



Cirque du Soleil Michael Jackson ONE

Case Study

Lightware Visual Engineering

Cirque du Soleil – Michael Jackson ONE

Market	Country
Rental & Staging	USA
Lightware Equipment Used in Project	
1 - Lightware MX-FR65R frame	
41 - Lightware fiber receivers	
3 - Lightware fiber transmitters	

"I'm a perfectionist; it's part of who I am," Michael Jackson is purported to have said.

Given the quality of his work and his reputation for high standards, the expectations for a show revolving around Michael Jackson will always be exceedingly high. Cirque du Soleil's Michael Jackson ONE, produced in conjunction with Jackson's estate, aspires to meet the level of perfection the star would demand.

The show, which combines Jackson's music with Cirque's distinctive acrobatic feats, is at the Mandalay Bay Resort and Casino in Las Vegas in a space that was formerly occupied by a production of The Lion King; it was completely renovated specifically for MJ ONE. CDS anchored a team that included Auerbach Pollock Friedlander, Moser Architecture Studio, and Jaffe Holden Acoustics for the design and specification of the rigging and automation, lighting control, and audio-video systems.

The show's story line was written by choreographer Jamie King, who danced in Michael Jackson's 1992 Dangerous World Tour. The musical director, Kevin Antunes (New Kids on the Block, Marky Mark and the Funky Bunch, Britney Spears, 'N Sync, Justin Timberlake), made his selections from "Michael's entire treasure vault" and remixed it specifically for the show. "You take this sound system, combined with the immersion of an IMAX-like surround-sound theatre," Antunes says, "then you take a story line that Jamie King put together, all the creative minds of Cirque, and Michael Jackson's music to create a truly unbelievable show."

Audio fashion

Jonathan Deans designed the audio system along with Auerbach Pollock Friedlander principal Paul Garrity and senior associate Dan Mei. The main front-of-house sound reinforcement and effects play back through a computer-controlled audio matrix and processing system with 120 inputs into 120 matrix outputs. It has modular control surfaces for live mixing and routing control of microphones and multi-track audio playback. There is also a secondary 48 x 48 channel audio console and processing system for performer in-ear and stage loudspeaker monitoring.

Audio is distributed using a redundant fiber loop transport system with microphone preamps. It routes all the front-of-house, performer-monitoring, and back-of-house audio using recallable matrix presets. A network server allows on-the-fly routing and also provides a means of backup. There are 16 channels of wireless microphones, 16 channels of stereo in-ear monitoring, two channels of IFB, and 40 wireless receivers.

"Come naked," Deans says. "We'll clothe you in sound. It's very immersive. I want you to wear the sound."

Deans has twice been nominated for Tony Awards and has designed audio systems for many theatres and venues around the world. His credits include Pippin (2013 Tony nomination), Carrie (2012 Drama Desk nomination), La Cage aux Folles

Cirque du Soleil – Michael Jackson ONE

(2010 Tony and Drama Desk nominations), and many more. He has also designed the sound for several Cirque du Soleil shows, including The Beatles' LOVE, Ovo, Corteo, Zumanity, La Nouba, O, Mystère, and Saltimbanco.

The audio in Michael Jackson ONE doesn't overpower the rest of the production, but it blends well. It's not exceedingly loud, and there are no gratuitous 3-D effects, just great quality sound that you would expect from a live concert. And there's a very good reason for that.

"Every time I do a Cirque show," Deans says, "in the sound world, they have to be different and unique. This one is very much like attending a concert with Michael Jackson. I really want you to feel as if you're at a great concert. We're not standing there screaming and lighting lighters but a very elegant concert."

This experience is aided by the quantity of the audio components. There are more than 135 speakers, including the mains and surround, plus 12 subs in the house. If you add that to the almost 5,500 speakers embedded in the seats, it adds up to a concert-like experience.

The main arrays and downfills are Meyer Sound MICA, M'elodie, and UPJ-1P speakers; overhead are Meyer JM-1Ps and MTS-4As. The subs are Meyer 1100-LFCs.

Surround speakers include Meyer MSL-4s, UPQ-1Ps, UPJ-1Ps, MICAs, M'elodies, and M1Ds. Providing front fill are Meyer M1Ds. Audio is processed through a Meyer Galileo system; the power amps include Crown CTS-3000, CTS-2000, and CTS-4200 units.

The audio is distributed throughout the venue in digital form using a fiber-optic backbone powered by an Optocore 2 Gbps network with 496 inputs and 700 outputs. There is a total of 19 devices in the ringed network, including one server computer and six client computers. Among the networked devices is a Meyer Sound D-Mitri digital audio platform, which processes and distributes audio signals.

The front-of-house audio console is a Yamaha DM 2000 with six Optocore Y3R-TP audio interface I/O cards, which allow 96 inputs and 96 outputs at 48kHz. Optocore provided custom sample rate converters to maintain its fiber network rate at 96kHz, while the Yamaha consoles run at 48kHz to keep the full channel count.

There is also a Meyer Constellation electronic acoustic system, designed to enhance and augment the room acoustics. It provides the ability to alter the reverberation time and delay characteristics in real time using a 48 x 72 routing matrix and digital signal processors.



Cirque du Soleil – Michael Jackson ONE

The audio coup de grâce is the personal 3.0 speaker system built into each seat, with left and right speakers built in and another speaker embedded in the seat directly in front. The main speaker arrays are hidden behind acoustically transparent material in the 64'-wide proscenium, while the subwoofers and surround sound speakers are rigged in the catwalks.

“It’s surround sound,” Deans says, “but we make our own format, like in LOVE. In fact, during one of the sessions of LOVE, someone said, ‘What format is it?’ I said, ‘I don’t know because I don’t work in formats; I work with what’s needed for the production.’ The format is not a format because every single moment, and certainly every single song, has a different way of coming to you. It’s not something that is fixed because if it is fixed, that’s a movie. Movies have formats because they need to go from one movie house to another. It has to be something very fixed so that you can plug in and off you go. We’re not interested in that. The only way you can hear Michael Jackson ONE is by coming here. There’s nowhere else you can hear it, any of the music, in the same way.”

Montreal-based Solotech installed the audio system, and Deans says its work was impeccable. He also gives high marks to Aaron Beck, the head of audio for the show, who he says “keeps the show to a standard that makes me proud and respects the Michael Jackson legacy.”

Four large towers move from side to side and go up and down, even turning into platforms for the performers. Of the more than 7,000 LED lights in the show, many custom LED elements are integrated into the costumes, and the set pieces themselves have nearly 300 built-in LED fixtures.



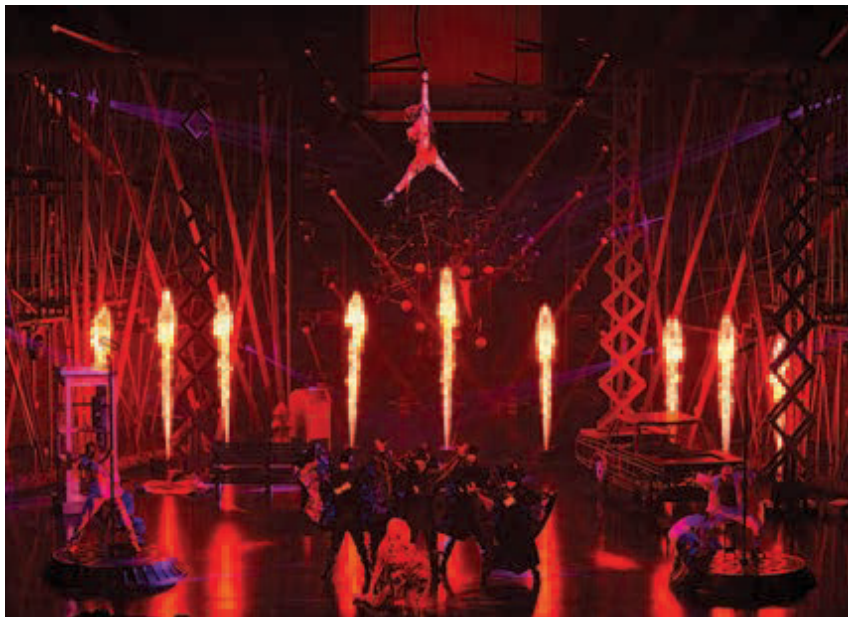
Video bling

If the audience is clothed in audio, then it is bathed in lighting and swaddled in video. Projection takes a leading role in the production, with a highlight being the virtual appearance of Jackson in 3-D video form during “Man in the Mirror.” The video was designed by Jimmy Lakatos, Raymond St-Jean, and Gonzales, while Michel Lemieux and Victor Pilon produced the Pepper’s ghost video effect. Jean-François Talbot, of Montreal-based Fly Studio, also designed and produced video content for the show.

Cirque du Soleil – Michael Jackson ONE

One major consideration was the choice of presentation format. “More and more in rock shows today, we use LED screens,” Lakatos says. “And they are so powerful that they light the entire stage.” It was a challenge, he adds, to strike a balance between the light on the stage and the brightness of the video. “Normally, Jamie King is used to working with the power of video walls, but, in this case, he needed to rethink how we needed to show the images with less power.”

The designers had one factor in their favor, however, and that was time. They used it to set up gear on the stage, measure light levels, and evaluate the effectiveness of video projection as opposed to an LED video wall. “It was a lot of trial and error,” Lakatos says, “and that time was very valuable. It was really important to work with a light meter. We’re at around 30fc in this show. Normally, we work at around 50 or 60. We needed very, very high contrast.”



Another reason to use projection, Lakatos says, was King’s desire to incorporate video mapping. “And that works only with projectors,” he adds. “He had this whole idea of immersion. It was also better for the budget because video walls are expensive.”

The resulting system uses a total of 16 Christie Roadster HD-20K projectors for the main projection plus six HD6K-Ms, three HD10K-Ms, one Roadster HD-20K, and one Roadie HD35K for various specials. Content was developed using a variety of software tools, including Autodesk SoftImage (3-D animation and visual effects software), Blue Newt, and Adobe After Effects.

Toward the end of preproduction, King decided to add another video element to the show, and Dago Gonzales came on board to incorporate more video of Jackson in addition the manufactured content.

“Jamie King is a director of shows in rock environments,” Lakatos says, “especially arenas, but he wanted more of a theatrical show. So that was our lead for at least a year. But when we started to present, it was felt that we needed more of Michael’s presence. It really made a difference being able to see Michael Jackson dancing at the same time as the dancer on the stage.”

Lakatos says Fly Studio owner Jean-François Talbot was very involved in creating video content for the project and spent time with them in Vegas. “It made a big difference. They work a lot with Softimage, Blue Newt, and After Effects, and they have a lot of good animators. Near the end, for about three weeks, we had about 20 people working full-time on the show creating new edits and new animations. Normally, we have no more than five or six.”

A Photon media server, from Montreal-based VYV, plays back the video. Lakatos says it works in a 3-D environment, does video-mapping, and has a lot of inter-activity. He calls it the Swiss Army knife of media servers and also praises the company. “They did amazing, amazing work,” he says. “I’ve worked with other media servers that can work in 3-D environments, but it’s getting so complex now—everything is multi-layer and networked. You need an engineer with you

Cirque du Soleil – Michael Jackson ONE

to program the show. Most companies sell software, but they don't sell people with it. The way VYV works is they create a server and people come with it. We had no problem at all. Everything worked. And one operator will stay with the show."

Lakatos says the Photon has virtually unlimited potential because the engineer on site can write code on the spot in C++." "It was very, very powerful having two engineers with me," he says. "It was like having a dream team making sure that Jamie King's wishes come true. That was the first time that I had a team with this much experience. More and more, I see that MJ ONE was the result of six years of work on other shows, and it went so smoothly. We did a lot of work, but, technically, it was amazing."

Although much of the video is projected, there is an LED video wall backdrop as well with six Daktronics 12mm-pitch LED display columns. Each column is 5'W- by-35'H and is rigged on an automated trolley, which allows them to traverse the stage. Christopher Whelan was the project manager, and one of his responsibilities was the purchase of the gear.

Lighting zing

David Finn led the lighting design team with support from Cirque du Soleil project manager Joshua Hind and programmers Benny Kirkham and Joshua Koffman. It's no surprise that video and lighting had similar design approaches, given that they were under the creative direction of Guy Laliberté and the direction of King, but Finn added another wrinkle.

"Even though Jaime King is a pop director," Finn says, "I knew that [the lighting] had to have a real sense of theatricality to it, that I had to create atmospheres that support the story line. I also knew that I had to have those [pop] elements in the plot. I knew that he would want to turn to them at some point and say, 'Let's just blow this number out, have a good time, and make a pop number inside of this little story that we built.'"

Finn says he wanted the lighting plot to support a repertory situation. "I come from the world of modern dance, ballet, and opera," he says. "I started out with Jennifer Tipton as my mentor, so I work from that repertory style. I knew that if I created a flexible repertory system, I would have the tools I needed. Then it was a matter of adjusting that system or playing with it to make it specific to the show."

That decision led him to using profile fixtures with a variety of gobos. The main fixture he chose was the Clay Paky Alpha Profile 1500. "It's sort of the workhorse of the production," he says. "There are over 100 of them in the show." To be exact, there are 100 Alpha Profile 1500s and ten Alpha Profile 1200s. "We put them in a grid over the stage. They're on every boom. They're throughout the house in a variety of patterns." When he says patterns, he does not mean the layout but the gobos.



Cirque du Soleil – Michael Jackson ONE

“We probably put in one of the largest, most diversified gobo loads that these guys have ever seen. I kind of drove them crazy with it because the gobo book to load these things is as thick as a Bible.” This provided Finn with the flexibility he was looking for. “I knew that there were 27 production numbers in 90 minutes,” he says, “and that I would need a lot of choices.”

For color washes, he chose 18 Clay Paky Alpha Wash 1200s, which were brought in from another Cirque show and refurbished. To create pop looks, he used 86 Clay Paky Sharpys. “I knew [the Sharpys] would be useful. We put them on the four ladders in the back that we can bring in and out upstage in front of the video walls. When we wanted to go real rock and roll, we bring them in.”

No rock-and-roll show would be truly complete without lasers, so a 25W LaserNet RGB and two 20W LaserNet RGB units were programmed into the show, requiring careful calibration of projection zones for the audience and video projectors. “This is especially difficult if you consider that the SL and SR units fly in/out on ladders for different segments,” says Tom Harman, president of Laser Production Network. “The unique structure of the performance made us go above and beyond in the programming of the lasers. All cue response is in milliseconds, as per David Finn’s direction.”

And since this is 2013, it wouldn’t be a rock-and-roll show without LED fixtures. “Integrated into the set pieces,” Finn says, “we found this fixture that fell into our lap at the last minute called the Rosco Miro Cube. It’s a 4”-by-4” cube, and it’s RGBW LED with a variety of lenses that you can use. It was a perfect size, perfect brightness, perfect color, perfect dimming, everything, for this show. We have around 250 of them all throughout the set pieces, in trenches, and all over.”



The integration of lighting with the video was key to the design and programming process, and it was pulled off with aplomb. According to Finn, by the time lighting got to the theatre for preproduction, the video crew already had four or five numbers “roughed in.” They already had ideas about ten numbers; another ten were yet to be designed.

“For the four or five numbers that [video] had roughed in,” Finn says, “I took my cues from them, and I based my work around what they were doing. It really came down to color, rhythm, and speed of movement. They would put an image up, and I would start working from that image. But then I would take a turn, and they would follow me. It really was a 50/50 give-and-take. They would say, ‘We really love what you’re doing with that,’ and I would do the same thing. It was a true collaboration in that sense.”



Cirque du Soleil – Michael Jackson ONE

When Finn arrived in Vegas, he came with some lighting-for-video chops. “I just did Parsifal in New York at the [Metropolitan Opera], and they had a 60’-by-80’ projection on the backdrop. So I had the experience of knowing that light levels have to adapt, that you have to adapt color. When I did that show, the director kept saying, ‘Can’t you adjust the red values to match the red values in the video when they change over a 30-minute transformation?’ I said, ‘I’ll do my best, but I’m going to be much more linear in transition, and there are going to be moments when I’m off.’ But on this show, I had much more time than I did in New York and could adapt my color to the video color as necessary.”



One of the more notable lighting technologies involves the custom LED elements, especially in the costumes. It took nearly six months of tedious work to program the LEDs in the costumes and the set. RC4 Wireless placed DMX receivers on the moon to dim the custom-LED star sticks, inside the translucent moon for internal lighting, and on a prop stool to control the start and stops of motorized props. Receivers also dim the custom RGB LED panels and LED MR16 Par20 fixtures lighting the elephant during the “Elephant Man” sequence while dimming RGB Philips Color Kinetics iColor Flex fixtures and controlling a Look Solutions Viper NT on The Muse’s platform.

“When we mention that we had over 7,000 LEDs, we feel like we’ve earned the right to brag a bit,” Hind says. “Because of the complexity of the pieces, we ended up programming most of those 7,000 LEDs individually.”

Benny Kirkham was the lead programmer, and he worked on an MA Lighting grandMA2 full-size console. Koffman programmed the LEDs and filled in for Kirkham when needed. Of Kirkham, Finn says, “I knew I needed somebody with rock-and-roll experience, and Benny brought a lot to the production. He actually programmed for Michael Jackson. We had the greatest time. We just riffed off of each other, and it was great to work with him.”

Finn says that there are more than 13,500 cues in the show, and programming the LEDs in the costumes and the set was incredibly time-consuming. “The ‘Billy Jean’ number alone probably took two months to program,” Finn says. “He had to start out by mapping all the LEDs, and some of the costumes had 300 or 400 LEDs in them. And then if I said, ‘I want the thing to go blue from head to toe, he would have to make sure he had the mapping in the right order and know whether the arms were up or down, if the leg is out or in ... It was crazy!”

Finn had high praise for his entire team. “Joshua Hind was incredible,” he says. “He essentially took on four positions: He was my assistant, he was the project manager, he oversaw the purchase of all the equipment, and he oversaw the retrofit of the theatre. He consulted on the redesign of the electrical system and renovation of the catwalks. I think he was on that project for four years, and he did a tremendous job.”

Cirque du Soleil – Michael Jackson ONE

Much of Michael Jackson ONE resonates with Jackson’s touring shows and his love of technology. The use of poplifts in this show is fitting, as is the automation and the state-of-the-art technology.

“There are five poplifts,” notes Auerbach Pollock Friedlander principal Tom Neville. “Each one can propel a performer high into the air, or it can also be used as a small standard lift to bring props and performers on stage in a less dynamic fashion.

“There are also three large stage lifts that are used to bring large scenic pieces from the trap room area to the stage. These lifts, as well as all the stage machinery, are operated by the integrated stage machinery automation control system that has multiple control consoles positioned within the theatre. The dynamic acrobatic flying choreography is supported by acrobatic tracks with automated trolleys and individual winches over the audience. These winches are controlled by the same system that controls the large lifts, poplifts, and other stage machinery, so the interdependent timing between all moving elements is flawless.”



The automated rigging system includes two “winch farms” with individual control of up to 59 motorized winches. An automated trolley system with individual winches flies performers and scenic elements over the audience. All of the automation is networked using one of three fiber-optic networks that synch the automation, lighting, and audio-video systems. Each system also has a redundant backup using RAID-1 hard drive arrays.

The automation controls, winches, tracks, and trolleys were supplied by Stage Technologies, and the stage lifts were supplied by handling specialties. The structural engineering was handled by Englekirk Structural Engineers, and the mechanical/electrical/plumbing engineers were JBA Consulting Engineers, and they also handled life safety engineering. As the theatre and audio-video consultants, Auerbach Pollock Friedlander was instrumental in the redesign and retrofit of the theatre. The architect was Troy Moser Architecture Studio, and the acoustics consultant was Jaffe Holden Acoustics.

Jackson lives

The success of the show guarantees that Jackson's music and legacy will survive, and the sound, imagery, and emotion of his live shows will remain intact. For the designers, engineers, technicians, and performers, it was the kind of project that might only come once in a lifetime, but to the audience, it's a way of transcending time.

"I think people really enjoy seeing Michael," Lakatos says, "which is why I think the show works well. At the end of the day, people really feel the presence of Michael."

"He's not alive," Deans says, "but his presence is definitely here. You feel him. And I feel that if Michael was with us, he would be sitting here going, "Yeah."

