

NEXO speaker clusters at the Stade de France, Paris

Sound thinking

Although sports remain the primary driver of profits for many stadiums, an increasing number also host regular live music and other entertainment events. In the second half of our special report, **David Davies** hears the latest thinking about stadium audio design – including its contribution to more immersive match-day experiences – as well as some key standards issues destined to inform the next generation of venues

As the previous article in this two-part report into smart stadiums has made clear, it is the sports events that pull in the punters week after week which tend to be the drivers of new investment – especially during an era when deepening ‘fan engagement’ is (in every sense) the name of the game. Perhaps inevitably, this often translates to higher-definition screens (and more of them), enhanced connectivity for mobile services, and visually driven new technologies such as VR and AR.

The ‘smartest’ of the smart stadiums, however, know that high quality permanent audio systems can also play an important role in creating a compelling overall experience – both on sports event days and as an auxiliary component to hired-in systems for live music and other entertainment events. No wonder, then, that Daktronics’ EMEA vice president Pete Egart describes audio as “an unsung hero” of the stadium experience.

“It usually only draws attention when it is not working correctly,” he says. In reality, “there is a large amount of engineering that goes into designing an immersive audio environment. It is very important to work closely with experts when designing an audio system to ensure a clean and clear audio experience at the venue.”

Indeed, speak to vendors and integrators and you will quickly establish a consensus view around sound specification becoming evermore critical above and beyond the essential requirements of a permanent PA/VA system. As NEXO engineering support division director François Deffarges observes, “increased interaction between audience and sound will play a growing role. [Consequently] we see clear trends for improving the audience experience through general usage of subwoofers, and total audio system integration.”

Guillermo Wabi – professional sound application design manager, Bosch Building Technologies, Communications Systems Division – concurs

Key Points

- As audience expectations rise and venues look to offer increased engagement, audio quality in stadiums has never been more important
- A system that can support touring concerts will make the stadium more affordable for - and therefore attractive to - big-name tours
- Audio systems that are fully integrated with other systems, such as those for security, fire, access control and evacuation, offer lower cost of ownership as well as a more consistent fan experience
- With EN54 compliance now widespread, standards development is set to concentrate on complex evacuation scenarios, including guidance related to dealing with terrorist incidents

about this general drift towards more powerful permanent systems. "Audio systems' usage in stadiums has changed in the past 20 years from an announcement system to added dual functionality beyond just announcements to evacuation systems, and is now evolving [towards] multifunction systems including entertainment functionality," he says.

Top-class entertainment

In general the factors that underpin notions of 'good sound' in a stadium are the same as those in other large-scale public spaces: even coverage and intelligibility to all seats in the venue; consistency of levels and clarity across different types of content; reliable amplification and integrated, systems-wide control; and effective protection from the weather and its many extremes.

The advent of highly directional beam-steering, line array and point source technologies has meant that, for those venues willing to make the investment, there is really no bar to high quality sound at every seat. And with systems such as these, some venues are looking to structure sports event content – including interviews and dynamic pre- and post-match music – into comprehensive programmes that complement the changing moods of the day. A recent project undertaken by NEXO at Wolves FC home ground Molineux Stadium – for which delivering a "top-class programme of entertainment on match-days" was a key priority – is a case in point [see box item].

For non-sports events, such as concerts, a high quality stadium PA may be used to augment the substantial loudspeaker system that will be brought in by the band's audio rental company. "By plugging in parts of the stadium PA as delays it is possible that a venue will be able to sell more seats for concerts," explains Roland Hemming, founder/consultant, RH Consulting. "A good example of this is Amsterdam ArenA, where they plug into the delays and rotate the clusters to 'concert mode'. This enables them to reduce the amount of temporary PA equipment that needs to be brought in for concerts, which is obviously good for the [overall cost base] of events."

However, just because well-specified venues do have this capability doesn't mean that they always take advantage of it. Hemming cites personal experience of a recent UK stadium gig by a very well-known rock band in which the house PA was left unused in favour of temporary delays "which sounded quite appalling where we were sitting. It was just as well that I knew the songs because I could not hear the words – and the between-song chat was also unintelligible. A lot of people around me were complaining about it too."

With the mass availability of highly directional speaker systems, such oversights are difficult

Case Study

Boosting match-day entertainment at Wolves FC

One UK venue that can attest to the potential rewards of taking an integrated approach to audio system design is Wolverhampton's Molineux Stadium. Best known as the home ground of Wolverhampton Wanderers FC ('Wolves'), the stadium wanted to upgrade to be able to deliver the blend of music, player interviews and commercial content that fans have begun to expect on match days.

Wolves' head of operations Steve Sutton enlisted TG Baker to design and install a new audio system suitable for both entertainment and PA/VA requirements. The previous system was 24 years old and "well past its recommended working life. Our new owners and Laurie Dalrymple, our managing director, were very keen to deliver a top-class programme of entertainment on match days," says Sutton.

The end result of their deliberations on behalf of the 31,000-capacity stadium is a versatile system based around a total of 34 NEXO PS15-R2 cabinets, fixed to the roof of each stand, with a mere six NXAMP4x4 amplifiers powering the speakers. Ensuring compatibility with the VA requirement, the NXAMPs feature a special firmware version designed with a focus on life safety systems.

The new installation has delivered significant improvements to fans' enjoyment of an extensive match-day programme that may include DJ sets, pitch-side interviews, and even pyrotechnic displays synchronised to audio. Hence, Sutton concludes, "we can now deliver a much more professional entertainment programme, especially in the crucial five minutes before kick-off. Consequently, we can see fans coming into the stadium earlier than before. Sound is subjective, but in my opinion it's made a massive difference since the NEXO system went live."



to justify – and hardly likely to win over a not-insignificant group of music fans who remain unconvinced of the merits of the stadium gig experience. As ticket prices continue to rise – frequently hitting three figures for even the least desirable seats once booking fees are taken into account – it's an issue that could become increasingly acute for those venues wishing to maintain their lucrative non-musical 'sidelines'.

implies. Not surprisingly, IP has proven to be the great enabler here.

In truly smart stadiums, he says, "the audio system is now linked to the security system, the fire system, access control, evacuation, video systems and mechanical systems. All can be interfaced to one multi-platform and multi-functional system, with self-monitoring and diagnostics." Adopting such an holistic approach paves the way for stadium owners to benefit from a "lower cost of ownership and a better and more consistent fan experience, resulting in higher profits to the owners with the added benefit of higher safety and security for the public."

Different configurations can be created for different event types, meaning that "with the push of a button we can change the system from sports mode to concert mode, and the system operator can dial in the correct delay to the stadium system in order to align with the temporary concert system and function as a support or delay system to the live concert."

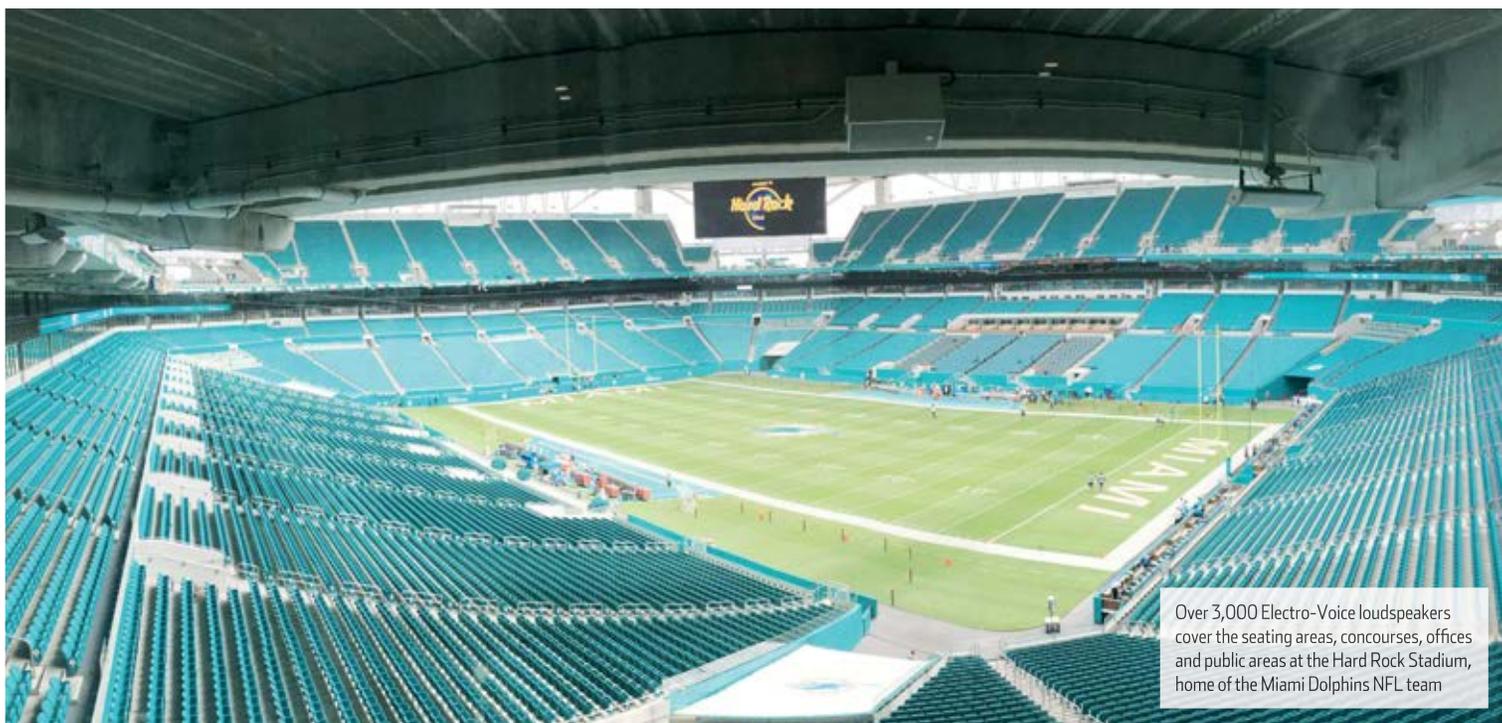
Equipping a control room with this kind of overarching control functionality also makes it easier for venues to furnish conference and seminar suites with varying audio content. Corporate gatherings and social events are



'All systems can be interfaced to one multi-platform and multifunctional system, with self-monitoring and diagnostics'
Guillermo Wabi,
Bosch Building Technologies

Smart (re)configuration

Of course, plenty of stadiums are getting it right – and for Wabi, integral to the success of many is an integrated approach that sees all applications being masterminded from one central platform, with the ease of re-configuration that this



Over 3,000 Electro-Voice loudspeakers cover the seating areas, concourses, offices and public areas at the Hard Rock Stadium, home of the Miami Dolphins NFL team

another common contributor to (in the words of Wabi) “providing a constant revenue stream” for stadiums, so it’s unsurprising that some integrators have benefited from a steady stream of related indoor audio upgrade schemes.



‘We see clear trends for improving the audience experience through general usage of subwoofers, and total audio system integration’
François Deffarges,
NEXO Technologies

Setting standards

While they contemplate the stadiums of the future, operators and their consultants also have plenty of standards-related matters to bear in mind. Compliance with EN54 is a given and has been well documented in *Installation* over recent years. Next on the horizon is a comprehensive update of BS 7827, which provides recommendations and guidance for the design, specification, maintenance and operation of permanently installed sound systems used for emergency purposes at sports venues.

Roland Hemming has been engaged in the revision project as a committee chair for several years now, and confirms that the updated standard “will have a wider remit and cover all large public buildings, for want of a better term.” In particular, it will offer more explicit guidance on complex evacuation scenarios, such as instances involving “a combination of internal and external

areas, which haven’t really been clarified before. There will also be an expanded environmental section and additional guidance on the issue of back-up power.”

The end result, says Hemming, will be a code of practice that brings “clarity to a lot of issues related to more complex projects”. The updated standard – which may be published before the end of 2018 – is also set to incorporate guidance related to counter-terrorism and measures that venues can implement to ensure their audio systems remain effective in a host of possible attack scenarios.

With the first anniversary of the Manchester Arena attack having only just been marked internationally, the need to have extensive planning in place should be at the very top of venue operators’ and consultants’ priority lists. However, Hemming clearly feels there is some complacency about the issue in the wider industry, suggesting that awareness of the latest UK Home Office advice – such as the ‘Guidance to Improve Your Security Stance’ issued last summer – remains minimal.

Not surprisingly, this latest Home Office guidance is likely to inform the relevant sections of the new version of BS 7827, which will address issues such as “how to keep people in or moving around the building [during an attack], or maybe bring them in from the outside.” The effect upon, and utilisation of, staff during such an emergency will also be tackled, along with the steps that should be taken to create an effective risk assessment whenever a new system is established.

“There is a real obligation on consultants to be up to date on these issues, and therefore be in a position to provide [venue operators] with the

necessary information. Without that there is a risk that some venues are not well protected at present,” says Hemming.

Smart ‘micro-cities’?

In turn, these very real and pressing challenges may encourage further diversification by stadiums to ensure a minimum of non-event days as operational costs continue to rise. Wabi puts it succinctly: “Sports venues cost lots of money to build and maintain, and if they are used just for sport [there may not be sufficient] profits to maintain the cost of operation year-round.”

Expanding upon his vision of the stadium of the future, Wabi envisages the nurturing of “‘smart micro-cities’, built around the stadium and following the evolution of the ‘work, live, play’ lifestyle, all implemented in one interconnected IP-based area.” Extended partnerships with food and beverage outlets, shops and hotels in the surrounding environs are bound to be integral to these ‘smart micro-cities’ that have stadiums as their hub centres.

It’s a tantalising vision, but one that will call for an even more consistent focus on audio quality, not least to convey the commercial messages that will be fundamental to these sites’ financial viability. Therefore, the smartest of the smart venues will be thinking not just about the fan engagement expectations of the next few years, but the likely habitational and behavioural patterns of their customers a decade or more into the future. **1**



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