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THE HOUSE OF DANCING WATER
Inside Macau's super-show

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Pump up the volume

An entire City of Dreams has been created in Macau to house Franco Dragone's most ambitious fantasy production to date. **Phil Ward** immerses himself in The House of Dancing Water

Layers of Meyer Sound speakers are used for The House Of Dancing Water

WHEN YOU THINK OF ENTERTAINMENT technology, what springs to mind? Moving lights? Video walls? Surround sound? All of these things represent the latest techniques around the world, but nothing has prepared you for *The House of Dancing Water*. Try 17.5 million litres of water, enough to fill seven Olympic swimming pools, kept at a constant 30-degrees Celsius. Try the equivalent hydraulic pressure to that used on US aircraft carriers to lift planes onto the flight deck. Try two billion Hong Kong dollars in the making.

The team behind this extravaganza is some 200-strong: 70 in the cast, 70 technical show crew and the rest in general staffing and maintenance of the theatre. Technical stage manager Matthew Abercrombie is British, with many years under his belt at London's Royal Albert Hall – good training for the circular design of the Dragone Theatre within the thoroughly Las Vegas-like City of Dreams complex of casino, malls, restaurants and retail outlets.

As the title suggests, fountains and pools play a big part in the action, above and into which acrobats, dancers and divers flow freely. 'We get through 700 towels per show,' points out Mr Abercrombie. 'At a constant 30-degrees Celsius quite a bit of the water evaporates, so we have to replace it. There was a hysterical moment when I bought a million and a half litres of water from the Macau Water Authority and paid them with an Amex card.'

Given the complex of platforms, winches, lights, sound reinforcement and countless other paraphernalia above the audience, looking upwards calls to mind the moment when the mothership descends in *Close Encounters of the Third Kind*. There are no vocals in the show, but a critical music mix keeps the narrative flowing sourced from a live, four-piece band hitched via click-track to a battery of sound modules and effects driven by Ableton Live. The band is led by the drummer, who sits in an iso-booth calling the cues and triggering various samples and sequences alongside the keyboard player. It all generates the 96-channels of live and sequenced instrumentation fed to the FOH and monitor mix positions. Such a labyrinthine performance demands quick-witted flexibility, and Ableton Live enables improvised looping whenever necessary, triggered by a Jazz Mutant Lemur touchscreen.

The atrium created by the design of the theatre is nearly 80m deep, on top of the 7m bunker into which the water flows. Designed by François Bergeron and Vikram Kirby of The Thinkwell Group, the audio systems make use of several 'layers' of speakers, from California-based manufacturer Meyer Sound with equipment supply from Montreal-based Solotech. There are eight different types of loudspeakers inside the theatre, totalling 258 units and their associated accessories: 23 CQ-2s; 56 M'elodies, in eight clusters of seven; 15 600-HP subs; 43 UPM-1Ps; 36 UPJ-1Ps; 32 UPJuniors; nine SB-2s; and 32 MM-4XPs. The M'elodie arrays hang from the lowest grid in a multiple-storey maze of platforms and trussing, while the cables and patching travel the full height of the auditorium. A sub array of five 600-HPs has two of them inverted to achieve the cardioid pattern often used today to cancel the energy behind them, a technique adopted here especially to feed enough sub bass to the VIP area.

The SB-2s are hanging at 'level 4', cross-firing well forward to clear the curtain. The CQ-2s, UPJuniors and UPM-1Ps constitute a surround system, split into upper, lower and rear sections. The MM-4XPs, meanwhile, are time-aligned to the main PA arrays. Twenty-four of the UPJ-1Ps, in an outer and an inner ring, are dedicated to Meyer's Constellation acoustic system with its patented VRAS algorithm – more of which later. Fundamentally, lots of adjustments were necessary as the set took shape, with catwalks and other obtrusions appearing and causing the sound design to evolve around them.

Sound design

It's a 270-degree show, aiming to reach 2,000 seats. The Thinkwell Group spearheaded the sound design, headed by Francois Bergeron with Vikram Kirby as associate sound designer. Australian husband-and-wife team Jason Graham and Kerill Ezzy head up the sound department. 'The basic thrust of the PA comes from the grid above,' explains Mr Graham. 'Between the M'elodies, the 600-HPs and the SB-2s, the whole idea is to try to draw the image into the performance space at the centre of the ring, using a circular pattern of speakers that follows the seating. In parts of the show the action is really high up, so the design has to take into account this very deep performance 'well'. We also have three rings of surround speakers behind and above the audience, with which we can control upper and lower surround mixes.'

Everything about this show is immersive, and that's exactly the right description of the audio. To achieve this, Dragone Macau Limited has called upon the full gamut of Meyer Sound digital audio processing. The centrepiece is Matrix3, Meyer's third-generation technology that takes full command of every signal path and provides comprehensive automation of just about everything: analogue and digital inputs; matrix mixing and routing; signal processing; surround panning; hard disk playback; and the Constellation acoustic system technology.

Nowhere is the power of this brain more evident than in the surround panning, which uses Meyer's proprietary SpaceMap multichannel surround panning developed specifically for the Matrix3 audio show control. SpaceMap 'defines a panning space as a series of contiguous triangles defined by three nodes and referred to as trisets,' according to Meyer Sound. 'Panning within each triset is equal power, and SpaceMap provides extensive control over the behaviour of each triset's nodes. Physical loudspeakers are represented by speaker nodes, but virtual nodes and silent nodes provide solutions that ensure smooth panning for any trajectory you wish a sound to traverse.'

'One of the unique benefits afforded by the room layout is that the front and surround sound systems are equivalent in power, and time aligned much closer than you can usually achieve in a proscenium style seating configuration,' says Vikram Kirby, associate sound designer. 'This lets us really be aggressive in our sound movements and support the stage action with what feels like 3D panning.'

'The musical image is as 3D as possible,' adds Ms Ezzy. 'Some instruments are in the surround mix, some are in SpaceMap and some are in the main PA. It takes a lot of bussing. There is literally no stereo mix of what we do! You'll hear instruments and sound effects springing out all over the auditorium. The entire space was painstakingly walked, plotting all of the time alignments and working out the different gain structures, which

Members of the 70-strong cast perform at the Dragone Theatre

vary because in this building the speakers cannot be spaced evenly apart.'

Matrix3 uses the LX-300 digital audio engine, a 32-bit floating-point DSP for mixing, processing, matrixing, networking and serial communications. The interface for all of this is the CueStation, located at the FOH mix position where commonly you would find a digital mixing console. CueStation provides access to every Matrix3 feature for programming, real-time operation or automation, creating a virtual mixer with up to eight bands of parametric EQ and two dynamics processors. The user can matrix any combination of channels to any output, build a custom control surface for the Matrix3, pan multiple channels independently of the physical layout of the loudspeaker arrays, and generate both audio playlists and cue lists for Matrix3 and for external devices.

The final piece in the jigsaw is the integrated hard disk playback system called Wild Tracks, another Meyer solution and one that removes the need for external CD, DVD or hard disk playback machines when pre-recorded effects and music are needed. A Matrix3 system can be configured to provide over 120 tracks of Wild Tracks playback. Beyond this, Wild Tracks offers up to 24 tracks of sound effects per hard disk system, but unlike a 24-track DAW it allows the sound designer to create groups of up to 24 tracks, each group acting like a separate multi-track device that can be started and stopped independently of each other.

'That's the beauty of the CueStation,' continues Ms Ezzy. 'Pretty much anything can be done. We have about a hundred cues; generally the first cue of each scene is the base cue, which sets up the levels, and there'll be a few more within the scene which change the instrumentation moves, the SpaceMap and maybe something

like a reverb setting. Then we fire sound effects throughout as well, all from Wild Tracks within the Matrix3.'

'The time-alignment is mostly done from a series of Yamaha DME-64Ns,' adds Mr Graham. 'It was quite tricky because it all had to be done in separate sections.'

Alignment and Design's Bob McCarthy tuned the system with Mr Kirby, assisted by the Dragone sound team. Mr Bergeron and Mr Kirby perfected the design section-by-section, speaker-by-speaker over six nights, along with specialists

Sound panning is from Meyer's SpaceMap

from Meyer Sound's Constellation team and again assisted by the Dragone audio crew.

'Vikram Kirby deserves great credit for the overseeing of the system commissioning, tuning and performing the initial base mix and system configuration for the show,' Mr Graham says. 'Francois was also involved with the creation-

With no vocals, a critical music mix keeps the narrative flowing

period sound design as he worked with Franco to develop the sound effects and soundscapes required to keep the rehearsals flowing and productive. Benoit Jutras, the composer of all the music, was also onsite to assist with the development of the sound with Francois and Vikram before handing it over to us as the Dragone sound team.'

Wet and dry signals

The underwater audio, video and communication systems were also designed by The Thinkwell Group and engineered by Pascal Van Strydonck from Montréal, Canada. Thirty-six of the loudspeakers are Lubell Labs underwater models, together with 16 fixed cameras and underwater comms. A team of 30 industrial divers is on hand to shepherd performers around the pool invisibly, move scenery around and generally keep an eye on things. Four of them use the underwater comms to communicate either on the general comms systems – one Telex wireless, one Riedel wired – or to broadcast to the underwater speakers. 'The Yamaha DME also keeps the background noise down,' adds Ms Ezzy. 'There's quite a high amount of ampage in the pool, and it was breaking through into the comms.'

The motorbike riders have Sennheiser IEMs

Mr Graham and Ms Ezzy enjoy an unusually large FOH pit: a generous space, considering that every seat is sold out for weeks in advance. 'You don't get this very often,' Mr Graham confirms. 'Normally you're fighting to get a Cadac into a shoebox.' From here Mr Graham controls onstage and backstage foldback via a Yamaha M7CL as well as FOH. 'It just made sense when we began rehearsals,' he says, 'because we're so close to the cast. There's no point in radio-ing backwards and forwards to some hidden room.'

'When the lifts move, bringing the water in and out of the performance area, there's this massive suction sound,' says Ms Ezzy, 'which makes onstage monitoring kind of difficult! François and Vikram placed side-fills and down-fills around the 'proscenium' using UPJs. More UPJs and UPQs were added during the production period to enhance the stage effect sound for the audience.' Mr Graham adds: 'The motorbike display riders have Sennheiser IEM and despite all the concrete just one A5000-CP antenna covers the whole performance area.'

A DiGiCo CS-D5 plus two Yamaha M7CLs handle monitor mixes: the CS-D5 for the band and their attendant sequences; one M7CL primarily for talkback between the musicians, monitors and FOH; and the other for the underwater mix, comms and paging systems

– literally how the divers track the show and communicate. Meyer Sound's Constellation is also present: the patented VRAS algorithm is employed in conjunction with Meyer Sound self-powered speakers and, here, is hooked up to 32 Meyer Sound-certified Constellation microphones.

'Constellation allows us to take the immersive nature of full surround mixing to the next level and connect the sound image to the room in a very real way, as well as anchor it to the audience experience,' adds Mr Kirby.

Constellation is based on technology from the Matrix3 system, and generates reflection and reverberation as well as the mixing, processing and routing needed to distribute its output. It also comes with all the communications hardware needed to build any system, as well as the critical VRAS algorithm. One VRAS processor is needed for each zone in a system, and there are five frames in use here. (See *Pro Audio Asia January-February* 2010)

'The VRAS does pick up some of the filtering of the pool,' points out Mr Graham. 'But it also picks up applause, so we can engineer something of a chain reaction if we care to by triggering applause in different sections of the audience. That's a bit of fun…'

Fun is the word. You'd have to go a long away to see – and hear – anything on this scale, and the fun capital that is Macau is making a pretty big splash with it.

'I've done some strange gigs in my time, but this is something else,' reflects Matthew Abercrombie. 'A lot of them have been industrial or corporate over the last 20 years. But if you've seen one BMW come up from a hole in the ground surrounded by smoke, you've seen them all. This is… different.'

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