Higher ground

Facing its first refurbishment since opening, the Queensland Performing Arts Centre has taken the opportunity to improve its operation on all fronts – not least its audio. **Stephen Bruel** reports

The Concert Hall auditorium

LOCATED IN BRISBANE, THE Queensland Performing Arts Centre has confirmed its standing as one of Australia's world-class performance facilities with a recent Aus$34.7m refurbishment. Comprising the 2,000-seat Lyric Theatre, the 1,800-seat Concert Hall, the 850-seat Playhouse and the 312-seat Cremorne Theatre, and with numerous spaces for banquets, receptions and conferences, this is the first major renovation since the complex first opened its doors in 1985. Completed at the end of May, improvements have been made in the areas of production operations and acoustics, public area design, disability access, and food and beverage services.

For QPAC director John Kotzas, the whole refurbishment was about inclusion – the centre was determined to use the refurbishment to break down a number of perceived barriers. With past experience as a freelance stage and production manager, and a 20-year career with QPAC (having starting out as an education officer), Mr Kotzas has a strong understanding of the physical shape and layout of the facility and the need to upgrade. 'Before the refurbishment, QPAC could be regarded as a kind of walled fortress,' Mr Kotzas says. 'We could have performances running in all of the venues, the whole place could be packed, but nobody walking past the place would be aware of what was going on. We now have better defined entrances and a more open feel.'

With this focus in mind, Mr Kotzas involved as many people as possible in the process and provided a communications platform built on trust and support that encouraged input from key stakeholder the Queensland Government, architectural firm Cox Raynor, the building contractor and his own team in a co-operative and efficient manner. It was decided by the group that QPAC would only suspend its staging of events for four months in order to complete the building process due to the financial costs involved in being unable to trade. With performances pre-booked four months ahead and the deadline looming, Mr Kotzas found a great camaraderie developing between the groups, resulting in a fantastic standard of work. 'During the four-month build we had a peak nine-week period where 250 people worked seven days a week, 24 hours a day, in order to meet our schedule,' he recalls. 'The level of workmanship attained, particularly on the curved timber auditorium and Concert Hall stage, is testament to the ethos and culture created. I can also proudly say that the project ran on time and on budget, which is extraordinary.'

Detail of the sound absorption in the raised seats

Another major goal was to extend the access available to patrons with mobility issues or disabilities, so that they could share performances equally with other patrons. Mr Kotzas explains that a new aisle option was built in both the Lyric Theatre, and that the Concert Hall now allows seating to be removed to accommodate wheelchairs in an area of the room that has a good view of the stage and good acoustics. 'Patrons in a wheelchair or with mobility issues can now arrive at QPAC by car or taxi at a new designated drop-off point, catch a new glass lift directly to Door 5 or Door 6 in the Concert Hall or Lyric Theatre, and sit in the middle row of the hall in an area designed to accommodate their needs with no impediment to sound or sight,' he says. By completely re-tiering the timber floors and replacing and re-raking the chairs in these performance spaces, QPAC can now offer patrons with mobility challenges a choice of reserved seating, as well as balcony options, whereas the only space previously allocated would have been limited and at the rear of the venues. The fact that these additions do not hinder the quality of the performance for patrons around these areas is testament to the thoroughness of the design.

Controlling the acoustic

The role of ensuring the acoustic quality of the project was given to Marshall Day Acoustics. With previous projects including the Melbourne Recital Hall, the Guangzhou Opera House and the Perth Concert Hall, and with work about to start on the Philharmonie de Paris Concert Hall, Marshall Day Acoustics engineer Peter Holmes welcomed his involvement in the project: 'Robin Gibson was the original architect for the building and did a great job, so we knew we had a great shell to work with,' he says. 'However, to get the acoustics right in the venues, we needed to work out how they have changed in focus from when they were originally built until now.'

Mr Holmes explains that the core function of the Concert Hall is to make a symphony orchestra sound as good as possible, as this was the thinking behind the original acoustic build. However, the Concert Hall has since become a multi-purpose space, so it now needs to flexible enough to accommodate amplified performances with equally satisfactory results. To this end, Mr Holmes designed rear acoustic absorptive curtains to complement the existing side wall absorption panels. Mounted on rollers, these can be mechanically lowered and raised from the ceiling area at the press of a button, providing a drier, less reverberant space. 'The Concert Hall could have a university graduation one night, a comedy show the next, an amplified music group the following night and an orchestral performance after that,' Mr Holmes says. 'Therefore, we needed to look at ways of improving the sound across the full range of performances.'

He also saw problems with the construction of the stage shell – the side walls, which were originally flat, produced a lot of 'crosstalk' on the stage and prevented sound from being projected cleanly into the auditorium.

Marshall Day Acoustics' Peter Holmes

Apart from degrading the audience's experience, this also compromised the performance conditions for the orchestra. The chosen solution was to curve the walls and shorten the distance between them, which resulted in the sound being more efficiently directed into the audience and better clarity in the performance area for the orchestra. Mr Holmes also made adjustments to a curved concrete wall that focused sound from the rear, creating a timing delay for the performers and generally reducing the clarity of sound in the room. 'A lot of acoustics is based on what the audience hears, when the focus should also be on the musicians,' he says. 'If the musicians cannot hear themselves or other members in the group playing well, this can hinder their performance.'

Apart from improved access and comfort for patrons with mobility issues, replacing the original seating presented an opportunity to dramatically improve the acoustics of both the Concert Hall and Lyric Theatre. Mr Holmes explains that the original seating was quite plush and damped the sound quite strongly. But, while for a rock band this is desirable, for an orchestral group relying on the reverberation created by reflections from the wooded floor and acoustic side and back panels to help produce its sound, the damping from the seats posed a problem. 'In combination with the stage area, reducing the absorption in the seats really helped in improving the feel and lifting the reverberation of the Hall,' Mr Holms says. 'In order to establish the range we installed large acoustic banners on the back wall as well, so it diffuses also. 'The seats tilt up when they are unoccupied, so that the absorption slots that are now built into their underside face the stage. In this way, the absorption of the room is not altered when a seat is not in use, as there is no longer a hard flat wooden surface facing the stage. 'The acoustics of a room change dramatically when it is occupied as opposed to when it is unoccupied,' Mr Holmes says. 'You want to try and minimise the difference so that when an orchestra rehearses in an empty room, the difference in sound is not a huge leap to that attained with a full room.'

QPAC director John Kotzas

The refurbishment also included a new modular stage to accommodate the different uses. 'I had to create a space with less reverberation so a more direct "vocal" could be achieved for theatre, as well as lower the absorption,' he says. 'I achieved this through laying carpet on the floor [as opposed to the wooden floor in the Concert Hall], installing acoustic advantageous seats, panels and banners.'

Rider riding

As well as being a 'second home' to some of the Queensland's leading performing arts companies – including Queensland Theatre Company, Queensland Ballet, The Queensland

Doug Brimblecombe, QPAC manager of lighting

QPAC manager for audiovisual production services John Kelly (seated) with the Studer Vista 5SR

Orchestra and Opera Queensland – QPAC hires out its venues for international touring shows and independent producers. For QPAC manager for audiovisual production services John Kelly, this forms the basis for all audio equipment purchases and upgrades. 'With so many touring companies using our equipment as well as providing their own, we need to be able to be flexible and "rider friendly" with the audio products we provide,' he says. 'Although the acoustic upgrades have made the rooms more manageable, we still need the best analogue and digital equipment available to take full advantage of these improvements. We offer analogue Midas Heritage 2000, 1000 and XL 200 consoles, digital Yamaha DM1000 and M7CL digital surfaces, as well as the new Studer Vista 5SR live digital console.'

With a background as a touring live sound engineer gained during the 1980s, three years on Hamilton Island looking after audiovisual (nice work if you can get it) and 10 years' production work at the Cairns Civic Theatre, Mr Kelly has a good knowledge of audio systems. Being responsible for all of the audio operations and infrastructure throughout the building, he has to manage the audio requirements and resource allocation carefully, and give people what they want. 'As the Lyric Theatre is primarily used by people who provide their own gear, when asset replacements come around we generally put the latest and greatest into the Concert Hall,' he continues. 'However, the set up on offer is always a good industry standard one. No engineer is going to say they won't use Midas or Klark Teknik. It is a good, high-quality analogue audio set-up in both venues.'

The Lyric Theatre's system consists of a 40-channel Midas XL200 console, Meyer Sound CQ1 and CQ2 speakers for the left and right FOH PA, with UPA1Ps for the centre cluster and Meyer Sound UPM1P and 2P for the delay speakers. In addition, there are Klark Teknik DN360 EQs, dbx compressors, Lexicon effects units and BSS Soundweb networked signal processors.

The Concert Hall audio set-up is similar, except for the Meyer MSL4 speakers used at FOH and UPM1Ps for close-field monitoring in the choir stalls. There is also a 48-channel Midas Heritage 2000 console with Dolby Lake Processors.

Although not part of the refurbishment funding, the Studer console is less than a month old – and a welcome arrival. Set up in the Concert Hall at the time of writing, it is envisaged that it will also spend time in the Playhouse. QPAC head technician for audiovisual Brian Inglis, a 20-year veteran as an audio systems specialist with Australian Concert Productions, is happy with the Studer purchase. Both Mr Kelly and Mr Inglis undertook research of most big name digital consoles but decided on Studer. 'The open architecture allows you to configure the system how you want it,' Mr Inglis says. 'It is expandable by adding cards, it has an easy-to-use operating system and has the really nice warm and natural Studer microphone preamps. It is the most versatile console out there. Also, VST plug-ins are available on a separate engine and use their own computer processing, not affecting the overall performance.'

With performances from rock bands through opera to comedians taking place throughout the centre, the microphone selection is comprehensive. The list includes Neumann U87, TLM170s and KM184s, Schoeps, AKGs, a Schertler piano pair, DPA headsets, Shure Beta 87, SM57 and SM58 dynamics, and Shure UHF-R wireless systems featuring the wireless workbench software. 'As you can imagine, with multiple venues next to each other the number of wireless microphones used requires careful frequency management,' Mr Kelly says. 'The Shure wireless workbench software helps with this, and using Clear-Com Freespeak DECT cellular (frequency hopping technology) comms in the Concert Hall eliminates frequency management issues with the talkback.'

For QPAC manager of lighting Doug Brimblecombe, the refurbishment has seen the latest in lighting technology used for architectural lighting in the venues and throughout the building, stage lighting effects and substantial energy efficiency gains. 'We prioritised the Concert Hall because people at a concert tend to look around at the venue, as opposed to the Lyric where they focus on the action on the stage, he says. 'We can easily change colour and create mood to enhance the concert experience.'

Traditional 300W auditorium lights in the Concert Hall were replaced with LED lights and 2.5k theatrical lights with 80V (1.2k) lights resulting in an overall reduction in power useage of 62 per cent. Furthermore, 400 fittings backstage were changed, and with the addition of dedicated work lights for use during non-performance times, power consumption will be reduced by 85 per cent.

With The Paris Opera Ballet presenting the Australian Premiere of Rudolf Nureyev's stunning production of *La Bayadère* by The Queensland Orchestra on 24 June, the multi-million dollar refurbishment of QPAC has ensured a performance of the highest audio and lighting quality – with easy access throughout the venue for a broader catchment of patrons than ever.

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