



## Eaton Powers the Bolshoi Theatre

**Location:**

Moscow, Russia

**Segment:**

Data Centre

**Problem:**

Ensure uninterrupted power to the theatre and its storage warehouse during its reconstruction process, failure to do so can disrupt productions and also put at risk valuable and historic stage sets

**Solution:**

A mixture of double-conversion UPSs, maximising the protection of sensitive equipment against potential damage from mains power problems

**Results:**

Reliable and uninterrupted power has helped ensure continuity of performances, audience safety, and the safe storage of valuable props

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**Background**

The world-famous Bolshoi Theatre is one of the largest theatres in Russia and its iconic status is universally acknowledged. It has deservedly earned this status through the major contributions it has made, over many years, to Russian and world culture.

The theatre was founded in 1776 during the reign of Empress Catherine II. The present-day building on Theatre Square opened in 1855, the year that Alexander II was crowned, and it has become one of Moscow's leading attractions. Between 2002 and 2011 a major reconstruction project was carried out which doubled the area of the building and restored many lost architectural features.

The theatre has its own industrial warehouse, on which extensive work was carried out during the second phase of the reconstruction and restoration project. The transformation of the warehouse into

a modern, high-tech facility has helped to make the Bolshoi Theatre into one of the world's most technologically advanced music theatres.

The warehouse is used for storing sets and props, and also for the production of new sets. It is extensively equipped with state-of-the-art equipment and includes a storage facility comprising 518 containers with a total volume of 185,000 m<sup>3</sup>. This is used to store stage sets. The warehouse is fully automated and has a tractor trailer on which the containers, which weigh five tonnes when full, can be loaded.

Kopitan Dem, a long-time Eaton partner specialising in the design and implementation of intermediate- and high-power UPS systems, has been working with the Bolshoi Theatre for near 15 years to ensure a stable and uninterrupted supply of power to the main theatre building and the warehouse.

*"The productive collaboration with the Bolshoi Theatre engineers that enabled us to provide a stable, dependable power supply system for the theatre and its associated warehouse would not have been possible without the exceptional reliability and performance of Eaton UPS products."*

*Viktor Ashurkov, engineering director at Eaton partner company, Kopitan Dem LLC.*



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## Challenges

The provision of a robust uninterruptible power supply system was a key part of the Bolshoi Theatre reconstruction project. Among other things, this would be used to ensure the stable operation of equipment in the warehouse, including 3D plotters and automated machine tools. Another essential requirement was that power should be continuously available for the equipment that maintains the elevated nitrogen levels in the containers used to store sets and props. This equipment is sensitive to power problems and even brief outages can lead to loss of or damage to irreplaceable and historically significant artefacts.

## Solution

After carefully assessing the requirements of the project, Kopitan Dem engineers developed a solution based on Eaton UPS equipment. Over the period 2010 to 2014, the company installed Eaton 9355, Eaton PowerXpert 9395 and Eaton 9SX UPSs in the main Bolshoi Theatre building and in the warehouse.

The 9395 and 9355 models were chosen for their double-conversion technology, which maximises the protection of sensitive equipment against potential damage from mains power problems.

*"We have been a partner of the Bolshoi Theatre for more than 13 years," said Viktor Ashurkov, engineering director at Kopitan Dem. "We are delighted to have the theatre as a customer as it is one of the few world-renowned Russian brands and it is also one of our most high-tech clients. The success of our relationship with the theatre is the result not only of the professionalism of the theatre's engineers, but also of the exceptional performance and reliability of Eaton's UPS products."*

An important benefit of the Eaton products was that the unique HotSync technology made it possible to operate four 9355 modular UPSs in parallel in the main theatre building without the need for separate synchronisation connections. This meant that the critical loads could be distributed among the four UPSs to provide absolute supply protection: the HotSync system automatically performs

internal diagnostics on the UPSs and, should a module fail, it immediately isolates the defective module and transfers the load to the remaining modules. The HotSync technology also makes it easy to implement scalable parallel systems that allow for future increases in power requirements.

Further advantages of the Eaton 9355 and 9395 UPSs used in this project include ABM three-step charging technology which continuously monitors battery status, optimising charging time and extending battery life by up to 50%; compact tower construction that saves valuable

space; and internal battery accommodation that eliminates the need for cumbersome and expensive external battery banks.

## Results

The Bolshoi Theatre and its warehouse now have a robust power supply system based on Eaton UPS technology. The system's stable and dependable operation eliminates power-related problems, maximises quality in the production of one-of-a-kind theatre displays and guarantees reliable storage of valuable artefacts in a nitrogen-saturated environment.



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Publication No. SuccessStoryBolshoi15  
April 2015

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