



Precision, timing, and trust: Automated stage protects performers with the touch of a button

Highlights:

- In entertainment automation, safety and consistency are high priorities
- AHI Automation helped Harlequin Floors automate the Harlequin Liberty Switch, a stage floor that goes from rigid to sprung with the touch of a button
- The quick change keeps dancers safe and comfortable during performances, while dramatically reducing the switchover time between different types of shows

“I can just touch a button and make all of the dancers happy.”

– Aaron Sternke, Director of KPC Studios

Customer profile: AHI Automation

“Ahi’ is the Hawaiian word for fire,” said Mark Castle, owner of AHI Automation. AHI specializes in automating the entertainment world. “My background comes from building and using flame systems in rock and roll. Fire was a passion of mine, and Hawaii is a place that I love.”

Mark got his start building lighting and sound systems for live entertainment. He has designed control systems for flames and fire effects and toured extensively with world-famous rock acts. He eventually settled in Las Vegas and founded AHI Automation, a UL 508 shop that builds control systems for live theater, both locally and in venues around the world.

“Customers expect their show to be the biggest and best in the world, so we’re constantly pushing the limits of what the technology can do,” Mark said. “Our goal is to support and make the artist better on stage. Knowing that millions of people from around the world are seeing our work really drives us.”



Figure 1: AHI Automation specializes in automating the entertainment world.

Safety is central to supporting an artist. “We want the system to do the same thing every night, because when it does that, the artist feels comfortable with the system and they perform better,” said Mark.

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Austin Olsen, head of controls and design at AHI Automation, explained, “We are looking for the highest safety we can possibly have. These systems have to work all the time, every day, every second you ask for.”



Figure 2: The mechanics beneath the floor make it easy to switch between a sprung and rigid surface.

Challenge: Safety, right down to the floor

Those high safety requirements extend all the way to the performance floor. Harlequin Floors, a world leader in advanced technology flooring for dance, performing arts, entertainment, and events, is an AHI Automation customer.

Different shows have different requirements for the stage, not just for lighting and sound, but also for the floor itself. Musical performances and plays require a rigid surface, while dance shows require a sprung floor to protect the performers.

“For dance, there is specialty flooring called a sprung floor,” explained Adam Drill, Technical Manager at American Harlequin, the local subsidiary for Harlequin Floors. “That floor allows a little bit of buoyancy. When the dancers land, it’s consistent, and they know how it’s going to react.”

Sprung floors allow dancers to jump higher and land farther. More importantly, they absorb shock and protect the dancer from injury. However, sprung floors aren’t designed for heavy loads, so they limit the size and weight of set pieces.

Adam said, “A sprung floor needs to hit very specific metrics. You need to have at least 68% shock absorption. You need at least 4.2 millimeters of vertical deformation. You need a certain slip resistance and certain fire ratings. In the engineering world, all those things together leave very little trade-off.”

Harlequin Floors, with support from AHI Automation, designed the Harlequin Liberty Switch. The automated floor – the first of its kind on the market – can go from rigid to sprung with the touch of a button.

“The system allows you to have a solid mode, where the stage is just as rigid as a normal stage floor. It increases the load rating to the point where you can put on plays, musicals, and operas,” said Adam. “Then, with a push of a button, you can transform your floor from a solid fixed floor to a sprung floor that allows you to have the performance benefits of the dance world.”

Solution: Reliability beneath the floor

AHI Automation wanted a cost-effective way to control the motors and other mechanical parts. Space was limited, so they needed to keep the panel size to a minimum.

AHI Automation specified a variety of Phoenix Contact products for the job, including TRIO power supplies with integrated circuit breakers, PLCnext Technology, a HMI (or HMIs), WLAN radios, and numerous other components. The new flooring system can not only change the entire floor from rigid to sprung, but operators can also select specific floor zones to allow greater flexibility.

“The system is designed with intentionality and forethought about what can go wrong and how to prevent that,” Adam explained.



Figure 3: AHI Automation relies on numerous Phoenix Contact products, including TRIO power supplies with integrated circuit breakers, PLCnext Technology, HMI, and WLAN radios.

“Timing has to be perfect across the entire set of equipment for the show. Think about the timing, the pacing, and the pressure. How do you go about specs and orchestrate to pull everything together?” said Austin. “We make sure everything works together from that design phase. That goes all the way down to the PLC and the new TRIO3 power supplies with the IO-Link breakers built directly into them. That allows us to have all of that connectivity from the power supplies to protect the technician. If the breaker trips, the technician can reset those breakers from the screen, without having to open the enclosure on top of the breakers. Those are things that I’m excited to see because we like to see a great control panel.”

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Figure 4a and 4b: Phoenix Contact's TRIO power supply with integrated circuit breakers ensures reliability. If a breaker trips, the technician can easily reset it from an HMI screen without opening the enclosure.



Adam said, “Having AHI come in and sit with us to go through all the things that could go wrong—that allowed us to troubleshoot a lot better. It’s amazing how working together can take us farther.”

Austin continued, “Once we’re sure the floor meets Harlequin’s product standards and the standards for the artist, then we can turn around and provide them with a great technology product in the background. We also work with Harlequin on those specifications to make sure that it works for their end customer.”

The stage can go from sprung to rigid or vice versa in just a few minutes. “In the past, you’d bring in a portable dance system, and that could take anywhere from eight hours to three or four days to install,” said Adam. “Now that the equipment is embedded in the subfloor itself, you can keep the solid stage floor until you’re ready for rehearsals or performance. When it’s time to perform, you just press a button, and you can go to sprung mode.”

Results: A game-changer for the performing arts community

Kirkland Performance Center (KPC) in Kirkland, Washington, is the first venue in the U.S. to install the technology. Jeff Lockhart, Executive Director at KPC, called the Harlequin Liberty Switch “a game-changer.” He explained, “The efficiency, the safety, and the marketability to have this kind of floor in our theatre to attract business and attract artists changed our game here.”

“The technology is incredible for us,” said Aaron Sternke, Director of KPC Studios. “The health and the well-being and the experience of our amazing dance community were just as important to us. We’re excited to offer this to our clients. It’s amazing to see their reaction and how it makes their lives better as performers.”

“All of the smarts and programming are built into it, and it’s so easy to use. I can just touch a button and make all of the dancers happy,” Aaron stated. “We’re just scratching the surface of the amazing flexibility and versatility that this technology brings to a theatre like ours.”

Mark concluded, “It’s one thing to have a technician tell you, ‘Hey, your equipment was working flawlessly.’ But it’s another thing to actually go to the show and see everyone else enjoy it without them even knowing about your part in it.”



Figure 5: The Harlequin Liberty Switch has been a “game-changer” for the Kirkland Performance Center in Washington.