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ATEÏS COMPLETES GREEN LINE PROJECT

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ProAudio Middle East

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LEADER

The rising demand for finite resources is a problem found in every industry around the world. However, the pro audio industry faces the rather more challenging position that the increased need often comes from other, usually larger, industries. While for many sectors this would be catastrophic, the wonderful thing about pro audio is the innovation that goes on to ensure that new solutions are found.

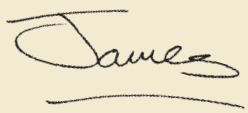
Of the current externally-driven pressures the global industry is feeling there are a couple that stand out, namely the never-ending battle for bandwidth and the rising price of neodymium. While these can be seen as insurmountable challenges, they also present enormous opportunities.

The debate over radio-frequency bandwidth is one that has been raging for a number of years. With mobile operators and broadcasters lobbying hard for extra frequencies and more equipment moving into the wireless realm, the fight for an ever-narrowing amount of space will get even harder. While the debate will continue, manufacturers have been working on products that can work despite the restrictions. The most obvious example of this is the frequency-switching capability of Shure's Axient system. This sort of innovation is the driving force for the pro audio industry, and the reason why challenges that would seem impossible for other industries are regularly overcome in ours.

The latest challenge to hit the industry is the ever-increasing price of neodymium. With increased use in consumer electronics and environmentally-friendly technologies, demand from much larger sectors is outweighing the needs of pro audio. The metal has produced real advances in lightweight powerful speakers and is widely regarded as one of the key materials for modern pro audio equipment. It will therefore be interesting to see what alternative materials the industry will use to overcome this challenge and how the innovation in speaker design will continue as a result. One thing that we can be certain of is that manufacturers will currently be working hard to find the next solution.

The ability to overcome these challenges is mainly due to the unsung heroes of pro audio's R&D teams. The work they do to move the industry forward is not always appreciated, but the end result is certainly something to be marvelled at. Perhaps they are the most important finite resource this industry has.

Enjoy the magazine!



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The right place at the right time

Ten years working on the audio systems at Mecca and Medina made **Ahmad Tekin Topuzdag** a sought after consultant in mosque sound. However, it was a fortuitous event that started his career

Ahmad Tekin Topuzdag in the control room

WHILE A GREAT DEAL OF PLANNING and forethought often goes into the way people develop their careers, there is a lot that can be said for being in the right place at the right time. Having studied at the SAE in Glasgow in 1993, Ahmad Tekin Topuzdag had returned to his native Turkey to set up an audio consultancy in Istanbul looking mainly at sound systems and noise control for hotels and factories. Four years later, he found himself presented with the opportunity of a lifetime when on an Umrah pilgrimage to Medina.

Ten years working on the mosque's audio systems has made Mr Topuzdag a global authority on mosque sound systems and his services are regularly in demand across the Middle East. The starting point for this however, was a common situation that audio professionals often find themselves in – visiting a venue and thinking 'how would I improve the sound here?' That question set his career on a very different trajectory.

Looking back on his first visit to Medina's Prophet's Grand Mosque in the late 1990s, Mr Topuzdag recalls his first impressions of the venue that would go on to define his career. 'As I'm from the industry, the first thing I noticed was the sound. As I entered and joined the worshippers I heard a sound that was pretty hard to describe, but unsuitable for the second holiest mosque in the world. The constant reverberation, the unmatched equalisation, and random long feedback were just a few of the problems.'

As he went through his obligations that day he assumed that there might have been a breakdown with the audio system, but there was the same problem when he went back the next day and again for the third. 'However, as I was sitting there, one of the Haram's employees came by and we started to have a conversation about the sound. I asked him why the sound was the way it was, and he said there was a problem and it was impossible to fix.'

Much to his surprise, this conversation led to Mr Topuzdag sitting down with the general manager of the Grand Mosque to discuss the problem. 'He explained that they knew there were some problems but experts and consultants from the several countries had inspected the system and said nothing could be done due to the architecture. They said the reflections were unavoidable,' he explains. 'I was invited to have a meeting the next day with the engineers. They were convinced that I knew the subject well so they took me to the audio room in the heart of the Grand Mosque. I saw the fundamental mistake. They had regular analogue 31 band – 1/3 octave graphic equalisers which had been manually set. But at that time there were six Imams and 13 muezzins. Each of them obviously had different tones but there was only one setting on the EQs rather than an individual setting for each voice.'

With this problem identified, Mr Topuzdag was set the challenge of improving the audio setup. 'The system was split into 23 domed sections and they gave me one section to setup,' he explains. 'They listened and they found the sound had improved dramatically. The main problem was the enormous resonance in the Grand Mosque. As the Imam spoke, sound would reverberate for almost 6s, which meant people couldn't follow the sermon,' he recalls. 'After the test I was invited to the controller of the mosque's office and the general manager told me how happy he was that someone had come and done this. He offered me a job to improve the sound in the Grand Mosque permanently.'

Worshippers inside the mosque

Following this, the head of Bin Laden Group – the company responsible for the operation and maintenance of the Haramain – came to inspect the new situation. 'The Sheikh said they had tried so many ways but they just couldn't make it work efficiently,' says Mr Topuzdag. 'The Sheikh authorised me with an open budget to bring in any equipment and any engineer or technician from anywhere in the world to make it the best it could be. This was a shocking step for me and I happily accepted. The Sheikh said he would make me the head of the audio at Medina Haram and also Mecca Haram.'

While good fortune may have played its role in Mr Topuzdag landing this prize job, it was experience and knowledge that he used to improve the sound system at Medina. One of the key factors for this was that as a Muslim, he understood how the Quran should sound – knowledge lacked by some of the previous consultants who had been brought in. 'I'm sure they are very good companies and well-respected people in their fields, but they are used to either music or straight speech like a conference. They don't know what the Quran sounds like. It is very rhythmic, yet very spoken.'

The main problem with the audio within the venue was the same as can be found at many mosques around the world – the room resonance. Using an audio analyser and a signal generator, Mr Topuzdag tested the resonance at various frequencies. From this he found high levels of resonance in the Old Building area at 212Hz and at 320Hz in the Second Extension area. As these frequencies correspond to vowels in Arabic, the Grand Mosque was constantly ringing, which made it impossible to follow speech. The problem could not be rectified with the existing equalisers, so instead Mr Topuzdag

Mr Topuzdag spent a decade working on the audio systems at the mosque

Reflective surfaces made the mosque extremely resonant

Medina's extensive rack room

installed Klark Teknik DN3600 EQs and used the two notch filters to provide a solution.

The next technique Mr Topuzdag employed was to speak to all of the Imams and muezzins to hear the specific frequencies in their voices. The result was setting 19 individual memories for the Imams and muezzins. However, as there were no acoustic separators between the Imam and muezzin, there were still real feedback possibilities. As such, the system was fine-tuned until the perfect balance could be found.

While equalisation proved useful it could only go so far in solving the audio problems. The next stage was to look at the equipment already in place and see what needed repairing or replacing. This was an exhaustive process that saw Mr Topuzdag replace the microphones with models that suited their locations, primarily Shure SM 58As and DPA 4006s, install new Midas Heritage 3000 and Soundcraft Vi4 mixers and add gates, limiters, compressors, reverbs (which were needed in some zones despite the resonance) and exciters to the audio chain. Further to this, the mic cables were replaced with over 6km of new cables from Klotz as well as DN 1248 Plus microphone splitters.

> 'There are some common acoustical problems in mosques which we go in and fix for good'

One of the new additions that Mr Topuzdag made was a third mic position for the Imam. 'At that time they only had two microphone levels, one for standing up (Qiyam) and one for bending for prayer (Ruku), but they didn't have anything on the ground (Sujuud). So the Imam was disappearing from the audio for certain parts,' he explains. 'So I installed a third set of microphones.'

Mr Topuzdag also set up an audio monitoring system by installing studio quality microphones in various locations in the building. The engineers could hear and measure the sound on location without leaving the operation room, and could therefore adjust the output SPL.

The end of the signal chain was also examined. 'All the speakers were two-way custom-built triangular speakers from Altec Lansing. As I tested them, I found that many of them had missing tweeters that caused missing consonants and less intelligibly,' Mr Topuzdag reports. 'I ended up replacing around 1,000 tweeters. I don't know if it was from the construction or because they didn't set the compressors properly beforehand – maybe with the peak sound they burnt away. But after the new compressors I replaced all of them and the sound became even more intelligible.'

Another logical step from the consultant was to break the site down into different zones so the system could be individually tailored for each location. 'I set it up with seven zones – one for the Old Building, one for the Haswatain, one for the First Extension, one for the Second Extension, one for the perimeter, one for the rooftop, and one for the minarets,' he explains. By doing this, the audio was divided to two separate signal paths. This helped the overall audio quality by keeping the sound from the dynamic microphone chain in the Old Building and creating a new signal chain with a non-restricted frequency bandwidth from the DPA condenser microphones and console matrices for the New Building.

'Each zone was separately adjusted, compressed, gated and equalised. After the set up and fine tuning the sound became even more beautiful,' says Mr Topuzdag, but this is not just being proud of his own work. 'So many people – officials and ordinary people – said it became something completely different from what it was before,' he explains.

The rooftop was one of the seven zones created

The final touch came from Mr Topuzdag's experiences as a Muslim growing up in Turkey. 'We have these huge historical mosques in Istanbul with enormous domes and the sound acts so differently. If you put together the Quran audio and the dome you get something new and very touching,' he explains. 'As I had grown up in this culture I know what the Quran sound was meant to be. However, the Old Building didn't have those sound properties, so I ordered a number of Yamaha effects processors to replicate it. 'Rather than a flat and straight cut sound you had extensions and worshipers liked it even more.'

The frequency response at the Prophet's Grand Mosque is now 100Hz to 19kHz, compared to the 500Hz to 6kHz found in most mosques. 'While this was an extremely challenging task to implement due to room resonance, high reverberation and feedback, the final audio quality is superior,' Mr Topuzdag reasons.

After 10 years working on the systems at Medina and Mecca, Mr Topuzdag decided to return to his native Turkey. However, his experiences in Saudi Arabia have deservedly made him a sought after name in the Islamic audio industry. 'This is a specific field because in some areas, non-Muslims are not allowed to enter. Not many people are focused on this skill. I have proven myself on this subject for more than a decade now and my company is specially focused on it.'

Islamic audio is certainly a specialised niche of the market, but one that has provided opportunities for the consultant to build his reputation. 'I have become the name for any acoustically challenging buildings that require a Muslim audio specialist on site,' he admits. 'I've been invited to Saudi on many occasions to look at Islamic buildings, as well as sites in Turkey such as the Sabanci Mosque and the Suleymania Grand Mosque. There are some common acoustical problems in mosques which we go in and fix for good.'

With the King of Saudi Arabia's position as Custodian of the two Holy Mosques it is his responsibility to constantly maintain and upgrade the sites at Mecca and Medina, including the sound systems. While much of the work Mr Topuzdag did at the sites will therefore be replaced over the years, one of his achievements will remain in Saudi for a long time to come. While working at Medina he began training a team of Saudi audio engineers and technicians in the art of Islamic sound. Many of these technicians have now gone on to run the audio systems at a number of mosques around the Kingdom.

What may have started as a piece of incredible good fortune for Mr Topuzdag has therefore been passed back to the people who gave him that chance. Through his knowledge and skill, not only have the Grand Mosques been given a sound system to get the best out of the space, a new generation of Islamic sound specialists have been given a solid grounding in this unique niche.

www.topuzdag.com

The Prophet's Mosque at Medina is the second holiest mosque in the world

A third mic position was added for the Imam