

AV MAGAZINE

AV Awards shortlist: celebrating our finalists 6

AV Interview: Vestel's plans for global expansion 20

Big spender: Qatar invests heavily in AV tech 25

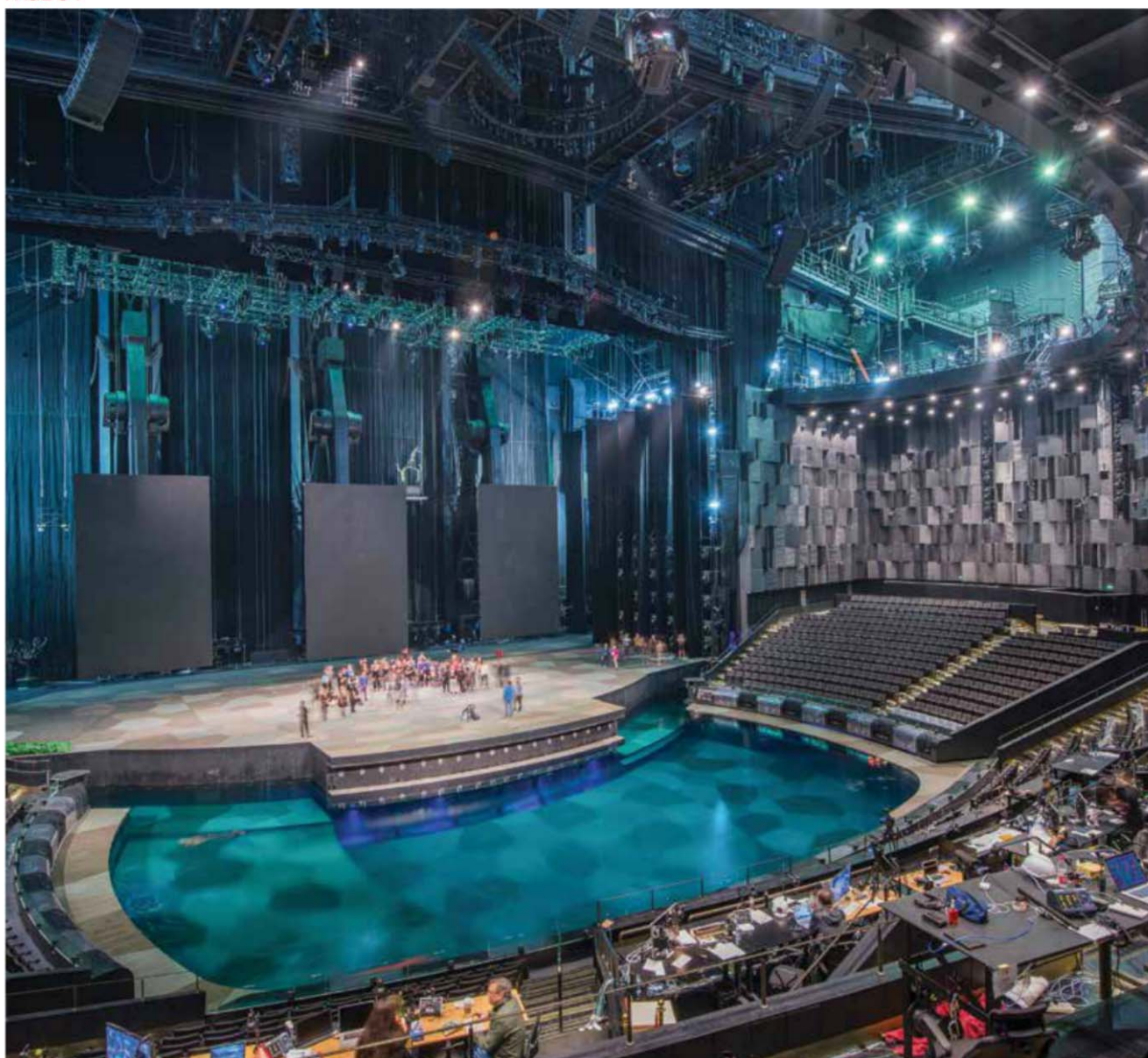
Star of the show: Milan Expo's interactive journey 41

Masters of mapping: exploring the art of projection 53

Music magic: capturing the Montreux Jazz Festival 61

The Han Show's stage spectacular

PAGE 34



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INSIDE: NEWS ■ INTERVIEWS ■ TRAINING ■ CASE STUDIES ■ MARKETS ■ TECHNOLOGY ■ PRODUCTS ■ EXHIBITIONS

CASE STUDY

TOMASZ RUSIA

The Han Show Theatre is one of Daillan Wanda Group's most prestigious and groundbreaking projects to date





Theatrical production at its finest

Ground-breaking projects such as the Han Show Theatre demand a team with outstanding creative and technical abilities. Steve Montgomery reveals how the Chinese mega structure could well be an example of world-beating AV.

» It was quite a brief: create the best theatre in the world for a future show designed to outperform Las Vegas in spectacle; develop and design new world-beating AV, lighting and moving projection systems around a moving stage; include a massive performance pool; and build it in four years.

Couldn't be done? It was. Welcome to the Han Show Theatre in China.

At either end of the Wuhan Central Cultural District development in central China lie Dailian Wanda Group's most prestigious and groundbreaking projects to date: the Wanda Movie Park and Han Show Theatre. Separated by the 1.6 km Han Street, the centre is visited by over 300,000 people per day. According to Wanda Group's chairman, and China's second richest man, Wang Jianlin: "The Han Show and Wanda Movie Park are first of a kind, unique projects which will undoubtedly become new symbols of Chinese culture as well as leading new global entertainment brands."

Wuhan is one of China's second-tier cities despite having a population of 10 million. As the capital of Hubei province, it has been earmarked for cultural development and the Han Show celebrates the essence of Chu-Han ethnicity and culture dating back to 1500 BC: of whom 92 per cent of the population claim descent. Investment in the cultural district has so far exceeded 50bn Yuan (€4,375m)

The Han Show Theatre is a purpose-built venue that serves to stage Franco Dragone's Han Show spectacular. It is an extraordinarily ambitious project that opened in December 2014 after a design and construction phase of just four years. London-based Stufish Entertainment Architects led the design of the building which turned out to be founder Mark Fisher's last project before he sadly passed away in June 2012.

The building is jaw-dropping: fashioned as a traditional Chinese red lantern, 100 metres in height and 100 metres in diameter. Its facade is covered with 18,000 bi-discs reflecting the sun and sky during the day and lighting up at night to cast a

pixelated red glow from LEDs in each disc. At the base of the building Stufish represented the lantern's tassels with the podium's slender support columns. The roof profile is accentuated by the offset of the lantern's intersecting ring geometry intended to evoke the curving profile of traditional Chinese rooves.

Creating a world-leading venue

Designing and building such a world-leading venue and show demanded a world-class team. Working alongside Mark Fisher was one of the most sought-after producers in the world and the show's writer and producer: Franco Dragone. Project director Jules Lauve of Theatre Projects helped bring the vision to life. Lauve attributes the ultimate success of the project in this remarkably short timescale as being largely down to the way that the protagonists (and their respective organisations) worked together; an ability borne of long association:

"Our histories go way back into the past: to the earliest days of staged spectacular shows in Las Vegas in the 80s and 90s. The tenet of this project was to create new and better than has ever been seen before; ground-breaking and boundary stretching, a show that is 'off-the-charts' with its creativity and execution. It only happened because we knew each other so well and were able to stretch and push each other into areas that we had not entered before, but that were realistically possible."

New techniques and equipment were designed specifically for this show. Dragone deployed a large project team of experts and specialists to create the conceptual designs and original specifications for numerous items of theatre-specific equipment that were then put out to tender. Scores of tender responses were then reviewed and the contracts put out to create the working equipment, with subsequent collaboration between Dragone and the supplier ensuring that final designs met the show's requirements.

The 8mm LED screens were designed specifi- »

TOMASZ ROSSA



The purpose-built venue serves to stage work from one of the most sought-after producers in the world, Franco Dragone's Han Show spectacular

cally for the installation as Jean Marcouillier, Dragone's lead for theatre development explains: "We developed a core specification for the three screens which contained attributes that commercial LED modules lack."

For example this included a 90 degree viewing angle, fanless operation, black non-reflective facia that wouldn't reflect the stage lights and front maintenance access. And because they were to be flown at the end of a 23 metre arm they had to be incredibly light.

"We worked with Wanda's preferred manufacturer, Lupo, over two years to create a totally new module; one that hadn't been produced before. We looked at every design detail and removed elements, like trims, that weren't absolutely necessary in order to save weight," says Marcouillier.

The three robotic arms that mount and position the four ton LED screens were also designed specifically. The arms have six axes of motion, so the three 7m x 11m screens can be positioned as one giant display of 2,500 x 1375 pixels or separated and moved independently with up to 360 degree turns and to an accuracy of less than 2cm during movement so that they can project images on to the ceiling or floor as well as directly at the audience.

Each arm has six joints and is controlled by 12 motors and 14 axles. They were constructed in China by military contractor Beijing Special Equipment Design Institute, one of just a few companies in the world thought capable of achieving such a complex and large-scale device.

The design of the show proceeded in tandem with the design and construction of the theatre; a process that allowed both aspects to evolve and develop

together. Lauve: "It was very much an iterative process between theatre and show evolution: the many highly talented people interpreted the brief from Wanda for a show that sets a new standard for live events. We brought understanding of traditional disciplines to all of the non-conventional aspects of the project to create performance specific equipment and venue."

Flexibility to change

Dawn Chiang, Theatre Projects' US project manager, worked in tandem with site project managers in Wuhan: "We worked closely with engineers, specialists, and project managers across three continents and two languages. This complex, one-of-a-kind, purpose-built venue demanded a high level of attention to detail throughout every phase of design and construction. We were literally working 24 hours a day across multiple time zones to help coordinate the project daily."

The show includes a stage and conventional auditorium that opens up, 20 minutes into the two-hour performance to reveal a basin containing 10 million litres of water, eight metres deep which allows acrobats and performers to dive from a height of 26 metres. The 2,000 seats divide and move, whilst occupied, to surround it and 11 independent lifts within the basin can be raised and lowered to change the acting space, rapidly creating a dry floor and islands within the expanse of water.

"This meant we had to contend with a whole raft of technologies; including pool technology, purification, aquatics, fall protection, cathodic protection, waterproofing of concrete hydraulic structures, moving seats and all the special effects," Lauve said. "As well as managing up to 80

performers and all the stage sets and costumes most of which were either fully or partially submerged or splashed with water."

Central to the whole show is a set of 16 Christie Roadster S+20K DLP projectors but there are no fixed projection screens. Eight units are installed in an arc line to project spectacular visuals that cover the entire stage, while four units of the Roadster S+20K are fitted over the centre portion of the stage to project images on to the core stage area. The remaining four units are installed around the theatre to enhance the projection effects.

The projectors are mounted on custom yokes from Zap Technologies, so they can project on to any area of the stage or scenery. Content is supplied in uncompressed form from VYV Photon media servers, developed for live entertainment and immersive experiences. They incorporate projection mapping, realtime alignment and edge-blending on any surface shape using infra-red tracking cameras mounted on the projectors.

Emric Epstein, VYV's co-founder explains the process: "The projectors actually realign themselves with the stage set every 60th of a second to synchronise with the movement of props and actors on stage and to enable realtime edge-blending. Even though the moving yokes are inherently very accurate, a slight or drift causes a noticeable drift over a throw of 30 metres which we can totally eliminate with this realignment technique."

The Albion positioning system transmits the coordinates of objects to other systems, in this case to the Meyer/LCS Cue Console control surface for cue recall that perfectly synchronises the sound with the live performance.

A further benefit of the VYV system is that it »



TOMASZ FLOSSA



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New techniques and equipment were created specifically for the show, with a large project team of experts and specialists deployed to create conceptual designs



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The building is jaw-dropping: fashioned as a traditional Chinese red lantern, 100 metres in height and diameter

streamlines the creative process by enabling the output of the editing tools (Premier, After Effects and Maya) to be projected live on to the actual stage surfaces: a boon to the creative and production team as they fine-tune the show.

Each sub-contractor or equipment specialist was responsible for power handling and cabling installation for their specific element, rather than specifying and then relying on a main power or network installation contractor, as is the normal case in large projects in the west.

This eliminated issues associated with incompatible infrastructure, although it added to Theatre

Projects' already massive workload ensuring that standards were met and smoothing conflicts during stressful periods of installation and commissioning.

Behind the scenes, video distribution of back-up channels for the VV servers is maintained by Lightware MX Series matrix and distributed control of the servers is achieved by means of an IHSE draco tera KVM matrix switch, a technique favoured by Epstein:

"The show cannot afford to lose the video content during a performance, so we have implemented several back-up servers and support systems, together with an extensive access mechanism to

control and monitor the individual systems. Engineers at the theatre are able to access servers and computers through the KVM switch from remote workstations throughout the building.

This is a technique we have deployed before very effectively: the IHSE draco tera switch provides highly reliable connectivity to access the servers and has the flexibility to change and adapt as the venue's requirements grow."

Surpassing expectations

Opening up and altering the stage and creating what is effectively two theatres presents major challenges to the design of the audio system. To solve this, two overlapping audio systems have been created with around 50 per cent of the speakers common to both.

An extensive Meyer Sound audio system has been installed, including 350 loudspeakers in a combination of CAL, MICA, MINA, and M'elodie as well as 1100-LFC subwoofers, explains Robert Mele, digital products field support specialist for Meyer Sound.

The 10 line arrays making up the core PA system are processed by Callisto processors and each speaker is addressed individually using D-Mitri and CueConsole control surfaces to handle the multitude of channels in a dedicated routing system.

Splitting the theatre into two areas also had implications for the lighting system.

In total there are 50 lighting trusses supporting 170 Vari-lite moving heads and 168 Clay Paky wash and moving heads, supplemented by further Terby lumiaires, all controlled by two MA Lighting grandma consoles and ETC dimming system.

The audio and lighting systems also extend underwater. Support divers and performers need to know when to move and the actions they need to take, and with submerged scenery and props moving around on lifts communication underwater is essential for safety.

This is achieved through underwater loudspeakers from Lubell Labs. Divers are equipped with face mics and head-mounted cameras and use a Navy Seal technique of coloured rope lights to navigate in the water.

The result is an installation that surpassed the original design expectation. Says Lauve: "Pushing the envelope to the limits of realisability meant that technically, we could deliver whatever the creative team asked for; making this show, and theatre, unique in the world of emotional and creative theatrical production.

The Han Show is, as described by Cesar Mario O. Mamon, chairman of the board of the International Associations of Amusement Parks and Attractions: "The world's best. Compared to Las Vegas or other leading international performances, Han Show is the most amazing show I've ever seen." ■

CONTACTS

- » www.thehanshow.com
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- » www.wanda-group.com