All photos by Jesse Goff (except where noted otherwise)

CASE STUDY

California Academy of Sciences
San Francisco, California

Meyer Sound®

"Meyer Sound is a premium brand and the people we worked with really lived up to their name. They listened to our needs, took our ideas onboard, and in some cases made suggestions to improve them. As a company, they are very knowledgeable, but also very friendly to work with."

Dean Do
Assistant Director of A/V Electronics
California Academy of Sciences

SUMMARY

Billed as the only place on Earth where you can visit a planetarium, an aquarium, and a natural history museum under a single, living roof, the California Academy of Sciences deserves every column inch of praise it has received since opening its doors in autumn 2008.

Located in San Francisco's Golden Gate Park, the Academy has a mission to explore, explain, and protect the natural world. In keeping with this theme, the facility was designed from the outset to be energy-efficient, and has become the largest public building to earn the top platinum rating for Leadership in Energy and Environmental Design (LEED) from the U.S. Green Building Council.

Pritzker Prize-winning architect Renzo Piano was commissioned to design the new building, having been drawn to the project by the Academy's dual role as both a museum and a place for research and scientific inquiry. Project architects were Stantec Architecture of San Francisco, while Ove Arup & Partners were project engineers. Together with Renzo Piano, these two companies worked with consultancy Visual Acuity to develop the multimedia technology platform for the Academy, and with Teecom Design Group on the specifics of the AV system design.

The Academy site embraces many different locations where multimedia technology plays a key role in educating, informing, and entertaining its public. Rather than recreating the 12 different structures that had previously occupied the site, the new building allows interaction between the various areas, while at the same time giving each its own clear purpose and identity.

Among the most important attractions are Morrison Planetarium, Steinhart Aquarium, and a multipurpose presentation space known as the Hearst Forum, as well as open piazza-style spaces. In all of these, Meyer Sound audio solutions have been deployed as a key component in the museum's day-to-day functioning, having been specified by Visual Acuity in the planetarium and by David Person of Teecom in the rest of the facility. For the Academy, which has received numerous awards for its sustainable design and features, Meyer Sound loudspeakers offer a clear advantage by delivering exceptional audio quality while their self-powered features enable less power consumption than traditional systems and eliminate external cooling.

System Credits

Architects

Renzo Piano Building Workshop
Genoa, Italy

Stantec Architecture
San Francisco, California

System consultancy

Visual Acuity, Brighton, UK

System specification

Morrison Planetarium:
Visual Acuity
Brighton, UK

Rest of Facility:
Teecom Design Group
Oakland, California

System installation

Morrison Planetarium:
Sky-Skan
Nashua, New Hampshire

Rest of Facility:
BBI Engineering
San Francisco, California

Engineering and Sustainability Consultant

Ove Arup & Partners
San Francisco, California

Challenges

- "Whispering gallery" reverberation effect, common to domed spaces, is exaggerated by sheer size of the planetarium
- Architectural packaging—less than six inches between screen and structural sphere in places
- Loudspeakers positioned behind perforated screen must not be visible to audience

Requirements

- To provide a 13.1-channel surround sound system capable of spatializing both vertically and horizontally
- To add the capability to play back in other configurations such as 5.1 and L-C-R
- To supply sufficient power and spatial distribution to immerse the audience in sound and complement the all-encompassing nature of the planetarium environment

Benefits

- Planetarium can play both its own purpose-designed shows and content from other institutions
- Sound system fully "tuned" to the dome by Meyer Sound engineers, neutralizing unwanted acoustic artifacts
- All audio content stored centrally on Wild Tracks hard disk playback in Matrix3
- All loudspeakers are self-powered and reside on a network so that their behavior can be monitored remotely

MORRISON PLANETARIUM

Designed from the ground up to offer the most compelling outer-space experience one can have without leaving planet Earth, Morrison Planetarium has 290 seats and a 78-foot seamless video projection screen. Mimicking the 30-degree tilt of our planet, the planetarium has a more powerful audio system than any comparable venue and is the largest all-digital installation of its kind.

But power alone is not enough to guarantee a sense of realism. The Academy also needed an audio solution that would thoroughly immerse the audience, to create an experience that was more akin to flying through space than watching a movie. Additionally, the design had to take into account the rich variety of multimedia content likely to be screened inside the planetarium.

The planetarium's sound system was designed by Visual Acuity in partnership with John Monitto, Meyer Sound's director of technical support, and installed by Nashua, NH-based Sky-Skan, Inc., which specializes in developing and integrating digital planetarium instruments and automated video playback systems.

"In a planetarium, the sound composer and producer will give their music certain production values, but the dome then imposes acoustic challenges of its own, such as echoes, rings, and so on," explains Blair Parkin, founder and managing director, Visual Acuity. "For us, this story really started when I was working on the Hayden Planetarium—a millennium project in New York—using an analog LCS system to manage the audio in relation to the dome effect. Its ability to deal with a challenging environment with a real-time matrix and level switching was very impressive."

Meyer Sound's Matrix3 audio show control is the third-wave implementation of that LCS technology, and Visual Acuity specified the installation of two Matrix3 frames to act as audio image processors for Morrison Planetarium, with a Meyer Sound Wild Tracks 24-track playback unit—also part of the Matrix3—handling all audio content, not just for the planetarium but also for its pre-show area.

The planetarium's main in-house show is called "Fragile Planet," produced by Tom Kennedy. The show's composer, Michael Stearns, has produced a soundtrack in which different audio signals are moved around the space not just horizontally, as would normally be the case, but also vertically. This necessitated the design of a 13.1-channel sound system, with provision also having to be made for alternative playback configurations, including 5.1 surround for content sourced at other planetariums, and L-C-R (left-center-right) for presentations where the input from on-stage microphones can be combined with background music from Wild Tracks. The planetarium can also link its audio with NASA so that the audience can hear a two-way conversation between the two sites.

The all-Meyer Sound self-powered loudspeaker solution includes a number of unusual components. Among these are a UPJ-1P loudspeaker positioned in the zenith of the dome so that sound can be spatialized over the audience, rather than merely around it; specially matted-down grille screens to reduce the likelihood of loudspeaker visibility through the projection screen; and enclosures with specially repositioned connectors so that they can be accessible and serviceable while positioned immediately adjacent to the planetarium's structural sphere.

The end result has wowed everybody from seasoned planetarium professionals to regular visitors. Dean Do, assistant director of A/V electronics at the Academy, comments: "A dome is not a sound-friendly space, and even less so when you want to recreate not just one environment, but several. At Morrison Planetarium, we want to make you feel like you could be on the moon, and the next minute, in the middle of space.

"Meyer Sound worked with us from the very beginning, listened to our needs, took our ideas, and made suggestions to improve them. And our audiences love the system. We even had one woman write into us and say: 'If this sound system was a guy, I'd marry it!'"

"A dome is not a sound-friendly space, and even less so when you want to recreate not just one environment, but several. At Morrison Planetarium, we want to make you feel like you could be on the moon, and the next minute, in the middle of space."

Dean Do
Assistant Director of A/V Electronic, California Academy of Sciences

Meyer Sound Solution

- 3 CQ-1 loudspeakers (Left, center, right)
- 9 UPJ-1P VariO loudspeakers as side and rear surrounds
- 1 UPJ-1P VariO loudspeakers at the zenith of the dome
- 8 X-800 extended range subwoofers
- 2 Matrix3 audio show control
- 1 Wild Tracks hard disk playback

Challenges

- Two spaces need to be joined together electronically but isolated from each other acoustically
- Dividing wall houses cinema projection screen, making permanent loudspeaker positioning difficult
- Low ceiling clearance imposes additional acoustic and installation constraints

Requirements

- To provide a 7.1-channel surround sound system for a 3D digital movie theater
- To provide a L-R loudspeaker system for speech reproduction in the auditorium
- To offer sufficient system flexibility for the two spaces to be combined into a single room for special events and presentations

Benefits

- A combination of versatile loudspeakers and innovative positioning solutions gives the Academy the flexibility it needs, without compromising sound quality

HEARST FORUM

Located one level above the planetarium entrance, Hearst Forum has been designed to host special events, lectures, and temporary exhibits. It houses both an auditorium and a 3D digital movie theater—the latter being the first DCI-compliant 3D cinema in a not-for-profit institution.

These two rooms are adjacent to one another and, to complicate the issue, the whole space can be opened up by the removal of a central dividing wall. “The Forum can really be considered as two installations joined together to become one,” comments Blair Parkin. “The divisible wall is the wall that the cinema screen goes against, and the screen is 28-foot wide.”

Parkin adds that, perhaps a little unconventionally, the sound system for the Forum uses loudspeakers designed principally for touring—Meyer Sound UPQ-1P wide coverage loudspeakers—rather than cinema. “When the divider is in place,” explains Mark Roos, vice president of engineering at BBI, Inc., which installed the sound system at the Forum, “the pair of UPQ-1Ps in the 3D cinema provides the left and right channels in a 7.1-channel surround setup. The room has a front-projection system and very little ceiling clearance, while the screen is non-perforated and is on a movable wall, so for the center-channel speaker we embedded a Meyer Sound UPJ-1P horizontally into the ceiling. The rest of the surround system comprises 12 UPJuniors—four on each side wall and four on the back wall.”

Meyer Sound Solution

- 4 UPQ-1P loudspeakers (Left and right for each room)
- 1 UPJ-1P loudspeaker (Center channel for 3D movie theater)
- 12 UPJunior VariO loudspeakers (Surround channels for 3D movie theater)
- 2 750-P subwoofers (Sub-bass channels for 3D movie theater)
- 2 MM-4XP self-powered miniature loudspeakers (Control-room monitors for auditorium)

Perhaps the greatest challenge of all was the positioning of sub-bass enclosures for the cinema. “Normally you would mount the subs on the floor under the screen, but given that this screen can be raised so that the room can be opened out, where do you put them?” comments Parkin. “This was particularly challenging, given that we wanted the low-frequency energy to go into the cinema, and not into the auditorium.”

The solution was to use a pair of Meyer Sound 750-P subwoofers (which offer extended low frequency response) with castors on the back so that they can be treated like a dolly and rolled around 20 feet out of the way and into a closet when they are not being used. When the cinema is operational, specially located floor boxes provide connection points for the subs.

During regular opening houses, the movie theater is run as a separate room and generally hosts around seven screenings per day. For special presentations, most commonly in the evenings, the Academy chooses to open the space out and join the cinema to the auditorium to create a single, large presentation space. In this configuration, the pair of UPQ-1P loudspeakers normally used as L-R enclosures in the cinema surround setup become rear-hall delays to augment the auditorium system, which has been designed primarily for speech reproduction.

Challenges

- Highly challenging acoustic conditions caused by the glass surfaces of water tanks and curved projection screens
- Loudspeakers chosen for this elaborately designed space must be acceptable architecturally and visually unobtrusive

Requirements

- To immerse the audience with multichannel sound of high quality and power, derived from a pre-recorded soundtrack
- To provide a reliable and repeatable sound experience for audiences during a show that is aired once an hour, every hour the Academy is open

Benefits

- The low-visibility Meyer Sound solution offers high dispersion and has eliminated the space's acoustic gremlins, providing even coverage throughout

WATER PLANET

Designed by New York's Thinc Design in collaboration with Urban A&O, Water Planet acts as a multimedia centerpiece for the Academy's aquarium. It comprises several dozen tanks filled with fish, reptiles, amphibians, insects, and other invertebrates from around the world, underlining the diversity of our planet's marine life.

Once an hour, the lights go down inside the tanks, and the space is transformed into a 360-degree projection theater for the screening of a five-minute AV show that demonstrates the importance of water to our planet. The room boasts silvery, sculptured walls onto which a new kind of molded projection surface has been grafted, so that when the show is running, the screens seem to flow into each other, creating an immersive and suitably "watery" atmosphere for the audience.

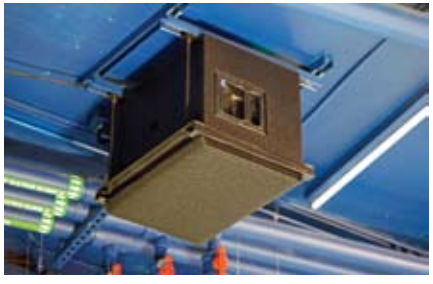
Here Visual Acuity designed the video projection infrastructure, while integrator BBI deployed its proprietary MSC-4MP3 show controller for the automatic scheduling and triggering of lighting, sound, and projection. Particular care was taken to ensure that light and video brightness levels were set so as not to adversely affect any deep-water wildlife.

Meyer Sound Solution

8 UPM-1P loudspeakers for program audio playback

4 UMS-1P subwoofers

One of eight UPM-1P self-powered loudspeakers that deliver eight channels of audio (one for each channel.)



One of four UMS-1P subwoofers in custom brackets.

Eight channels of program audio are reproduced by Meyer Sound UPM-1P self-powered loudspeakers (one for each channel), with a further sub-bass channel provided by four UMS-1P subwoofer systems. "We chose the UPM because this is another low-ceilinged area and it is a high-dispersion speaker," explains BBI's Mark Roos. We made custom brackets for the UMS subs and all the loudspeakers were painted black so that they were visually unobtrusive during the show."

"This is another really challenging environment," adds Blair Parkin, "because all the glass from the water tanks makes it highly reflective. Meyer Sound's engineers did a huge amount of work to overcome the acoustics."

"These are all big, uninterrupted spaces, and the MVC-5s give us really good articulation, directivity, and control, while only having to bring power to one point."

Mark Roos
BBI Engineering

MEYER SOUND IN OTHER PUBLIC SPACES...

In addition to the Academy's three highest-profile multimedia attractions, Meyer Sound solutions have also been deployed in key public areas. These include the "Islands of Evolution" and "Science in Action" exhibits, which surround the exterior of the planetarium dome, and a mirror image of these, the "Altered State" area that tracks the story of climate change in California. Between these lies the piazza, a social space with a flowing roof that echoes the curved surfaces of the planetarium and the "Rainforests of the World" exhibit.

In all these public spaces, BBI chose Meyer Sound's MVC-5 graduated vertical coverage loudspeaker in custom colors to distribute public-address messaging with even coverage and clarity. "These are all big, uninterrupted spaces, and the MVC-5s give us really good articulation, directivity, and control, while only having to bring power to one point," explains Mark Roos. "The piazza, in particular, is both extremely reverberant and architecturally very sensitive—the curved glass roof has a stainless-steel strut assembly, and we worked hard with the architect to ensure it was right. We ended up positioning an MVC-5 high up in the south-west corner, and suspended it from stainless-steel tubes so that it would look similar to the structure that holds up the roof. In any event, we could not have suspended it on cable because it is within 18 inches of glass—on two sides!"

...AND BEHIND THE SCENES

In the basement, beneath all the glamour of the exhibits and away from the prying eyes of visitors, the Academy operates its own visualization studio. Here, staff work on new AV shows for the planetarium and other areas, while also liaising with other similar institutions all over the world on the sharing and distribution of outside content. The studio has its own 7.1-channel surround sound system so that the engineers can simulate the immersive environments of Morrison Planetarium, Hearst Forum, and Water Planet—albeit in a much more restricted space.

"In the studio we've used seven of Meyer Sound's MM-4XP loudspeakers which deliver very high sound output from a small enclosure, plus a UMS-1P sub," says Mark Roos. "As well as working on content, the area can also act as a preview studio, where media are invited to look at new shows the Academy is working on, and it's also a monitoring space—where staff can keep an eye on what's going on in the rest of the building from an AV perspective."

CONCLUSION

Having provided more than 60 self-powered loudspeakers to various spaces within the Academy, together with complementary processing and playback electronics, not to mention many hours of technical support, design assistance, and system tuning, Meyer Sound can justifiably claim to have made a key contribution to the success of a uniquely appealing and educational attraction.

Dean Do, the Academy's assistant director of A/V electronics, says that Meyer Sound "has proved time and again that they are dependable—a premium brand that really lives up to its name".

"Anytime we had a technical issue during construction, somebody from Meyer Sound just drove across the Bay overnight to resolve it," adds Do. "As a company they are very knowledgeable but also very friendly to work with."

The point is echoed by Blair Parkin of Visual Acuity, who says: "Before this project, we knew Meyer Sound for their reputation but not all of us knew them that well as a company. We couldn't believe how well they combine the scale and quality of a mass manufacturer with the approachability of a cottage industry. Normally you get one without the other. With Meyer Sound, you can go direct to the owners if you need to, or you can go right up to the person who is building your speaker on the shop floor."

"As consultants, we often find audio companies quite unapproachable. They say: 'Here's the price list and the name of our favorite sound designer'. Or they just send a sales guy round," continues Parkin. "Meyer Sound has this deep respect for everybody. They are really easy to do business with, and they are happy to make a long-term commitment to your project."

Evidence of this commitment can be found in the way that Meyer Sound's engineers provided custom colors, finishes, and connectivity solutions to meet the building's many architectural and aesthetic challenges, and in the way that the low power consumption and higher efficiency of the company's products helped the Academy become one of the most environmentally friendly museums on our planet.

California Academy of Sciences Awards and Recognitions

Platinum Certification for Leadership in Energy and Environmental Design (LEED)
The U.S. Green Building Council

2009 Award for Excellence
The Americas, Urban Land Institute (ULI)

2009 National Award, Innovative Design in Engineering and Architecture with Structural Steel awards program (IDEAS2)
American Institute of Steel Construction (AISC)

2008 Award of Excellence, Extensive Institutional Category
Green Roofs for Healthy Cities

2009 Green 15, InfoWorld

Regional 2006 Environmental Award
Environmental Protection Agency (EPA)

2005 Silver Award, North America
The Holcim Foundation for Sustainable Construction

2009 Spotlight Award, Best Museum AV Project
PRO AV Magazine

2009 AV Award, Grand Prize Winner
Archi-Tech Magazine

"Meyer Sound combines the scale and quality of a mass manufacturer with the approachability of a cottage industry. Normally you get one without the other... They are really easy to do business with, and they are happy to make a long-term commitment to your project."

Blair Parkin
Managing Director, Visual Acuity

WORLDWIDE OFFICES

Meyer Sound Headquarters
2832 San Pablo Avenue
Berkeley, Calif., 94702
USA
T: +1 510 486.1166
F: +1 510 486.8356
sales@meyersound.com
www.meyersound.com

Meyer Sound Nashville
T: +1 615 244.2472
nashville@meyersound.com

Meyer Sound Australia Pty Ltd.
T: +61 7 3252.4433
F: +61 7 3252.3380
australia@meyersound.com
www.meyersound.com.au

Meyer Sound Belux
T: +32 2 567.2710
F: +32 2 567.2709
belux@meyersound.com

Meyer Sound Brazil
T: +55 11 3816.0401
brazil@meyersound.com

Meyer Sound Canada
T: +1 250 549.2558
F: +1 250 549.2668
canada@meyersound.com

Meyer Sound CIS
T: +7 095 943.0091
F: +7 095 947.9140
russia@meyersound.com

Meyer Sound España S.A.
T: +34 90 216.0245
F: +34 90 018.0762
spain@meyersound.com

Meyer Sound Lab. Germany GmbH
T: +49 2602 99908.0
F: +49 2602 99908.99
germany@meyersound.com
www.meyersound.de

Meyer Sound México
S. de R.L. de C.V.
T: +52 55 5631.8137
F: +52 55 5630.5391
mexico@meyersound.com
www.meyersound.com/spanish

Meyer Sound Portugal
T: +351 91 512.8686
portugal@meyersound.com

Meyer Sound UK Ltd.
T: +44 7887.777150
uk@meyersound.com

thinking sound

18.908.065.01A

Printed on recycled paper