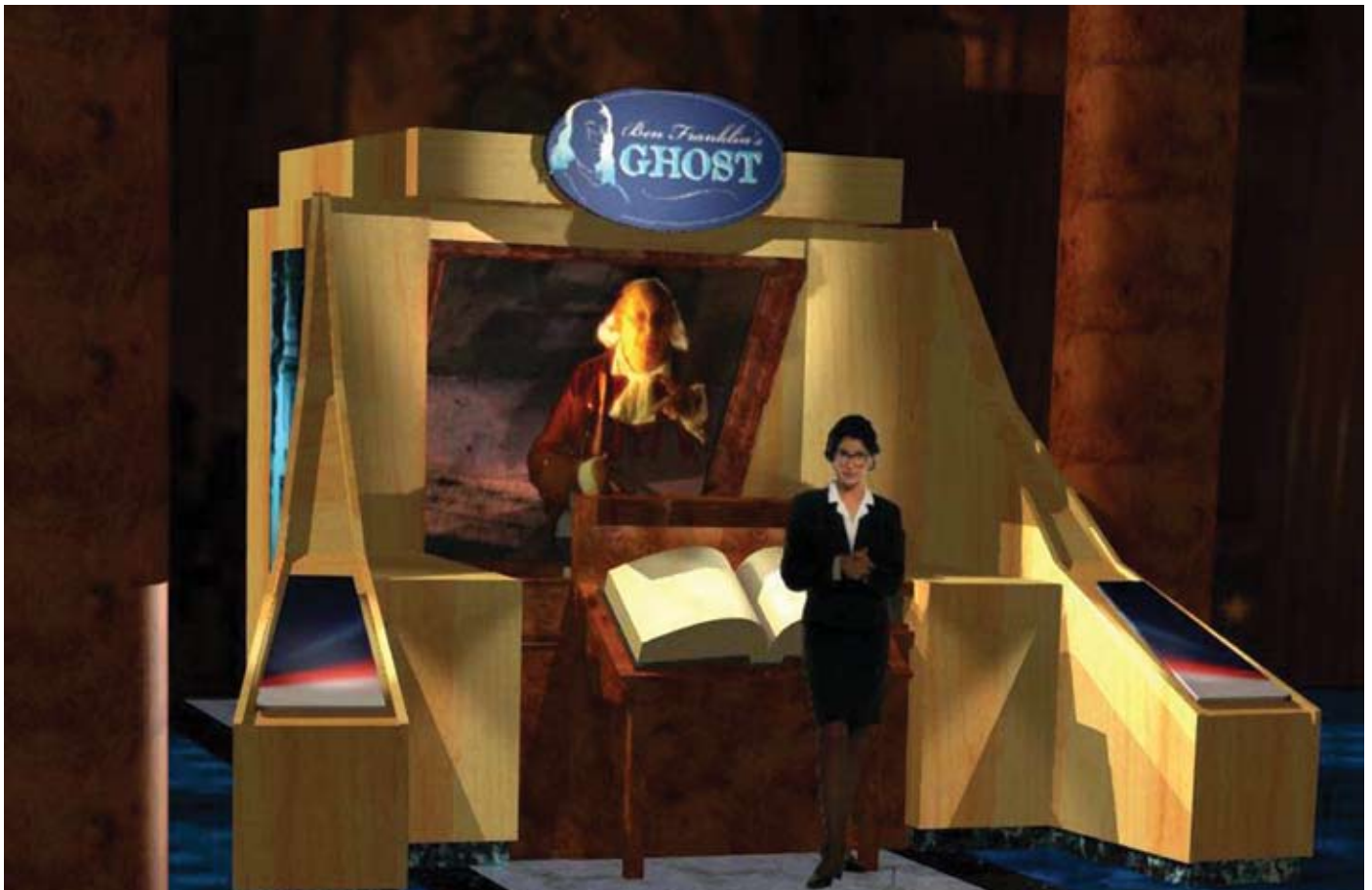




VECTORWORKS CASE STUDY



VECTORWORKS, VECTORWORKS SPOTLIGHT AND RENDERWORKS TEAM UP TO HELP BRING THE BEN FRANKLIN'S GHOST EXHIBIT TO LIFE.

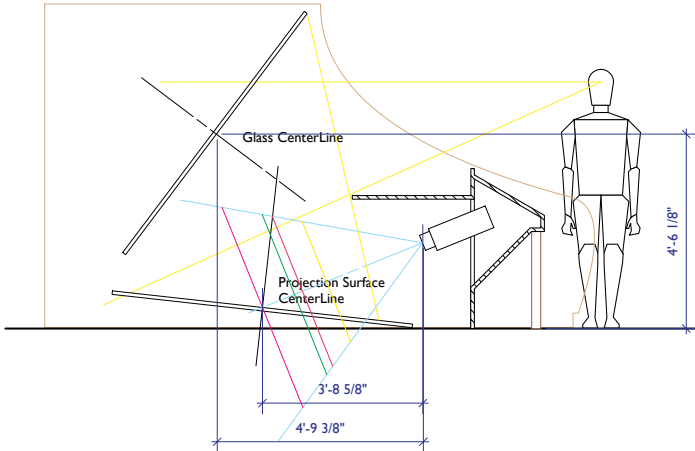


ACROSS FROM THE LIBERTY BELL AND INDEPENDENCE HALL IN HISTORIC OLD CITY PHILADELPHIA, THE GHOST OF BEN FRANKLIN CAME TO LIFE IN JULY 2005 TO COMMEMORATE THE THREE HUNDREDTH ANNIVERSARY OF BEN FRANKLIN'S BIRTH. VECTORWORKS, VECTORWORKS SPOTLIGHT, RENDERWORKS AND A TRI-STATE TEAM EFFORT HELPED PULL IT OFF.

Exhibit designer Kevin Allen, principal of Kevin Lee Allen Design, Clifton, NJ, lighting designer Chris Klug, a professor at Carnegie Mellon University's Entertainment Technology Center, in Pittsburgh, PA, and fabricator Jacob Gendelman, managing partner of blackwalnut, in Valley Cottage, NY, all worked together remotely to have the Ben Franklin's Ghost exhibit ready for its grand opening on July 4, 2005, in the visitor's center across from Independence Hall.

Ben Franklin's Ghost uses keyword search technology to control a 150-year-old effect known as the Pepper's Ghost illusion, by which digitally recorded images of an actor portraying Ben Franklin answering questions are reflected on an angled pane of glass in front of the exhibit visitor. Visitors can choose from a list of questions to ask or pose their own questions, and the computer matches input to a list of possible answers. Computer

software then pulls the most appropriate answer, and Ben Franklin appears to float in front of a backdrop depicting his study, giving the illusion of a ghost.

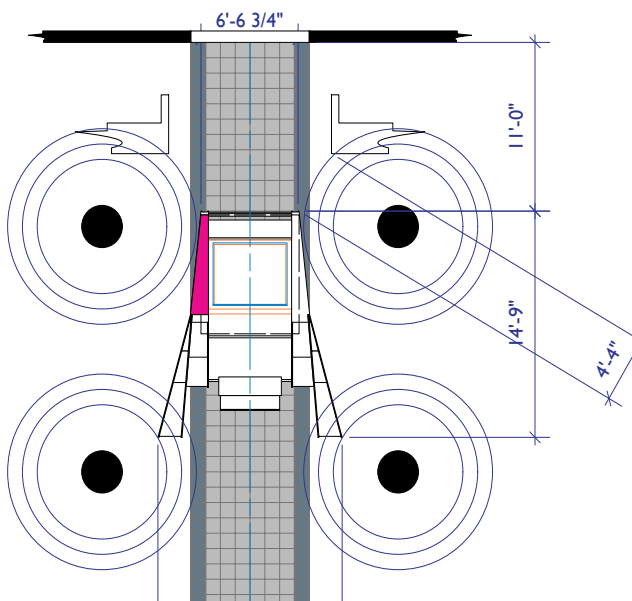


"Using VectorWorks, we were able to do a thousand sections in a fraction of the amount of time it would take to do sketches, putting people at every possible angle to make sure they couldn't see the effect, the projector and the water white glass the image bounces off," explains Allen. "In about two seconds, replacing what would normally be my thumbnail sketch, I did a quick 3D model of the proposed exhibit and emailed it to Chris. The 3D model allowed them to visualize the concept and understand how it would be possible to both hide the technology and allow the biggest possible audience to see the effect—much faster and more effectively than any sketch."

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A GHOST OF A CHANCE

The challenge for exhibit designer Allen was to design a structure that supported the exhibit's physical needs and was appropriate to the interior space of the historic Public Ledger Building in which the exhibit is housed. The structure had to be inviting and accessible to groups of children, yet, at the same time, not permit any adults to see how the effect is achieved. The exhibit also had to be designed to control the many sources of light in the lobby.

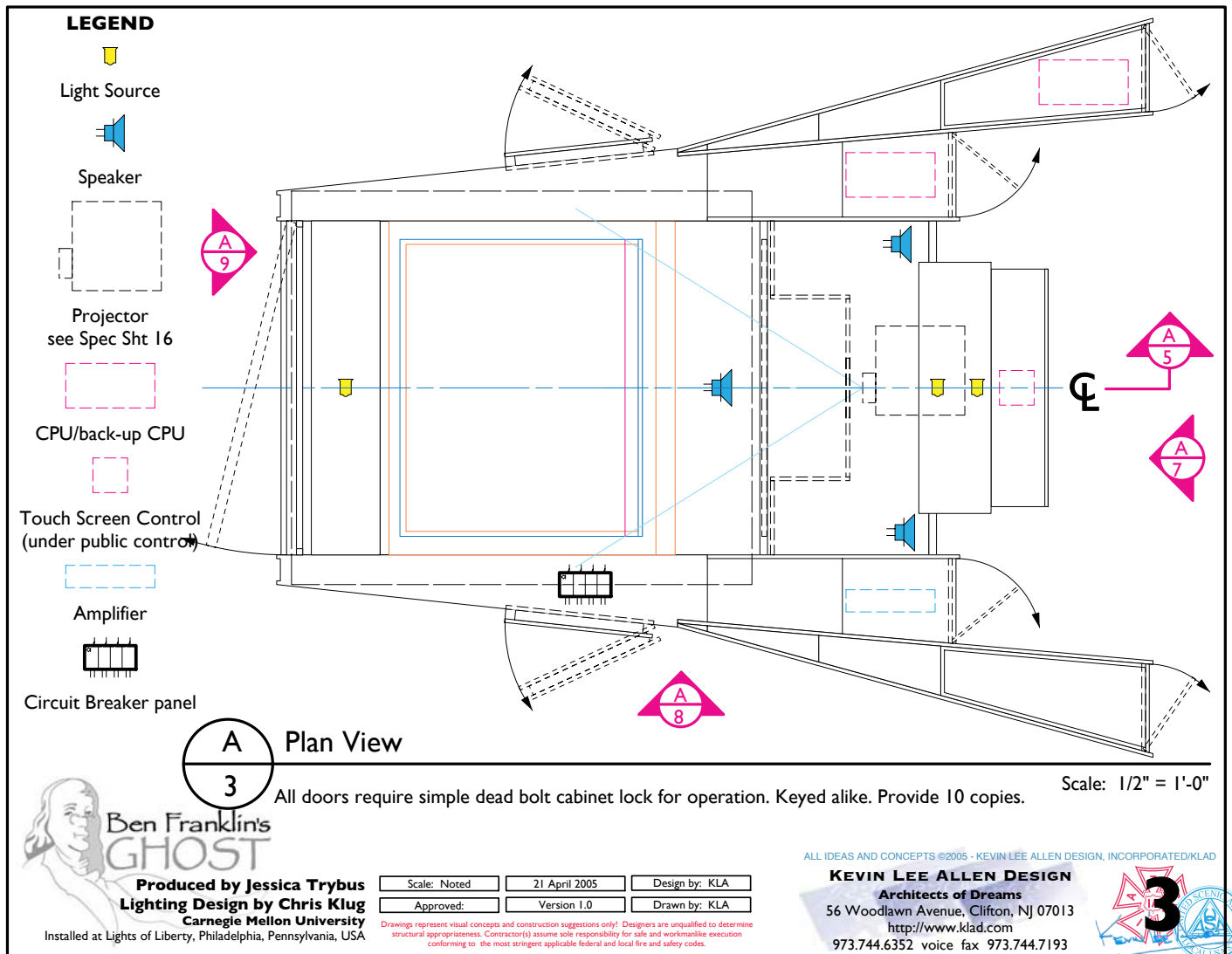


SEEING IS BELIEVING

Lighting of the backdrop is a critical part of the ghost illusion. Without a detailed background and control of the lights tied to the computer programming, much of the illusion would be lost. This is where VectorWorks Spotlight came into the picture.

The challenge for lighting designer and CMU professor Klug was to learn VectorWorks Spotlight first, then design a lighting plan that would conceal the mechanics behind the illusion.

"I purchased VectorWorks Spotlight to import the exhibit drawings seamlessly, so I could work on the lighting portion of the project," says Klug. "And I was pleasantly surprised at how effortless it was to learn and apply VectorWorks Spotlight."



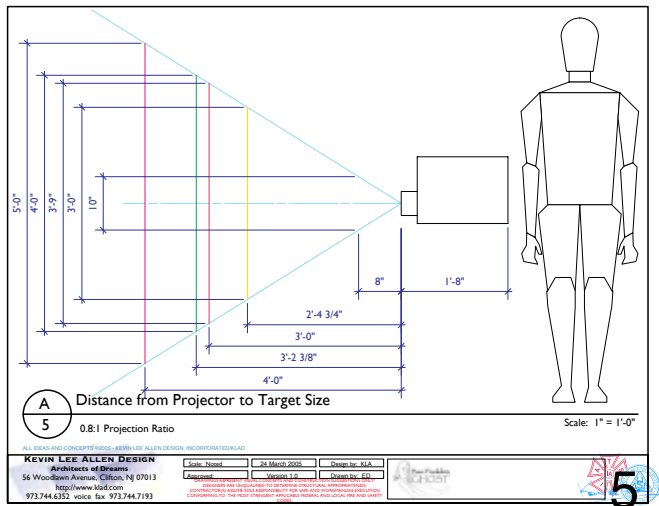
"VectorWorks Spotlight really made the process of choosing what lights I wanted and where I wanted to put them easy," he continued. "I eliminated a lot of the guesswork about whether something was going to be covered or what the falloff was going to be like, because I could actually see it in VectorWorks Spotlight. That was invaluable and saved me an immense amount of time."

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SCARY TACTICS

One of the challenges for exhibit fabricator Jac Gendelman was incorporating the Pepper's Ghost technology into the building process.

Allen first perfected the model, that is, finishing design and schematic engineering, and flattened it into 2D elevations, which he notated, detailed and sent to blackwalnut. Blackwalnut then converted the 2D elevations into 2D construction drawings, detailing the engineering aspects of the project, and built another 3D model from the construction drawings to check the accuracy of the working drawings before cutting any materials.



"We converted Kevin's original 2D drawings into construction drawings," adds Gendelman. "We went back and forth with the technology people in Pittsburgh to do all the engineering and interface work. For us, modularity, precision and construction of design is critical because we're building something and must make sure we can completely dismantle it and put it back together. So we built the entire exhibit in 3D before we output anything to make sure it would fit. VectorWorks enabled us to enhance the engineering we had to do in order to make the exhibit buildable."

"VectorWorks helped us address several tricky issues in building the exhibit," explains Gendelman. "The entire exhibit depended on the technology that enabled the Pepper's Ghost illusion to work. There were some sections that curved into two planes. The side panels were faceted in plan and curved in section, which required a lot of precision layout work, because it was made of a series of boxes that were interconnected—to hold the technology, to hold the lighting, to access the mirror inside, as the illusion needed to be adjustable."

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Gendelman continues, "So a fairly compelling argument could be made that the VectorWorks platform enabled us to enhance the engineering we had to do in order to make the exhibit buildable, to make it work."

The Ben Franklin's Ghost exhibit is free and open daily from 9-5 in the PECO Energy Liberty Center, 6th and Chestnut Streets in Philadelphia.

Then there was the tight turnaround. Blackwalnut had four weeks to create construction drawings, build the exhibit, dismantle it and ship it out to be reassembled on site in Philadelphia.