



Soldiers of Fortune

Jeremy Railton and his team create a pair of good-luck-themed attractions for the Galaxy Macau

By Sharon Stancavage

The Galaxy Casino required a wow feature—some kind of unique attraction—to make it stand out in the crowded, Las Vegas-like market now found in Macau. (The Galaxy is located in Cotai, near other large-scale casino/hotels, such as The Venetian and the City of Dreams; all are bigger than anything you'll find on the Vegas Strip.) To create something memorable, the resort's management hired Jeremy Railton, president and principal designer at Entertainment Design Corp., of Venice, California, and the creator of the Dancing Cranes at Sentosa Resorts World in Singapore (covered in *LSA's* April 2011 issue).

Railton's first idea for the Galaxy Macau was an interactive bamboo organ. Francis Lui, deputy chairman of the Galaxy Entertainment Group, then weighed in with an idea of his own. "He said, 'We want to make a diamond suddenly appear,'" says Railton. A tall order perhaps, but, for the designer and his team, this seemingly outrageous request wasn't a problem. "I've been involved with illusionists, and one of my partners, Richard [Wechsler], has a company called Astonishment Technologies; we have connections with the best illusionists in the world," Railton says.

Working along with Railton were many of the core people who collaborated with him on the Sentosa

project, which was winding down as the Galaxy attraction was beginning. "The key people on board were John Rust, our show director/media producer; our senior project manager, Chris Holmsley; and our senior technical director Bob Chambers," explains Edward S. Marks, the project's producer and director. Marks and Chambers are currently co-owners of newly formed The Producers Group, located in Glendale, California.

Diamonds are forever

The Fortune Diamond feature, located in the hotel lobby, essentially consists of two distinct parts: a multi-tier water fountain, with mechanical water effects engineered and fabricated by Technifex, of Valencia, California, and the diamond, created by Lexington Design and Fabrication, of Los Angeles. "The entire diamond lifts out of the floor behind a 30' wall of water," says Railton. "Around the base of the fountain, there are LED panels, and, at the end of the show, the whole thing becomes a roulette wheel, to inspire everyone to start gambling in the casino."

Railton, a veteran at creating large, unique installations, knew exactly what he wanted for this attraction. "Jeremy envisioned a large cut-glass diamond with a lot of visual effects, video effects, and smoke and mirrors," explains Ron

Antone, Lexington's project director.

Antone and his team did reflection studies with mirrors and glass, and then moved to white models and acrylic mirror mock-ups. "It was quite remarkable what we were able to do with just mirrors and reflected light," he says.

It was during those studies that the team had a revelation. "The original design had a clear, faceted case with internal facets of mirrors that would reflect like a diamond would," says Antone. "As we developed our full sized mock-ups, it became clear that we didn't need the outside shell, since you couldn't tell what you were looking at—it fooled your eye in the sense that the outside plane of the diamond appeared to be there when it really wasn't. It was a very convincing effect."

Thus the diamond is an illusion. According to Railton, "It's actually a negative space with a mirror; you cannot tell that it is a structural skeleton of the facets of a diamond made with mirror glass and stainless-steel trim."

Initially, the rotation of the diamond was going to be battery-powered. However, given its size—22' in diameter and about 12' tall—and weight (50,000lbs), the battery system to power the internal motor mechanics would have to be fairly large and heavy. The batteries would also have to be accessed between

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Photo: Chris Holmsley/EDC

A view of the lobby that contains the Fortune Diamond.



Photo: Chris Holmsley/EDC

The show begins with a display of color.



Photo: Courtesy of Lexington Design and Fabrication

The Fortune Diamond under construction.

each show for recharging, which was also an issue. "That was the most problematic piece of the mechanical design," Antone admits, "and, ultimately, it was designed out, because it wasn't practical."

Since the battery-operated internal drive was gone, and the diamond still needed to rotate, another solution needed to be found. It proved to be an elaborate moving chandelier, created by Preciosa, of the Czech Republic, and designed by Railton, which sits above the diamond. It proved to be the perfect solution to disguise the power cables for the rotation mechanics. "A feature was that looks like it's part of the chandelier, but it's really the cables that suspend and power the diamond," Antone says.

Masking the diamond's cable rigging wasn't easy. "We mocked up cables in the shop and tried different surfaces on the cables to disguise them," says Antone. "We tried masking them with chrome tubing, black tubing sleeves, and a series of glass beads that were approximately the same size as the chandeliers." The glass beads worked the best. The rigging was handled by LA Propoint, of Sun Valley, California.

The diamond was completely fabricated and rigged at Lexington. "We spent a lot of time in the shop—and outside the shop—suspending large mirrored mock-ups 30' in the air to determine the viewing angles to see what would be reflected," says Antone. What everyone saw was actually the mechanical pit below the diamond. Consequently, any and all hardware that was exposed in the pit needed to be white. "It became all about reflected white light on the mirror surfaces of the diamond," he adds.

The fountain lift was also fully constructed and assembled by Technifex, of Los Angeles. "We did it here in Los Angeles, so Jeremy could review the pieces more often than he could if it had been built in Macau,"

says Marks. Doing the work in California had another welcome result. "We brought quite a few million dollars back to this country," Railton notes.

The diamond structure is an assemblage of large, bolted-together aluminum frames that were shipped to Macau via sea containers. The glass mirror panels were shipped attached to the individual metal-framed panel modules. "You can imagine the angst over shipping that much glass and waiting for it to arrive in Macau, hoping we wouldn't have a box of rocks at the end of the journey," says Antone. Thankfully, they survived the voyage.

In Macau, Railton and the team needed to make room for the installation in the lobby. "When we walked in prior to starting this project, the core and structure was already built, so we had to cut through concrete, rebar, steel, and slab to give ourselves a two-story hole in the ground," Marks reports. The demolition came as a bit of a surprise to the client. "We are constantly brought in on projects where people assume the entire attraction comes in a giant box with a big red button on the side," he adds.

Like Antone, lighting designer Michael Lagrotteria, from the Los Angeles office of Lightswitch, spent more than a little time looking at models. "We played with that in mock-ups forever," he says. "It was very hands-on; we were making three to four trips a week up to the scenic vendor just to make it work."

To light the space, Lagrotteria divided it into sections: the waterfall, the diamond/pit, and the chandelier. He says, "We used [Philips] Color Kinetics C-Splashes to up light the waterfall, as well as Acclaim X-Balls for some of the scenic details of the fountain structure."

For the diamond, Lagrotteria and his team used a combination of Philips Vari*Lite VL3500 profiles and VL2500 Washes/Spots from both above and below in the pit. "The pit below was

used to indirectly light the diamond, which has only mirrored surfaces. Color and texture come from lighting the pit itself, and sparkle and intensity come from lighting the diamond directly," explains the lighting designer. "There are Martin Atomic strobes and Color Kinetics ColorReaches for color in the pit."

The chandelier was also part of the lighting design. "We light it from above, using [ETC] Source Fours with [SeaChanger] Nemo plasma lamps and color changers," says Lagrotteria. Regarding the latter, he reports, "That was my first time using them; the color you get out of them is so much superior to a traditional arc source." Altman RGB Spectra Pars are also used to give the chandelier extra punch.

There's plenty of color in the show, including Ruby Red, Sapphire Blue, and Emerald Green. However, the diamond stays sparkling white. "The only real white light is on the diamond, especially when it's first revealed—that creates contrast when everything else around it is so saturated," says the lighting designer.

Lagrotteria programmed the diamond on an MA Lighting grandMA2 console, working with Warren Kong. "We dumped that to a DMX playback unit," he notes. For the LED-laden ceiling, the pair turned to an Artistic Licence Colour-Tramp. "It's PC-based control software made for large LED arrays that runs it all off Art-Net," says Lagrotteria. "All of the lighting gear was provided by Ptarmigan, of Hong Kong."

Adding video and audio to the mix

The video and audio aspects of the diamond were directed by John Rust, and were produced by media designer George Johnsen, of Mammoth Sound and Vision, located in Burbank. "We first tell the story of an enchanted chandelier that comes alive and begins to descend," Rust explains. "And the chandelier elongates, finally touching the water, giving a 'life' to the fountain, which

magically begins to grow upwards."

"The point of putting this video into it at all is to make it easier for the viewer to understand what is going on in the fountain," says Johnsen. The video, located at the base of the fountain, was initially specified as only a lighting gag. "As we started looking at those lighting solutions, they got to be less and less satisfactory, only because of the resolution of them," he adds.

After determining that video content was the answer, the key was finding the right product. "First of all, it had to be IP67, which is a tough rating to achieve in an LED video screen. Second, since the screen area of the fountain is conical in shape, we couldn't use conventional video products to do it," Johnsen explains.

Eventually, the team turned to a custom solution, and, through the use of a consultant, did get 20mm modules that are angled to match the base. "The horizontal pixel distance is actually different, and the vertical distance stays the same—so the pitch is different, not the resolution," says Johnsen.

"It is an enormous video screen that you're standing very close to, so resolution becomes an issue immediately," notes Johnsen.

"Definition of the content on the screen becomes an issue immediately, because the public is standing 36" away from the video screen."

The LEDs are spread across one continuous screen with seamless content, per the request of Railton and Rust. "We used a combination of the coolux Pandoras Box [media server], because I needed every possible live video layer I could get, as well as Final Cut Pro and After Effects as a pre-comp solution to make composites on site. This show was put together entirely on site, as there was no way to prebuild anything of significance; we built a studio on site to allow the video track to be built precisely to the time of the



The Wishing Crystals under construction.

water feature.”

From an audio standpoint, the space also posed several challenges. “The water is running all the time, so the ambient sound level is actually pretty high,” says Johnsen. “To make it more difficult, it’s a marble floor, a hard ceiling, marble walls, and a huge, huge, echo-filled room. The reverb times were running around eight seconds, which is a lot.”

Not only was the room extremely live, but the layout of the lobby had an impact as well. “The whole space opens physically into the casino, and, if we just turned it up, the gaming people would say, ‘Hey, turn that thing back down, you’re interrupting the people who are playing poker.’”

The diamond is a 16-channel surround sound environment. “In typical surround, you have left-right-center—this was more of an ‘every speaker is a front speaker’ situation,” Johnsen explains. The key to making this environment surround was the use of time delay. “The primary mixing horse we rode was ProTools 9 by Avid. For time manipulation and coordination of time effects, Outboard Electronics’ TiMax 2 SoundHub was employed,” he explains. The Haas Effect management of time delays controls the reflection patterns and

the apparent source directions of the individual audio columns, which results in surround sound.

Key to the process was a lineup of Renkus-Heinz RHAON-powered speakers. “We are able to use the Renkus-Heinz steering columns—they’re like tiny line arrays, so we were able to steer the sound around, and were able to move the sound tremendously through the space by using multiple channels,” says Rust. The speaker package includes Renkus-Heinz Iconyx 16-Rs, Renkus-Heinz Iconyx 8-Rs, Renkus-Heinz CF151-5Rs, and Renkus-Heinz PNSUB112Rs.

The multiple levels of speakers also address another challenge in the space: a two-level fountain that rises and falls. “We had two levels of speakers on the columns, and we would transition our source point based on the position of the fountain,” Rust says. The overhead speakers, which were initially for effects, increased in number and became part of the show’s audio, due to the height of the fountain.

For show control, Railton turned to Birket Engineering Hong Kong Limited and project manager/engineer Timothy D. Swieter. “We were respon-

sible for the design, production, installation, and commissioning of the systems,” explains Swieter.

Show control for the Fortune Diamond included the diamond itself, lighting, audio, and video, as well as the fountain. “We coordinated the ballet of effects,” says Swieter. “Our system synchronizes the sub-systems to produce a precise show. We provided the show control system, the audio system, and the video playback.”

Birket Engineering is the only certified Medialon expert center in Asia, so it’s natural that the diamond’s systems rely on Medialon products. Swieter explains, “The Showmaster Pro is the heart of this system; we also used Medialon MIP-HD for video playback, the MAS-PRO for audio playback, as well as [Peavey] MediaMatrix NION N3 for audio routing and DSP processing.”

The attraction also relies on a Dell System laptop that runs Medialon Scheduler software for show scheduling. The laptop is used for system maintenance, and is also connected to the Internet for remote diagnostics. “We attached this laptop to the Internet and use LogMeln to ‘remote’ into the control system from any Internet connection in the world, in order to see how the system is operating and to help with troubleshooting,” says Swieter.

“The audio, video, and show-control systems are all Ethernet network-based,” adds Swieter. “The communication to sub-systems is over Ethernet I/O or serial, and the audio utilizes CobraNet direct to the Renkus-Heinz speakers; CAT5 is easier to put in, and is cheaper than a 16-pair, 18-gauge copper cable. We chose to implement Ethernet everywhere in the attraction that we could, knowing that, with Ethernet, we can accomplish about 95% of any communication needs that came up.”

Colorful crystals

While most facilities would have stopped with the magical, luck-



The Wishing Crystals inside the 20'-wide-by-200'-long black reflective pool, intersected by three bridges.

bestowing diamond, Lui had other ideas. Specifically, he wanted something to enliven the casino's day-tripper entrance. "It is for all of these people who come over from mainland China in hundreds and hundreds of buses," says Railton.

The 60 Wishing Crystals are located in a long, narrow reflecting pond, to allow the maximum number of guests to experience them. "They look like giant crystals that have burst forth from the earth," explains Marks. They range from 3' to 30' in height, and are from 12" to 40" in diameter. "We went out and bought little crystals, studied their shapes, and tried to figure out the best way to achieve them, especially how the crystals' octagonal shape would be terminated at the top," says Antone.

Railton also wanted the crystals—

which were originally specified to be clear—to be more than just set pieces. As Marks notes, "The crystals have internal technology that makes each one of them do something different."

Consequently, Antone and his team were charged with creating "transparent" crystals that weren't transparent at all, as the technology inside them needed to remain hidden. "So we developed a series of scenic samples to determine the right level of translucency and what effects would work the best," he says.

While the team at Lexington was doing scenic studies, there was a major change in visual direction for the crystals. "Francis [Lui] decided it should be more colorful, and it was a good choice—they are colored themselves, they have lighting inside

and out, and they also get laser texture mapped on them," notes Railton.

For Lexington, that meant a trip back to the drawing board. "We went through a series of brightly colored scenic tests, figured out our best options, and started down the path of this very colorful approach to the crystals," says Antone. This "involved translucent paint, opaque paint, and layers of polyester resin—we used everything in the scenic bag of tricks to make the color palette more intense."

The client-approved palette included primary and secondary colors that were subjected to extensive work by the team at Lexington. "We presented the colors that they wanted on a series of acrylic panels, and then lit them so they could get an accurate sense of what



This view takes in the two 30'-by-24' Lighthouse LED walls that are featured in the show, and are also used for in-house ads and promotions.

the real color would be with the real material; it's very easy to be fooled by renderings or tests that aren't using the actual material," Antone explains.

The show effects within the crystals are fairly simple. "There are strings that go up the entire length of some of the crystals that oscillate; there are small 3" mirrorballs on a series of strings that work on an oscillator and pick up lighting in a strange and interesting way, as well as Mylar shag materials on turntables that turn slowly and pick up reflective light," explains Antone.

Once the shape of the crystals was determined, along with their interior effects, they were placed into the

day-tripper lobby in a 20'-wide-by-200'-long black reflective pool, intersected by three bridges that allow guests to cross from one side of the crystals to the other. "The bridges are pretty complicated Asian-style steel structures—they are high compound S-curve shapes covered with marble, and have glass railings," Antone says.

Interactivity is key to the Wishing Crystals. According to Marks, "There are motion sensors set into the marble floor; if someone goes up to throw a coin, if they are in the right spot, they magically turn on a section of the crystals—lights sparkle, they

twinkle, they hear music, and they are hit with random good luck." Or, to put it another way, "The Wishing Crystals are actually a musical sculpture, created by the guest's interactivity, with over a million different musical combinations possible," notes Rust. When all the sensors are triggered, the finale begins, and the guests are bathed in health, wealth, and happiness, courtesy of Chinese symbols projected onto the crystals by the Vari*Lite VL3500s. "With all these good luck symbols going all over the crystals, guests think, 'Oh, I'm so lucky,' and then go into the casino and win," explains Railton.

Musical crystals

The space has a variety of four different base-ambient audio tracks, and, when they're triggered, a new track is selected and unmated in a point source speaker in each one of the clusters. Johnsen explains, "What we've really done is created a gigantic mixer."

The exhibit features an orchestral track composed by Paul Mirkovich, with additional tracks from Mike Schmidt, supervised by Rust. Johnsen says, "It was more difficult to orchestrate than it was to mix, and John had to do a lot of solo sessions to make sure we didn't get bleed from one section to the other section's microphone. It was more rock 'n' roll versus an orchestral recording."

The mix, which is in surround sound, was done on an Avid Command 8 console with the studio version of Pro Tools HD. As with the diamond, there were installation issues. "The Command 8 at the

turning off the mute," Railton explains. The physical audio positions within the crystals are discrete. Johnsen notes, "The violins come from Position One, the brass from Position Eight; you don't really hear the brass when you're standing by the violin, but, as you walk towards them, there's a blend that happens. It's a very cool kind of sound sculpture that isn't normally done." As guests walk through the crystals and over the bridges, their aural experience changes as if they were on a stage, walking through an orchestra. "And to make it even more interesting, each track rotates into a different physical location each time, making this a very involving, ever-changing attraction," Rust says.

The space is, as one might imagine, awash in speaker cabinets. "There are point source speakers on every crystal stack, and they are actually time-matched to a set of overhead speakers and a set of speakers that are constantly on within

the pool— obviously not underwater, but just above it. We divided up [the overhead and pool speakers] to have different orchestral flavors as well." There are Renkus-Heinz CF61-2R units in the crystals, Renkus-Heinz CF121-5R and CF12S-5R boxes under the bridge, and Renkus-Heinz CF121-2Rs in the ceiling hang.

Crystal show control

The show control system is a critical, and flexible, element of the crystals. Located in a separate electrical equipment room, it is similar to that of the Fortune Diamond, being comprised of a Medialon Showmaster Pro, a Medialon MAS-PRO, two Medialon MIPS HDs, and Peavey Media Matrix elements: two NION N3s and a CAB16i.

The interactivity in the installation is courtesy of nine Banner Engineering IR proximity sensors—eight on the perimeter and one on the center bridge—used to trigger the various areas of the attraction, as well as the

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crystals succumbed to the marble dust that thickened the air, so we finished the job using Neyrinck's V-Control Pro app on an iPad, and it worked like a dream," Johnsen notes.

The audio environment at the crystals is complex. "There are 32 channels of audio running all the time—the first eight are playing off the ceiling in the venue, and there's a little bit of ambient sound coming from under the bridges," says Johnsen. "As you walk by each group of crystals, you can turn on an additional set of six tracks by waving your hand over the sensor—those tracks will be perfectly in sync with the master audio." However, the tracks really aren't turned on. "You're not turning on music, you're actually



Programming the lighting for the Wishing Crystals.

finale. Swieter notes, "The sensor works well, because it is small and could be hidden away from guest view. It is 24V DC and is compatible with the I/O of our system."

The sensors can be configured in a variety of ways. Railton explains, "We initially divided these crystals into nine different areas; each area has a sensor, so each group of crystals has a sensor on the side of the handrail." However, since the Galaxy has opened and guest traffic patterns have been established, there have been changes. "Throughout the show programming, we debated and tried different triggering schemes," Swieter admits. There were various experiments with different sensor numbers, and time was also explored as a trigger for the

"You can imagine the angst over shipping that much glass and waiting for it to arrive in Macau, hoping we wouldn't have a box of rocks at the end of the journey." —Antone

finale. "The final configuration uses both time and sensors for this purpose—the idea was that, after eight sensors, or after seven minutes, a finale would occur. We wondered how the system would behave with real guests, so we created the software to be flexible and easily adjusted for any changes that came about once we saw the general public interact."

There's also a video aspect in the finale of the crystals' show, thanks to two 30' x 24' Lighthouse LED walls that are also used for in-house ads and promotions. "We shot the crystals lit in the space; we took that footage and did post-processing on it, so the magic is happening in sync with the music and the instruments that are lighting the installation," explains Johnsen.

For the video screens, two Medialon MIP HDs work in tandem with Gefen DVI splitters and switchers, as well as two FSR

Compass CP-100 video switchers. "The 'show video' is only run during the finale. When the finale is not playing, the client wanted to display a video feed that includes information about the resort and advertisements, so the show control system uses the FSR video switchers to switch between the house feed and the show feed," Swieter explains.

Like Antone and his team, Lagrotteria was planning on lighting clear crystals; when that changed, so did his plan. "One of the big challenges was finding colors that worked on an entire cluster," the lighting designer says. The problem was solved with time and patience. "We sat down with Jeremy and went cluster by cluster, really dialing in what colors worked best, and then

made that the programming language for that cluster. We found a handful of colors that worked, and found a bunch that didn't, and threw those out," says Lagrotteria.

The Wishing Crystals cover a larger area than the Fortune Diamond. "It's a decent-sized space, and, when you look at it, the tallest crystal is around 24'—it's a lot of ground to cover without a lot of fixtures," says Lagrotteria.

Lagrotteria made do with a combination of general and effects lighting. "In terms of the overhead lighting, we have a conventional wash from ETC Source Fours, just to give us a base palette; over that, we have Vari*Lite VL3500s—the VLs are really there for color and effects, especially when the crystal clusters are activated." There are two VL3500s per structure, and, overall, Lagrotteria is a fan of them. "I think they are really reliable," he notes.

Then there's the lighting inside of the crystals. "One of the biggest

challenges was that some of them are 12' tall and some are only 8" in diameter but that tall, so really getting light inside of them and around all of the scenic effects was definitely a challenge." The units inside the crystals include Diversitronics Finger Strobes, Traxon RGB and white dot LEDs, Traxon XB wash units, and Color Kinetics ColorBursts, ColorReaches, and iColor Flex units. "In the field, once everything was installed, we did some modify some of the scenic effects and some of the light positions to make it all work," the lighting designer confides.

Ringling the lip of the pool are eW Fuse powercores, also from Color Kinetics. Lagrotteria says, "They illuminated the lower opaque scenic work, so we would not have to dedicate limited overhead resources to those elements."

Programming, once again on a grandMA2, was done by Seth Rapaport. "I think Seth did a great job—with a little bit of creative programming, he was able to get the coverage that we needed," says the lighting designer. Playback of the effects is via an Artistic Licence Colour-Tramp, while the lighting is played back from an Artistic Licence Two-Play; both are controlled through the Medialon Showmaster Pro.

Lasers, provided by Laser Fantasy, of Seattle, Washington, are also part of the finale. "We gave them a CAD drawing, and they used CAD to program the lasers to follow the outside edge of the crystals—so when you're looking them, you see them sparkle on the edges, and it gives a magical extra dimension," says Railton.

In the end, the Wishing Crystals and the Fortune Diamond are more than just iconic features that make the Galaxy Casino a unique world destination. "The pieces trigger a sense of good luck or mystery, as well as making people walk away feeling empowered," Railton concludes. 📶