

## Shanghai Symphony Hall Opens

By Dr. Yasuhisa Toyota

Shanghai Symphony Hall, which I last wrote about in this newsletter's October, 2009 issue, opened on September 9, 2014. The project began in 2008. At first, the project scope encompassed only the rebuilding of the orchestra's rehearsal room. That plan grew to include seating for an audience of 600 to 800 persons and then expanded to seating for 1,200. Instead of a rehearsal room, the project became a splendid and well-appointed concert hall building with two halls and support spaces. The name of the building also changed to its current Shanghai Symphony Hall. With the opening of the hall this autumn, the Shanghai Symphony Orchestra now has a new home hall where it will perform most of its concerts and rehearsals. Exterior views are shown in Figure 1 and Figure 2.



Figure 1



Figure 2

Shanghai Symphony Hall

In August and September of 2008, a competition was held to select the project architect. Shanghai-based Isozaki + HuQian Partners won the competition and became the project's architect. I had the honor of participating in the competition as a member of the selection committee, so it's fair to say that I've been closely involved with this project from its inception.

At a very early stage of the conceptual phase of the project the Shanghai Symphony Orchestra directly retained Nagata Acoustics to be in charge of the hall's acoustical design and to serve as the acoustical consultant during all phases of the project for all acoustics-related needs, including managing the implementation of the design and on-site evaluations and measuring activities.

## The Concert Hall

At the beginning of the architect's work on the project, the client, the architect and Nagata Acoustics discussed the basic hall configuration options and agreed that the best configuration for this hall is the so-called vineyard shape, with seating on all sides of the stage and much of the seating divided into terraced blocks of seating. (The blocks of seating inspired this configuration's "vineyard" name.) The vineyard configuration enables us to design a hall where the audience seating is closer to the stage than is possible with other configurations. The audience's physical proximity to the performers increases the sense of intimacy in the hall.

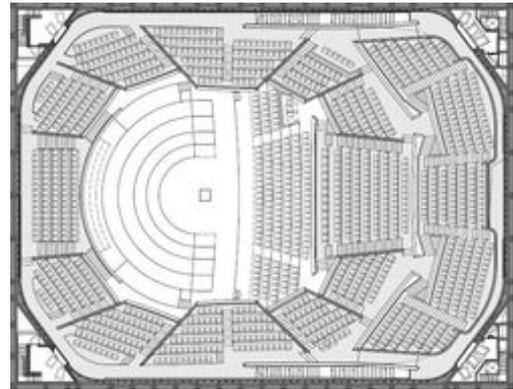


Figure 3: Plan of the Concert Hall

Plan and section views of the hall are shown in Figure 3, Figure 4 and Figure 5. The hall has a total spatial volume of 20,000 m<sup>3</sup> (706,000 ft<sup>3</sup>), which is a rather large spatial volume for a hall of 1,200 seats. The ceiling and the panels that protrude along the side walls are constructed of a wood product with a mesh-patterned finish that creates the acoustically needed sound diffusion that we desired for this hall. The concert hall interior is shown in Figure 6 and Figure 7.

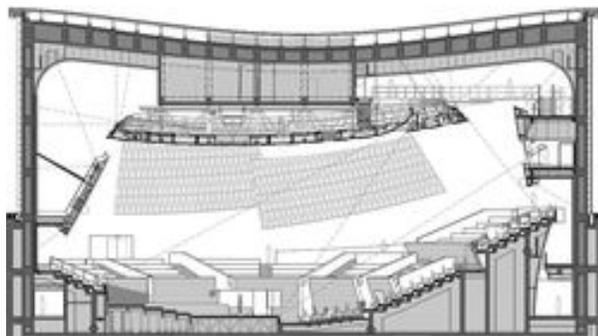


Figure 4: Longitudinal Section of the Hall

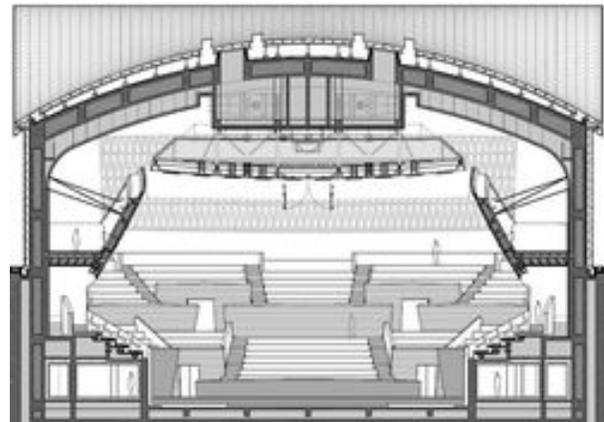


Figure 5: Cross Section of the Hall

Above the stage and audience seating, a ceiling panel hangs from the big ceiling at a distance of about 4-5 m (12-15 ft). Thus, the space above the ceiling panel is directly connected with the auditorium space, and it is working as a part of the entire big air-volume, acoustically.

The design allows for a layer of sound-absorbing glass wool to be installed between the ceiling and the panel suspended from it. The insertion of sound-absorbing glass wool above the ceiling panel was scheduled for the very last stage of construction and, because the process to add the glass wool is a rather easy one, we decided to wait to add any glass wool until we measured and evaluated the acoustics of the completed hall. Then we tested the addition of glass wool in small increments while listening to the orchestra rehearse in the hall.



Figure 6



Figure 7

#### Interior of the Concert Hall

The reverberation time at mid-range frequencies (in an empty hall) measured 2.7 seconds, which is a somewhat long reverberation time compared with the value of 2.3 seconds that we predicted based on calculations during our design work. In our design, we prioritized the twin goals of rich acoustics and clarity of sound. These two acoustical goals are often considered to be in conflict with each other. Nevertheless, in this hall we achieved high performance levels for both of these goals.

Based on my first-hand listening to the orchestra during its early rehearsals in the hall, I could truly sense the richness of the hall's long reverberation while I simultaneously noticed the excellent clarity of the hall's acoustics. I was able to clearly hear and distinguish the sound of each of the instruments in the ensemble. Because the design of the ceiling makes it relatively easy to add sound-absorbing material even after the completion of construction, we decided to have the hall open with its long reverberation time and defer the addition of any glass wool. Currently, the hall's reverberation time measures 2.7 seconds (at mid-range frequencies, in an empty hall), and has a calculated reverberation time of 2.3 seconds at the same frequencies when the hall is fully occupied.

#### The Hall for Chamber Music and More

The 1,200-seat hall truly deserves the “concert hall” appellation. Likewise, the building's 400-to-600-seat small hall deserves its Chamber Hall name. The Chamber Hall was included in the project because of the strong request from the orchestra and, while this hall's acoustics and design prioritize the hall's use for chamber music concerts, this hall also works well as a multipurpose venue. Plan and cross-section views are shown in Fig. 8 - Fig. 10. And also, the chamber hall interior is shown in Figures 11 and 12.

This hall has a basically rectangular shape in the traditional, so-called, “shoebox” style. The hall's main level (on the first floor) has an entirely flat floor including both the stage and the audience seating. The main floor is with an electrically operated system of mechanisms for raising and lowering portions of the floor. This riser system divides the entire main floor into 12 sections and enables numerous options for configuring the space.

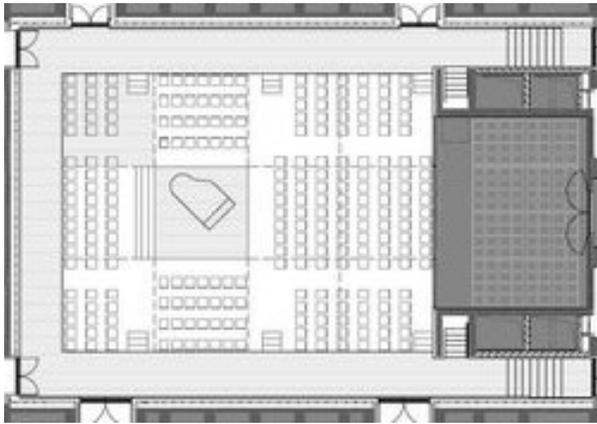


Figure 8: Plan of the Chamber Hall

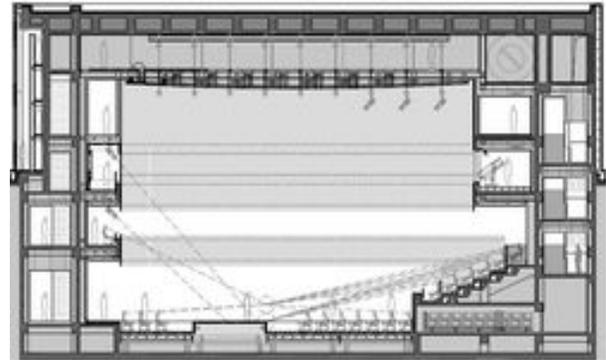


Figure 9: Longitudinal Section of the Chamber Hall

The hall has two levels of balconies along the side walls and at one end of the hall. We designed these balconies and a fourth level directly above them to maximize their configurability and adaptability for multiple uses. The existence of the balconies can even be camouflaged from view when not in use. The lower (second floor) balcony has freestanding folding chairs for seating. The seats can be entirely removed to create an empty, flat-floored balcony. Likewise, the upper (third floor) balcony also has the same kind of adaptable seating and, in addition, can also be used as a technical balcony. To hide these balconies from view when not in use, large, wood grid panels attach to the front openings of the balconies and close off the openings. Also, the fourth floor space directly above the upper balcony has both walls and a floor with the same wood grids which provide acoustic transparency. Thus, the hall can be used in many creative and practical ways.

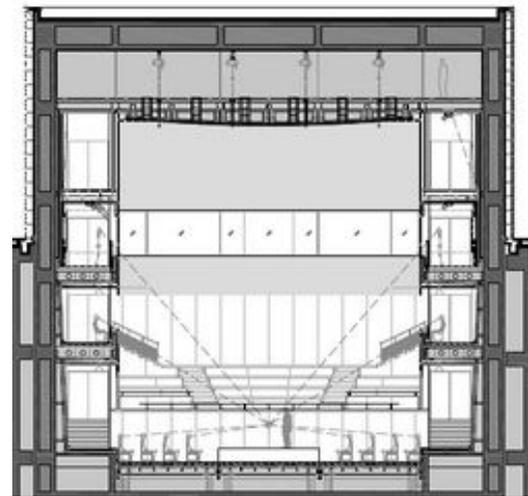


Figure 10: Cross Section of the Chamber Hall



Figure 11



Figure 12

Interior of the Chamber Hall

As a basic piece of equipment for varying this hall's sound reverberation characteristic, we installed sound-absorbing curtains in the fourth floor space that can be opened or closed. The hall is well-equipped with sound system equipment and loudspeakers, and all of this equipment can be operated from behind-the-scenes locations not visible to the audience. The variety of equipment, functionalities and configuration options of this hall will enable it to well fulfill both its chamber music venue role and its role as a multipurpose hall.

### **Some Other Project Details**

The cost of the entire new building, including the above facilities of the 1,200-seat concert hall and 400-to-600-seat chamber music hall, plus the building's lobby and the various meeting, office and support rooms for the orchestra's administration and other activities completed at a cost of about 630 million yuan (US\$103 million). Because the project site is located in a prime, central Shanghai location near embassies and consulates, the building's exterior architectural design was constrained by height restrictions and a need to appropriately complement the surrounding neighborhood. As a result, the building has 4 floors below ground and just two stories above ground level.

From the audiences' perspective, the hall location has the benefit of proximity to multiple underground train lines. For example, the tracks of the closest subway line run just 15 m. (49 ft) from the hall structure. However, this situation that benefits audiences also meant that from the start of this project we needed to give serious attention to the sound and vibration isolation design. After considering multiple design options, we applied the same approach to both the concert and chamber music halls. Our anti-vibration design uses springs under a floating structural system to achieve the desired level of sound isolation. The hall's sound isolation design will be reported in the next issue of this newsletter.