Extron XTP Fiber Enables Immersive Exhibits at Ark Encounter Theme Park

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Project Manager at Clearwing Productions

The Ark Encounter is a biblically-themed attraction in Williamstown, KY. A large petting zoo, animal show venue, restaurants, and other amenities surround the focal point of the park, a full-sized replica of Noah's Ark. This seven-story, timber-framed structure is an interactive exhibition space, offering an immersive experience that is both entertaining and educational.

The Milwaukee office of Clearwing Systems Integration was brought on board to design the AV system under a tight deadline. Though they were aware of the potential project a few months in advance, the contract was not signed until three weeks before installation was scheduled to begin. This left four months to hold in-depth conversations with the client, and then design, install, and commission the AV system. Because of the system requirements and distances involved, Clearwing designed a fiber optic infrastructure and chose Extron XTP Systems® with XTP® fiber optic products for signal switching and distribution.

"We took care to thoroughly plan out the system and installation with accurate drawings, and to choose the right people and product mix for the job," says Mike Jonas, Senior Systems Integration Project Manager at Clearwing Productions. "The truly unique interactive Ark Encounter exhibits required high performance switching and signal processing that only the Extron XTP system could provide."

Extron Electronics
INTERFACING, SWITCHING AND CONTROL

Extron multimode fiber optic cable supports long distance transmission within the Ark and to the exterior displays. All story photos by Aaron Wallace.

AV Needs and Challenges

The Ark is built to the dimensions specified in scripture, and contains a variety of walk-through exhibits on Decks 1-3. A restaurant on the top deck is being added. At 510 feet long by 85 feet wide and 51 feet high, it is one and a half times the length of a football field and can comfortably hold up to 11,600 people. It is constructed of responsibly harvested dead-standing spruce, and is one of the largest 'green' structures in the country. Over 3,000 steel plates join together the logs and timbers to meet building and safety codes.

The control room that also functions as the main distribution frame is mid-ship on the port side of Deck 2. Three Alcorn McBride® AV Binloop HD media players provide HD-SDI source signals, with each offering eight channels of video at 1080p/60. For audio, 144 input tracks from three audio Binloop players go to over 200 interior and exterior zones. Deck 1 features a show system that creates a boat-shaking thunderstorm effect. Cable termination had to follow strict protocols.

Scattered throughout the structure are 28 indoor and outdoor interactive stations. Station displays include LG® SM5B Series commercial flat panel displays and Peerless® 55" Xtreme outdoor displays. These units do not support SDI, thus all video signals needed to be converted to a format common to both models. The challenge facing Clearwing was to design and integrate a comprehensive solution that would distribute signals quickly and reliably, regardless of destination and content.

Going the Distance with Multimode Fiber Optic Cable

Distribution over HD-SDI or CATx cable was not practical because of the distances from the central AV rack and displays located between decks. The solution was to install a fiber optic infrastructure, which easily supported very long signal transmission distances. Also, the inherently isolated nature of the medium ensured signal immunity to outside interference, such as from visitors' wireless devices.

Clearwing specified 12-strand fiber optic cable and Extron OM4 MM P plenum-rated fiber optic cable, as well as cable assemblies of various lengths. For core infrastructure, 12-strand cables were run between the head end and intermediate distribution frames within the structure. The Extron duplex fiber optic cables provided the connection from the IDF patch panels to the receivers behind the displays.

OM4 MM P was selected for its plenum rating and tight bend radius capabilities, which also simplified installation to the exhibit stations. The cable's duplex zip-cord construction along with the use of Extron Quick LC fiber optic connectors made it easy to terminate the bulk cable in the field. The cabling is run through the air-return spaces to avoid detracting from the carefully crafted environment.

The integration team measured the optical power and loss over the fiber optic infrastructure at installation, and once again when the system was commissioned. Results remained below the allowed loss of 8 dB.

XTP System for End-to-End Reliability

After evaluating a variety of AV signal switching and distribution solutions, the system design engineer at Clearwing chose the Extron XTP II CrossPoint 3200 modular matrix switcher for its capabilities to accept 3G-SDI input signals and convert them to fiber to support long-haul transmission throughout the Ark. The matrix switcher's advanced system monitoring and control capabilities, along with hot-swappable boards and a redundant power supply, provided assurance of high performance and reliable system operation in the exhibition spaces. "The built-in technologies are of great benefit, and when combined with the other capabilities of the XTP II and fiber for distance and future-proofing, the installation is rock solid," says Jonas.

The XTP II CrossPoint® matrix switcher was selected for this unique installation to provide an evergreen signal distribution system that anticipates the requirements of future resolutions and signal formats. Featuring a 50 Gbps digital switching backplane, the XTP II matrix switcher provides ample bandwidth to support resolutions up to 8K and emerging formats like HDMI 2.1. The AV system integrators felt confident that by designing their AV infrastructure around XTP equipment with a clearly defined upgrade path, they could extend the life of the installation with a matrix switcher that stays in place, while I/O

Each of the Ark's 28 interactive exhibition stations offers visitors a personalized experience with history. All story photos by Aaron Wallace.

boards and receivers can be replaced in the future with new models that support the latest video signals.

The XTP II CrossPoint 3200 is fully populated with XTP CP 4i 3G-SDI input boards and XTP CP Fiber 4K 4o output boards. "It's nice that if the client wants to change input or output formats to keep up with the latest technology, it's simply a matter of swapping boards," says Jonas.

At each of the 28 interactive stations, an Extron XTP FR HD 4K MM fiber optic receiver accepts video with embedded audio. Bidirectional RS-232 control signals are inserted from the matrix switcher's Ethernet control port, and sent alongside the AV signals to automatically power up and shut down the displays on predetermined schedules. Transmission distances are easily within the XTP fiber optic products' signal extension range of 700 meters (2,297 feet) over multimode cabling. Extron LockIt® HDMI cable lacing brackets ensure connectors remain in place over time.

The internal color bars test pattern from the XTP II CrossPoint 3200 was used to provide initial content to each station display for setup and calibration purposes. The features and capabilities of the XTP products greatly reduced installation time, while also decreasing cost by allowing AV and control to be sent to each station over a single cable.

The Ark's technician is an onsite AV presence who is stationed within the control room, primarily monitoring the installation. The AV system is automated to wake up, provide content as required, and shut down at the time specified for that day.

Clearwing checked in frequently with the client as the system was designed, installed, and commissioned to ensure that every need and expectation was met, from beginning to end. "Extron gear was our

An Extron XTP II CrossPoint 3200 modular matrix switcher accepts and converts 3G-SDI source video for routing, along with audio and control signals, over the Ark's fiber optic cable infrastructure.

first consideration, and the client actually asked about Extron as well," says Jonas. "I'm very pleased with how well the XTP II performs in this mission-critical application Although there were a few bumps along the way, the support from Extron has been excellent, ensuring the client is satisfied with the end result."

Results

The Ark Encounter theme park, featuring a full-sized replica of Noah's Ark, is a popular tourist destination, hosting more than 10,000 visitors on its first day. The Ark's AV system, designed and installed in a mere four months, was commissioned right on time for the grand opening. It has helped to make the interactive exhibition stations a tremendous success with children and adults, alike.

"We enjoy customizing AV systems for such unique projects as the Ark Encounter, and it is an honor to be a part of making it successful," says Mike Jonas at Clearwing Productions. "Extron's XTP II system provided the performance and flexibility we needed to fully actualize this project, transforming a strong concept into an inspiring immersive experience."