

Concert Hall Opens Inside Lotte World Tower and Mall in Seoul, South Korea

By Motoo Komoda

In Asian grocery stores everywhere the brand name Lotte may be most commonly associated with the conglomerate's candy manufacturer and, in Japan, the brand name also quickly evokes the Chiba Lotte Marines baseball team— named for its owner, the Lotte conglomerate. In South Korea, this major conglomerate also owns and operates department stores, hotels and other service-related businesses.

In the southeast part of Seoul, the Lotte Group opened Lotte World theme park in 1989, with a department store and hotel in adjacent locations. Lotte World is already a well-known and popular tourist destination. Recently, the Lotte Group has been in the process of adding a Lotte World Tower and Mall next to the existing facilities. A portion of the complex is already open and the remainder will complete this calendar year.



Figure 1: Lotte Tower and Mall Exterior

Overview of Lotte World Tower and Mall

The new Lotte World Tower and Mall complex is a very large project covering 807,508 sq. m. (8,695,140 sq. ft) at a project cost of 3.8 trillion Korean won (US\$3.4 billion or JPY 370 billion). The project comprises the supertall skyscraper Lotte World Tower and a separate, low-rise structure for the mall.

When Lotte World Tower completes at the end of this year, it will be 555 m. (1,821 ft) tall with 123 floors above ground. It will be the sixth tallest building in the world and will house shops, offices, condominiums, a hotel and the highest observation deck in the world.

The mall building has 11 floors above ground and 2 basement levels. The shopping floors are named “AvenueL” and include floors of world-class luxury brand stores and floors with premium and more affordable merchandise. The mall also has restaurants and is an entertainment destination with cinemas and an aquarium, plus the newly opened Lotte Concert Hall. The concert hall and its support spaces are on floors 7 through 11 of the mall building. The concert hall seats 2,036 people and the support rooms include a rehearsal hall, practice rooms, a recording studio, green room, an orchestra lounge, a conference room and space for administration offices.

The architect for the overall complex was the U.S. firm of Kohn Pedersen Fox Associates (KPF). All of the complex except Lotte World Tower and Lotte Concert Hall opened in October, 2014 and the popular mall daily receives a steady stream of shoppers and visitors.

First Arena-Configuration Concert Hall in South Korea

Lotte Concert Hall is designed specifically for the performance of classical music. It is South Korea's first large scale arena-configuration concert hall. The hall has a total area of 13,223 sq. m. (142,331 sq. ft). The architectural design is the work of the South Korean firm Designcamp Moonpark (DMP). Nagata Acoustics served as the acoustical consultant in charge of the room acoustics design and noise and sound isolation design.

Because a subway runs below the mall and because shopping and other activities in the mall will generate a certain amount of noise, we addressed the hall's sound isolation needs by creating a robust noise and anti-vibration design for Lotte Concert Hall. The entire hall has a double structure supported on rubber anti-vibration material.

Lotte Concert Hall Interior

The interior of Lotte Concert Hall primarily uses color hues of white and natural wood. The arena configuration's blocks of seating are visually defined by the walls of the hall, with white arches vaulting over slightly recessed areas of balcony seating and curved natural wood surfaces that rise from the orchestra-level seating to pair gracefully with the arches.

A Rieger pipe organ is installed at the front of the stage. It has 68 stops and 4958 pipes. The pipe organ and deep red of the seats' upholstery add eye-catching elements to the overall serenity of the interior architectural design.

Room Acoustic Design Highlights of Lotte Concert Hall

The hall stage is sized to accommodate the seating of full orchestras. Blocks of seating surround the stage in arena configuration. A fixed, sound reflection

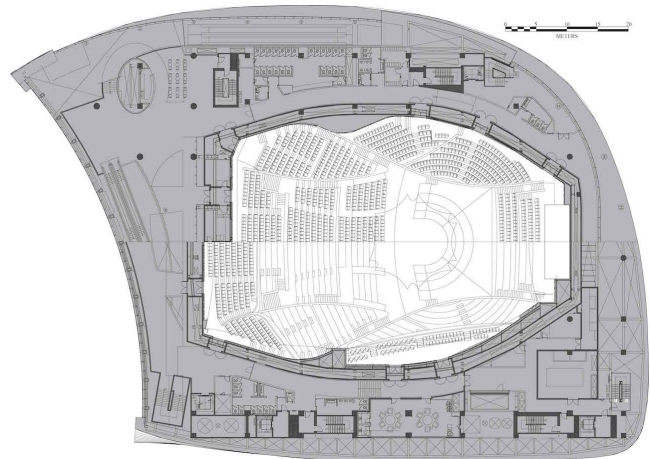


Figure 2: Lotte Concert Hall Plan

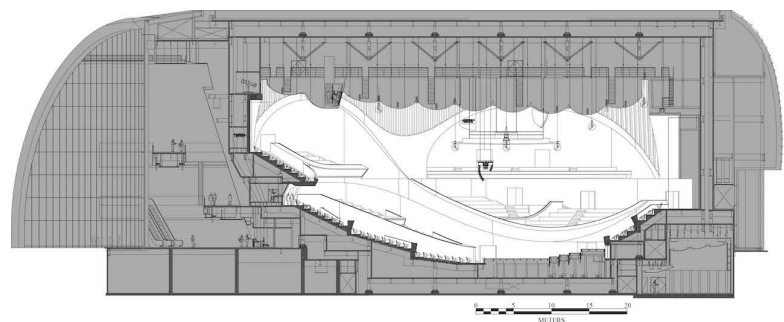
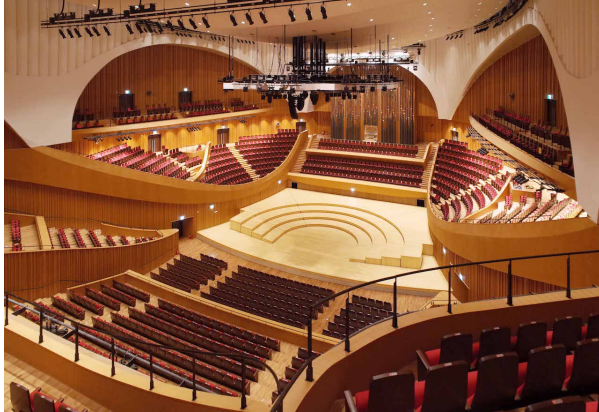


Figure 3: Lotte Concert Hall Plan and Cross-Section Drawings

panel system is installed suspended from the ceiling. The stage floor is equipped with electrically operated risers.

The footprint of the hall has an almost elliptical shape. In elliptical-shaped rooms, sound reflections tend to produce undesired sound focusing phenomena. Therefore, we gave careful attention to designing the specifications of the 3-dimensional shape of the hall. For a validation tool we built a 1/10 scale model of the hall interior and performed testing in the model during the period from October, 2012 to February, 2013.



Lotte Concert Hall Interior

To prevent sound focusing we implemented specific surface features throughout the hall. On the large surface of the hall's ceiling, which has repeating convex shapes, we added narrow slits. On the rather smaller continuous surfaces of the white upper portions of the walls, and on the wood lower portions of the walls we implemented a random pattern of ribbing.

The hall has a spatial volume of 32,600 cu. m. (1,151,258 cu. ft) and the spatial volume of each seat is 33 cu. m. (16 cu. ft). While from the numbers alone it's clear that this is a grand and spacious hall, the distance from the front edge of the stage to the uppermost balcony seat measures just 33 m. (108 ft). The somewhat conical shape of this arena configuration means that the audience feels very proximate to the stage from every seat in the hall.

Fine Tuning the Hall's Acoustics

We reserved the time period from the end of 2015 until the hall's Grand Opening in August, 2016 for so-called "pre-concert dry runs" and a variety of events that tested and validated the hall's acoustics. I attended a number of these concerts and rehearsals and made fine tuning adjustments to the hall's acoustics based on these sessions. For our final measurements we obtained a sound reverberation time of 2.9 seconds with the hall empty. This calculates to a reverberation time of 2.7 seconds with the hall 100% full. (Both values are for mid-range sound of 500 Hz).

A reverberation time of slightly less than 3 seconds might seem to be even too long, but the amount of liveliness in the hall is not too much for this hall—rather it is just right. Also, the words of on-stage speakers can be heard clearly and without stress at the audience seats. By listening to a live concert in the hall I also confirmed that the music has clarity of sound during performances.

For concerts that use the hall's sound system we installed retractable sound absorbing curtains that are housed behind the side balcony seating where the side walls meet the ceiling. In addition, the stage is equipped with a custom manufactured carpet that can be used on the stage floor and sound absorbing baffles to reduce the hall's sound reverberation time as needed for the requirements of specific events and performances. By using these sound-absorbing materials in combination with appropriate placement of loudspeakers, the hall can serve as the venue for pops-concerts.

Grand Opening Concerts

At the Grand Opening of the hall on August 19, Maestro Myung-Whun Chung conducted the Seoul Philharmonic Orchestra in the hall's inaugural concert. The program was Beethoven's Leonore Overture No. 3, Unsuk Chin's world premiere "Le Chant des Enfants des Étoiles", Saint-Saens' Symphony No. 3 (the "Organ Symphony") and 3 encore works. I was moved by the enthusiasm of the audience's applause.

The hall's Opening Festival continues to the end of 2016. On November 13, Japan's NHK Symphony Orchestra will perform.



Figure 4: Grand Opening Concert

Budget airline tickets can make it less expensive to travel from Tokyo to Seoul than to reach some Japanese cities. I encourage everyone who can do so to make a trip to Lotte Concert Hall and hear the rich reverberance of this hall with your own ears.

The Lotte Concert Hall website can be found at <http://www.lotteconcerthall.com/eng> and the website of Lotte World Tower and Mall at <https://www.lwt.co.kr/en/main/main.do>