People power

Involving musicians in the process of tuning a concert hall is necessary to balance the science and art of acoustics

The art of acoustics has always been an important factor in the success of venues for music performance. Historically, this subject was sometimes left to the intuition of the architect in the absence of any scientific understanding of the physics and perception of sound. "Nowadays, acoustics is a well-established technical discipline," says Eckhard Kahle, acoustician and founder of Kahle Acoustics. "As a result, concert hall acoustics are often assessed from a purely technical perspective, turning a deaf ear to what the musicians on stage hear and feel. It would seem worthwhile to invest in an approach where the design and appraisal of acoustics are in the hands of specialists who are both scientists and musicians."

This would be mirrored in the approach to understanding and evaluating the acoustic quality of a venue by not only taking physical measurements but also listening as a musician and an audience member. It would be part of the DNA of such a team to play an active role in rehearsals and concerts, acting in turn as technician, listener and musician performing on stage. Kahle Acoustics says that understanding a hall's acoustics from a musical perspective is key to providing acoustic solutions that are creative, architecturally well-integrated and cost-effective.

L'Auditori Barcelona

The following case studies shed light on what can be achieved with such a multidisciplinary approach. The first of these is the 2,000-seat concert hall Sala 1 Pau Casals at L'Auditori Barcelona in Spain. "Acoustic problems on stage had been reported by the musicians ever since its inauguration in the late 1990s," says a Kahle Acoustics spokesperson. "A number of acoustic measurement campaigns had been carried out, but none succeeded in explaining the complaints on stage, let alone proposing solutions to fix it."

In 2022, Kahle Acoustics was invited to carry out tests to identify the acoustic problems and propose solutions. After several visits, extended listening sessions, acoustic measurements and 3D modelling, a series of prototype reflectors and carefully placed absorption were temporarily installed in the hall for testing. A questionnaire and many conversations were used to assess the musicians' acoustic impressions while playing in the new conditions. Incorporating their feedback, adjustments naturally followed, encompassing optimised surfaces on stage and in the room. The Sala 1 reopened in October 2024, impressing the musicians, the audience and the press. The project showcases how close collaboration with musicians and the venue's staff enables creative and bespoke acoustic solutions to be developed that are well blended into the architecture.

Kahle Acoustics' acousticians have a background in music and science

Townsend St Church, Belfast

Historic houses of worship are another context where Kahle Acoustics has been regularly asked to find acoustic improvements. Between 2017 and 2023, Kahle Acoustics helped to transform a church in Belfast, Northern Ireland, into a rehearsal space and home for the Ulster Orchestra. "This former Orthodox church was not offering appropriate acoustics to enable the orchestra to rehearse properly," says the Kahle Acoustics spokesperson. "The challenge was to find solutions that were simple, cost-effective and that could be easily installed without requiring major alterations to the historic building."

Several listening sessions and acoustic tests were undertaken during orchestral rehearsals to define and optimise the proposed acoustic

Top left: **Optimised acoustic elements integrated around the stage and back wall of Sala 1 Pau Casals at L'Auditori Barcelona in Spain**

Above: **Acoustic surfaces optimised in Townsend St Church in Belfast, the new home of the Ulster Orchestra**

surfaces. Curved reflective panels were added to the peripheral balcony fronts and behind the conductor to aid musical communication between musicians. Acoustic curtains were also installed around the auditorium (under the balconies) and over the seats in the upper gallery to limit excessive loudness and rebalance the sound energy in the space.

Theater De Oranjerie

At Theater De Oranjerie in Roermond, the Netherlands, Kahle Acoustics participated in the renovation of the hall to better accommodate a wider range of performances including theatre, amplified concerts, orchestral music and wind bands, as well as corporate events. Among the improvements, a new (partial) orchestra shell was added to the stage. Each element of the shell was defined and optimised using acoustic simulations before installation. The final acoustic optimisation was carried out on-site with a musician member of Kahle Acoustics on stage (viola) and finally with a chamber orchestra including two musician team members. The company shares that this musical experience is always very insightful, as it allows acousticians to fine-tune acoustics both from the perspective of a musician on stage and a listener in the hall.

Ecole des Musiques Actuelles

The company also carried out the renovation of the Ansermet auditorium (École des Musiques Actuelles) in Geneva, Switzerland. One of the aims was to increase capacity to 300 seats without compromising the hall's acoustic reputation for

Above: **Acoustic tests for fine-tuning the stage acoustics in Theater De Oranjerie, Roermond, with musician members of Kahle Acoustics and then with the orchestra**

Top right: **Musician members of Kahle Acoustics participate in acoustic tests to fine-tune the Ansermet auditorium**

Opposite page: **Active acoustic system tuning at the Sala Palatului in Bucharest**

Below: **The École des Musiques Actuelles in Geneva**

classical music. The team developed a fully immersive sound system to retain the intense musical experience of classical music while also enabling new creative uses with amplified music. The room acoustics have also been improved by developing highly flexible natural variable acoustics systems in addition to the immersive active acoustics system. In-situ acoustic tests with the team's musicians (in this case a drummer and a viola player) enabled the immersive system to be fine-tuned and the acoustic variability to be adapted to the various uses. "Musical listening combined with the skillset of experienced acousticians enabled optimal acoustic conditions for musicians on stage and listeners in the hall to be developed quickly, resulting in a very natural sound quality," says the Kahle spokesperson.

George Enescu Festival

Fast, yet detailed active acoustics system tuning is very important for the George Enescu Festival. The biennial event, launched in the 1950s, draws orchestras from all over the world. Concerts are held in the 4,000-seat Sala Palatului in Bucharest, Romania. "In its natural state this venue is very dry and not at all suited to classical music," says Kahle's spokesperson. "Since 2009, Kahle Acoustics has been invited to improve the

acoustic experience of this event by designing and tuning an active acoustics system installed for the occasion. The team always succeeds in creating a natural reverberation in the hall and communication reflections to the musicians."

These experiences have also led to great collaborations with major conductors and orchestras – Kristian Järvi and the National Youth Orchestra of Romania in 2015, the London Philharmonic Orchestra conducted by Vladimir Jurowski in 2017, and Paavo Järvi and the George Enescu Philharmonic in 2021.

Because of its way of approaching acoustic design, listening tests and musical tuning, Kahle Acoustics is often asked to support orchestras, musicians and local authorities in improving the acoustics of their music rooms. Thanks to extensive experience and active listening, very specific, optimised and architecturally integrated acoustic solutions can be developed for each venue, be they temporary, a protected landmark building or a new construction, and for wide range of musical styles. ■

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Photos: Kahle Acoustics