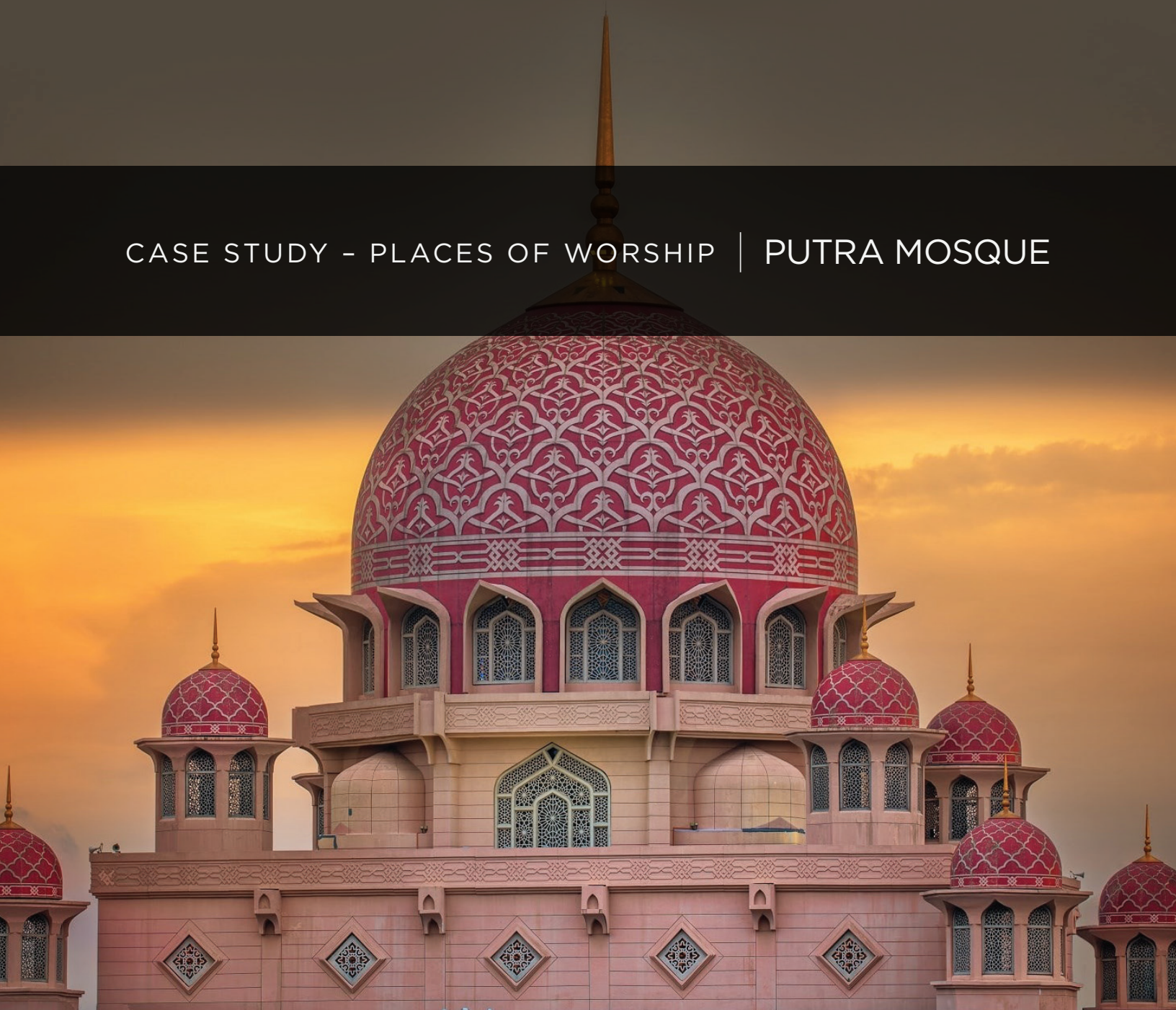


BOSE

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CASE STUDY – PLACES OF WORSHIP | PUTRA MOSQUE





A HOUSE OF WORSHIP LIKE NO OTHER

Every house of worship is unique. That's certainly the case for the Putra Mosque: visually striking, it's one of the few pink mosques in the world, clad in rose-tinted granite, with a 380-foot-high minaret that is one of the tallest in the region.

Located in the Putrajaya neighborhood of Malaysia's capital Kuala Lumpur, the mosque's design is a synergy of traditional Malay and Middle Eastern architectural styles. Opened in 1999 after two years of construction, the main masjid or prayer hall can accommodate over 15,000 worshippers at a time on two levels. In addition to its immense spiritual value for the nation's Muslim community, the Putra Mosque has national significance, as well: It is located adjacent to Perdana Putra, which houses the Malaysian Prime Minister's office, and in front of the mosque is a large square with flagpoles flying Malaysia's national flag and those of each of its states.

OVERLY REVERBERANT SOUND DETRACTS FROM WORSHIP

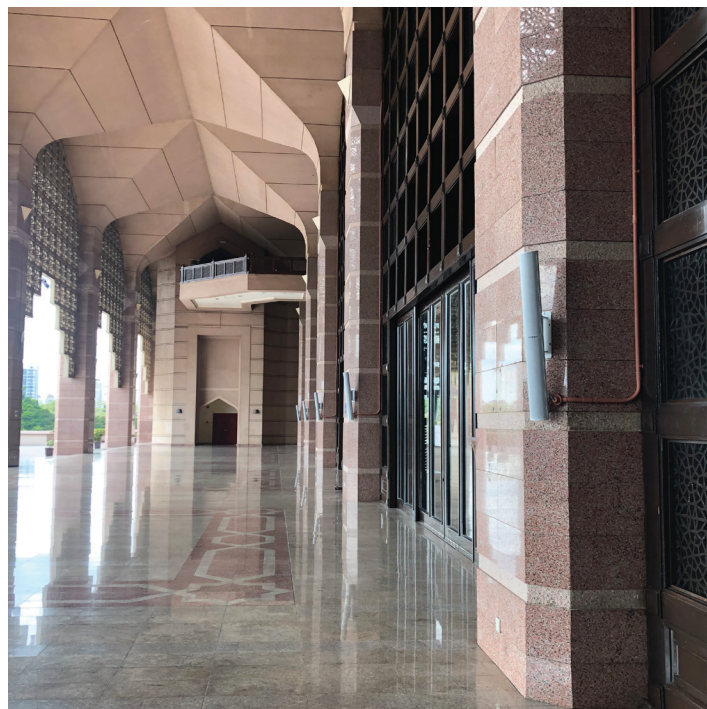
As impressive and breathtaking as it is, Putra Mosque needed to solve a set of common but serious problems for all houses of worship: poor speech intelligibility; a lack of even, consistent coverage of sound; and a sound system that was neither user friendly nor intuitive to operate. An unfortunate combination of challenging acoustics — a highly reverberant acoustical environment that's the natural

result of the mosque's domed architectural nature — and inadequately designed PA systems were ruining the sonic quality of the spoken word. In fact, for over two decades the mosque had experienced sound systems from three different manufacturers without quite meeting its needs. And those ineffective installed sound systems brought some of their own problems in the form of overly complicated system operation and maintenance.

“The articulated array configuration of the MSA12X loudspeakers produces a very wide horizontal dispersion, with sufficient throw without any loss in decibels.”

— Azizi Ala
Founder and Technical Director
Acousticon

“The overriding problem with mosques is that they are highly reverberant spaces,” observes Azizi Ala, founder and technical director of Acousticon, the Kuala Lumpur-based mosque system specialist that successfully bid on the project to assess and correct the sonic deficiencies at Putra Mosque. Azizi Ala on-site acoustic testing showed a reverberation of more than 2.5 seconds, which needed to be addressed without the use of architectural/passive acoustic materials due to the aesthetic design.



“Although the dome is always seen as the main challenge, the building surfaces are hard, the prayer areas are expansive and there are many pillars, so the audio directivity across the main prayer hall was uneven,” Ala continues.

A SOLUTION AS UNIQUE AS PUTRA MOSQUE

Between Acousticon’s mosque audio expertise and Bose Professional’s innovative audio technology solutions, a careful and nuanced evaluation of the mosque’s acoustical needs was identified. Ala and his team determined the MSA12X self-powered digital beam-steering loudspeakers would best provide the precise directivity needed. They first applied 3D Modeler prediction software to simulate various potential speaker-system designs and placements, and then used the Auditor playback system to virtually “listen” to those simulated spaces.

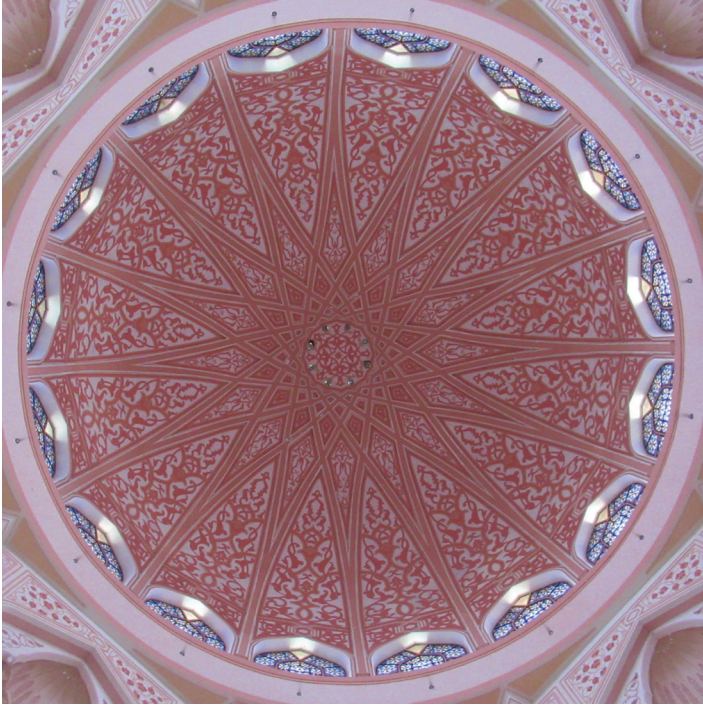
Modeler sound system software’s advanced algorithms predict acoustic performance of a space, including direct and reflected energy, as well as measure Speech Transmission Index. Designers can iterate quickly using Modeler’s proprietary calculation pipeline, allowing them to test different loudspeaker configurations and placements for optimal coverage, SPL, and intelligibility. Modeler can also import model data from standard CAD software, matching acoustic performance of the model to that of the actual space. Array construction tools also help automate the creation and layout of complex loudspeaker arrays.

The MSA12X proprietary Articulated Array® transducer configuration allowed for wide, 160-degree horizontal coverage throughout the space, and its modular design allowed the assembly of vertical arrays using one, two, or three units, while its slim form factor enables improved room aesthetics. Importantly, the steerable MSA12X loudspeakers are compatible with and able to be digitally controlled over a Dante Ethernet network, which Acousticon installed as part of the project. A total of 10 MSA12X loudspeakers in a 4-cluster column were installed on the mosque’s large interior columns.

SUBLIME AUDIO EXPERIENCE, USER-FRIENDLY OPERATION

The new audio system performed as predicted and blended nicely into the mosque’s architecture — but other improvements less immediately apparent were also important. Acousticon programmed a user-friendly QSC Q-SYS interface that provides users with an intuitive experience using a 12.9-inch iPad to operate the sound system. In addition to the basic system on/off and volume control, the controller also lets the user determine specific zones for sound to be on and has presets for specific activities, such as worship services or seasonal celebrations. Ala also programmed intuitive GUI display icons for the mosque’s individual imams and muezzins, which activate the appropriate audio zones.

The outcome was everything the mosque’s leaders had hoped for, and more. Speech intelligibility was significantly improved not only throughout the main prayer and seating areas, but also in traditionally difficult areas such as underneath balconies. “The articulated array configuration



of the MSA12X loudspeakers produces a very wide horizontal dispersion, with sufficient throw without any loss in decibels,” says Ala.

Putra Mosque is one of Malaysia’s leading spiritual institutions, and thanks to Bose Professional technology and its proven promise to “help our partners build incredible pro audio experiences,” it now has sound befitting that stature. ■

SYSTEM COMPONENTS

MSA12X loudspeaker

Modeler sound system software



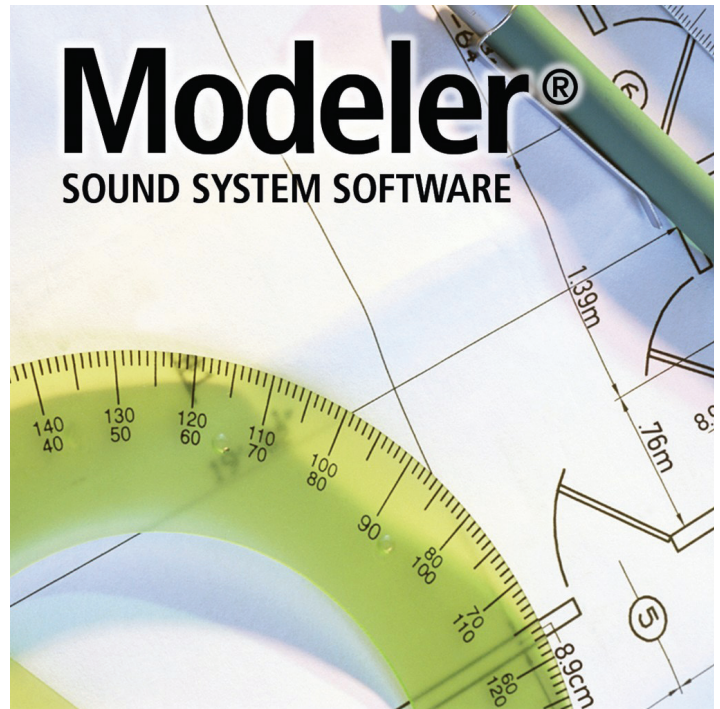
PARTNER: **ACOUSTICON**

Based in the Malaysian capital, Kuala Lumpur, Acousticon specializes in audio and visual solutions. From system design and consultancy to equipment installation to testing and commissioning, Acousticon focuses on the whole project.



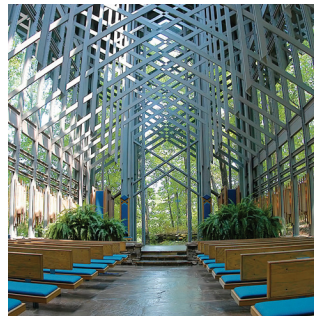
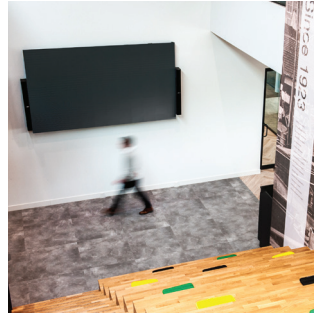
MSA12X LOUDSPEAKER

MSA12X is a self-powered digital beam-steering loudspeaker that enables improved room aesthetics, with outstanding vocal intelligibility and tonal consistency. The proprietary Articulated Array transducer configuration allows wide, 160° horizontal coverage throughout the room, and MSA12X's modular design allows building of vertical arrays using 1-3 units. Dante digital audio network interface comes standard for connection with other Dante-enabled products over Ethernet-based networks.



MODELER SOUND SYSTEM SOFTWARE

A 3D modeling program for acoustic design and analysis, Modeler software helps system designers and acoustic consultants predict sound system performance in both indoor and outdoor environments. From places of worship and multi-purpose spaces to hospitality venues, stadiums, auditoriums, and more.



Bose Professional serves many different markets, delivering great sound in venues all around the world — performing arts centers, theaters, places of worship, stadiums, restaurants, schools, retail stores, hotels, and corporate buildings.

We know that our pro audio customers depend on us in a unique way. This is your business, your reputation, your livelihood — not just an amp, not just a loudspeaker. So, when you buy a Bose Professional product, you get the full weight of the global Bose Professional team behind you — our time, support, and attention. We see every purchase as the beginning of a partnership.



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