

Alpine charm

Simon Duff reports on a new concert hall in the Swiss Alps deploying an active acoustics system . . .

[Switzerland] Set in a picturesque valley in the heart of the Swiss Alps, Andermatt is famed for its ski resort, but a recent major development of the former Swiss Army National Service training ground has turned the charming Alpine village into a year-round tourist destination, complete with new amenities and hotels, plus a stellar arts venue.

Designed by Studio Seilern architects, Andermatt Concert Hall is located at the heart of the main square and forms part of the Radisson Blu Hotel. With wrap-around front glazing, a sculptural timber ceiling and spacious, naturally-lit interior, the new venue has completely repurposed an underground space that was intended to be used for hosting used conventions and conferences. The venue's acoustic design was by Kahle Acoustics, specialist in acoustics consulting for performing arts, while theatre consultant for the project was dUCKS Sceneo, structural engineering was by Suisseplan and lighting design was by MichaelJosefHeusi GmbH.

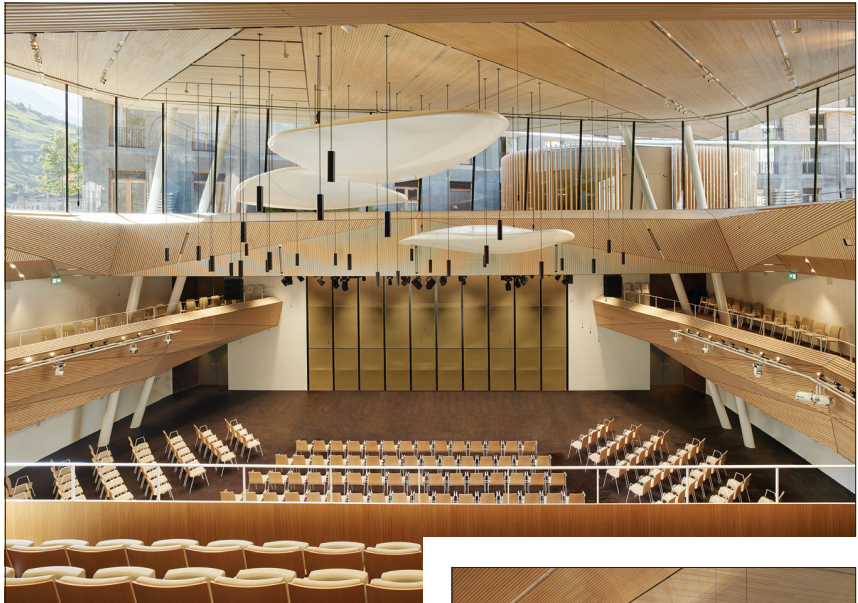
A major part of Studio Seilern's scheme involved lifting a large section of the existing roof to double the effective acoustic volume, thus increasing the venue's total capacity and enabling it to host a 75-piece full symphony orchestra and a total of 663 audience seats. Raising the roof also enabled the architects to give the building a sculptural presence within the village and to rethink the traditional notion of a concert hall as a closed and inward-looking space. The glass façade means the hall is awash with natural light. During a winter concert, the audience is surrounded by a whirlwind of snow; in the summer by nature and sunshine.

ACOUSTICS

Brussels-based Kahle Acoustics started work on the Andermatt project in early 2016 with the hall opening in June 2019. Lead acoustic designers on the project were Eckhard Kahle and Evan Green.

Green explains the company's background: "I think what is really special and unique to the company is that every member of the team is both a trained acoustician with a physics or engineering background as well as an active musician. With the team's background both in music and science, Kahle Acoustics is very attuned to the requirements of musicians, audiences and performers."

Kahle's work on the Andermatt Concert Hall started with testing several alternative solutions before completing the final concept development with Studio Seilern. This involved almost doubling the volume by cutting the concrete lid off the existing 'bunker' structure and raising the roof to let in natural light.



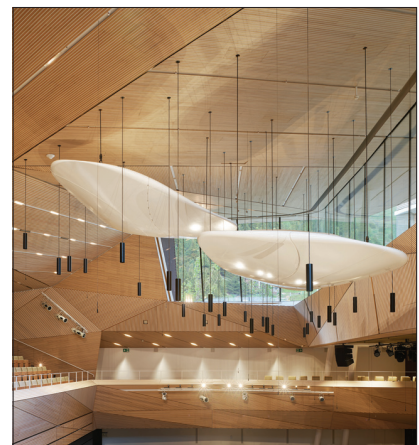
"Musicians love spaces with natural daylight," explains Green, "and the position of the windows relative to the stage was carefully considered to avoid any direct sound reflections from the glass. Before hitting the glass, the sound has already been reflected a couple of times from other wooden surfaces inside to become warmer. To ensure that outside noise does not disturb performers in the hall, the glass has a high acoustic rating and is double-glazed, using laminated glass."

Even though the volume of the hall was increased to around 5,000m³, the main challenge was still to create an acoustic that was suitable for orchestras and performers who are more used to performing in 'full-size' concert halls, with an acoustic volume of the order of 15-20,000m³.

An important feature of the hall is that the stage end is wide enough to accommodate a full orchestra, connected to a shorter audience end. The acoustic design needed to keep the 'loudness' of large orchestras manageable whilst still creating a rich, detailed and characterful acoustic. The solution was to optimise the natural acoustics to provide early reflections, thus giving acoustical character, presence and clarity in the sound. Kahle Acoustics' own in-house software operates directly in the architect's 3D computer model.

ELECTROACOUSTIC ENHANCEMENT

In order to provide an enveloping and resonant late reverberation, both for the audience and as a "hall return" back to the musicians but without excessively increasing loudness, an electroacoustic enhancement in the form of the Amadeus



↑ The hall's double-height ceilings, timber interior and acrylic reflectors all enhance the acoustics

The Amadeus system uses a mix of Renkus-Heinz and Atlas Sound speakers

Evan Green of Kahle Acoustics

Active Acoustics system was used.

"Achieving a reverberation time of 1.7 seconds with natural acoustics alone would have made the sound too loud," says Green. "The Amadeus Active Acoustics enabled us to balance the reverberation time with loudness. It was a challenge to create a perfectly natural match between the natural early acoustic and the electroacoustic enhancement for the late reverberation, but after careful tuning, the long reverberation from the Amadeus Active Acoustics sounds completely natural and is now part of the acoustic character of the hall."

The Amadeus system uses around 25 DPA SC4098 microphones and 75 loudspeakers, predominantly Renkus-Heinz CX41 and Atlas Sound ALA10T and ALA5. Amadeus Active Acoustics provides and programmes the main acoustic processing engine which is controlled via an iPad interface. When the system is

switched on, the reverberation time increases to 1.7 seconds and there are multiple settings of the system that compensate for the total acoustic absorption produced by the audience. This way, the acoustic of the hall can be set to stay relatively consistent between the rehearsal with no audience and performance with a full audience. There is also a dedicated opera setting for situations when the windows are covered with curtains, providing a reverb time of 1.4 seconds. The background noise level in the hall is below NR15 with the ventilation system running.

The building materials used inside the hall also play a role in the room's acoustics. Wood finishes are oak veneer on MDF with wood surfaces untreated to leave the pores open and to provide a warm sound. The floor is solid wood, parquet. The white plasterboard walls are angled to project sound from the stage, whilst the suspended acrylic reflectors provide early reflections to the musicians and audience.

The gold-coloured rear wall of the stage and black stage ceiling are both made of an acoustically-transparent metal mesh with a mixture of sound-absorbing and sound-reflecting surfaces hidden behind the mesh.

The first step in tuning the acoustic of the hall was to adjust the height and angle of the acrylic reflectors. "This adjustment was carried out through detailed listening with one of us on stage either speaking or playing an instrument," says Green. "I am a guitarist, my colleague Eckhard plays the viola, and our other colleagues moved throughout the hall, listening critically to ensure that the reflection coverage was even."

The base reverberation time with the Amadeus system switched off is around 1.3 seconds - this setting is used for speech and amplified events such as conferences. For conference use and amplified music performances, a left-right line array loudspeaker system is

available in the form of three d&b audiotechnik Yi12 loudspeakers and two Yi subwoofers. The console is a Yamaha TF1 with wireless microphones, including a Shure QLX-D.

FULL OF PRAISE

The Grand Opening at Andermatt in June 2019 saw the Berliner Philharmoniker perform works by Mozart and Shostakovich conducted by Constantinos Carydis.

In February 2020, Daniel Barenboim gave a Beethoven piano recital. After the concert, he was full of praise for the new venue, saying: "Andermatt Concert Hall captivates the audience with its most wonderful harmony between design, rich acoustics and a stunning panoramic view of the surrounding Alps. This concert hall has transformed Andermatt into a magnificent musical destination to look out for." ❖

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