



NEW SOUND IN MONUMENT PROTECTION:

TECHNICAL MODERNIZATION OF THE SOUND SYSTEM
IN MAGDEBURG CATHEDRAL

MEDIA SOUND AND VOICE ALARM USE THE SAME LOUDSPEAKERS



CATHEDRAL ST. MAURITIUS UND KATHARINA ZU MAGDEBURG

The Cathedral of St. Mauritius und St. Katharina in Magdeburg relies on a sound reinforcement system from Pan Acoustics for the transmission of speech. The special feature: The spoken word and the congregation's singing are reproduced via one and the same system during the service, but at the same time it can also be used for voice alarms in the event of an emergency. Thanks to intelligible announcements, the system provides significant support in safely evacuating church visitors if the going gets tough.

Historically significant building

The Cathedral of St. Mauritius und St. Katharina in Magdeburg looks back on a long and important history. Thus, Magdeburg Cathedral, with construction

beginning in about 1207, is considered the first Gothic cathedral building in Germany. At the same time, the cathedral serves as the burial church of Otto I the Great, the founder of the Holy Roman Empire. The building was severely damaged during World War II and reopened after restoration in the 1950s. The cathedral consists of a nave with two aisles. The rood screen, a stone wall, separates the nave from the high choir behind the altar area.

Sophisticated architecture and use

The Gothic design of the cathedral with high side aisles and the high nave looks simple and imposing at the same time. The light-colored stone creates a pleasant atmosphere. The nave has a total length of about 71 meters and a height of about 31 meters; the side aisles are 60 meters long and 12 meters high. Aisles and nave have a width of about 10 meters.



This results in a large volume of space, which brings with it a corresponding reverberation time in the cathedral of 6.6 seconds when empty. If an audience is present, the cathedral's reverberation time is reduced to 3.8 seconds when fully occupied.

The cathedral is primarily used for mass celebrations, weddings, baptisms and church services; it is also used for cultural purposes such as readings, concerts and award ceremonies. The performances of the cathedral choirs and wind instruments as well as organ playing have a long tradition in St. Mauritius und Katharina zu Magdeburg.

Project requirements and implementation

The task at Magdeburg Cathedral was to modernize the aging sound reinforcement system - consisting of compact, passive column speakers - and make it fit for the future. In addition to increasing speech intelligibility and acoustic coverage in the cathedral, modern signal management and on/off turning of individual sound reinforcement areas was required. The basic idea for the sound reinforcement in the project „Dom zu Magdeburg“ was to guarantee a good and even direct sound distribution in the audience and at the same time to excite the reverberation of the room as little as possible and to avoid energetic sound reflections.



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MAGDEBURG, GERMANY



The challenges: Dual function and monument protection

The challenge in this project consisted of two additional details: On one hand, the public address system also had to serve as a voice alarm system and on the other hand, it was necessary to intervene as little as possible in the building fabric. This is often a real challenge when running cables.

The project was helped by the fact that the floor of the cathedral was renovated a few years ago. Planned with foresight, empty conduits were laid in the floor to the lateral columns of the nave, which end in a passage under the floor of the cathedral. These empty conduits and the passage under the floor could be used for the upcoming construction work, even though the cable pull proved to be non-trivial due to the small cross-section of the pipes.

In the beginning there was planning

The realization of the new sound system was preceded by a lengthy design and evaluation phase, during which the cathedral congregation, together with a specialist consulting office, embarked on a search for the best possible sound solution. Through a trial soundsystem setup, the design group finally found ideal loudspeakers from Pan Acoustics that stood out for their pleasant, natural timbre and guaran-

teed good to very good intelligibility in the cathedral. Active line array loudspeakers with beam steering technology were selected, which are easy to operate and, thanks to DSP control, can emit the sound specifically to selected audience areas depending on the requirements (church service, concert, fully occupied church, sound reinforcement only in the front area). In addition to the audio and control signals, active line array speakers require a mains cable for the power voltage. Having to pull two wires into the mentioned empty conduits in the floor and then laying these wires on the stone columns accordingly, would have presented an almost unsolvable problem.

The implementation: „minimally invasive“, space-saving and discreet

This is where the clever solution from Wolfenbüttel-based Pan Acoustics came into play with the active loudspeakers from the Pan 2-Line series: Audio data, supply voltage and control data are transmitted via two-wire network technology. Thus, the proper solution for a minimal intervention in the building fabric was found, since the use of the narrow empty conduits and a discreet laying of the cables in the visible area of the stone columns was no longer an obstacle.



Now the second detail had to be considered, the use of the public address system as a voice alarm system. Together with the design office, representatives of the municipality and the dome personnel, a solution was found for this as well. The loudspeakers used in the Pan 2-Line series are based on the Pan Beam series. The Pan Beam series can be used in ENS systems according to DIN EN 50849 and in voice alarm systems according to DIN 0833-4. What was missing from the Pan Beam loudspeakers in Pan 2-Line design was a contact closure to be monitored in case of a loudspeaker fault. Since this contact is present in the loudspeakers as standard, it simply had to be routed to the outside through a new connector. This meant that nothing stood in the way of monitoring the loudspeakers via the SAA central control unit. The Central Control Units for the Pan 2-Line loudspeakers, which are necessary for operation, were also modified so that integration into a redundant, battery buffered voltage supply became possible.

After these two hurdles had been overcome, further design could be continued in terms of the number of loudspeakers to be used per sound reinforcement zone.



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In the nave 4 x PB 16-P2L, in the side aisles 4 x PB 04-P2L each and in the high choir 2 x PB 12-P2L are used. For the area around the baptismal font, two additional PB 08-P2L were chosen to ensure the acoustic reference explicitly during baptism ceremonies. For signal processing in the media sound area, a Yamaha Audio Matrix with expansion was installed, which is operated via a Crestron media control system. In the SAA area, a Bosch controller is used to monitor the public address zones and provide the announcement texts for the fire alarm control panel (FACP) alarms. A redundant Dante network with an interface to the voice alarm control center is used for signal distribution in the media sound area.

Conclusion

Special solutions often have to be sought in listed buildings. Due to the great know-how of Pan Acoustics in the areas of acoustics, signaling, guidelines and also the development and production of innovative sound reinforcement solutions, competent help was offered to the users and operators of the cathedral and a sound reinforcement system was found that meets all requirements and can definitely be heard and seen.

THE MOST IMPORTANT KEY DATA

Special features	A combined sound system for public address and voice alarms
Challenge	Monument protection
Used product series	Pan 2-Line
Building owner	Protestant cathedral parish

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