

UV COATINGS PLAY ROLE IN CREATING SOUND-ENHANCING INTERIOR FOR THE NEW

Walt Disney Concert Hall

At the Music Center of Los Angeles County



By Chuck Susnis

The \$274-million Walt Disney Concert Hall in downtown Los Angeles is an award winning synthesis of acoustical and architectural design of which UV-coatings technology played a part. The stainless steel curves of its striking exterior are rivaled within the bold design of the hardwood paneled main auditorium.

The concert hall is the new home of the Los Angeles Philharmonic and the Los Angeles Master Chorale.

Opened in October of 2003, the hall is one of the most technically advanced structures in the world. The architect, Frank O. Gehry, and the acoustician, Minoru Nagata, aimed to create a structure that would equal or surpass the best concert halls in the world. The concert hall's history making design required the use of extraordinary, state-of-the-art construction techniques.

The 2,273 seat auditorium was designed to achieve both visual and acoustical intimacy. Among the interiors most distinctive characteristics are the sail-like forms of the wooden walls and cloud-like hardwood ceilings, which suggest a great ship.

"The curves of the ceiling and the flow of the interior walls actually improves the acoustic's" Nagata said. "by scattering the sound and



Eighty four curved structures, each containing about 80 panels, form the ceiling of the Walt Disney Concert Hall at the Music Center of Los Angeles County.

producing more reflection, adding warmth and resonance to the sound" Using another analogy, the hall can be likened to a woodwind instrument, with its interior curvature contributing to the richness of the sound produced

half inch fire resistant particle board covered with a quarter cut vertical grain Douglas fir veneer. Douglas fir was chosen because it met the exacting criteria of the architects for both its acoustical and appearance properties.

Panel Structure

There are approximately 80 panels in each of the curved, sail-like ceiling structures, with 84 different structures combining the ceiling. About 34,000 square feet of finished panels comprises the ceiling alone. 10 to 14 feet wide, the ceiling structures vary in length from approximately 20 – 40 feet. The panels comprising the interior are made up of 4 foot by 8 foot



All of the ceiling and wall panels, and the architectural woodwork for the main auditorium and lobbies were produced by Columbia Showcase & Cabinet Company Inc. Columbia is a manufacturer of custom cabinets, showcases and architectural millwork from concept drawings through finished production for retail and corporate interiors. The veneer was produced by Architectural Plywood Inc. (API), a subsidiary of Columbia Showcase. The panels were coated using a UV-finishing process selected by the panel maker because it assures compliance with VOC and HAP's environmental mandates, which is critical in California, and because it is one of the most cost-effective methods for creating a premium finish. Columbia Showcase invested nearly a half million Dollars for equipment, installation and other related start-up costs to implement the UV-finishing line because they determined it would be useful and cost effective not only for the Walt Disney project, but also for future projects.

The UV Coating

The panel manufacturer worked with Sherwin-Williams Chemical Coatings Division, which offers a UV coating system with stain, sealer and topcoat that can be formulated using any desired UC chemistry to meet specific needs. This approach is designed to ensure higher throughput and increased productivity to meet the need of specific applications ranging from kitchen cabinet finishes to wood and composite building products, residential furniture and wood office furniture.

The particular interior wood coating product selected for use by the panel

manufacturer was a specially formulated, very low gloss UV curable coating offering excellent toughness, mar resistance and cure response, as well as outstanding adhesion and cold check resistance. Very low gloss and low film build were desired by the architect to ensure the natural wood look desired.

Before settling on the coating, the panel manufacturer worked closely with the coating manufacturer to thoroughly test product performance. Each test panel was placed in a QUV Weathering Tester for 25,50,75 and 100 hours. Color change was checked on a Macbeth Color Eye. Testing showed the samples coated with the UV product selected by Columbia had better resistance to the Weathering Tester than the samples of competitors. Acoustical tests also were performed to assure that the UV-coating process did not impact the panel's acoustical attributes.

The Finishing Process

Before the ceiling structures were assembled, the panels were finished on the new UV finishing line.



The 4 foot by 8 foot vertical grain Douglas fir veneer panels move through the 60 foot long UV curing line in about two min.

The first step in the finishing process was to apply a sealer to seal off pores of the wood and build the grain to assure a more uniform coating. The 4 foot by 8 foot panels entered the Giardina US UV Finishing Line where the sealer was applied by rollcoater and B-stage cured to a gel like state – not a full cure.

After the panels exited the B-stage cure, they headed through the denibber, which sanded the panels. Next the panels traveled along a 10 foot conveyor to another precision rollcoater where the final topcoat was applied and cured with 2-3 seconds of exposure to UV light. The same coating produced was used for both the sealer and topcoat., each applied at a film thickness of 1 mil for a total film build of 2 mils.

The panels moved from beginning to end through the 60 foot long UV curing line in about two minutes. Upon exiting the UV coating line, the panels were graded and matched so that panels with like grains could be placed adjacent to each other during the assembly of each ceiling structure, to assure uniformity of appearance.

The finisher developed a system for grading the panels after finishing so the true color and grain of the wood could be fully ascertained. A-grade panels, with uniform color from left to right and no barber pulling, were considered premium.

Production of Ceiling Structures for Ceiling

The panels were graded in a staging area where they were matched, and then proceeded to the CMS CNC router specifically for producing the ceiling. The ceiling consists of over 8,000 unique wood parts, each requiring its own individual CNC program. The shapes were defined by the 3-D computer model supplied by the architect, then "flattened" electronically and translated into . dxf files. The router plotted and cut the holes for sprinklers, rigging ports, house lights, light bridges ect.

After finishing and milling, Columbia Showcase craftsmen pieced the puzzle back together, attaching the wood to the structural steel frame. The structure were then shipped from the manufacturing site to the construction site in Los Angeles, about 35 minutes away. Upon delivering the panels were flipped, finish face



After the panels are finished, graded, matched and shaped, assembly begins.

down, hoisted and secured to their final location sixty feet above the floor of the hall.

Finally, upon being fitted and connected to each other, 1 to 2 inches of shotcrete was sprayed onto the backside of the assembled structures to achieve the desired acoustic properties. With the addition of the shotcrete, each ceiling Structure weighs approx. 10,000 to 15,000 pounds.

Today, the unique combination of materials and form interact to enhance the depth and resonance of some of the most beautiful music ever heard.

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