



Blast from the Past: NEC Projectors Bring a Dinosaur's World to Life in Chicago Natural History Museum

World-class natural history museums continuously strive to create extraordinary experiences for visitors, and that means finding creative ways to transport people of all ages into a specific tableau or era. So when Chicago's Field Museum of Natural History began the process of moving its famous Tyrannosaurus rex specimen to a new home within the museum, curators saw an opportunity to immerse visitors in the dinosaur's world.

SUE the T. rex

Specimen FMNH PR 2081 – nicknamed "SUE," after Sue Hendrickson, the explorer and fossil collector who discovered it in 1990 – is the largest, most complete and best-preserved T. rex specimen ever found, with 90 percent of the fossil recovered.

The Field Museum has been SUE's permanent home since 1997, with the fossil positioned on a dais and looming over visitors as they entered the main hall. In early 2018, however, the museum decided to move SUE to a new area within the museum, and realized they could amplify the already-impressive fossil's impact.

The original SUE exhibition did not utilize technology, using only a static plaque to convey information to visitors, but the museum had a different idea for the specimen's new home in the Griffin Halls of Evolving Planet – a smaller and more intimate setting that would allow visitors to get up close and personal with SUE.

The Challenge:

Create an engaging experience for natural history museum guests within a new exhibition about life in the Late Cretaceous period

Solution:

- (6) NEC NP-PA653UL 6,500-lumen laser projectors with NEC NP40ZL short throw
- lenses; (3) NEC NP-PX1004UL-WH 10,000-lumen professional installation laser projectors;
- (2) NEC NP-PA653UL 6,500-lumen laser projectors with NEC NP41ZL zoom lenses

Result:

- An immersive exhibition featuring projected images and projection mapping on the world's most complete dinosaur fossil specimen





“Our goal was to point out certain parts of the skeleton, such as indicating which bones are real and which are reproductions, and where on the skeleton you can see evidence of injuries,” said Latoya Flowers, exhibition media producer for the Field Museum. “We realized digital signage was the best way to make it more immersive and interactive, giving visitors a close look at what’s being pointed out.”

“There’s only so much static signage can tell you,” added Alvaro Amat, design director for the Field Museum. “Projecting onto the actual object helps visitors follow along with the story we’re telling.”

The museum staff began planning a combination of projection mapping and projected images to create this immersive experience for guests, said Paul Horst, media services supervisor at the Field.

“We wanted something large, so guests could walk among the different areas of projection,” he said. “Instead of having an image talking about SUE’s behavior, we wanted to show it.”

Searching for the Technology

The Field Museum consulted one of its partners, AVI Systems – an audiovisual integrator and designer – to help narrow down the options for the projector manufacturer.

“Because the new hall was a smaller space, they had more ability to control the environment and lighting than they did in the larger main hall,” said Kyle Ruebel, senior account manager at AVI. “The museum wanted to make visitors feel surrounded by the story, so I gave Paul [Horst] some projector and lens choices that I thought would work well with their budget and what they wanted to do.”

When the museum asked what AVI would suggest for this scenario, the integrator recommended Sharp Information and Imaging Company of America

“The museum had used other NEC laser projectors before this project, and they were very reliable,” Ruebel said. “Both performance and pricing were important to them here, and Sharp met both of those qualifications.”

Horst added that the museum uses other projectors that run for 12 hours a day in its various exhibitions, “so we have a lot of experience with the idiosyncrasies between brands and versions.”

“We have a long history with Sharp, and a couple dozen of their projectors throughout the building, and they’ve performed really well,” he said.

In addition to reliability, Horst appreciated NEC’s network stability.

“The goal is to not to have to touch the projectors once they’re in an exhibition, and NEC’s network connectivity has always been very reliable,” he said. “The museum is so large that if I have to go around and reset things every week, it’s a monumental task, and we’ve tried other projectors that have had issues with networking and required frequent resets and maintenance. But with exhibitions that have used NEC projectors, once they were up [in the ceiling or suspended], I didn’t have to go back up there except to dust.”





A couple of additional qualifications Horst called out included NEC's projectors' brightness and longevity, with the most important features being 1920x1200 HD resolution, the laser light module with 20,000 lamp hours, HDBaseT video input, and IP control. But a "softer" benefit – customer service – also helped seal the deal.

"Customer service played a huge part in my decision to purchase NEC projectors," Horst said. "I have had excellent prior experiences working with [the Sharp sales rep on this account], as she always goes above and beyond, and Sharp has always been very responsive with items like getting shipments on time and replacing parts if needed."

Horst cited one instance that showed this customer service mentality. Projectors come in either black or white, and the museum decided to change its color choice after the projectors were delivered to the museum, once curators saw what the projectors would look like within the actual exhibition.

"The sales rep was extremely helpful and orchestrated all of the shipping needed to do a swap," Horst said. "It was very hands-off for me, which was greatly appreciated, because I was in the middle of an installation."

"Not every company would have handled this the way Sharp did," Ruebel added.

Once the museum had decided on the manufacturer, the real challenge began: the installation and projection mapping.

The Installation

Using six projectors positioned to project onto six mounted glass screens, the museum planned to show short vignettes of different behaviors SUE would have exhibited; additionally, three projectors suspended from the ceiling would projection-map onto the specimen itself.

"We made custom mounts for the three NEC projectors that hang from the ceiling, because we wanted to feel confident in their stability," Horst said. "That meant we had to add a lot of special rigging in the ceiling to ensure they were as stable as possible, because moving them even an eighth of an inch makes a big difference with where the light falls if the projector was highlighting something small, like vertebrae on the tail."

The gallery was initially scheduled to open in the spring of 2019, but this timeline was moved up to mid-December 2018. This compressed schedule meant it wasn't an option to wait until the new space was fully built to install the projectors and ensure they were properly positioned and stable.

"The projectors went in before the ceiling was fully in, so it was challenging to get the projectors up and running, and simultaneously work on the show and test media elements while construction was still happening," Horst said.

Flowers added that while the media and content production team had about a year and a half of lead time to prototype, animate and storyboard, the projection mapping still proved to be tricky because of the nature of the specimen.



“Some of the bones were so thin – like the gastralia, or belly ribs – that it was a challenge to light them,” she said. “We had a hard time getting the projection mapping to show up on these small, thin bones, and had to bring in additional lighting to highlight them.”

And, of course, everything had to be scientifically accurate.

“We spent a lot of time going back and forth with scientists to ensure the projected images accurately portrayed how the dinosaurs looked, walked and behaved,” Horst said.

Horst used NEC’s NaViSet to turn the projectors on and off and change inputs to adjust shift and other elements during installation.

NaViSet running on a computer lets me control all 11 projectors without having to work with remotes – which can be difficult in a space like this – as well as automate some of the functionalities,” he said. “I still have the Naviset in the exhibition because it lets us

check lamp hours and make any tweaks, and gives us information about the projectors.”

Despite the level of detail and precision involved with putting the exhibition together, the team was able to meet the compressed deadline. The installation took place over the summer and fall of 2018 and opened on December 21, 2018.

The Exhibition

The Field Museum’s 5,100-square-foot exhibition runs as a 20-minute looped show, utilizing all 11 NEC projectors to show scientifically accurate behaviors of a T. rex on the glass screens and an informational narrated projection mapping on the fossil over that time.

Six NP-PA653UL 6500 lumen projectors, mounted in a portrait configuration, create a window into “SUE’s World,” showing 6K content on six staggered, floor-to-ceiling glass screens. These six screens can be viewed together as one large projection surface and stand behind the more than 40-foot-long, 13-foot-tall, fearsome T.rex, giving the fossil a backdrop of the Late Cretaceous.

Three NP-PX1004UL-WH 10,000-lumen projectors hang from the ceiling on custom ultra-stable mounts and are used to do projection mapping directly onto the fossil itself.

The museum worked with a British CGI company to recreate scenes from SUE’s daily life and project them onto the glass screens, pairing them with projection mapping to tell a story. After the ceiling projectors cycle through the three different scenes, the lighting changes and the projection mapping, accompanied by a voiceover, points out evidence on the bones of what visitors just saw.



“The use of this technology has allowed us to break the fourth wall,” Amat said. “Instead of a traditional museum diorama, we can bring the visitor into the story with these projectors.”



“In addition to providing facts about the specimen and mentioning still-unanswered questions like whether the dinosaur was male or female, or whether it had feathers, we point out things like arthritis in the tail joints and holes in the jaw – evidence of a hard life and dozens of injuries,” Flowers said.

One projected CGI scene, for example, shows SUE being injured during a fight with a Triceratops; then the projection mapping on the fossil shows places on the skeleton where SUE incurred various injuries.

Two additional NP-PA653UL 6,500-lumen projectors hang from the ceiling to project captions of the narration in multiple languages.

“We use plenty of digital media in other parts of the museum, but they don’t really tie into each other,” Horst said. “Here, all the projectors work together to create a larger experience.”

The projectors use NEC NP40ZL lenses, which AVI also recommended.

“It’s important with projectors to get the throw distance right, and a lot of that has to do with the lens,” Ruebel said. “The right lens can

give better black level depths and color presentation, ensuring the final representation is accurate.”

The Results

Visitors have been enjoying the new SUE exhibition since it opened in December 2018, Amat said.

“I recently was in the exhibition and saw a family with several children looking at the different bones in the specimen, and when the lights went down, the kids got excited, saying to each other, ‘Something is going to happen!’” he said. “When the projection began, you could see the surprise and awe in their expressions, and it’s so satisfactory to see those reactions in children.”

Following its success with “SUE’S World,” the museum is planning future exhibitions that will use digital media to tell stories via projection mapping and projection technology, helping to engage visitors and immerse them in history.