy-efficient solutions for the integration of renewable energy and energy storage in the grid. For more information, visit <http://www.siemens.com/low-medium-voltage>