Fondation Louis Vuitton Museum Opens in Paris

By Dr. Yasuhisa Toyota

This past October 27, 2014 a new art museum opened in Paris. The new museum is Fondation Louis Vuitton. Located at the western edge of Paris, in a corner of the 16th arondissement's Bois de Boulogne, the newly completed museum embodies the mécénat goals of the Louis Vuitton Foundation (established in 2006) and is where exhibitions of primarily contemporary fine art sponsored by the foundation will be displayed. Frank Gehry led the development of the musuem's architectural design.

Among Mr. Gehry's many architectural works, his most well-known designs for cultural facilities are the Bilbao Guggenheim Museum (Bilbao, Spain, 1997) and the Walt Disney Concert Hall (Los Angeles, U.S., 2003). Fondation Louis Vuitton becomes Mr. Gehry's third major cultural facility. The new museum's exterior is wrapped in large, curved glass panels said to be inspired by a yacht's sails in a unique and bold architectural statement that is truly Gehry-esque. It's an exterior that may well become a new symbol of Paris and that is already creating an impact. The accompanying Figure 1 shows the exterior and Figures 2 and 3 are views of the museum's performing arts auditorium.

Figure 1: Fondation Louis Vuitton Exterior

The total interior floor space of the museum building measures 11,700 sq. m (125,938 sq. ft). The museum has 11 exhibition spaces of varying sizes and the performing arts auditorium for concerts and other performances.

Figure 2: Interior of the Auditorium

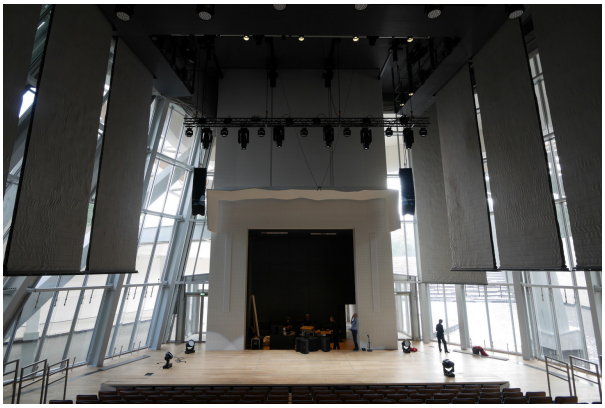

Figure 3: Curtains in use

Room Acoustical Design

Nagata Acoustics served as the acoustical consultant for the museum's auditorium. The auditorium's main floor is comprised of movable elements. The floor of each row of seating can be flipped 180° to expose or hide its fixed seats and each row can be raised or lowered as desired. The auditorium has a total seat count of 350 and when all the rows are flipped so that the seats are facing downward, the auditorium becomes a flat floor space.

The slope of the main floor audience seating can be set by raising or lowering individual rows. When the main floor rows are configured to the steepest possible slope, the seating continues seamlessly to the permanent balcony that is at the rear of the auditorium. In addition, the size of the main floor's stage and its location can be configured among multiple options so that—together with the flexible audience seating configurations—the auditorium can be set up for a multiplicity of uses (Figure 4 through Figure 9 show some of these configurations.) Because the project's programming information indicated that the auditorium will be used for many performance genres, we created an acoustical room design that can be configured as a multipurpose space, including installing deployable curtains that can be used to adjust the space's reverberation time. The project requirements also requested room acoustics appropriate for live classical music performances without the use of any electronic sound enhancements. For this objective we focused primarily on the shape of the auditorium and the choice and placement of the materials used in the auditorium's interior.

The Auditorium's Glass Walls

In particular, for continuity with the building's overall conceptual design, the interior design team wanted to use glass as the primary material for the auditorium's walls. Glass is a challenging material from the room acoustical design perspective and became one of the key discussion topics on this project. In general, because glass generates sound reflections characterized by abundant high frequencies and extremely sharp sound, the use of glass walls in an auditorium requires a design that prevents the strong reflections generated by the glass surfaces from directly reaching the audience seating.

We negotiated with the interior design team and they agreed to limit the use of smooth and flat glass surfaces to the upper portions of the auditorium's walls. With this placement, the strong reflections from the smooth and flat glass surfaces first reach the ceiling or other room interior surfaces that are not the audience seating. Only after being reflected off a non-glass surface do these reflections reach the audience seating. In addition, for the lower portions of the walls that generate reflections directly to the audience seating, we specified a glass surface that combines curved surfaces with a textured finish to promote the diffusion of the direct sound reflections. These acoustical design elements and modifications that we implemented to affect the sound reflections do not directly influence the quantitative acoustical characteristics—such as reverberation time—that we measure in a room. However, these design elements and modifications are important ingredients for achieving sound reverberations of fine quality.

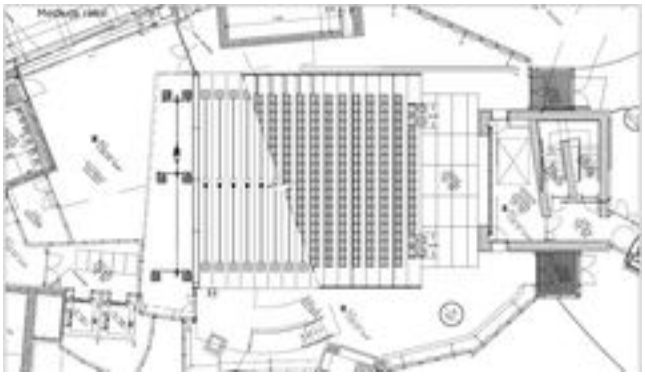

Figure 4: Plan of the Auditorium (1)

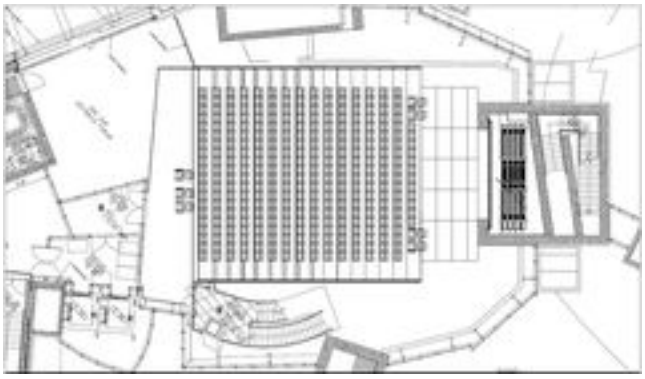

Figure 5: Plan of the Auditorium (2)

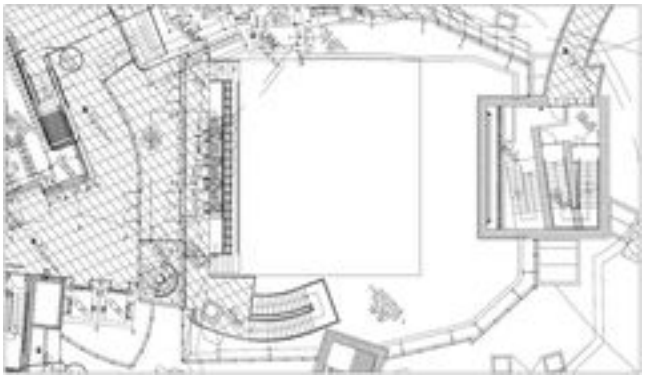

Figure 6: Plan of the Auditorium (3)

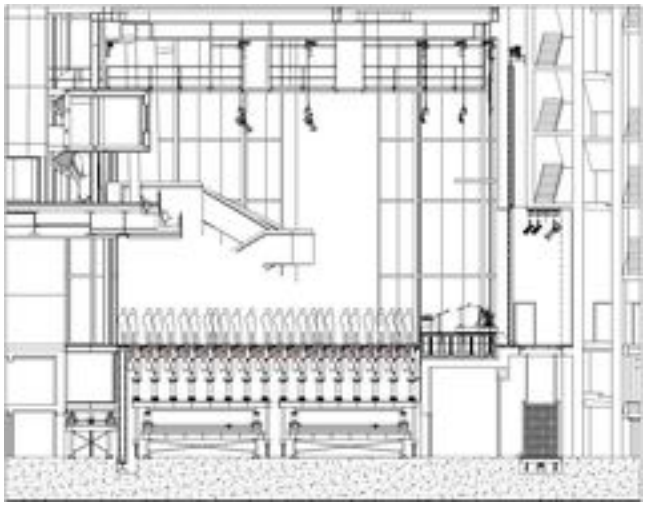

Figure 7: Flat Floor (hide seats)

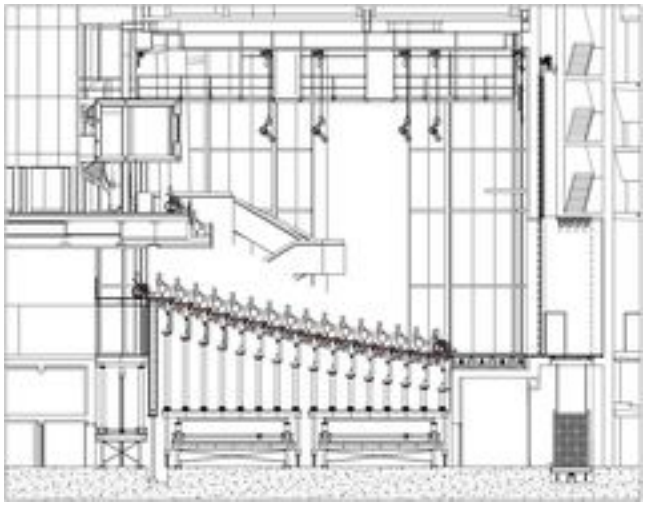

Figure 8: Seats in use (lowered)

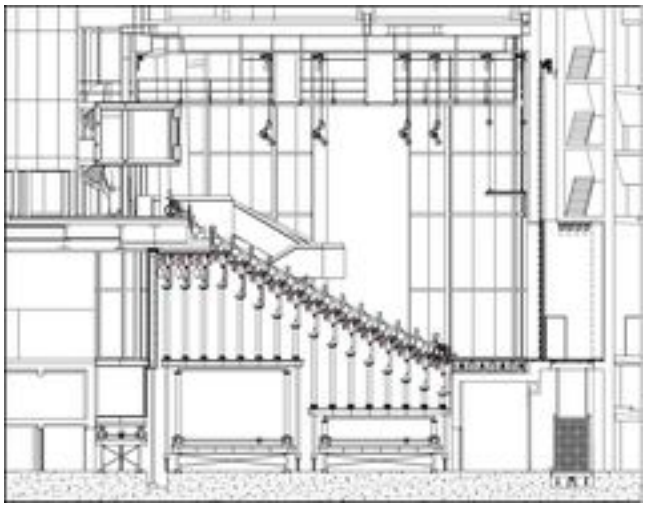

Figure 9: Seats in use (raised)

Sound Reverberation Characteristic in a Multipurpose Auditorium Mostly for Classical Music

In its most live configuration—typically the configuration we assume will be used for classical music concerts—with the sound reverberation curtains stored away, the auditorium's sound reverberation time measures 1.2 seconds (at 500 Hz with the hall empty). When the hall is set up in its most dead configuration—such as when a sound system is added to amplify popular music performances, etc.—with the curtains fully deployed, the reverberation time measures 0.7 seconds (at 500 Hz, with the hall empty).

During the project's construction phase, a representative of the Louis Vuitton organization responsible for the museum auditorium's operations informed us that the primary genre of the hall's performances will be classical music. Together with the project's programming parameters of a multipurpose hall, our room acoustical design would be expected to deliver high quality acoustics for classical music performances.

In fact, for the acoustical testing we conducted at the completion of the auditorium's construction, we brought together classical musicians of various instruments, including pianists, violinists, cellists, a quartet, clarinetists and a soprano. Unequivocally, each of the musicians praised the auditorium's acoustics.

If we consider just the auditorium's sound reverberation time, it suits a multipurpose hall and would seem to be somewhat short for classical music performances. During the acoustical tests by classical music performers, however, we heard not even one comment of concern about the reverberation time. We did receive many positive comments about the quality of the sound reverberations.

In my opinion, there is a connection between our attention to creating acoustical solutions for the use of glass walls and the auditorium's excellent acoustics. When the museum opened on October 28, 2014, the opening concert featured pianist Lang Lang. He delighted the audience with his performance in the fully-occupied auditorium.