The Walt Disney Concert Hall opened on October 23, 2003, 16 years after the project started, as the new home of the Los Angeles Philharmonic. The $274 million stainless-steel building with flowing lines designed by Frank O. Gehry houses the concert hall, pre-concert area, numerous rehearsal/practice rooms, other backstage and dinning facilities and amphitheater.
• The Walt Disney Concert Hall is a triumph—a gleaming, billowing symphony in steel, composed of thrusting, stretching, and overlapping organic forms that enclose an outstanding concert hall and excellent supporting facilities. The requirements were that the hall should provide the best possible acoustical conditions and the design should create the CLOSEST POSSIBLE CONTACT BETWEEN THE MUSICIANS AND AUDIENCE.

• The Concert Hall consists of a SHOEBOX-SHAPED auditorium swathed in a swirling, steel-clad cloak, with the spaces between the two providing room for supporting facilities.
• The 2,265-seat concert hall is the physical heart and musical soul of the building. Gehry worked closely with both acoustic specialists and musicians to achieve a design that produces optimum acoustics by BALANCING DIRECT AND REFLECTED SOUND.
The abundance of CONVEX FORMS throughout the concert hall create a near perfect acoustic environment with over 38,000 reflective faces.

After testing more than thirty models, the final CONVEX FORM that evolved is a glorious, visually intimate space clad entirely in bowed and curving Douglas fir—a space where, in Gehry's words, “the beauty is in the ear of the beholder.”

The radically sculptured design of the WDCH's main auditorium features a curved wood ceiling consisting of many individually shaped panels, each made from DOUGLAS FIR WOOD.

The curves of the ceiling and the flow of the interior walls actually improve the acoustics' by scattering the sound and producing more reflection, adding warmth and resonance to the sound.
A series of short acoustic walls among the seats create a TERRACED EFFECT known as a VINEYARD DESIGN. The fanciful colors of the upholstery are meant to give the sense of a field of wildflowers.

Three different kinds of WOOD create the distinct acoustics to create an intimate sound in a large space WITHOUT AMPLIFICATION.

### BUILDING PERFORMANCE ANALYSIS

**FINISHING MATERIALS**

<table>
<thead>
<tr>
<th>Material</th>
<th>Absorption Coefficient (α) @ 500 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceiling</td>
<td>0.14</td>
</tr>
<tr>
<td>Wall</td>
<td>0.17</td>
</tr>
<tr>
<td>Floor</td>
<td>0.10</td>
</tr>
<tr>
<td>Seats</td>
<td>0.88</td>
</tr>
</tbody>
</table>

# agata Acoustics
After analyzing the coefficients of absorption we have determined that the Disney Concert Hall space is indeed live.

**Reverberation Time**

Unoccupied: 2.2 sec (@ 500 Hz)
Occupied: 2.0 sec (@ 500 Hz)
This graph provided by Nagata Acoustics depicts the reverberation times of the Disney Concert Hall at different frequency levels and occupancy.

Nagata Acoustics calculates the Noise Criteria (NC) to be at 15, which fits in perfectly in the MEEB criteria for concert halls.
1. **ADJUSTABLE HEIGHT ACOUSTIC CEILING PANELS**
The Suspended Ceiling Panels work quite well with the convex shape that they have, though they only provide a specific range of resonance that is only effectively changed by the size of the audience.

2. **Removable Seating**
Though the various tiers of seating are well placed and improve the reverberation in this space, they are limited to one configuration and occupancy size. If they could be relocated for smaller or different events then the sound could be better tailored per attendance.

3. **Convex Balcony Facades**
With all the curves in and around this facility, it is somewhat surprising that the balcony facades are just a flat angled surface. These edges could be redesigned to provide a better range for reflection of sound.

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1. **ADJUSTABLE HEIGHT ACOUSTIC CEILING PANELS**
If these ceiling panels were made to be able to be lowered on the sides or as a whole it would drastically change the dynamic in the room and allow the room to be adjusted to best suit the venue.

2. **Removable Seating**
The same approach for seating of a vineyard could be applied to a retrofit. To be able to change where they are planted to best suit the ‘season’ or occasion. Especially for events that may have a smaller audience since, as previously shown the occupancy can have a large effect on sound quality.

3. **Convex Balcony Facades**
If the bottom edges were rounded out or of the over downward angle was built of the have a curve to its surface in either plan or in section it would improve the diffusion of sound around the audience rather than back toward the open space.
CURRENT REDesign: Adjustable seating & ceiling panels

By implementing adjustable height ceiling panels and flexible seating, the hall could meet recommended reverberation times for smaller venues, thus making it a more versatile space.
CONCLUSION

Viewed from any angle, this structure has an intriguing and powerful presence, while the dynamic shapes of Gehry’s design and the shining surface of the steel walls suggest movement and the lyricism of music. The Walt Disney Concert Hall is a building that perfectly articulates the glamour and dynamism of the city of Los Angeles for which it now provides both a stunning architectural landmark and an inspirational experience.

QUESTIONS