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MILO GOES MASSIVE

Beijing's Birds Nest hosts Meyer Sound's biggest ever Milo system

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80,000 in the round

Beijing's Bird's Nest recently saw the biggest ever Meyer Sound Milo system deployed for a huge in-the-round concert. **Bruce Borgerson** explains how it was done

WHEN TAIWAN'S ROCK RECORDS turned 30 years old, founders Sam and Johnny Duan decided to throw a memorable party – which eventually became three parties, or four if you count the two in Taipei separately. First staged in Taiwan last November, then on January 22 in Singapore, and finally in Beijing on May Day, the celebrations were an exuberant blend of pop and rock festival and family reunion.

Each show presented more than 50 of the label's artists, packing the marathon evenings with a repertoire immediately recognisable everywhere that Chinese is spoken. After all, the parties were celebrating the fact that Rock Records had grown to become Asia's largest independent record label, with its hits dominating the charts not only in Taiwan but throughout the region, including on the mainland as cultural openness gradually took hold.

To accommodate a maximum of partygoers, while maintaining minimum average distance between the pop idols and their fans, all four concerts were staged in the round. This approach was easily managed for the first three celebrations, as the first two were in the 15,000-seat Taipei Arena, with the third in the slightly smaller (12,000 seats) Singapore Indoor Stadium. Although the logistics of in-the-round production does raise costs, this option is not uncommon – a number of rock acts have toured successfully using this format, usually performing in arenas seating up to about 25,000.

Consider, however, that the National Stadium in China's capital, popularly known as the Bird's Nest, seats around 80,000. For high-dB concerts in stadia of this size, use of in-the-round staging is exceedingly rare. Granted, U2 are erecting their monstrous "claw" stage in stadia accommodating 50,000-plus for the on-again, off-again 360 Tour. But remember, the iconic Irish rockers can amortise the staggering costs over, at last count, more than 110 shows. In this light, producing a stadium-sized, in-the-round rock concert as a one-off event is, in some ways, an even more daunting proposition.

Exactly why Rock Records decided to do one huge party at the Bird's Nest rather than two or three shows in a smaller venue is a matter of speculation. Regardless, once the venue location was fixed, and the decision was made to keep it in-the-round, the wheels were set in motion for creating an audio system of exceptional proportions.

An in-the-round concert inside the Bird's Nest was a huge challenge

The Guinness Book of Records has yet to create a category for 'largest sound reinforcement system in a stadium for a one-off event'. But if it had then this one would rank near the top, incorporating as it did 248 Meyer Sound Milo high power curvilinear array loudspeakers and 96 700-HP ultra high-power subwoofers. Indeed, sources at the company headquarters in Berkeley, California state that it is almost certainly the largest Milo system ever assembled for a single concert.

The Japanese connection

System design and integration was a collaborative, pan-Asian enterprise. The core production team in Taiwan first assigned overall responsibility for audio reinforcement systems to MSI of Japan. Cognisant of the fact that the concert would demand an extraordinary number of high-power and high-quality loudspeakers, MSI CEO Fujii Shuzo quickly surveyed availability for first-rank systems available in China during the required time frame. He discovered that the only certain proposition would be a system based on Meyer Sound's Milo.

While retaining overall supervisory responsibility, MSI then subcontracted system design to another Tokyo-based company, SC Alliance/Arte (henceforth Arte), based on the latter firm's long experience in designing similar large scale concert systems based on Milo arrays.

To appreciate the task shouldered by Joji Fukumoto, Arte's chief system designer, it's important to grasp the immensity of the Bird's Nest. It measures 330m long by 220m wide, with the canopy soaring 69.2m above the pitch. Quick mathematics reveals that, if stripped to its shell, the structure would have an interior volume of nearly 4 million cubic metres. The seating configuration occupies about a third of that space, but the remaining 2.4 million cubic meters easily eclipses the total volume of London's wider but flatter Millennium Dome. That's a lot of air to energise, and you still have to deal with a highly reflective roof over all seating areas.

'We had handled a number of large systems using as many as 168 Milo for concerts by Mr Children, Exile and Céline Dion in the Tokyo Dome and Osaka Dome,' recalls Mr Fukumoto. 'The Bird's Nest is much larger than either, of course but there we could hang arrays from the roof, which we cannot do in the 'soft domes' of Japan.'

Splitting the system into tower- and roof-flown arrays proved critical to Mr Fukumoto's design. 'I'd heard that the venue had a reputation for poor sound quality,' he continues, 'so to overcome the image I was determined to provide uniform sound for the listening area. The biggest challenge was minimising reflections from the overhanging roof.'

Applying Meyer Sound's MAPP Online Pro acoustical prediction program, Mr Fukumoto crafted several design iterations before finalising a plan with 10 arrays of 12 Milo each flown around the roof edge for covering the upper seating sections and eight arrays of 16 Milo each (15 90-degree boxes and a wider-dispersion Milo 120 at the bottom) for blanketing the lower bowl. (There was no audience seating on the ground level.) For sub-bass, each tower also suspended 12 700-HP subwoofers behind the Milo arrays, with the combination effectively becoming a full-range source.

The roof-flown arrays solved two issues. They kept the sound source closer to the audience, and directed sound away from the taut fabric roof, which reflected sounds in the roughly 800Hz to 2kHz range. With both the roof-flown and the tower arrays, the high cabinet count was necessary at least as much to accommodate splaying to achieve the needed vertical coverage as it was to supply raw power output. Nevertheless, concentrated throw-power was important, as nobody would be seated close by. The nearest audience seating to the towers was more than 30m back, and some seats were more than 100m away.

MSI representatives conferred with the primary equipment supplier and systems integrator for the event, Beijing BeiAo Dalu Stage and Art Design & Production Co Ltd (hereafter simply BeiAo). BeiAo supplied all the front end gear, as well as the lion's share of the Meyer Sound cabinets, with the assistance of Shanghai Future Electro Technology Co Ltd, Meyer Sound's distributor in China, stepping in to source additional cabinets from several other rental companies in China. BaiAo was also in charge of staging and rigging, and six days in advance of the show, the company's crews had all 248 Milo loudspeakers in place ready for testing and tuning.

Final system alignment and tuning was carried out under the direction of Arte's Etsuo Shibahara, with assistance from globe-trotting Meyer Sound contract consultant 'dB Dave' Dennison. MSI's Mr Shuzo was also present to lend his experience and practiced ears, as well as to represent the interests of his client.

Mr Dennison, who has designed and/or tuned more than 60 large-

Top and bottom: The concert by day and by night
Left: A flown Milo array

scale reinforcement systems over the past 15 years, admits that he could count the number of times he's worked with in-the-round systems anywhere near this size on the fingers of one hand. He also relates how, in his supporting role during system tuning, the vast scale of the system literally kept him hopping – from one point in the seating area to another – during the exhaustive, three-day tuning process with the SIM 3 audio analyser.

'On a typical concert rig I'll check and adjust response at five or six places in the house,' he says. 'But here we must have checked the response at 40 different measurement points.'

SIM to Go

To facilitate his duties as 'the remote guy', Mr Dennison employed his own remote alignment rig, consisting of a Lectrosonics HM wireless microphone transmitter module equipped with a B&K 4007 measurement microphone, a matching Lectrosonics receiver for audio connection to the SIM machine, plus wireless routers for linking his laptop to SIM and the Galileo loudspeaker management system (six Galileo 616 processors).

'It took us a long time to get the first quadrant set, both with the right gain structure for the multiple zones in each array, and the right EQ,' he recalls. 'But once we had that one quadrant set, we could simply copy those settings to the other three, as the system was symmetrical. But we still had to check the other three, at all the same relative points, just to be sure.'

In the end, the biggest tuning challenge on the Milo side remained the task of equalising the system to maintain high frequencies at the uppermost rear seats while still not exciting the reflective canopy. Some splash was tolerated under the assumption that jam-packed rock fans replacing hard seat surfaces would provide significant absorption underneath, which turned out to be the case.

The task of pumping out 360 degrees of solid bass, top to bottom, was another (literally) tall order. For most rock shows, the majority of subwoofers are ground stacked, which takes advantage of half-space loading and works well if most of the audience is at or near ground level. As such this was decidedly not the case here, the subs had to be hoisted high in the air to achieve the desired uniformity.

'When you array subwoofers in a line like this, the sound comes out in a doughnut shape, so you really

Just one section of the overall, massive system

'dB Dave' Dennison helps to tune the system want to raise those doughnuts up high, as close to the midway point of the seating as possible,' explains Mr Dennison.

Once the process was complete, the Arte-led tuning team was pleased with, and relieved by, the results. The basic goal of 105dB minimum C-weighted, plus or minus 3dB, was realised in all seating areas. Even more satisfying was the amount of headroom still available above that point – a good 15dB if not more, according to Mr Dennison. The subwoofers in particular had ample unused reserves, as again the high box count was essential to achieve the desired directional coupling effects.

A soundcraft Vi6 console over looks the Bird's Nest

Moving up front

Meanwhile, back at front of house and down in the monitor pit, BaiAo technicians were working with the Taiwan-based music production crew in sorting, testing and prepping the mountain of front-end and monitoring gear.

The FOH mixing hardware complement was relatively straightforward, with three matched 96-input Soundcraft Vi6 desks supplying mixing and integrated effects. Down in the sprawling monitor world, the selection was more variegated, with nine digital models – Avid Venue D-Show, Soundcraft Vi6 and Vi4, Yamaha PM-5D, and Yamaha LS-9 – joined on the analogue side by one mainstay Midas H3000 and one marginal utility Behringer MX2004.

BaiAo also supplied the production with a full array of wired microphones, with all the usual suspects checking in from AKG, Audio-Technica, Electro-Voice, Neumann, Sennheiser and Shure. The radio mic and wireless in-ear monitor (IEM) systems were largely from Sennheiser. Technicians initially struggled amid Beijing's dense and sometimes fickle RF jungle to find sufficient stable openings, but eventually enough frequencies were pinned down for the show to go on.

By early afternoon on May 1st, the crowds were already streaming into the Bird's Nest, though it wouldn't be fully packed until well after the show commenced at 4pm. At this point, the Japanese-American tuning threesome stepped to the side, their only remaining task being to monitor and compensate for temperature and humidity changes in the Galileo's Compass control software. Taking over the driver's seat was Taiwan-based principal FOH engineer Chen Tai Shan, who either mixed the acts personally or assisted engineers who worked with specific acts.

As the sun went down, the party heated up. With each passing hour, the fast-changing line-up on stage moved toward the bigger hits and the more enduring headline acts. Increasingly, the massive audio system was tasked with keeping the artists' vocal levels above those of 70,000-plus fans who were singing along with gusto. Artists like (appropriately) Mayday, Wu Bai, Richie Jen, Winnie Hsin and Karen Mok may be unfamiliar to those in the West, but they command a devoted following wherever in the world Chinese is spoken.

To be sure, the celebration benefited from high production values across the board. The gigantic stage featured massive tilt-up screens to supplement the overhead 360-degree screen. Following a precedent set by the Olympic ceremonies in the same venue, the lighting effects were predictably spectacular, with lasers criss-crossing under a canopy projector-painted with constantly shifting hues.

But Rock Records is a music label, not a television network, so ultimately the fans came to hear the songs that had shaped their lives. Certainly the massive audio reinforcement system delivered the core of what they had come to experience.

'Once a big show like this takes off, you just have to kick back and fly with it,' philosophises the ever-roaming 'dB Dave' Dennison. 'In this case there were some bumps of turbulence along the way, but everybody got where they wanted to go and had a happy landing.'

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