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Clever architecture and well-thought-out acoustics have enabled a new Guangxi venue to stage a range of events in its three halls – even at the same time

Nanning's new Culture and Art Centre incorporates three halls to accommodate various musical performances

The city of Nanning, in Guangxi province, China, has built a new Culture and Art Centre. The complex consists of an 1,800-seat opera house, a 1,200-seat concert hall and a 600-seat multipurpose auditorium. The complex also includes rehearsal rooms, dressing rooms, workshops and more, enabling it to stage a range of artistic performances at the highest level.

Plans for the facility were drawn up following an architectural competition that attracted leading architectural practices from around the world. The contract to design the new structure was awarded to gmp from Hamburg, Germany. The architectural and structural acoustics, as well as the planning of the AV system, were contracted to German firm Müller-BBM. The idea behind having just one planner involved was to ensure better interface management and greater synergies.

To avoid cost-intensive acoustic separation of the three halls when they were scheduled to be in use simultaneously, gmp designed them as single buildings above a common basement. This natural separation made it possible to use simple build-ups and even to avoid floating constructions in most areas of the various floors. Each building has a separate foyer leading into the performing space. They are connected by a common platform that offers a stunning view of Nanning.

The horseshoe

The Opera House is designed as a modern interpretation of the traditional horseshoe shape, to ensure perfect sightlines and direct sound distribution for each of its 1,800 seats. It features the latest in stage technology, designed by Kunkel Consulting of Germany.

The interior walls feature wood veneer clad to MDF panels, and have a minimum mass exceeding 40kg/m² (8.2 lb/ft2) to ensure the reflection of the low frequencies. The technical equipment necessary to run shows is mostly hidden from the audience. The lighting bridge for scene lighting is integrated into a large canopy inside the ceiling above the audience. The loudspeakers are a full set of high-power integrated steerable line sources and special very slim subwoofers inside the proscenium arch. This means that a great-sounding full-power sound system is available at any time without resetting loudspeaker systems. A top-class digital sound mixing desk has been installed in the control room. For video images, a large-format video projector has been installed, with different selectable image sizes.

Acoustic results

The Opera House's reverberation time, when occupied, is designed to reach 1.8 seconds. Measurements from May 2018 show that this was achieved. The variance between occupied and unoccupied measurements was less than 0.2 seconds, thanks to the chairs selected. An optimum balance between the orchestra inside the pit and the singers on stage is achieved in the audience area by reflections inside the proscenium area, which force the singers to overcome the musicians for a balanced sound.

Images: Christian Gahl, Berlin

Above: **The Opera House, which has a reverberation time of 1.8 seconds**
Below: **The Concert Hall, which has a classic shoe box design**

Meanwhile, the architectural design of the concert hall follows the basic design of the classic shoe box. After decades of development and optimization in the field of concert hall construction, this classic form has emerged as acoustically optimal. The Nanning Concert Hall, designed in this way, and being geometrically perfect, is characterized by unique sounds.

Concrete solution

Wooden cladding was to be used for the walls, but fire regulations in Guangxi province meant that glass-fiber reinforced concrete (GRC) had to be used instead, and covered with Japanese wood veneer to give the appearance of a wooden hall.

The reverberation time is 2.1 seconds in the mid frequencies, an optimum range for a concert hall of this size. Due to the heavy mass of the hall's boundary surfaces, the low frequencies increase by 0.3 seconds, giving a warm sound.

For the sound system, a top-class sound mixing board was installed, along with a sophisticated multitrack recording system with a high number of microphones. Different loudspeaker systems are available.

The black box

The multipurpose auditorium was designed as a black box. Retractable seating was installed to facilitate a wide range of shows.

The architectural acoustic for this hall was planned as a variable acoustic, to match the flexibility of the hall. Thus, the reverberation time was set at its lowest levels for all performances, at about 1.0 seconds. Any necessary increase in reverberation will be carried out with the help of a Vivace electroacoustic enhancement system.

The multipurpose auditorium is equipped with a multichannel loudspeaker system which enables full sound reinforcement within any of the different room settings. All channels are freely configurable. The loudspeakers themselves are installed out of sight, behind acoustically transparent wall material. The digital sound mixing desk can be reset in seconds for any room configuration. ■

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