Technology Focus by Richard Cadena

This month: Lighting the 2014 Central American and Caribbean Games Opening Ceremonies

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Mexico - The 2014 Central American and Caribbean Games are held every four years, and much like the Olympics, athletes from around the region compete in a variety of sports, some of which can qualify them for the Pan American Games in 2015. The Games date back to 1924 when the Mexican Olympic Society wanted to make the participants more competitive. Last November, the Games took place in a 30,000-capacity newly refurbished stadium in Veracruz, the first time they were held outside of Mexico City. Around 5,700 athletes from 31 countries competed in 46 different sports in front of over a million people.

David Grill designed the lighting for the Opening and Closing Ceremonies and Montreal-based Solotech provided the gear and most of the crew.

Solotech began loading in four weeks before the event, and programming began two weeks later. The show, which included over 500 automated moving lights, several LEDs, 12 followspots, and 14 haze machines, was programmed by Paul Sonnleitner of DGA using two grandMA2 full-sized consoles, two grandMA2 Light consoles, and one grandMA2 onPC console with a Command Wing and Fader Wing. The two full-size consoles were the main and backup consoles in the control booth, while the two Light consoles were always on the field where Sonnleitner could use them to focus from different locations, and the onPC console was for the technicians.

"It's easier to take a Light to the centre of the pyramid [stage] than it is a full-size," Sonnleitner said. "And as it's a stadium, I usually spec two so that one can be mobile from each side of the field. That way, I can program from one position and send the electricians to move the other focus desk to an alternate position without losing precious dark time. Moving anything in a stadium takes time. The onPC system was for the tech area; they used it to repair fixtures and if I wasn't in until later in the day, they'd connect to the session and strike up and check out the rig for me without making the lengthy trip to the booth."

On the upper seating bowl there were eight large scaffold towers, two in each of the four corners, each housing 24 of the new Vari-Lite VL4000 Spots and 36 VL3500 Wash or VL3500 Wash FX fixtures. On the east side of the stadium, about 400ft (122m) of the lower balcony rail was filled with 108 Clay Paky Sharpys and 32 Clay Paky B-EYE K20s, plus a variety of PARs. On the Protocol stage, four large flags were each lit by three Elation ELAR 180 LED PARs that were mounted under the stage and focused through Plexiglas-covered openings. The Cauldron, on which the perpetual flame burned throughout the games, was a tall, beautiful structure with a geometric backdrop, handsomely lit by 55 ELAR 180 LED PARs.

But the centrepiece was a three-level tiered stage, about 30ft (9m) high, complete with three pools, two of which were lined with eight Clay Paky B-EYE K20s, and one of which was lined with 18 Sharpys. The all-white structure served both as a projection surface and a platform for performances during the Opening and Closing Ceremonies. Four tall masts supported two long segments of truss, each of which carried 15 VL4000 Spots. There were also eight Big LED custom pan and tilt fixtures, with 90 10W RGBW LEDs, 24 Color Kinetics ColorBlast 12s, 24 iWhite Blasts, eight MDG theONE haze

The networking system racks set up at Solotech's warehouse in Montreal.

Photo: Solotech.

Photo: Anima Inc.

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machines and six MDG Atmosphere haze machines. On the followspot platforms were four Robert Juliat Cyrano and eight Strong Gladiator followspots. In all, there were around 16,000 parameters under control, requiring 30 universes of DMX.

One of the keys to pulling off this show and programming all of those lights was the control network, which was primarily switched by 12 ELC dmXLAN Switch8GB gigabit switches and eight ELC dmXLAN Switch8LX Fast Ethernet switches plus 24 ELC dmXLAN Node 8S gateways to convert from Streaming ACN back to DMX. Each group of fixtures had its own power and data distribution, Ethernet switch, and Ethernet nodes. The power was distributed using eight Solotech 72-way power distros, two Theatrixx 48-way distros, and six Theatrixx 24-way distros.

Because of the long data runs in the stadium, many of which were 200m, much of the data was distributed using fibre optic cable. The lower concourse of the stadium, the field, and the upper bowl were all ringed with a pair of fibre optic cables, one active and one spare, using the two SFP cage connectors that are a standard feature of the ELC switches.

The advantage of using fibre optics instead of copper is that it can be run much farther than the 100m limit of twisted-pair copper wire. It's also

immune to electro-magnetic interference (EMI) and provides a huge amount of bandwidth. On the other hand, it is made of glass, so is not as rugged as copper wire and it will break if stepped on, rolled over with a fork lift, or bent too sharply. Antoine Malette, the technical coordinator for Solotech oversaw the project and mapped out the network. He explained that they used Neutrik OpticalCON fibre optic cable, which meets EIA/TIA-455-25 military requirements for impact resistance and TIA/EIA-455-41 military requirements for crush resistance. It has a bandwidth of up to 2GHz for a 1km run.

Ordinarily, you can't form a complete loop with the data lines using a standard Ethernet switch because it creates a situation where the data is sent around the loop in an endless cycle, flooding the network and eventually bringing it down. Some Ethernet switches have special protocols, like Rapid Spanning Tree, that allow you to loop the data runs so that there are two paths to any device in case any of the cables fail. In the ELC switch8LX, the ports can be programmed for looping, making one of the cables a backup. The backup output is detected by the switch and disabled until it is needed. In the event of a cables failure, the data is automatically rerouted through the backup port within 30 to 50 milliseconds. "With ELC we don't have to concern ourselves with IP terms because they just call it 'looping,'" Malette said. "It was very easy to use."

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All of the ELC switches and nodes were housed in two racks custom-built by Solotech. Each included a 1500W uninterruptable power supply and one of them had a PC on which the ELC dmXLAN software was run. dmXLAN is used to configure the nodes on the network; it can be used to discover RDM fixtures and monitor the fixtures while the console is being programmed or while it's running a show. The software also gives you the ability to monitor DMX values for every universe in real time.

"It's very useful for a large system like this," Malette said. "It diagnoses the system to make sure everything is online and if something goes wrong you don't have to go to the node, you can fix it from the computer. In another project we did in Mexico, the programmer asked for Cisco switches, so we had to learn how to program the switch, how to make VLANs, make a trunk, and all that. For what we do, it was way over-designed. It takes two weeks of training to get familiar with it. That's what great about ELC switches - they make it really easy to understand and bullet-proof. It takes no time to go into the software and designate different ports or different VLANs, baud rates, or loops."

The entire network was set up beforehand in the Solotech warehouse just to make sure everything was running properly because they were mixing the older ELC switches with the newer gigabit switches.

"Even if an entertainment switch makes it easier," Malette said, "it's not always easy. But that's normal with new technology. ELC provides us with 100 percent great service. We were one of the first companies to use their gigabit switch and we had some issues. If we find a problem, Joost (van Eenbergen, ELC design engineer) usually sends us new firmware the next day."

Once they were on site, Malette said, they had to use a crane to get all of the Vari*Lites, cabling and power distros onto the scaffold on the upper bowl and all the way up in the bleachers because there were no elevators.

"It took about 20 trips per corner," Malette said. "It was about one day per corner doing six lights at a time. We had a crew down, and a crew up. There were about 20 local crew taking the lights from the top of the stadium down the stairs and using a rope to hoist them up to the scaffold. It took forever, but that was scheduled."
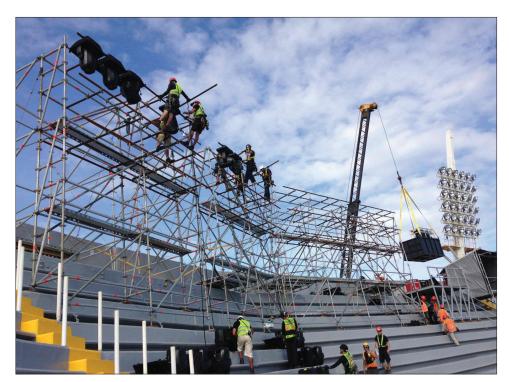
They also had to worry about the weather. "We developed a rain cover with Vari-Lite to prevent water from getting into the ballast. But we had issues with heavy rain getting in through the screws and we had to swap a few ballasts. It's going to be a full-time maintenance job," he said before the event.

Despite the challenges, the Opening and Closing Ceremonies came off without a hitch, thanks to lots of preparation, a great crew, and great gear. See photographs at **http://bit.ly/Veracruz2014** and video at **http://bit.ly/ Vera2014video**.

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