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An auditorium lectern equipped with AV presentation technology



The 1,400-seat Tay Eng Soon Convention Centre Auditorium



The upgraded 396-seat Tay Eng Soon Convention Centre Hall

With venues under increasing pressure to upgrade, creative AV design can transform spaces to attract bigger audiences while being mindful of budget and sustainability issues.

Richard Lawn visits one such upgrade at a Singapore's ITEHQ and CC

JOINING THE ALREADY-ESTABLISHED SITES OF THE

Institute of Technical Education (ITE) College West and ITE College East, ITE Headquarters and College Central (ITEHQ and CC) was unveiled as ITE's third and largest regional campus in late 2012. Located in Singapore's central neighbourhood of Ang Mo Kio, the vast site comprises a wide variety of learning and recreational facilities including a Centre for Music and the Arts, a sports and recreation hub and numerous F&B and commercial outlets.

Celebrating its 30th anniversary at that time, Electro-Acoustics Systems (EAS) was commissioned to design, supply and install AV systems into the many lecture theatres, auditoriums, halls and sports venues. Working under the guidance of acoustic consultant Acviron, a skilled team of 20 technicians in addition to subcontractors spent over 12 months completing the entire works. Over the past decade, EAS has continued to maintain and service various rooms and venues in the campus, with an impeccable record.

"The Tay Eng Soon Convention Centre Auditorium and Hall here at ITEHQ and CC were initially conceived to host educational events," explains ITECC music and arts officer, Joshua Chong.



L-R: ITECC music and arts officer Joshua Chong with EAS's Tze Tze Lam and Renkus-Heinz's KK Tan

"Speech intelligibility and PowerPoint presentations were the norm 10 years ago but, as the performing arts programme matured, the demand to host an increasingly busy schedule of live events and musical performances grew. Over the past 10 years, EAS has proved to be a reliable partner of ITEHQ and CC by providing invaluable expertise and advice, so we were fortunate to be able to reach out to them once again in our quest to upgrade the venues."

With sustainability being a predominant theme in higher educational facilities, ITEHQ and CC was also mindful that there was a limited budget to facilitate the desired upgrade. "The majority of technologies installed 10 years ago are in perfect working order," continues Chong. "However, upgrading the auditoriums from speech intelligibility, ambient lighting and PowerPoint presentations to high SPLs, intense colours and lumens together with 4K backdrops would require some careful planning." Acoustic works that would cater for higher-decibel entertainment were ruled out, however.

The Tay Eng Soon Convention Centre's 1,400-seat auditorium at ITEHQ and CC has become Prime Minister Lee Hsien Loong's venue of choice for the Singapore National Day rally

speeches. The 16m-deep stage hosts a wide variety of shows and presentations, all of which require their own individual AVL signature. Having fully evaluated all the components in terms of degradation and future entertainment requirements, ITE, together with industry input, determined what equipment would remain or need to be replaced.

The original Renkus-Heinz STXLA/9 dual 12-inch line array system, comprising 12 ceiling-suspended elements per side, remains in situ. Recessed into the wall on either side of the stage below each hanging array, eight original Renkus-Heinz DRS18 subwoofers continue to faithfully output down to 45Hz ($\pm 3\text{dB}$). With six ceiling-mounted CFX81 speakers serving as under-balcony fills, full coverage in the front rows continues to



The original Renkus-Heinz STXLA 9 line array system remains in situ in the 1,400-seat auditorium

be served by five Renkus-Heinz CX62 enclosures placed under the stage on speaker stands. Continuing to work reliably and efficiently, the entire system is powered by a combination of QSC Audio PL380, PL325, PL340, RMX1850HD and RMX850 amplifiers. "The Renkus-Heinz line array system operates across the full frequency range and perfectly fulfils our multipurpose requirements," says Chong.

With ITE having requested a low-latency Dante audio network to be installed, EAS was engaged to highlight some of the digital components that needed to be swapped out. Located in the control room, a Yamaha Rivage PM5 console is now used for audio mixing. Designed with multi-operator use in mind, ease-of-use functionality is assisted by three 15-inch capacitive touchscreens, a condensed selected channel section for intuitive operation, remote setup from an iPad and the ability to store show presets. Routed to two RPi0622 I/O racks, the 36-fader console is also connected to the Dante network via an RSio64-D interface capable of converting up to 64 channels of inputs and outputs.

Remaining in the digital domain, ITECC has taken ownership of a 24-channel Shure Axient wireless microphone system consisting of 12 ADQ4 four-channel receivers paired to Beta 87A transmitters, UA845UWB antennas and power distributors together with an AXT600 Axient wireless spectrum manager. Chong provides his rationale for the investment. "With our prime minister performing speeches here in addition to hosting top-class entertainment, the auditorium demands a stable and reliable wireless solution. The RF environment is quite complex, encountering a lot of interference."

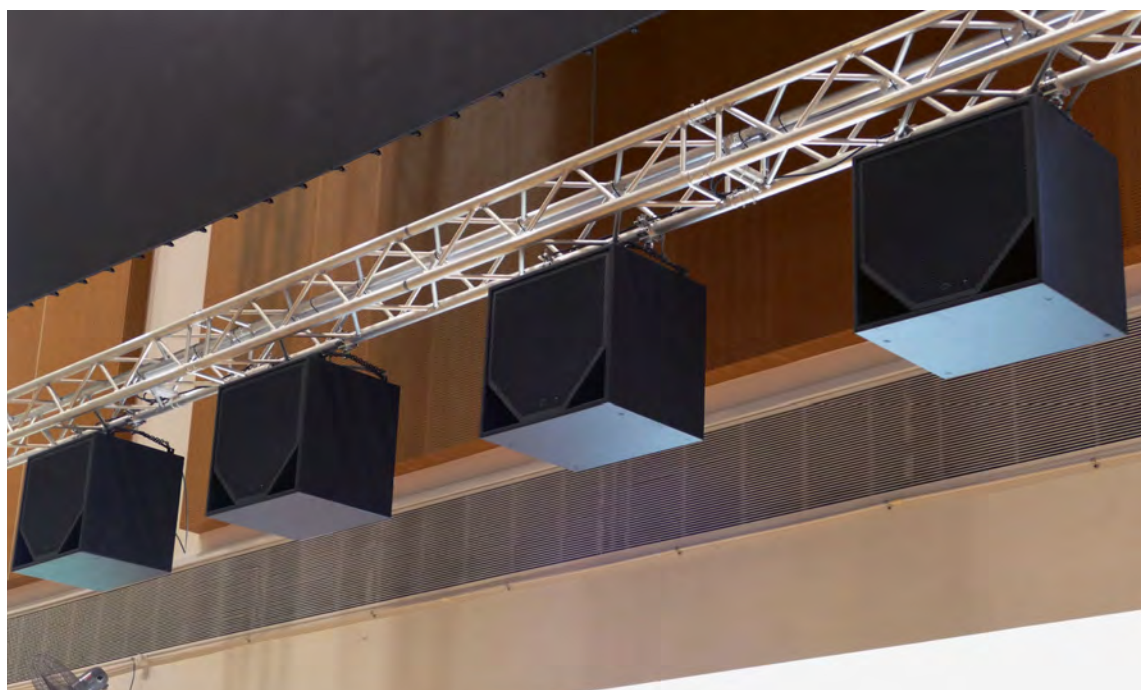
Shure's WWB6 Wireless Workbench management software was used to calculate the most efficient frequencies available, as well as backup frequencies. The AXT600 spectrum manager calculates compatible frequencies and assigns these to



A Yamaha Rivage PM5 has been installed in the main auditorium control room



Samsung P4.0 LED walls add a new dimension for visual entertainment



Renkus-Heinz ICLive X subwoofers are tuned according to phase, delay and EQ in the sports hall

networked wireless systems, monitoring the backup frequencies of the RF environment in real time. Encountered interference is managed by the Axient's automatic detection and avoidance function, while the ShowLink signal access point remotely controls all Axient transmitters. The built-in ShowLink test function was used to test all areas of the stage to ensure good coverage of the control signals. With the performers free to roam around, the deployment of extra UA874 antennas ensures complete signal coverage is achieved.

With an increasing demand to host varied visual productions, both at the front of the stage when films are being screened or as a backdrop to lavish live performances, ITE was faced with a dilemma. Venues are increasingly adopting fixed LED walls; however, the layout of the auditorium meant that installing an LED wall would severely cripple the ergonomics of the venue, limiting staging options. "Screen flexibility was an overriding requirement, so we opted for back projection utilising four Christie Griffin 50,000-lumen 3DLP laser projectors in native 4K," explains Chong.

With the use of Christie's Mystique Install Pro Venue software, recalibration of any complex projection mapping can be completed with a single click. Any detected changes in the blended image are automatically corrected using a camera-based alignment system. Crucially, Chong and his team can easily reposition the immense 16:9 motorised projection screen at any point on the stage.

With the addition of an Analog Way Aquilon C+ 4K multi-screen presentation system and processor, eight 4K60p inputs are transmitted over HDMI to 12 4K60p receiver outputs including the four Christie Griffin 4K50 RGB laser projectors. The various inputs, including existing Sony HD Live and PTZ cameras, are now mixed on an Analog Way RC400T event controller. A large inventory of Robe Forte and Tarrantula LEDs above the stage are controlled from a grandMA3 lighting control surface in the control room next to the Yamaha PM5 console.

Directly below the main level four auditorium, the 396-seat Tay Eng Soon Convention Centre Hall has also been upgraded with similar audio, video and lighting technologies. "Over the years, the demand for more full-range musical playback and live performances has grown," explains Chong. "The original LC-R TRX121 Renkus-Heinz TRAP array functions perfectly well in the proscenium, but this was originally specified for speech intelligibility." Chong's request for a discreet, higher-power loudspeaker system has been met with the addition of ICLive XL and ICLive LX enclosures. The self-powered speakers are wall-mounted on either side of the stage and are augmented in the lower frequencies by four DRS18-1B subwoofers. "The inherent beam-steering technology ensures the acoustic energy is evenly distributed to all the seats," he continues.

Having taken delivery of a Christie 4K projector in 2019 for a variety of presentations, ITEHQ and CC requested an LED wall to be installed at the rear of the main stage. Measuring 7.68m x 4.32m (WxH), a Samsung P4.0 LED wall comprising 64 (8x8)

individual IF040R panels supports HDR picture quality up to 8K (1920x1080p) resolution. The HDMI signals are transmitted from the existing Extron XTP II CrossPoint 1600 matrix switcher in the control room. “For speeches and presentations, the large-format LED is the right choice for this venue,” evaluates Chong. “In terms of reliability and price performance, Samsung is hard to beat. ITEHQ and CC’s MagicInfo digital signage runs on the same Samsung network and integrates with the campus content management system.”

A Yamaha CL5 control surface that interfaces with two Rio3224-D2 I/O racks for digital audio mixing has also been installed. Up to eight channels of Shure Axient wireless are transmitted from Beta 87A handheld and lapel transmitters to ADQ4 four-channel receivers paired to UA845UWB antennas and power distributors. “Axient Wireless Workbench programming is extremely accurate, so there are no interference concerns with the auditorium above,” explains Chong. A Dante network connection is enabled via a Yamaha SWR2310-28GT L2 switch. The Tay Eng Soon Convention Centre Hall has also been converted following an increasing demand to host more live



A Yamaha CL5 is located in the smaller auditorium’s control room



ICLive XL and ICLive LX enclosures provide full-range audio in the smaller auditorium

music programmes. “Owing to the 7m ceiling height, glazing and lack of effective acoustic treatment, the Renkus-Heinz ICLive steerable loudspeaker solution addressed audio quality issues,” says Chong. L-C-R arrays each comprising ceiling-suspended ICLive X steerable speakers are enhanced in the lower frequencies by two hangs of four ICLive ICLX-118S subwoofers. The existing ceiling speakers continue to be used for speeches and announcements. A further four ICLive columns have been added as fills and in the pre-function area.

As in the level two auditorium, the audience is greeted by a high-resolution 7.68m x 4.32m Samsung P4.0 LED wall at the rear of the stage upon entry. A Yamaha CL5 console receives microphone inputs, including those from eight channels of

Shure ADQ4 four-channel receivers as well as from two Yamaha Rio3224-D2 I/O racks. Lighting control is now handled by a grandMA3 onPC lighting console. Installed in 2018 for digital audio processing of the back of house areas including the dressing rooms, a Q-SYS Core 110f processor transmits the digital signal over the QLAN network to an LEA Professional Connect 704D amplifier.

Furnished with retractable seating for parades, exhibitions and presentations, the level five sports hall combines five basketball courts. Consisting of 25 displays, the existing Samsung LCD wall used as a live screen, scoreboard and for PowerPoint presentations has been upgraded. The highly reverberant acoustics of the large, open room have been greatly mitigated by the addition of two wall-mounted Renkus-Heinz ICLive arrays each combining two LX (top), two X (mid) and two XL (bottom) column enclosures. Fixed to the lower truss below the projection screen, four Renkus-Heinz ICLive ICLX-118S subwoofers have been tuned according to phase, delay and EQ. The previous analogue console has been upgraded to a Yamaha TF5 digital control surface fitted with an integrated Dante card for connection to the Rio stageboxes via wall- and floor-mounted patchbays. With nine presets available, the various DSP configurations have been programmed for recall at the touch of a button.

By staying in tune with both the audience and the artists, Chong and his team have transformed the ITEHQ and CC venues according to changing demands. With tastes in entertainment seemingly changing at a similar rate to technological advances, facility managers need to maintain an open mind in their quest to stay current – and solvent. By opting to expand on the solid foundations that the four venues in ITEHQ and CC are blessed with, the adoption of digitally precise and high-power AV technologies has taken them beyond the present day and into the future, without breaking the bank.

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