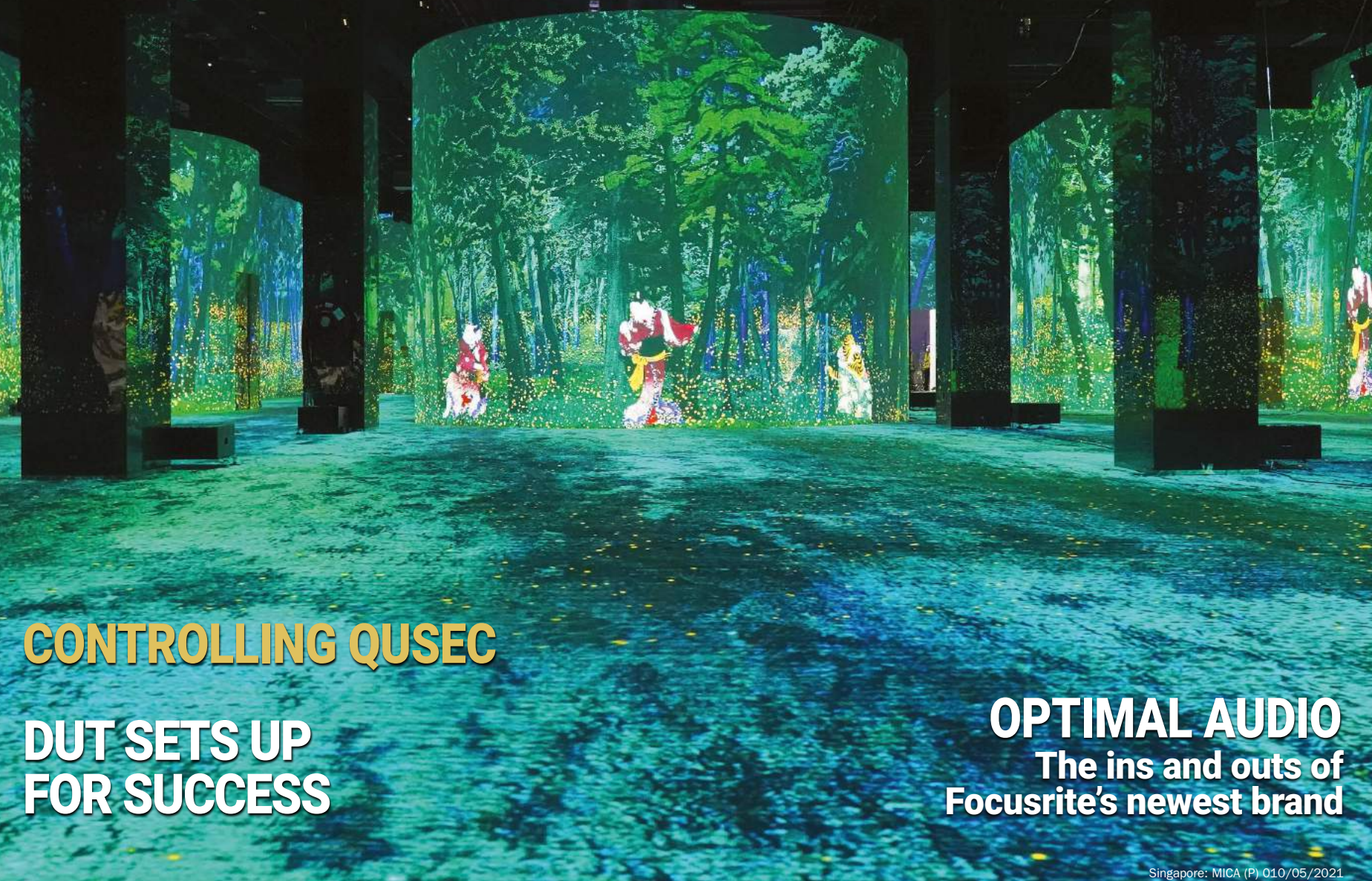


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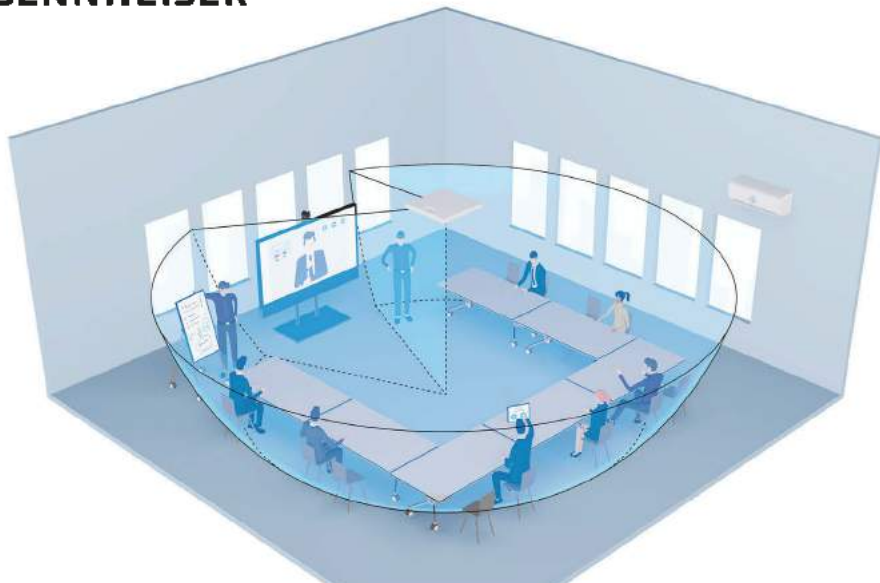
CONTROLLING QUSEC

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Techno Q delivers the biggest Active Field Control solution to date as it puts the client in full control at QUSEC

QATAR UNIVERSITY SPORT AND EVENTS COMPLEX

(QUSEC) is the biggest venue of its kind in the Middle East. Not only has its cutting-edge audio technology won awards for systems integrator and installer Techno Q, the venue is also home to the largest fixed installation ever supplied by NEXO with its sound reinforcement products. QUSEC further exemplifies the technical synergy between Yamaha's Active Field Control (AFC) system and NEXO loudspeaker technology.

The QUSEC facility on Qatar University's campus in Doha is celebrated as a ground-breaking project of space versatility. Its design philosophy set about creating a multifunctional building which serves as a sports venue for curriculum activities at the same time as being a multipurpose hall accommodating presentation ceremonies, major sports and other events, such as functions and exhibitions.

The complex is comprised of multiple adaptable rooms surrounding the pivotal Multipurpose Hall, which can host ceremonial and staged events for an audience of 5,000; multiple sporting events for 3,200 (with variable field-of-play layouts to accommodate multiple court spaces using suspended curtains); or banquets for 900 – all by means of retractable seating, lighting, rigging, ceiling, suspended curtains and 30m x 9m of portable staging. Including the adjacent 36m x 67m Training Hall, the QUSEC complex can accommodate more than 30 fixed and portable sport courts for volleyball, basketball, indoor tennis, futsal, badminton, squash and handball.

In this 25,500m² ensemble, a multitude of architectural, acoustical lighting and audiovisual technologies come together to create facilities with exceptional spatial flexibility. Techno Q was brought in from the outset to provide complete integration of the AV and public address systems, broadcast system, scoreboards, IPTV and digital signage, stage lighting, interpretation system and a sophisticated adjustable-height



The Multipurpose Hall



Techno Q senior project manager Mohanad Is-Hak

scenic lighting solution covering the main hall's ceiling. A Yamaha/NEXO audio system design with multiple sources has been implemented in both the Multipurpose Hall and the Training Hall, switchable between big sporting competitions or intimate staged events, either focusing on the group or the individual to create different ambiances from the solemn to the dramatic.

The huge multifunctional hall is characterised by its 70m x 40m retractable ceiling comprised of 80 5m² scenic lighting panels. These were designed and customised by Techno Q to fit the complicated ceiling alongside a number of other services, including the HVAC and fire system. The panels are grouped and connected to motors and shafts allowing the end user to position them at different

heights – 10m from the floor in events mode and 12.5m in sports mode, as per FIBA requirements. Techno Q's senior project manager Mohanad Is-Hak was involved in the project from the first day, charged with delivering the scalable audiovisual system that could keep up with the building's physical flexibility. Aside from the adjustable ceiling, the extensive multifunctional Yamaha AFC acoustic conditioning system, using NEXO loudspeakers, is a highlight of the design.

"At first, we only had basic plans and artistic renderings for the building, so the first priority was a deep study of every element of the project," explains Is-Hak. "Motorising more than 70 tons of ceiling panels that included a sophisticated lighting system, acoustic materials and the

AFC system – and ensuring complete sound harmonisation at all ceiling levels – was beyond any difficulties we'd imagined. We had to do a lot of acoustic studies, audio modelling and simulations to make sure that we would achieve what we are aiming for. In addition, we had only nine months to design and build everything."

The various configurations each have their own options for audio ambience, and Techno Q worked closely with Yamaha to implement the AFC system, which facilitates natural reverb time for every audience seat to deliver an exciting crowd experience. QUSEC is the largest AFC system of its kind in the world.

For the primary FOH system, used for ceremonies and banquets, Techno Q chose NEXO's STM Series modular line array. The dual 8-inch STM M28s are flown in L-R positions with seven modules with two S118 sub-bass cabinets in each line. The ability to lower or retract the nine-element pairs of line arrays greatly enhances various ambiences. The clusters can also be moved to match various seating plans or lifted into a "parking position" above the ceiling grid when they are not needed.



AV control is achievable from any location in the field via tielines in distributed broadcast boxes

also works for general public address and BGM. A further 30 PS15-R2s are mounted inside the side and end walls, spaced 8m apart, adding important sound information to the "dry room". Such a high density of wall speakers prepares the AFC system for possible use in concert mode. The Training Hall is also equipped with temporary event rigging points in the ceiling in order to handle a variety of stage locations and events requirements, as well as large LED scoreboards synchronised to the broadcast and in-house cameras.

In sports mode, all speakers are activated and receive varying gain and delay according to source proximity, with the signal processed to create additional reflected energy through wall and ceiling speakers. General reverb provides both extra loudness and spaciousness to the entire room to enhance the live atmosphere. Additional dedicated supporter microphones amplify crowd energy to maximise the experience and stimulate the players.

To further aid flexibility of operations in the highly configurable spaces, Techno Q provided 38 broadcast boxes distributed throughout the building to connect the different locations together, as well as to OB vans for outside broadcasting. These tie back to the OBTC room, which is reachable by media trucks. Furthermore, these boxes also provide internal audio and video transmission through portable racks as per an event's requirements, allowing control of the AVL systems from any location in the field. Portable media converters facilitate the transport of AV and broadcast signals between locations using dual LC Opticon tieline connections that can support 3G HD-SDI, HDMI, Ethernet and audio. "All sound system modules and I/O devices are integrated into a networked system to minimise the complexities of routing and maximise flexibility," notes Is-Hak.



A Yamaha CL5 and MA Lighting MA2 onPC control the audio and lighting respectively

There is a sport competition mode, which uses a separate arena FOH sound system comprising a central cluster of NEXO GEO S1210-ST long-throw line array modules located high above the field of play, with coverage aimed at the main seating areas in the retractable stands. Two arrays of six cabinets are located in this position using specially developed Stadium Sound versions of the GEO S12 module. A dedicated system is provided to cover the balcony areas using 29 GEO M6 modules.

The AFC system is implemented throughout the Multipurpose Hall using more than 60 high-power NEXO 10-inch and 15-inch PS Series cabinets in the side walls of the venue and the back wall behind the main audience seating. It can be used as the Exhibition PA or when there is an event with a large, seated audience, such as a sports competition, combined with the distributed NEXO RS15 subwoofer system to simulate reverberant low-frequency energy and create additional excitement by emphasising crowd noise. This aspect of the main hall's audio system is described as "luxurious", as there is a dedicated AFC Supporter Enhancement System, using six flown arrays of four GEO M10 cabinets, combined with high-power 15-inch point source cabinets on the floor to provide a fully immersive audience experience for live sport.

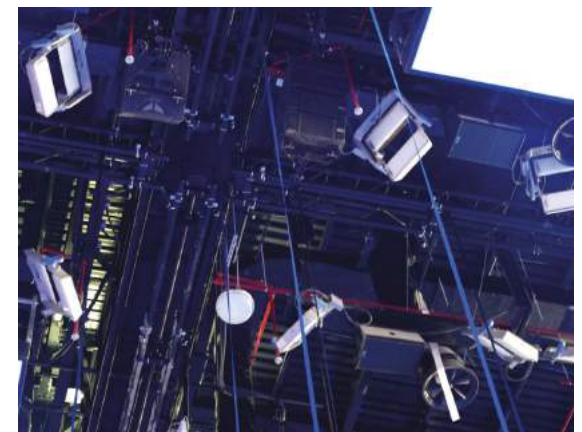
In a tennis match, for example, the sound of the ball hitting the racquet is localised by microphones and reproduced by the loudspeaker matrix. Flown clusters and floor speakers provide early reflections, ceiling speakers provide general loudness and sound locations clearly pan from side to side through the flown and floor speakers on each side of the court. Further accentuating the action are large LED high-brightness 6mm videowalls flown at opposite corners of the hall serving as scoreboards during games or as an integrated video solution capable of displaying video, show replays and presentations. Furthermore, the LED displays are

synchronised to the broadcast and in-house camera systems for live viewing.

The Multipurpose Hall also features a fully portable stage module with adjustable height. A mix of wash and profile stage lights from Martin Professional cover the 30m x 9m stage area, suspended from lighting trusses on the catwalk that can be lowered as per event needs and raised to the parking position during sports use. Situated at the centre of the mezzanine floor, the hall's control room has bi-fold windows allowing it to occupy the same acoustic space for engineers as well as an unrestricted view of spectator areas and the field of play. The control room provides full AV for the Multipurpose Hall via a Yamaha CL5 mixing console and MA Lighting MA2 onPC, with the control achievable from any location in the field via tielines in broadcast boxes distributed throughout the building.

The Training Hall can be completely sealed off from the main hall and can be presented in several different modes to cater for sport, ceremonies and theatre, or a seated banquet for 600. To facilitate this, there are two separate FOH systems that can also be used together, and a Yamaha AFC system of ceiling-mounted and wall-mounted NEXO loudspeakers. When the room is used in its "long room" layouts, the main FOH PA consists of a NEXO STM Series line array with L-R clusters of eight M28s and two S118 subs each, plus six PS15-R2 front-fill monitors. A second line array system using GEO S1210 cabinets is designated as the "wide room FOH" and used for banquets, assemblies and presentations, providing high intelligibility sound coverage to go with the large LED scoreboard.

The AFC ceiling-based system creates a general diffused energy field throughout the venue, using 60 NEXO PS15-R2 loudspeaker sources mounted in the ceiling to provide even coverage across the entire floor. Primarily deployed as a direct coverage PA when the hall is hosting an exhibition, the system



Nestled among the complicated ceiling architecture are flown arrays of GEO M10 cabinets for the dedicated AFC Supporter Enhancement System

Further maximising the building's appeal, Techno Q has integrated Williams Sound Hearing HotSpot assistive listening and translations systems throughout the building, allowing hard-of-hearing users to receive floor audio through the building's Wi-Fi system by connecting their smartphones to the network or via neck loop headsets. The Clear-Com intercom system allows the event management team and broadcasters to communicate while moving around the building freely.

In summary, QUSEC sees 320 NEXO loudspeakers from eight different product families combine to make up its FOH systems, nine early reflection systems and two reverberation systems. It is described as an impressive example of Yamaha AFC technology working with NEXO loudspeaker and power amplifier systems, with Yamaha Gulf and NEXO's Engineering Support Division heavily involved in the design and tuning/commissioning stages.

"We chose Yamaha and NEXO because they are the best combination for this project," concludes Is-Hak. "The combination of the best system 'brain' with the best speakers delivers exceptional clarity and smoothness. Without their support, we would never have delivered a solution that the university summed up in simply one word: 'Wow'."

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