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THE HOUSE OF DANCING WATER

The world's largest water-based permanent show, the $250m production The House of Dancing Water opened on 17 September in a purpose-built, 2000-seat theatre within the City of Dreams, Macau.

Julie Harper reports for L&SI . . .

Brain-child of the creative partnership between Lawrence Ho, Co-Chairman and CEO of Melco Crown Entertainment Ltd and Artistic Director, Franco Dragone, *The House of Dancing Water* has been five years in the planning and two years in the making.

Housed within its 270° theatre-in-the-round, the USD 250m show features the world's largest commercial pool, 8m (26ft) deep and 50m (160ft) in diameter, and containing 3.7 million gallons of water - enough to fill five Olympic-sized swimming pools. Eleven elevators, eight of which weigh 10 tons each, transform this aquatic stage into a dry, solid floor in less than one minute, to present a 20m (65ft) diameter stage. Above the stage is a complex system of 40 high-speed track and trolley winches for aerial acts and scenery transportation.

The show's themes, of East meets West and the battle between good and evil, are foils to the spectacular transformations which unfold before the audience. The attention is catapulted from pool to stage to air, by trapeze and aerial acts, motocross riders, divers that launch from Russian swings, a ship and pagoda that rise and fall through the waters, and no less than 258 dancing fountains, culminating at last in a Busby Berkeley-style finale.

A cast of 77 acrobats, musicians and stuntmen, 130 production staff, technicians and professional divers from 18 countries are involved in the show, the technical hub of which is a 30m (100ft) long control room which holds 11 control stations including lighting, projection, stage management, dive control, automation and sound. "It's like something out of science fiction," says Mike Sharp of rigging provider Stage Technologies.

Designed to resemble the inside of a red Chinese lantern, the Dancing Water Theatre is, to quote Jules Lauve of Theatre Projects, "a true collaboration between Scenic and Theatre Designer, Michel Crête, Architect, Li Chueng Pei (Sandi) of Pei Partnership Architects, NY and Theatre Projects Consultants' theatre designer, Brian Hall," all of whom have been guided by Crête's vision.

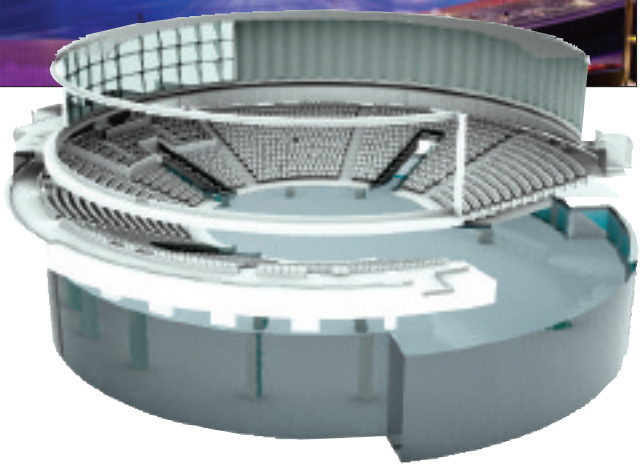
This is theatre design from the ground up, tailored specifically for a show which in the initial stages appears to exist mainly in the mind of its director. "Franco Dragone is anything but repetitive!" says Theatre Projects' project manager Dawn Chiang, "and the theatre design had to be able to cope with anything that was to be asked of it."

An organic, collaborative approach, with intense interdepartmental cooperation, pervades the whole production, from the theatre's design to the palettes of ideas brought to Dragone by each of the departments for inclusion - or not - in the final incarnation of the show during the final intensive four-month creative period. "Franco warned us all at the beginning, 'Don't fall in love with any part of the show'," explains head of sound, Jason Graham. "There's no guarantee that it will make it through to the final cut."

"Bringing all the elements together is a curious process," says Lauve. "Decisions on equipment are made far in advance of the creation process in order to meet delivery and installation deadlines. The wide open creative horizons are then gradually defined by the geometry of the auditorium and stage and the procuring of equipment as time goes by."

The remit of Theatre Projects Consultants (TPC) was to design a theatre which would answer the practical demands of this complex and varied show, yet at the same time create "a sense of intimacy on a heroic scale" for an audience of over 2000 people.

Photography ©FDEG



Above, the stage with central lifts lowered. Right, a projection showing the size of the pool relative to the theatre above.

Customised seating, conceived by Michel Crête and supervised by TPC's John Runia, has been manufactured by Series Seating. This is cantilevered over the performance pool with the front row level with the water's edge (the audience in the first few rows are issued with towels on arrival!). The shallow rake draws all 14 rows into the same space and, at Crête's request, the fabric on each seat carries a different visual style of colours and patterns which blend to form an abstract tapestry.

The roof rises 36m to the grid with eight levels bearing dive platforms and launch pads for aerial artists and divers. A 360° performer catwalk on Level 4 has loading and unloading zones for artists and scenery, 17m above the pool. The stage management runs a system of traffic control over the backstage passenger lifts to ensure each cast member is on the right level at any given time.

From the pool down, another five levels house hydraulic pumps for lifts and special effects, compressor chambers for air effects, a massive water filtration system and a huge holding tank used as a drain pool during maintenance periods.

The Pool

Of the pool's 50m diameter, only 21m is visible to the audience. The remainder is used as wingspace (finspace?) for underwater scenery storage and artist entrances. Water is kept at a high level of purity for the wellbeing of the performers and the 28 divers who manoeuvre scenery and escort artists on and off under the water.

To the audience it seems as if people simply disappear below the surface. Yet beneath the seating a network of handrails and colour coded ropelights guide performers to exits (N, S, E & W) from the pool. Hookahs - second-stage scuba breathing apparatus from which an extra breath can be drawn - are located along the route, as are acclimatisation points where performers can sit in the water and keep warm for rapid re-entry.

Blue LED show 'running lights' and white working lights, custom built by Hydrel, are installed beneath the water. Each fixture contains 16 3W LEDs, driven by Candle-Power CP24 drivers, custom built by Artistic Licence Engineering for lighting supplier White Light Ltd.

Systems engineer Simon Fraser of Ptarmigan Integration Ltd explains: "On previous water shows in the US, code allows 110V in the water using ground fault circuit interrupt; however, British code does not, so we had to go LED. To keep the drivers in a user-accessible, dry space we needed to run cable a distance of 90m. "Artistic pushed the boundaries hard in developing CP24 to handle the huge distances involved, and the engineering required to keep the drivers in the dry."

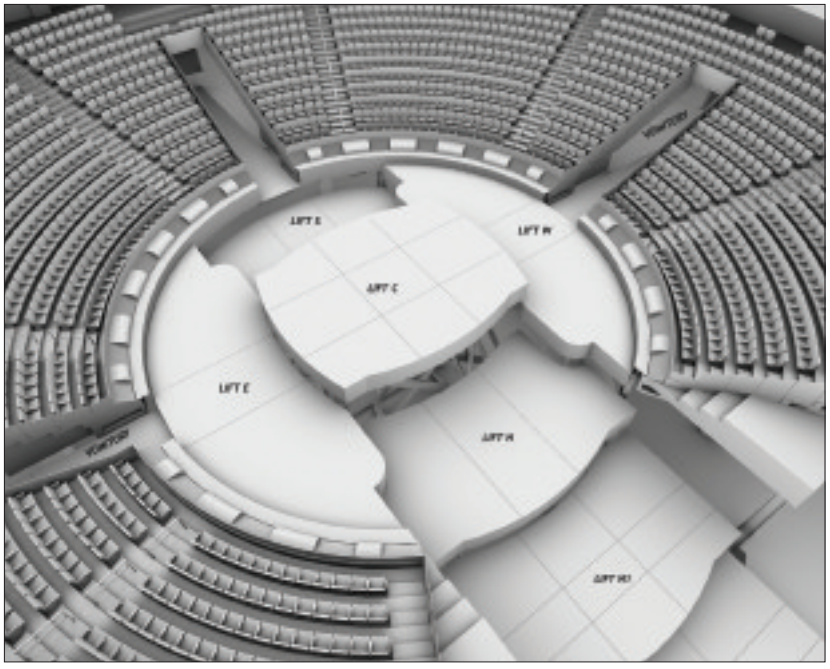
Underwater Video & Comms

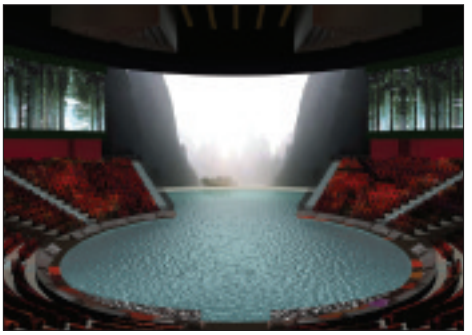
The pool has its own underwater sound, video and communication system - the largest of its kind - which plays an important part in the safety and smooth running of the show. The system is composed of 16 SplashCam underwater video cameras and four Shark Marine cameras attached to the divers' helmets, as well as 36 Lubell Labs LL916 underwater loudspeakers. The diver cameras link to a CCTV system installed throughout the theatre and to a direct controllable Honeywell video system at the Aquatic show call console position.

Divers are connected to the upper 'dry' show system via a custom-designed Dive Com Umbilical, comprising a two-button communication box, a Dive Com full face mask with built-in microphone and an aural bone transducer hearing device.

The Lubell speakers, powered by Crown amps, are distributed around the pool's outer walls, pillars and automated lifts and used for diver communications, show program and the lift movement warning tone. "The Lubells need to be installed evenly around the pool and under the lift system for a greater chance of sound being heard by the show divers and performers through the walls of masking bubbles," says Graham.

There are also four wall-mounted communication boxes around the pool entrance/exit areas, with a partyline speaker and microphone for further pool communications. The deck support diver can also speak into the pool via a Telex RadioCom beltpack, which is integrated with the show communication system.





Photography ©FDEG

Above: A plan showing the stage lifts and (right) a previsualisation of the lifts raised to create the stage platform, and lowered to reveal the pool.

The Dive Com system is controlled independently via a Yamaha M7CL32 digital console and a Yamaha DME64N processor from the monitor mix room. The underwater system is inspected weekly by the six-strong sound crew, four of whom are certified divers, headed by Jason Graham, who are responsible for the SVC systems of the whole show.

Pool lifts and stage

Literally taking the action to a different level, sinking to a depth of 7m or rising to 1m above the surface, are 11 automated stage lifts which transform the pool into a dry stage. Four lifts are arranged in a north, south, east and west orientation around a central lift with three wider lifts, N1, N2 and N3, located upstage and three long vomitory lifts allowing dry exit and entry points. All fit together to make a perfectly flat surface. This is a striking visual element of the show, accompanied by the distinctive 'whooshing' sound of water displacement, which Dragone uses to punctuate moments throughout.

Major set pieces stored beneath the water - the pagoda, a Chinese bridge, Russian swings for the show divers and a three-masted, 10m high ship weighing 26 tons - are rolled onto the lift platforms before being raised up to erupt through the surface. The pagoda is self-propelled and runs along a track, whilst the remainder are pushed into place by divers driving battery-operated, subaqua tricycles.

Each lift surface is coated with Mondo flooring to give the performers extra grip, and perforated with a regular pattern of 20mm holes. This reduces the resistance of the surface as it speeds through the water and ensures the water dissipates quickly on breaking the surface.

With design direction from Dragone, TPC provided initial design guidelines for the lifts, which were manufactured by Handling Specialty of Grimsby, Ontario. Control integration is provided by Fisher Technical Services Inc (FTSI) of Las Vegas. "It was most definitely a team approach to designing, identification and specification and building all the way along," says TPC's Jules Lauve. "Truly a collaborative art, a co-labour in that we all worked together."

Control coordination between automation and aquatics is paramount with so many people in the water whilst the lifts are being moved. At one point leading lady Faye Leung, a prima ballerina from the Hong Kong Ballet who learnt to swim specifically for the show, must swim from the central hole in the pool stage and underneath the surrounding lifts before they descend above her.

The eight main lifts are moved independently using 32 hydraulic cylinders, four on each lift, supplied by Comoso of California. FTSI's Navigator software uses position encoders and load cells to maintain the balance of the hydraulic cylinders to keep the platforms level, and to coordinate the vertical travel and positioning of all lifts from different control locations around the theatre.

"A major challenge was the mating of our control system with that of Stage Technologies' rigging control system," says FTSI's Scott Fisher. "We were able to design a protocol that would enable the drivers in the Handling Specialty/FTSI stage lift system to talk to and coordinate with the Stage Technology system, so both systems can act as one."

FTSI also created a driver that was able to import Maya information from Dragone's complex previsualised lift moves, created at the rehearsal venue in Lint, Belgium, into the stage motion cues when the show moved across to the Dancing Water Theatre.

"Head of automation and rigging, Steve Colley, was able to give us a Wysiwyg presentation showing the lifts moving in real time, so the real-world data was identical to the rendered preview," says Lauve. This made for a seamless transformation between venues, faster onsite programming and, during the creation phase, enabled the programmers to keep up with ideas as they developed. Originally designed for motion pictures, this technique is new to theatre and has proved something of a 'holy grail' in connecting visualisation to programming.

The 'Dancing Water' is provided by 258 water jets embedded into the lift lids, each of which is illuminated by two 3W LED uplights driven by CP24s. The fixtures were designed by PIL and custom-built in Hong Kong to withstand depths of 10m. These are run by the special effects console, a grandMA2 Light, allowing both LEDs and fountains to be chased together.

The fountain heads are powered by 63 newly developed submersible pumps which are hooked to the bottom of the moving stage lifts. "We needed something more powerful than could be achieved with the dry pumps used on previous water shows," explains fountain and special effects designer, Denis Lafontaine.

Each pump pushes water through hoses to seven or eight heads, which are controlled rather like moving lights from the grandMA2 Light. The system, manufactured by Aquatiques of Strasbourg, took

Photography © FDEG

From top:

Show creator Franco Dragone with the dancing 'swans'.

The huge control room.

The stage viewed from up in the grid.

Facing page:

Fountains and projections combine in spectacular fashion.

three months to build and seven to eight weeks to install before water was put into the pool. "We had to design the fountain kit without actually having a show!" says Lafontaine.

In addition, eight 'jumping jets', embedded in the aisles between the audience, throw water from the third row to the centre during the action. "We were not certain how this would go down with the audience," continues Lafontaine, "but they love it. We have to be careful about late-comers though!"

The water quality is so good that, even at a depth of 7m, activity below the water can be seen from above. To provide some camouflage, six huge Gardner Denver compressors in the basement push out 125,000 litres of compressed air per minute through 380 air effects pods attached to the floor of the pool. This creates a screen of microbubbles which mask underwater scene changes and can even be ramped up to create a 'boiling water' effect for the more dramatic moments, augmented by 35 geysers embedded in the stage lifts. The water bubbles also give a 'surface' onto which the light can play without individual beams of light being visible and 'spoiling the magic'.

Pool Lighting

Moving light positions are located both above and below the surface of the pool within two split-level acrylic 'bubble' enclosures. The immense water pressure (almost a full atmosphere) exerted by the rapid movement of the lifts presented a considerable challenge to Reynolds Polymer of Colorado, whose Thailand plant engineered and supplied the bubble windows. The final design incorporates windows of 38mm and 50mm thickness into a complex compound curve capable of withstanding the forces of the waves and designed to fit both the bubbles' shape and the circular curve of the pool.

The upper bubble, positioned half a meter above water level, contains Clay Paky HPE 1200 fixtures which are capable of a complete 120° pan upstage and downstage, plus a 90° tilt. These cover a wide swathe of the surface area and are used as 'shin kickers' to light the dry stage, the pool surface, the artists at stage level and aerial acts.

The lower bubble, situated 1m beneath the water level, holds Clay Paky Alpha Wash 1200s which light the surface from below to create mood and add texture to the water. "The pool surface provides a nice canvas - changing from brilliant white, through rich blues and greens, and even to red - by which we can change the atmosphere of the show and the theatre in general," explains Gary Bower, head of lighting. "When augmented by SFX 'masking' bubbles, it also enables aerial and diving acts to see precisely where the surface of the water is, which is essential when some of them are diving from heights of up to 25m."

The daunting task of separating electrics from water is governed by strict guidelines. "Electrical safety standards demand we keep all higher voltages a minimum of 3m from the pool edge - separated by an area known as 'The Beach' - and of course everything is bonded to earth," explains Bower. "All lighting cabling going into the pool is 24V or below, partly to minimise risk, partly due to the fact that high voltage speeds corrosion under water - and a lot to do with governmental standards."

And it is not just the lighting department who have to be careful - health and safety extends to house staff and cleaners with vacuums! "Luckily for us Steve Colley, in his second role as operations technical director, is well experienced in this style of production and has helped establish guidelines for all departments."

Special Effects

Above the water the special effects department has installed a huge low fog system incorporating a 22,000 litre tank of liquid nitrogen and over 2km of piping. The entire surface of the pool can be filled in less than 10 seconds from over 24 outlets, mainly distributed around the pool perimeter, vomitory areas and a large, dry loading area at the north side of the pool.

32 Look Solutions haze machines and 42 Martin Jem fans are dotted around the theatre and used largely to obscure the visible system of

Photography ©FDEG

hoists and tracks above the aerial performers. "All of this is DMX controllable," says Lafontaine, "which is very necessary as a careful balance has to be struck to maintain the effects around the building's aircon system."

Finally, two massive pumps in the basement shift over 24,000 litres of water per minute from the pool to Level 6 to create a rain effect so powerful that the air displacement it causes is enough to blow the hair of those seated in the first few rows of the audience.

Rigging

Responsibility for all flying effects in the show falls to Stage Technologies which designed, supplied and installed a 141-axis automation system into the Dancing Water Theatre and two tracks and trolleys and eight point hoists for the year-long rehearsals in Belgium.

In Macau, the main system includes a 40-unit track and trolley system on 20 tracks arranged in a cruciform pattern across the 100m by 60m grid. BigTow 290 lineset winches transport up to 250kg at 3.5m/sec, enabling mobile flying axes to pitch acrobats over the heads of the audience in heart-stopping feats of power flying, and swing performers out from the catwalk stage into the water below.

24 point hoists situated in the grid are used to drop larger flying pieces, such as the human chandelier - a spectacular feature carrying 26 acrobats - through the centre of the cruciform, to allow incredibly fast set changeovers.

Upstage bars are flown on multiple BT 490 Big Tow winches capable of lifting up to 2.5 tons each, whilst cloths and scenic mountain elements are moved around a curved upstage bar by a motorised tracking system.

Two 'winch farms' are located on the grid at the East and West walls and contain all the grid winches, while all control gear for that level dominates the Northern wall. The winches and control gear for all the track and trolley systems are equally distributed in winch farms at the cardinal points of the Cruciform.

The FTSI lift control and Stage Technologies rigging control systems are merged by the FTSI software and controlled by two fixed Acrobat desks, two portable Nomad desks, and four handheld Solo consoles.

Mike Sharp, Stage Technologies' general manager in Macau, explains: "Everything is on a server system so all desks are on the same network. Each desk is able to reach every piece of equipment but allocated differing functions according to show requirement. For example, one controller might load an artist or piece of scenery onto the machinery and then pass them to another desk to run the show sequence. The result is a fast and focused way of working."

Lighting

Lighting designer Luc Lafortune, veteran of many collaborations with Franco Dragone, had several challenging factors to contend with - the presence of water, extreme height, restrictive hanging space resulting in acute lighting angles - whilst creating an atmosphere which would help weave the *House of Dancing Water* spell.

"The Theatre is a huge space to light," says Bower. "Basically, we have lighting positions that are anywhere from 1m below the water, up to 36m above the water level, covering everything from aerial performances and the dare-devil stunts of the motocross riders, to the stage level action, fountain displays and underwater activity.

"The amount of rigging equipment, flying pieces, catwalks and sound and lighting equipment in the show means space is a high commodity," explains Bower.



Photography ©FDEG

"Lighting the show was a combination of coping with awkward angles and finding positions between the rest of the equipment in the grid.

"Most of our lighting equipment - Clay Paky Alpha Wash 1200s, Clay Paky HPE 1200s and ETC Source Fours in the main - is positioned on Level 5, which is adjacent to the winch track. This level also holds a lot of steel set and performers, so we frequently needed to install hanging brackets from the catwalk to maintain the necessary 1-1.5ft safety tolerance from them.

"The cruciform shape of the grid at this level means we are lacking 360° of hanging positions, whilst the angles are incredibly steep, with between 45° and 70° angles about a 30m throw distance to the centre stage."

"Almost all of our Robert Juliat D'Artagnans are used on Level 5; there is one at the North of L4 with a Turkish lace gobo and one at stage level to light the hero's motorbike as he enters. A large complement are used for the moto act to produce a nice, bright path for the main jumps. They vary in angle of shot, but produce a corridor of light. The remainder are used with custom gobos on the centre lift to help change the "locale" of the scene. We chose them for their ability to punch through almost any look or wash on stage. We also have 2 with Rosco Vortex spinners to emphasize the Dark Queen's entrance."

Level 4 presents a different picture with a complete 360° hanging area and a much greater choice of hanging positions. "We get good 40 to 45° angles from this level which do not create too much shadow on the performers faces." Clay Paky Alpha Wash 1200s and HPE 1200s provide the majority of stage wash while six Robert Juliat 1800W HMI Victor followspots are spread evenly around 270° of the circular grid above the audience. Followspot positions are restricted to 1.5m by 1.5m platforms, with a swivel seat and swivel yoke, and raised to a height of 12m to keep the operators out of sightline of the Drum Wall.

Level 2, the Drum Wall level, gives a flatter angle closer to the audience. "We use ETC Source Fours to bring out the facial expressions of the performers to the audience from here," says Bower, "for example, in the Russian swing and boat acts, and to provide a stage wash for the 'curtain calls'. We also accent some scenic elements and create aerial washes as artists still need to be able to see the stage/water surface from their positions in the rigging."

In addition to the quirks presented by the building's shape, the Mondo flooring on the stage lifts carries an intricate, multi-coloured, abstract design which also proved challenging to light. "The colours do not react to light in the same way so, guided by the show's storyboard, we went through all the colours on the moving light design palette to see how the floor would react to each colour and to find some basic looks we could present to Franco," continues Bower. "From this we created a colour palette to work with through the show.

"We also experimented a lot with gobo designs to help accentuate the mood or location that Franco was creating. For example, we used Rosco's checker board design as parquet flooring, overlaying it with gobo branches to create a marble design. The majority of gobos were custom made for the show."

White Light Ltd of London supplied all lighting equipment and smoke machines to the show, with Pacific Lighting HK Ltd supplying custom mains distro, the six Robert Juliat Victor followspots, 18 Robert Juliat D'Artagnan HMI fixtures and a GDS Blues worklight and cue light system backstage.

"Seeing the growth of a theatre of this size from construction, through the creative process, and now finally to a show is most rewarding," concludes Bower. "It's been a real education and I'm glad we got a good production out of it."

Projection

The Theatre presents many projection surfaces including fountains, moving mountains and 270° of Drum Wall (a waterproof curtain with a printed pattern) around the back wall of the theatre. Projection and lighting departments had to work hand in hand to create the ideal environment for the acts.

Video content, created by Patrick Neys, was put through a Showtime system designed and installed by Kraftwerk Living Technologies GmbH, using VYV Photon Show software and Barco projectors. 10 Barco DML 1200 moving head projectors and four Barco FLM HD 20 projectors provided backdrop projections ranging from rural Chinese settings, urban Hong Kong, snow, fire, gothic castles, arches and a Mother Earth figure, allowing the production to transcend mechanical moving scenery.

The VYV Photon video server operates with a virtual 3D model of the stage to give seamless projection, storing the constantly varying projection surfaces which are then retrieved live on demand.

"We also installed a number of backup servers which we connected to a Lightware DVI matrix," says Kraftwerk's Christian Hofer. "This, in

combination with our control system, gives us the chance to immediately change to another playback server if a unit fails."

All DVI signals are converted to fibre links, to manage the relatively long cable runs (up to 170m) to the full HD resolution backdrop projectors. Finding suitable projector positions was challenging so Kraftwerk made intensive 3D studies of different projector placements, to find optimum positions for perfect projection quality, avoiding flying artists or scenery, and accessibility for maintenance work.

"We also added dynamic blending, warping and masking functionality to handle tolerances of hydraulic stage elements, winch systems and so on by using stage machinery's position information to correct our virtual projection surfaces," adds Hofer.

Bower states: "The Barco projectors are great at coping with the difficult hanging positions. The output and versatility of the units help to complement the lighting design. Our task here was to integrate the two without drowning out the projection, yet to create the looks we needed - it's a delicate balancing act."

Sound

Sound designer Francois Bergeron of Thinkwell Group Inc, has been involved in the project from the very beginning, firstly designing the audio system for theatre owners Melco Crown Entertainment Ltd, some two to three years prior to the show's opening, before changing hats to create the sound design for Franco Dragone. This 'unique holistic approach' is a major feature of the way in which Thinkwell operates, providing the complete solution in a united process.

The system needed enough flexibility to provide a fully-immersive soundscape that could handle the unique layout of the theatre, the collaborative nature of the creative process - and the noise of 258 automated fountains, pool lifts and innumerable forms of automation.

"The main difficulties lie in creating an audio system in a vacuum so far in advance of the creative phase," says Bergeron. "But having worked with Franco for 20 years and understanding the philosophy of his creative process put me in a better position to anticipate what might be needed."

Having designed the audio system in Phase 1, Thinkwell had the benefit of knowing exactly how to deliver the best possible results for the audience. Installed and commissioned by Solotech of Montreal, the result is a 200-channel, 360° surround-sound, video and communication system which is able to focus upon Dragone's wish to provide the best possible sound for every audience member. "Our design incorporates a mix of low reverberation and highly directional reinforcement strategies to counteract the distortion of sound bouncing off the water's surface and the high noise floor of the fountains, performers and motorcycles that complete the *House of Dancing Water* experience," explains Bergeron. "This balanced approach has resulted in our ability to discreetly steer sound around the circular stage to within three degrees and provide every guest with an unprecedented sound experience."

Bergeron was aided by associate sound designer Vikram Kirby and programmer Colbert Davis who spent eight months tweaking and testing the kit in readiness for the four-month creation period.

"No-one knew what to expect before this phase as we were yet to see how Franco would use the space from all the creative ideas inside his mind," says Graham, who agrees with most of the creative team that, "working out the logistics to coordinate all our elements has been a very interesting experience."

ShowTex drapes provide acoustic & visual masking

ShowTex Hong Kong supplied and installed the main stage drapes and 100s of metres of tracks for the show.

Thousands of meters of ShowTex's inherently flame-retardant Paris CS Velour line the entire building as acoustic masking. The main curtains, weighing 348kg, are also made from the satiny 520gr/sq.m weight velvet. Drapes attached to custom curved Alu-Pipe tracks serve to mask all technical equipment, catwalks, grids, and wiring.

Bim Cheung, ShowTex Hong Kong's managing director, says: "From the beginning, it was clear that this space would become one of the most iconic concept theatres in the world. The special effects are an intricate collaboration of technical specialists in the air and underwater who must remain invisible to the audience at all times.

"The drapes create an intimate atmosphere for the dramatic love story on stage while making sure what's going on backstage remains a secret.

"The House of Dancing Water will run for at least a 10-year period and welcome countless audiences, the ideal environment for our Paris CS velvet that withstands moisture and meets the strictest flame retardant standards."

www.showtex.com

The main system is composed mostly of Meyer Sound equipment with the FOH sound control from Meyer LCS, Matrix3 frames utilising CueStation with CueConsole surface control modules and a Yamaha M7CL48 utility console. "We have a lot of redundancy and backup, with interconnectable audio paths in case any part should drop out," says Graham. "The live band and music sequencer racks are transported via analogue and MADI protocol to the rack room RME Micstasy preamps and RME MADI Bridge. They are then primarily split to the FOH Matrix3 Frames and the DiGiCo CS-D5 monitor console [a D5 without the optical I/O] for a dedicated band monitor mix. If anything goes wrong with the audio to FOH, the audio is being re-directed from the monitor system to the FOH M7CL utility console."

The four-piece band is led by the drummer with a guitarist, keyboards and Erhu (a Chinese violin, this forms the predominant sound of the show). They are situated in a band room on Level 3, from where they trigger the sequencer, play live along with the tracks and perform all the song transitions with some complete live-only sections in the show.

A total of 248 Meyer Sound loudspeakers are used to cover the 270° seating arrangement. These include 56 Meyer M'elodie speakers - arranged in eight hangs of seven elements per array - used as the main sound source, flown from the central grid sections on Level 8; in addition, 15 Meyer HP-600 subs also flown from the central L8 grid.

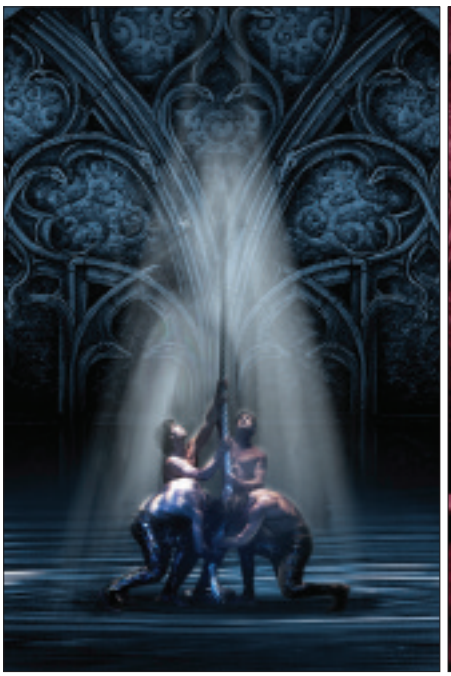
Eight Meyer SB-2 Parabolic speakers are used as long-throw front-fill speakers, hung from the Level 4 catwalk and cross-fired at the front five or six rows to help focus the image of the main sound system arrays. A ninth SB-2 is used as an on-stage centre foldback speaker for the performers.

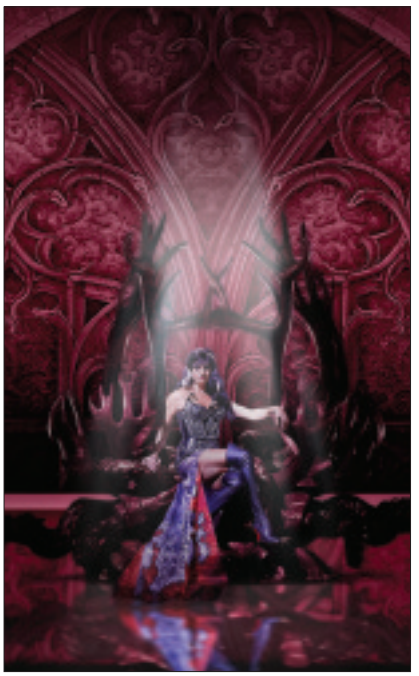
24 Meyer UPJ-1P speakers are used for Meyer's Variable Room Acoustic System (VRAS) as part of a Meyer's LCS Constellation. These are flown in two rings above the stage and seating from the Level 5 grid, which are also integrated with other surround speakers for the overall reverberation control.

The VRAS system adds a layer of reverberation using the Constellation technology with 32 Meyer Constellation microphones spread throughout the auditorium. These pick up any sounds within the room and send them back into the system to give the impression of natural reverberation. At one button press, it changes the room acoustics with various controllable settings. "This is useful when the audience reacts, making the whole atmosphere even bigger - and it's interesting for the operator on the mixing desk too!"

"One of the highlights of LCS is SpaceMap which enables sound to be sent virtually anywhere in the room. This is very effective for creating sound effects such as that of an aeroplane travelling from one end of the room to the other, or for directing particular instruments of the show music above or behind the audience. With this you can create the illusion of sound at different levels and spaces, even when there are no speakers at that point."

Twelve more Meyer UPJ-1Ps are used for SFX speakers and stage foldback, placed throughout the auditorium and back stage.





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Surround sound is provided by 23 Meyer CQ-2 speakers used as an upper rear surround, hung from under the Level 4 catwalk above the seating area, 32 Meyer UP Junior speakers used as a lower rear surround, mounted in the lower section of the auditorium balcony and 43 Meyer UPM-1P speakers used as a rear wall surround, mounted inside the auditorium balcony ceiling covering the complete rear audience wall ring.

Finally, 32 Meyer MM-4XPs are used as an under-balcony rear seating front-fill, with two Meyer UPQ-2Ps for central upper surround sound effects.

One spectacular act involves motocross riders jumping 20m across the stage and performing mid-air stunts at heights of up to 15m. Four of these motorcycles are fitted with wireless microphones to capture the sound of the engines as they ride in and out of the performance space. This can be sent to the surround sound speakers behind the audience so they cannot tell from which direction they are approaching. Each rider is fitted with an IEM body pack to hear calling instructions from the stage manager.

"We are using DPA microphones with Sennheiser wireless packs for the moto and other live sound effects," says Graham. "Having good quality, reliable kit is invaluable because we have no time to change it during the show. The sound designers chose wisely. The manufacturers' support has been excellent, with training for our team

Photography ©FDEG

Franco Dragone and Lawrence Ho (centre) with the show's cast and performers.

provided by some very knowledgeable people from some of the key equipment providers: Meyer, Telex Communications, Riedel Artist Digital Communications, to name just a few. It has been an interesting learning curve and an enjoyable time during the creation period, pushing the abilities and ideas of everyone involved. Now all we have to do is document it all!"

With 10 shows per week, *The House of Dancing Water* celebrated its 100,000th spectator at the end of November and, at the time of writing, is sold-out until mid-February. As Jules Lauve terms it: "It's the biggest monster show out there."

MORE ONLINE . . .

Belgian familiarisation tour: www.cityofdreamsmedia.com/view.php?id=588

Franco Dragone talks about *The House of Dancing Water*: www.youtube.com/watch?v=843t-2ScJ8o

Behind the scenes video: www.youtube.com/watch?v=IkX3b4RlOVo&feature=player_embedded