

PC-based control technology at the Müpa Budapest festival hall

Festival theater modernized with advanced stage and acoustic technology

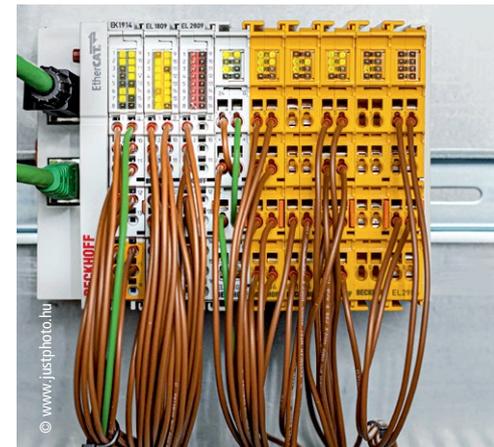
Müpa Budapest provides space for three expressive arts: music, fine art and theater. The festival hall boasts a multifunctional theater with what the operator claims to be one of the world's leading acoustic designs. Hungarian company Szinpad Automatika Kft. was commissioned with modernizing and further developing the stage and acoustic technology in the festival theater in 2019 and relied on PC-based control technology from Beckhoff in the process.

Müpa uses over 250 mechanically operated stage and acoustic systems. Some of the systems have their own controllers and operating units. There are also smaller groups that share control systems. In the concert hall, approximately 150 systems can be moved from one control panel, and the main computer for the theater also controls more than 40 systems. Szinpad Automatika has been looking after most of the systems since 2014. The Budapest-based specialist focuses on stage construction, maintenance and development of stage devices and new device installations. It also designs new mechanical systems together with the Müpa Main Engineering department.

Upgrade with TwinSAFE integration

In 2019, work began on modernizing and optimizing the proscenium (front stage) control system. Some parts had already been in operation for almost 15 years, which was a reason for replacement in itself and provided a great opportunity for modernization. After evaluating systems from different suppliers, Szinpad Automatika opted for PC-based control from Beckhoff, as Managing Director József Bálint explains: "When it came to general control technology requirements, we needed a deterministic system with a sufficiently high capacity to carry out synchronization tasks and more flexible programming compared to PLC devices. With its PC-based control technology, Beckhoff fulfills all these criteria and also offers a wide product range, comprehensive support, high levels of flexibility in terms of programming and connectivity as well as seamless integration of safety technology with TwinSAFE."

"In the festival theater, we operate eight stage systems using one user interface. The largest stage system is used to raise or lower the orchestra pit, which can be used as a cavity, forestage or auditorium. This lift comprises three motorized parapets to separate the area from the auditorium. Two stage lifts, a loudspeaker holder and an acoustic panel holder installed overhead cover this smaller stage area in front of the auditorium's safety curtain," explains Gyula Cseh, head of stage technology at Müpa.



EtherCAT and TwinSAFE Terminals in the control cabinet for controlling the orchestra pit

With the previous system, only the orchestra pit itself could be controlled and positioned. This has now been extended to the four systems of the upper stage area, which could previously only be moved at one or two speeds and without an indication of the height or magnetic field control. Since the modernization, all five of these areas have been controlled via the ultra-fast EtherCAT real-time communication system. With this, it is possible to synchronize the existing island controllers and also transmit safety-relevant data between the controllers and the TwinSAFE EtherCAT Terminals. A CP6600 built-in Panel PC with touchscreen and the TwinCAT 3 PLC software runtime form the central control unit. "The biggest challenges in the project were the group operation of safety switches, pinch protection sensors and emergency stop keys, as well as the fact that the controllers are located in three different rooms. TwinSAFE from Beckhoff proved to be a good solution here. The EL1918 EtherCAT digital input terminal that provides TwinSAFE Logic is installed in the control panel, while the other TwinSAFE I/Os are located directly in the relevant control cabinets on-site," explains József Bálint.

Gyula Cseh adds: "One advantage of the new system is that we can now move and position these somewhat cumbersome stage systems at the same time and in any combination. This increases efficiency and accuracy significantly during



Theater at Müpa Budapest with the Beckhoff CP6600 built-in Panel PC integrated into a control panel

preparatory work. What's more, we can save nominal values with specific designations in the controller and call them up to reach the required target positions quickly and precisely. In line with the development strategy, the long-term goal from the outset was for the operators to be able to save all necessary information in the automated systems themselves during technical maintenance of the individual productions and then be able to call up the relevant data from here during recurring shows. Our expectations have been met in all areas."

During the development of the new proscenium control system, the four manual stage lifts in the backstage area were also automated. The operator now selects the required direction of movement on the touchscreen of the CP6600 Panel PC and can then move the lifts in groups at the touch of a button. What's more, all relevant information, e.g., to protect against overloading and to monitor the rope tension, is shown on the display.

PC-based control promotes flexibility

With a view to further developments, József Bálint summarizes: "We have had very successful experiences with Beckhoff technology up to now and have further developed our system so that it can be scaled up to several hundred axes if necessary. Depending on the number of axes, the synchronization tasks

are carried out by a suitably powerful controller. We benefit particularly from the broad and finely scalable Beckhoff IPC range in this regard. In a typical configuration, the CP6600 (10.1") or CP6606 (7") built-in Panel PC with ARM Cortex™ A8 processor is used, both of which are ideal for controlling up to 10 axes. For a larger number of axes, the C6015 ultra-compact Industrial PC with Intel Atom® processor is the perfect choice. TwinCAT 3 is used consistently as the control software." Real-world examples of applications using the C6015 are the scalable 14-axis controller for the Szigliget theater in the city of Oradea and a scalable three-axis controller for the Csiky Gergely Hungarian state theater in Timișoara, both in Romania.

More information:

www.mupa.hu

www.szinpadautomatika.hu

www.beckhoff.com/entertainment-industry