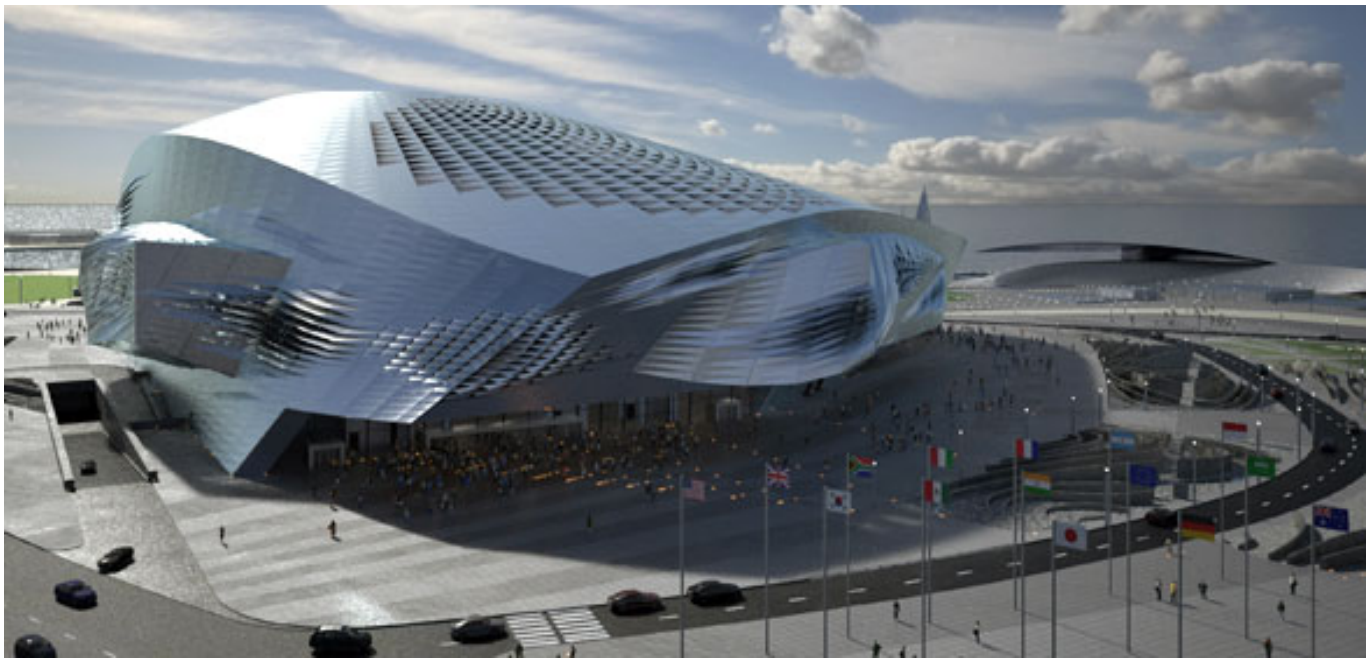
Dalian International Conference Center

Giant Multi-purpose Convention Centre Opened in China

Photos: Salzbrenner Stagetec and COOP HIMMELB(L)AU



The new Dalian International Conference Center is the newly constructed landmark for the aspiring seaport town Dalian in the north-east of China. The awe-inspiring building ensemble of the conference center is located in the heart of the new city district close to the sea, a prominent addition to the city skyline. It serves the entire region as a convention centre, theatre, opera house and exhibition centre. The complex will shape the cultural and economic life of the region significantly in the future. The goals are ambitious.

Like every other aspect of the building, the technical design was based on a single premise: Nothing but the highest quality equipment. Everything must be consistent, from the highest audio quality and maximum flexibility to optimal robustness with absolute reliability of the associated equipment. The planning team decided that the audio system should be based on STAGETEC components. The building construction was completed in June 2012, followed by installation and testing of the technical systems. The official opening ceremony was at Christmas 2012, with star pianist Lang Lang top of the bill.

This building is unconventional and so is the interior floor plan. At the core of the building are the large opera hall called the Star Grand Theatre with a seating capacity of 1,600, comparable with La Scala in Milan, and the adjacent Ball Room, which is actually a flexible multi-purpose convention space for 2,500 people. Thanks to this arrangement the main stage is shared by the two venues, the classical theatre auditorium and the multi-purpose hall. The main stage also features wings

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just like a traditional theatre.

This variable layout scheme extends the possible application options ranging from conventions to chamber music and symphonic performances, to theatre productions and classical opera. From a technical perspective, the two largest venues in the building – the Star Grand Theatre and the Ball Room – are of particular interest. A NEXUS network, which provides functionality extending far beyond audio routing, forms the basis of the flexible event-management system. The theatre hall audio-control room houses a fully equipped CRESCENDO with 40-faders which can be supported with a mobile 24-fader daughter console used for FOH or Monitor application. One 24-fader AURATUS is installed as an FOH desk in the Ball Room. Whether used for sound-reinforcement, playout, recording or producing, this combination of consoles together with the networking ensure that the audio systems can be utilised in many different configurations to suit the wide range of purposes the rooms are used for.

The manifold variety of applications for the Dalian International Conference Center require different acoustic conditions. Meeting this objective demanded the same degree of perfection required of all the other systems. Therefore, the renowned room-acoustics experts from Müller-BBM, a company the MEDIAGROUP has already co-operated successfully with on numerous projects around the world, supported the project from the planning stage. In Dalian, Dr Eckard Mommertz was in charge of the acoustics concept, which needed to provide a high degree of variability. Lectures and conventions require short reverberation times for good intelligibility. However, opera perfomances need a moderate reverberation time in the range of 1.3 to 1.7 seconds, depending on the genre, and a symphony concert requires a reverb time of around two seconds for optimum sound. In the large theatre hall, with a volume of 14,000 cubic metres, the reverb time in its normal state is about 1.7 seconds. This can be reduced significantly to around
1.4 seconds for the empty hall using purely mechanical means. With an audience present, this value will be even lower.

To achieve this passive, purely mechanical change, sound-absorbing curtains are mounted behind the hall's custom panelling, which is made of perforated metal elements. Deploying the curtains creates drier acoustics without any visual change. Despite the artifice, using tricks like these to manipulate the room acoustics passively does not yet provide enough reverb flexibility to produce the ideal acoustic conditions for symphony concerts. And this is where the benefits of electro-acoustics come into play, specifically the Vivace digital acoustics-enhancement system.

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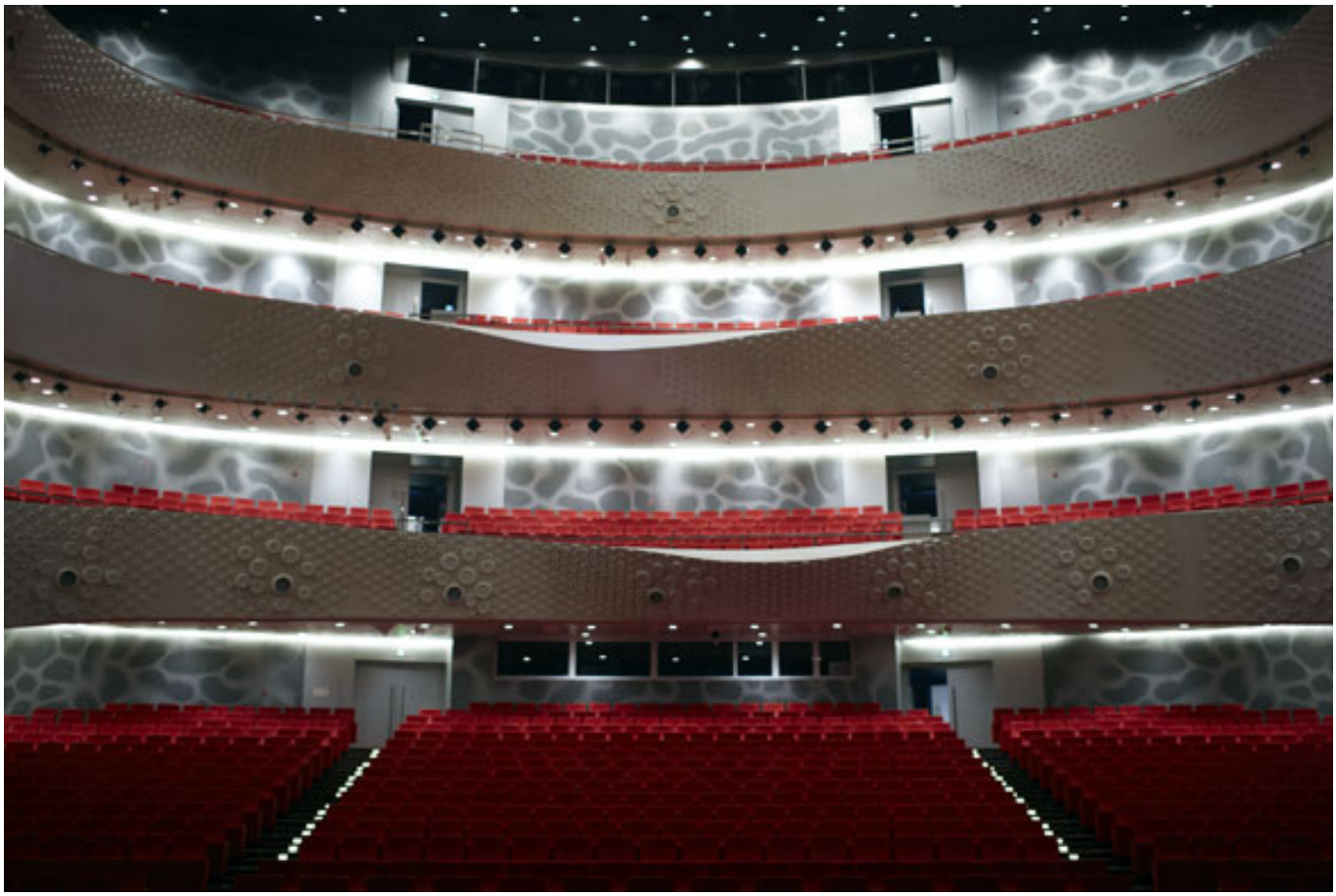

Vivace offers significantly longer reverb times of more than 2 seconds when the auditorium is fully occupied. Furthermore, the reverb can be designed to be composed with optimum early reflections emanating from the correct directions. In addition to pure room-acoustics features, Vivace also offers innovative functions such as the creation of three-dimensional surround sounds. In essence it works like this: The on-stage action is first captured by four suspended microphones. Vivace processes the resultant signals and replays them via the numerous loudspeakers in the room. The processing models the desired room acoustics adding "artificial" early reflections. When computed and placed correctly, these give the audience the impression of a room size appropriate for the music being performed.

One objective of this Vivace installation was to make the room larger acoustically. The natural reverb created using construction methods is 1.7 seconds, at the lower end of the range required for symphonic performances. Using technology to create longer reverb times and a reverb signal made-to-measure for the hall makes it appropriate even for large orchestras. This is the icing on the cake, turning a fine opera house into an ideal concert hall. When the very first presets were tested during the rehearsals, vocalists and musicians were already enthusiastic about what the system offers. This is because it changes the acoustic impression not only for the audience but also for those performing on stage.

"When a Vivace system is used, the performers get back more energy from the hall.

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Among other factors, this is due to the speakers mounted into the gallery baluster that cover not only the audience but also the stage," says Bjorn van Munster, product manager in charge from the SALZBRENNER STAGETEC MEDIAGROUP. The realistic manipulation of the acoustics is a key feature of the Star Grand Theatre in Dalian. The hall's inherent acoustic is first damped using the hidden curtains and is then recreated at the virtual level as desired. Results include not only fantastic concert-hall acoustics but also breath-taking artistic effects. For example, creating an extremely long reverb for experimental plays is no problem. The acoustic character of a concert can also be adjusted to suit the prevailing or local taste.

The Vivace processor computes a large number of signals emulating various early reflections in the virtual hall. Each reflection is then played out from an appropriately positioned speaker. The later a reflection arrives at the listener's ear, the larger the perceived hall is to him or her. And this is exactly why it is helpful to eliminate the physical acoustics at the Star Grand Theatre as a first step. Bjorn van Munster puts it like this: "If no physical reflections of the hall are perceivable, you are actually entirely free to create a virtual room of any size with the Vivace system." This gives rise to another application for the digital acoustics system: Only a technology such as this enables acoustics to be integrated into a performance and for acoustics to be altered precisely on scene changes. Apart from the processor, the audio matrix is the second main component of the Vivace. The matrix routes the computed signals to the appropriate speakers.

At this point, the system also adjusts signal levels and delays. When combined with speakers distributed around the hall, a matrix capable of doing this offers more than just acoustics virtualisation. For example, creating spatial panning of stationary sources or even those moving across the stage is very easy. If desired, this feature can be used in combination with a specific system for automatic tracking of the actors' or vocalists' actions on stage. Implementation of such a tracking system is not planned currently at Dalian but might be added at a later time. Other options include playing pre-recorded sources or sound effects through the 3-D space, which adds further benefits for imaginative, modern staging.

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With these two further benefits, the Vivace room enhancement system also becomes a classic sound-reinforcement system. In Dalian, the opportunities Vivace offers in the realm of theatrical effects have been even more important than the classical room enhancement, a trend which has been observed more and more in recent times. Where once acoustics-enhancement systems were used as discreetly as possible and were strictly separated from the main sound-reinforcement system, now the two technologies are growing ever closer together. The better the integration, the more possibilities become apparent for innovative sound design in 3-D space.

There is a bright future with even more opportunities for Vivace when used in combination with CRESCENDO and its extensive scene-automation features. For example, using a MIDI link or the NEXUS logic-programming features, the Vivace acoustics presets might even be triggered from the console-automation functionality. With this extensive MEDIAGROUP system, the Dalian International Conference Center sound crew have a truly powerful toolkit at their disposal! A prime example of the use of a Vivace and NEXUS set-up for the increasingly important live entertainment and events markets. Incidentally, Lang Lang enjoyed the Grand Theatre.

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