



World class concert acoustics with Beckhoff automation technology

The Sibelius Hall in Lahti, Finland is renowned for its excellent acoustics, which were designed by the American acoustic designer Russell Johnson. It is the dynamics of the acoustics that are so special: mobile wall elements, so-called acoustic doors, make it possible to change and to dynamically adopt the room reverberation to suit the performance and the desired sound quality. As part of a controller relaunch on the basis of Beckhoff automation components, the adjustment of the acoustic doors has been optimized so that concert audiences can now enjoy perfect sound.

The Sibelius Hall was built with the ambitious goal of creating unique acoustics, despite a comparatively low budget. In the implementation of the building, the architects Hannu Tikka and Kimmo Lintula made particular use of a natural material: wood. The side walls of the cuboid 1299-seat concert hall are made of veneered timber shells, which are filled with sand. Due to their solidity, the walls can also reflect low tones. In addition, the concert room is flanked by so-called echo chambers, which are as high as the building itself. They are equipped with 188 mobile wooden

doors, with which the reverberation time of the sounds can be adjusted, depending on the effect desired by the musicians.

Beckhoff Embedded PC optimizes the hall acoustics

The American company Artec Consultants Inc., which was founded by Russell Johnson and whose name is synonymous worldwide with the realization of concert halls, was commissioned to design these extraordinary acoustics. However, during the use of the Sibelius Hall, which was



The acoustics of the Sibelius Hall in Lahti in Finland, which were designed by the legendary acoustic designer Russell Johnson, are world class. The side walls of the over 1299-seat concert hall are made of veneered wooden shells filled with sand, which ensure optimum resonance.



The Sibelius Hall is flanked by wall-high echo chambers, which are equipped with 188 mobile acoustic doors. A Beckhoff Embedded PC from the CX series controls the positions of the acoustic doors via the KL2612 relay terminals. The reverberation time can be precisely adjusted according to the resonance effect desired by the musicians.

completed in 2004, it was determined that the solution for the automatic control of the acoustic doors was unsatisfactory. As a result, the Finnish company Keraplast Oy, based in Orimattila, Finland, was commissioned to relaunch the controller. Keraplast installed a Beckhoff Embedded PC from the CX series as the central controller, via which the 188 door elements are controlled. Relay Bus Terminals distributed to five PROFIBUS Bus Coupler stations control the asynchronous motors. Feedback is provided by digital input terminals, which detect the positions of the doors and pass them on to the controller – a solution that is as simple as it is inexpensive. “Beckhoff was chosen as control system provider because of really good pricing and industrial quality components. Now, the system has been proven to be really reliable in several events that have been held in the concert hall. Even though system layout is rather simple, the huge amount of controlled doors made an extra effort for the realization”, says Keraplast Project Leader Toni Potinkara.

The sound experts at the Sibelius Hall are satisfied with the results: The doors can be positioned accurately and with high repeatability, individually or in groups, so that the room is widened or narrowed depending on the desired resonance. In this way the reverberation time can be increased up to “cathedral reverberation”. In addition the CX has sufficient memory space to save a large number of door positions for different performances. A Beckhoff C5102 Industrial PC serves the musicians as a web server in order to access the position of each individual acoustic door.

Further information:

Sibelius Hall www.sibeliustalo.fi/en/sibelius-hall
 Keraplast Oy www.keraplast.fi
 Beckhoff Finland www.beckhoff.fi