



John McMahon and Pierre Germain (Meyer Sound), Tze Tze Lam (EAS), Philip Murphy (Coda Group), Melody Parker (Meyer Sound), Vincent Cheong and Sufian Abdul Majid (Coda Group), Patrick Chee (EAS), Tan Suan Wee (Radian Acoustics) and Theodore Huang (Meyer Sound)

# Star quality

In the starry world of showbiz, Meyer Sound's Constellation acoustic system, which has been installed into a historic Singapore venue, is aptly named. **Richard Lawn** reports

**THE SINGAPORE CONFERENCE HALL (SCH) DATES BACK** to the foundation of the Lion State. Home to the Singapore Chinese Orchestra (SCO), the 53-year-old multipurpose venue underwent major renovations in 2017, including significant upgrades to its audio and video systems.

Last renovated at the turn of the millennium, the heritage building received funding in 2016 to improve its concert hall, internal accessibility and external landscaping. Thirty seats were sacrificed as the depth of the trapezoidal stage was extended by 1.2m to accommodate the 86-piece orchestra. Outside the concert hall, two link bridges have been established in the concourse to allow ticketholders with mobility issues to take a lift and access the hall on a level path, while the existing staircase has been shifted back to the position it occupied in 1965. Finally, a new drive-in area has been added to the external landscape outside the concert hall.

Having received consistent feedback for years relating to reverberation and sound quality, especially from those seated furthest from the stage, the venue has finally silenced its critics. Previously, the reverb time of 1.3s to 1.5s proved to be an adequate deterrent to promoters booking the SCH, so this aspect of the upgrade was deemed critical. As the building is a heritage site, many meetings ensued with the preservation society to ensure that any proposed developments would observe regulations in place to protect the integrity of the building. Following that, a brief was handed down to the architects highlighting a demand for improved audio over aesthetics. The creation of warmer tones was emphasised, and these have now been provided with the installation of a Meyer Sound Constellation acoustic system.

Assistant director (concert production) Jackie Tay has been insistent on installing Constellation into the venue since attending a 2010 demonstration in Beijing. 'I went to hear a demonstration at the Palm China exhibition in 2010 and listened to a musical performance using Constellation,' he recalls. 'In such a large space, I was amazed at the acoustics, balance and volume of the music from only a few instruments. Yet it didn't add any colouration.'

Another pivotal point arrived several years later when Meyer Sound's John McMahon conducted another trial using Constellation at Sentosa Cove with the assistance of the SCO ensemble. 'The natural clarity, warmth and 3-dimensional audio reproduction of the orchestral sound was amazing as it wasn't overly reinforced and sounds truly natural,' continues Mr Tay.

'Not only could the musicians monitor themselves but they could also better interact with the audience.'

With budgets finally approved, an engineer from Meyer Sound conducted a full acoustic analysis of SCH, allowing schematic plans to be drawn. This resulted in a large Meyer Sound loudspeaker inventory being precisely installed into the main venue's architecture. The Constellation system incorporates 26 UP-4XP dual 4-inch and 39 MM-4XP single 4-inch models, together with 12 dual 10-inch UMS-1XPSPM subwoofers and a further 44 Stella-4C ceiling speakers. Fixed to the surrounding stage wall for the benefit of the orchestra, the Constellation shell comprises 12 UPJunior-XP point source cabinets fixed at a height of 2.5m together with 19 overhead UPM-1XP dual 5-inch models. Four UMS-1XPSPM on-stage speakers complete the stage zone.



**26 UP-4XP dual 4-inch and 39 MM-4XP single 4-inch models are integrated into the Constellation system**



**12 Meyer Sound UPJunior-XP point source cabinets provide orchestral monitoring**



**EAS' Tze Tze Lam with SCO's executive and assistant directors Terence Ho and Jackie Tay**  
(photo courtesy of the Singapore Chinese Orchestra)



**The stage has been extended to accommodate the 86-piece orchestra** (photo courtesy of the Singapore Chinese Orchestra)

Meyer Sound's Constellation system creates optimal acoustics for individual performances by adjusting the reverberation time, early reflections and signal strength accordingly. Rather than capturing the direct sound of the instruments, a distributed network of 35 denser microphones located above the stage and seated areas continually sense and feed ambient physical acoustic information.

Located in the BOH equipment room, a DCM-4 digital core matrix receives the inputs via two D-Mitri DAI-24 input modules before outputting to three DCP core processors. The addition of four racked D-Mitri VRAS modules containing stored SSD measurement data and audio files provide dedicated input channels and processing information for each of the zones

they serve. Completing the D-Mitri platform in SCH, two network switches provide full redundancy, while six DAO-24 modules route the audio signals from the core to the speaker system.

Other racked equipment include 16 MPS488HP external power supplies together with two Galaxy 816 modules for full DSP control for the main FOH line array system. Three SurgeX SEQ-1216i power-conditioning sequencers serve as a barrier to electrical spikes and assist in powering on and off. Facility management need not be confined to the equipment room as the D-Mitri mixing and routing parameters can be remotely monitored and controlled using CueStation software.

Multiple user configurations have been preset in Constellation, ensuring that customised acoustical signatures can be applied for any event in any seating configuration. Capable of staging music such as Chinese orchestras, symphony orchestras, ensembles, piano recitals, pop music and dramas, Constellation has significantly broadened SCH's appeal courtesy of these presets – including amplified music when required. Such events draw upon an FOH system incorporating 14 per side Mica line array loudspeakers, dual



The Midas Pro6 digital console has been mixing the audio in the venue since 2011.

UPJunior-XP side-fills, a single UPQ-1P centre-fill and three 1100-LFC dual 18-inch subwoofers. With the addition of two Galaxy 816 processors, the FOH reinforcement system can operate independently or simultaneously with Constellation.

For long-established SI company Electro-Acoustics Systems (EAS), integrating Constellation into a performance venue was a first. Working closely with Meyer Sound's distributor, Coda Group, EAS project manager, Patrick Chee, coordinated EAS' team on site. 'We've successfully employed Yamaha's AFC3 [Active Field Control] technology in a number of projects, as it can adjust and enhance the architectural acoustic characteristics of facilities,' explains Mr Chee. 'Constellation is a lot more complex and required direct assistance from both the distributor and the manufacturer. As this is Meyer Sound's largest installation of its Constellation acoustic system in Singapore and South East Asia, great teamwork and project management was instrumental in ensuring a job well done.'

Acvion Acoustics was the acoustic consultant for this project. The onsite team consisted of 13 EAS engineers and



The BOH electrical room houses the racked D-Mitri processing platform

technicians, Coda Group's Phil Murphy, Vincent Cheong and Sufian Abdul Majid. Meyer Sound's John McMahon, Melody Parker, Pierre Germain and Theodore Huang all flew in to tune and commission the system.

EAS also installed 16 Sennheiser Digital 9000 wireless microphone channels with two EM 9046 SU 8-channel receiver frames, boosted by an AD 9000 directional antenna system, into SCH. Mobile performances are enhanced with the addition of eight Sennheiser EM 6000 Dante dual receivers, transmitters and receivers together with eight Neumann KK 205 super cardioid capsules. As part of the makeover, a Williams Sound MOD 232-02 2-channel infrared modulator connected to WIR TX9-02 infrared emitters and RX22-4N receivers provide enhanced assistive listening capabilities.

EAS also conducted an extensive video upgrade capable of promoting multimedia mapping projections. A 4K-ready Analog Way Ascender 48 seamless switcher sources and processes composite video, HD-TV and computer formats, and the resultant images are output to two Christie D12HD-H 10,000 ANSI-lumens projectors firing onto an 8m x 4.5m Stewart Luxus screen. LiveCore control can be applied from a Vertige 16 VR-300 controller in addition to the web-based RCS software. 'Rather than having to hire external rental companies, SCH can now promote state-of-the-art, in-house projection services itself,' explains Mr Tay.

Stage lighting has not been left in the shade. Located in the rear production area alongside a previously installed Midas Pro6 digital console, a grandMA lighting console now controls the existing fixtures in addition to a number of new Claypaky moving heads including 24 A.leda B-Eye K20 LED washes and 12 800 ST profiles.

'It may sound like a well-worn phrase, but the timeline to complete was extremely challenging,' admits Mr Chee of the project. This was particularly tasking for EAS, as the SI had to pull personnel off other ongoing projects. 'EAS was fortunate to be nominated for this prestigious project and so we worked hard to create this milestone,' he continues.

'Rather than rebuild the hall specifically for orchestral acoustics, the adoption of Constellation allows us to adapt to different genres and uses,' comments SCO executive director, Terence Ho. 'Being the home of the SCO, musicians prefer to rehearse in their own familiar acoustical environment. Thanks to the presence of Constellation, we now have a hall that allows musicians to both rehearse and perform in. Previously, that meant some events requiring daytime set up could not allow rehearsals for that same evening.'



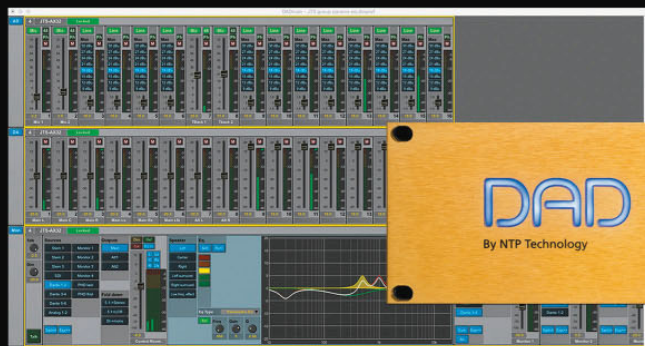
The stage has been extended to accommodate the 86-piece orchestra (photo courtesy of the Singapore Chinese Orchestra)

Normally, the SCO stages 125 shows per year ranging from regular ticketed concerts in the SCH and performances at outdoor community centres around Singapore to ticketed concerts at Esplanade Theatres by the Bay when large seating capacities are required, as well as overseas bookings. As the orchestra was forced to hit the road during the 2017 renovations, the *Rhapsodies of Spring 2018: Home for the New Year* concert felt somewhat special. 'I have been overwhelmed by the change of the tone, colour and quality of the sound – it's very vibrant, beautiful and rich,' commented music director, Tsung Yeh, upon testing the new acoustics of the revamped SCH.

For Mr Tay, the January concert marked the completion of a remarkable 7-year journey. 'So much preparation and thought were put into this entire project that the journey's end felt like a personal graduation ceremony,' he says. 'The unique technology integrated within SCH has definitely raised the bar here in Singapore to deliver the optimum audience experience.'

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