



## KAOS



LAS VEGAS, USA  
THE AMERICAS

After the Palms Casino closed its doors at the end of the 2017 party season, Station Casinos took on the monumental effort of reviving the property's identity and, in doing so, chose to set the standard in nightlife hospitality for years to come by making sure every detail and every feature of its rebirth was of the highest quality. Around 18 months later, the resort relaunched Kaos - over 100,000 sq ft of dayclub and nightclub, complete with a record-breaking pool deck.

The technical design of the project was lead by Fertitta Entertainment's Aiden Kemp, and he selected National Technology Associates (NTA) to handle the design and integration of audio, video, LED, special effects and automation technology. In turn, NTA collaborated with SJ Lighting for the theatrical



• Above  
The 'Demon  
with Bowl'  
stands at  
65ft tall at  
the centre  
of one of  
the main  
pools.

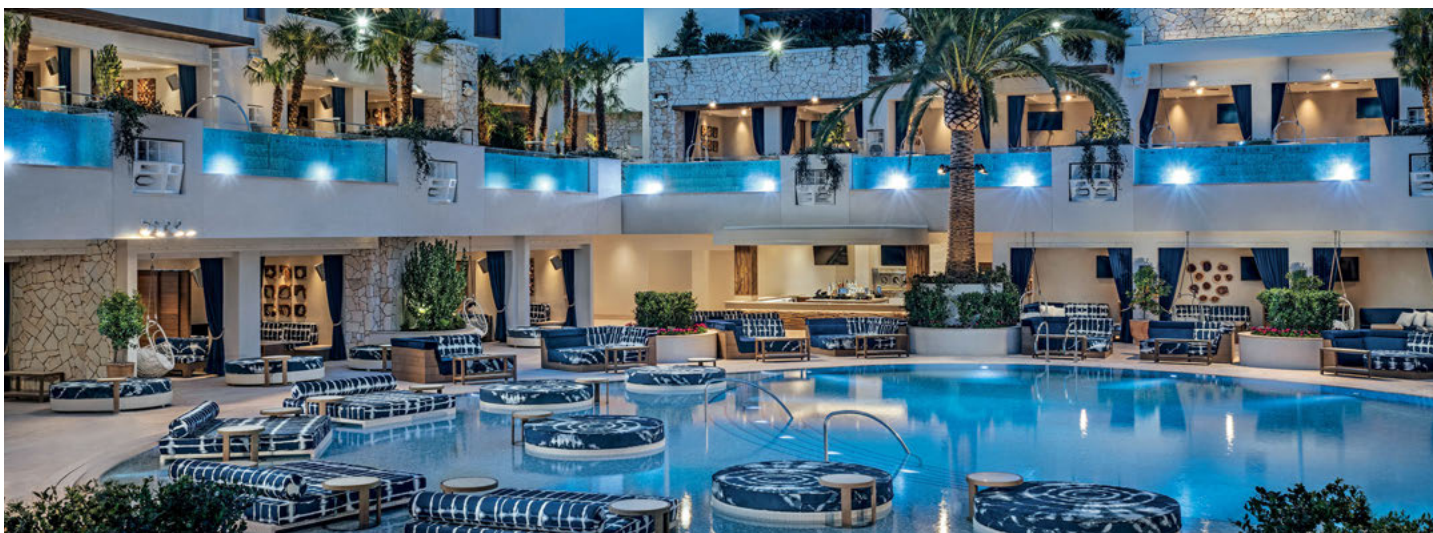
lighting, Advanced Entertainment Systems (AES) for special effects, Salvin Design for cryo, SGPS for LED, Green Hippo for media control, and Sound Investment AV (SIA) for audio. The interior design was by Rockwell Group. The entrance to the 73,000 sq ft outdoor pool deck/dayclub is home to Damien Hirst's 23ft tall sculpture 'The Warrior and the Bear'. There are two main pools, various side pools, and 39 cabanas, most with their own private pool. The dayclub, which can host around 6,000 people, features a seasonal dome cover that enables it to operate throughout the year. A second Damian Hirst structure - the bronze 'Demon with Bowl' - stands 65ft tall at the centre of one of the main

pools. The venue, which was designed by Friedmutter Group Las Vegas, also features a 270ft LED screen, which interacts with the music on the exterior of the resort's Ivory Tower. The pool deck also converts into part of Kaos nightclub via a massive retractable glass wall and a rotating 360° DJ booth with stages on both sides.

NTA's Project Manager, Nevin Edwards explained: "Obviously with a nightclub/dayclub, the set-up of the audio system is of prime importance. This is where we, along with Aiden Kemp from Station Casinos, reached out to Todd Konecny (SIA) to come up with a design for the venue using Funktion-One. We knew Funktion-One would be a rider-friendly

choice for DJs and we also knew Funktion-One is installed in other venues in the city. The sound system needed to be larger, better sounding and louder than any other venue in Las Vegas. The nightclubs are in a constant state of trying to one up each other, so we needed Kaos to one up every other venue in Las Vegas." With this in mind, the sound system was designed to deliver across various metrics: fidelity, controllability, SPL, and reliability. To achieve these goals, Funktion-One loudspeakers were chosen for their ability to reach high SPL levels without losing quality.

The lead system design and vision were by Aiden Kemp, the integration and commissioning of the system was done



• Above  
The view  
from the DJ  
booth across  
KAOS.

• Right  
The entrance  
to the  
nightclub  
and the  
mirror balls  
creating  
stunning  
lighting  
effects.

by NTA, and the supply and tuning of the system was by SIA.

While the visual elements of the dayclub/pool deck are bold and striking, the sound system was to be visually unobtrusive. SIA's Todd Konecny explained: "This demanded many hours spent in the design phase, working out the architecture around the loudspeakers. The sound system does its work to support the experience wholly in the audio realm. With global artists like Marshmello creating the party, the system had to be superlative at all points on the pool deck. Funktion-One loudspeakers were a crucial part of achieving this goal and, because sometimes more is more, the system predominantly employs the upper tier of Funktion-One equipment like the Evo Series, and F124 and F132 subwoofers."

The pool deck main stage is in the round and supports both DJs and live acts - often both on the same day. The system uses four clusters of Funktion-One Evo 7E cabinets with additional Evo 6SH down and front fill to cover 300° of area around the stage. The main stage's low frequency array consists of nine F124 bass enclosures and two F132A subwoofers. The main perimeter of the pool deck is equally substantial through the use of another 20 Evo 6EH mid-high sections paired with an equal number of F115 mid-bass cabinets. The perimeter low and

sub-bass is provided by three F124 bass enclosures and four BR221 bass reflex loudspeakers.

As is the norm in Las Vegas, there are VIP cabanas - 36, to be exact - that occupy the main and second level of the pool deck, each with private swimming pools in front of them. These cabanas are designed to be high-intensity party areas that live up to the highest Las Vegas standards with luxury interiors, video displays, and private pools.

To provide the appropriate audio experience for the cabana occupants, smaller main systems are deployed at the exterior of each cabana that consist of the brand-new Funktion-One Evo 2SH mid/high loudspeakers combined with F115 mid-bass and BR218 bass reflex loudspeakers. These are installed flush within the exterior walls of the cabanas facing the private pools and provide high-fidelity, high-intensity areas in front of the cabanas. The interiors of the cabanas are equipped with stereo pairs of F101 mid/high loudspeakers with one-of-a-kind annealed metal grills and RAL colour finish to match the stone. The entry corridor is covered by weatherised PSM12 mid/high loudspeakers and BR221 subwoofers.

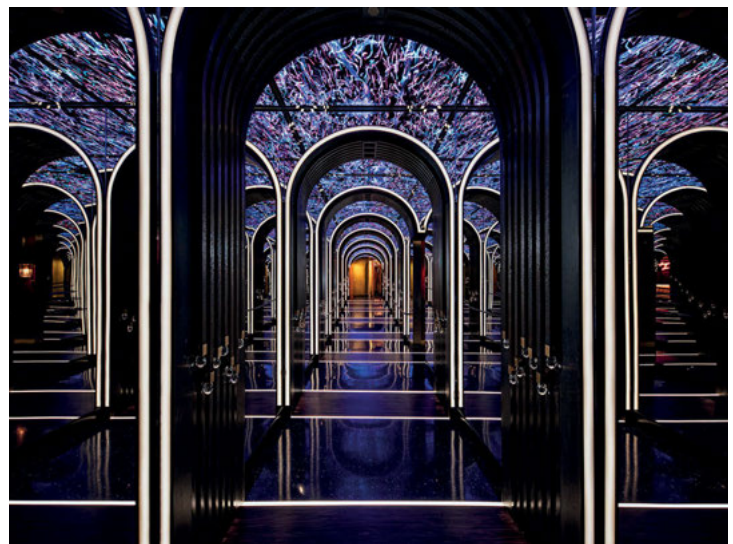
Todd said: "The overall result of this design is an expansive party pool deck that has very few areas not covered by high fidelity and high SPL audio

reproduction. Being such a large space with a variety of listening situations, the network backbone of the system was crucial to the fine tuning and daily usage of the system. NTA's Joe Garcia was responsible for schematic design, documentation, network setup, turn on verification, and aligning the various components."

Audio isn't the only system that required unique attention, as NTA's Nevin explained: "The video system also has its uniqueness. We didn't want to just give the guest in the cabanas the same lame free-to-guest channel line-up they would typically get, so we designed a DirecTV video head-end that is encoded into IP-TV using the new Crestron NVX product.

"Every cabana has access to 24 channels of DirecTV and, if they want, for example, to watch a particular football game they have that capability. We also included the capability for a local HDMI input and a guest can bring in an X-Box if they so choose and they can play X-Box in their cabana. Again, I believe that these features don't exist in any other dayclubs in Las Vegas."

NTA also installed water cannons and flame heads on the roofs of the cabanas all the way around the pool and on top of the pool stage. There are also outdoor rated lasers that shoot onto the 'petals' of the stage roof, as well as high-powered



## TECHNICAL INFORMATION

### SOUND

POOL: 2 x Funktion-One PSM318 DJ monitor; 3 x Funktion-One F132A subwoofer; 13 x Funktion-One EVO-7-E loudspeaker; 13 x Funktion-One EVO7-EH loudspeaker; 9 x Funktion-One DS210 Dance stack loudspeaker; 2 x Funktion-One F115MK2 loudspeaker; 2 x Funktion-One EVO6-E loudspeaker; 4 x Funktion-One Res1 loudspeaker; 1 x Funktion-One BR115 subwoofer; 5 x Funktion-One BR121 subwoofer; 12 x Funktion-One F124 subwoofer; 86 x Funktion-One F101 loudspeaker; 21 x Funktion-One F115MK2 loudspeaker; 6 x Funktion-One Res2SH-Wide loudspeaker; 11 x Funktion-One F115MK2 loudspeaker; 16 x Funktion-One BR218 subwoofer; 9 x Funktion-One Res2SH-Wide loudspeaker; 10 x Funktion-One PSM12 loudspeaker stage monitor; 6 x Funktion-One BR221 subwoofer; 1 x Linea Research 88C03-Dante amplifier; 24 x Linea Research 88C10-Dante amplifier; 23 x Linea Research 44C20-Dante amplifier  
NIGHTCLUB: 2 x Funktion-One F132A subwoofer; 12 x Funktion-One EVO7-EH loudspeaker; 1 x Funktion-One DS210 Dance stack loudspeaker; 14 x Funktion-One F115MK2 loudspeaker; 10 x Funktion-One F118MK2 loudspeaker; 11 x Funktion-One BR115 subwoofer; 4 x Funktion-One BR118 subwoofer; 4 x Funktion-One F124 subwoofer; 4 x Funktion-One F115MK2 loudspeaker; 6 x Funktion-One F221 subwoofer; 4 x Funktion-One F315 loudspeaker; 2 x Funktion-One DS310 Dance stack loudspeaker; 6 x Funktion-One EVO6-SH loudspeaker; 9 x Funktion-One F88 loudspeaker; 2 x Funktion-One F215MK2 loudspeaker; 8 x Funktion-One MB210 subwoofer; 3 x Funktion-One MB212 subwoofer; 18 x Linea Research 88C10-Dante amplifier; 11 x Linea Research 44C20-Dante amplifier; 2 x DiGiCo SD9 console; 1 x DiGiCo SD-Rack unit; 1 x Allen & Heath Xone:DB4 DJ mixer

### LIGHTING, VISUALS & EFFECTS

30 x Robe MegaPointe moving head; 10 x Robe Spiiders moving head; 2 x Robe LEDBeam 150 moving head; 54 x Ayrton MagicDot SX fixture; 26 x GLP JDC1 strobe; 24 x Elation DTW Blinder 350 unit; 16 x CHAUVET Maverick Storm 1 Wash light; 2 x MA Lighting grandMA2 Light console; 9,300 x NanoLumen 2.5mm LED tile; 8 x Green Hippo Hippotizer Montane+ server; 2 x Green Hippo Hippotizer Boreal+ server; 1 x Green Hippo Hippotizer V4.5 beta software package; 4 x Kvant ATOM 20 laser; 4 x Kvant Clubmax 3000 laser; 6 x Kvant Logo-LAS 3000 laser; 5 x Kvant Clubmax 10 laser; 1 x Pangolin Beyond software package; 5 x Antari M7 smoke jet; Look Solutions Unique 2.1 hazers; 1 x MDG haze system; Ultratec FX Air Cannons; Vario Aqua Fog units; Interactive Technologies Cue servers; 32 x Salvin CO2 jet; 1 x Salvin Big Easy DMX control system

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\*extract only



• Above  
The view  
from the DJ  
booth across  
KAOS.

lasers under the roof that shoot out from the stage.

The pool stage is also home to 10 Robe iPointe and 16 CHAUVET Maverick Storm 1 Wash lights - both fixtures are IP65-rated - specified by SJ Lighting, together with an MA Lighting grandMA2 Light for control.

Steve Lieberman, President of SJ Lighting, said: "The pool area is using outdoor-rated moving lights, which is such an amazing step forward in our trade. Not having to use enclosures to protect equipment saves the aesthetic and, of course, money."

A total of 1,035 25mm Yaham LED panels form the 270ft screen, while a further 1,624 4mm Yaham LED panels are installed throughout in the outdoor areas. While the pool deck is a stunning space with plenty of technological innovation, it is the 27,000 sq ft nightclub that sets Kaos apart on that front. The indoor space is a study in sensory immersion, with the singular goal of transporting visitors to another dimension.

The centerpiece of the dancefloor is a unique tesla coil feature, which works independently or together with the cryo and fog technologies to simulate weather patterns. At first appearing as a cluster of somewhat-conventional mirror balls, the array of spheres lower in to place to create stunning lighting effects. It was imagined and designed by Aiden. "That's the first time I've ever seen anything like that," said Steve. "It's nothing short of spectacular."

SGPS supplied no less than 9,300 NanoLumen 2.5mm LED tiles around the venue, amounting to more than 64 million pixels of video, with all outputs and content, including live inputs, driven at 60fps.

This includes four LED halo rings that encircle the tesla coil feature. Nevin explained: "The second ring is fully automated and moves at a rate of six ft per second, which, I believe, is twice as fast as the chandelier at Omnia nightclub. There is a complete halo of 2.5mm LED all the way around the ceiling, which extends down above the DJ booth. To further complicate things, the halo begins to angle as it heads toward the DJ booth from the back of the room."

The CO<sup>2</sup> cryo system from Salvin features 32 Salvin High Output DMX CO<sup>2</sup> Jets over six zones - controlled by the company's proprietary Big Easy DMX control system.

The Kvant laser and control system was provided to AES by Pangolin. It includes four ATOM 20s, four Clubmax 3000s, six LogoLAS 3000s, and five Clubmax 10 Lasers. All of the lasers use Pangolin Beyond software together with the grandMA2 Light for control.

AES also supplied 35 Antari M7 Smoke Jets mounted to the top of the pool stage, a number of Unique 2.1 Hazers from Look Solutions, the moving flame heads mounted on the cabanas, Ultratec FX Air Cannons for the confetti and streamers, as well as multiple Vario Aqua Fog units. The effects arsenal is routed through

Interactive Technologies Cue Servers and the grandMA2 Light consoles.

Media control is managed by a custom Green Hippo system, which handles 17 streams of 4K that fire out to dozens of areas of the club and façade. The system comprises eight Hippotizer Montane+ servers and two Hippotizer Boreal+ servers - all running Hippotizer V4.5 Beta Software. Green Hippo developed two new accessory cards and various new features specifically for this project.

"Kaos is probably the most technologically advanced nightclub anywhere," stated Nevin. "With all the systems that need to talk to each other we needed a robust network. We designed a main 12 switch stack with access switches connected to the stack. There are 27 VLans for all of the different systems."

This sentiment is reflected throughout. Steve said: "The theatrical lighting design for Kaos was a very complex task. We were part of a comprehensive team of consultants that all operate at the highest levels. With that said, we worked closely with Rockwell Group and Station Casinos to really bring our portion of the project to life. The lighting design priorities were first and foremost; a wow factor. There are over 100 moving connections with rotating panels and within each of these zones there are moving lights, LED pixel tape, special effects, video surfaces, etc. "We have a stage area for both venues with lighting being a critical detail. The artists that perform at this venue are world class, and there needs to



be a system in place to support their requirements. Pointing out the obvious fact that we are in Las Vegas - the entertainment capital of the world - the design needed to be over the top, overwhelming, and immersive.”

The lighting design features 30 Robe MegaPointes, 10 Robe Spiders, two Robe LEDBeam 150s, 54 Ayrton MagicDot SXs, 26 GLP JDC1 strobes, 24 Elation DTW Blinder 350 and an MDG Haze system, with control from an MA Lighting grandMA2 light.

Steve added: “This system is designed with efficiencies in mind. We gave very careful attention to the layout so that the lighting designers - both house and visiting - could systematically go through the system and build their respective shows.”

In a similar vein, the sound system had to be exemplary in all respects to support live acts and EDM equally well.

To achieve the ultra-high performance that the venue demanded, the main room has Funktion-One Dance Stacks built in to the walls flanking the DJ booth. Each stack features two F221 double 21-inch bass enclosures, two F315 triple 15-inch mid-bass cabinets, and six Evo mid/high packs for near perfect coverage of the room. The low frequency range is covered by another six F124 bass enclosures and a pair of F132A subwoofers. Additional F215s, Evo 7SH and Evo 6SH cabinets, MB210, BR118, BR115 and F88s serve to fill in the perimeter areas.

Todd said: “Overall, the main room is unequalled with respect to its sheer power and ability to create an entirely enveloping aural experience with any music genre.”

The signal chain electronics include DiGiCo consoles, AtteroTech DM I/O devices and over 75 Linea Research amplifiers - a combination of 88C03-Dante, 88C10-Dante and 44C20-Dante models - located in several rooms around the venue.

“The system makes great use of Dante audio networking to support complex source switching between the various stages and for monitoring the system health. The venue-wide network is a single backbone with an extremely high bandwidth distribution scheme that allows audio, video, lighting and control to exist within the same domain for the ultimate in controllability and flexibility.”

Todd continued: “The Linea Research amplifiers really showed the value of having a power amplifier platform that sounds good, has high channel density, internal DSP and onboard Dante network capabilities. Load monitoring, mains current draw control and actual power limiting at the output stage (as opposed to just voltage limiting in the signal chain) goes a long way towards system reliability, and allows an engineer to think of the system in more manageable blocks. We’ve been extremely happy with how the amplifiers integrated into the Kaos network.”

There’s no doubt that Kaos represents a major moment in venue design and entertainment technology. It has been delivered by the best in the business using the highest end of technologies. Much of the responsibility fell on NTA’s shoulders, as the lynchpin between owners and suppliers.

Nevin reflected: “NTA is very well positioned to deal with a project of

this size and scope. Our team is made up of people that have worked on and in numerous nightclubs. Joe Garcia was the lead engineer for the project - without Joe’s contribution, this project would have never gotten done in time. NTA’s COO H. Waldman assisted with project management. He headed up the coordination effort for the install of all of the static and flying LED elements in the ceiling and was the master gatekeeper for the network.

“The project definitely had its challenges, with schedule being one of the biggest. Projects always get pushed on schedule but given the complexity of this one the schedule wasn’t our friend for sure. Basically, we all worked the entire month of March with every day being no less than a 12-hour day, many days were up to 18 hours. It was a herculean task to get the project to the finish line, but all the extra hours made it worth it once we saw the finished product. I feel great about our part in it.”

Steve added: “This project is one of the most ambitious venues we’ve ever had the privilege of being involved with. We are extremely proud of the final product, and everyone who has had the chance to experience it first-hand can attest to the fact that this venue is at the pinnacle of nightlife and hospitality on a global scale.” Todd concluded: “We have worked with many of designers involved with Kaos on some of the highest profile projects in the world. Seeing their designs for Kaos come on line during the installation and knowing that those systems are unique in the world is awe-inspiring. We were fortunate to have been involved in this project.”

• Above  
One of the  
tables in  
Kaos.