

LED in Theatrical Lighting Design: Today and Tomorrow

How is LED technology transforming stage lighting and what's to come? A symposium hosted by Paul Whitaker

LEDs are rapidly changing lighting for live performance. Curious to know what my colleagues are experiencing, I convened a panel of designers and lighting supervisors to discuss how LEDs are impacting lighting in theatre, opera, and dance. I wanted to hear how LEDs are affecting their design processes and technical workflow, as well as the advantages and disadvantages LEDs present in these three disciplines. As a theatre consultant, I want to help design theatres for the

future, so it's critical to keep a finger on the pulse of how this technology is evolving, identifying what strategies are working and how challenges are being effectively overcome. The opportunity to get a read from busy designers and lighting supervisors working in the field provides a relevant gauge, as well as a window into what the future may hold. Below are some excerpts from our conversation.

Our esteemed panel includes: **Duane Schuler** has achieved

national and international acclaim as a theatrical lighting designer for such organizations as Metropolitan Opera, Lyric Opera of Chicago, De Nederlandse Opera, Opera National de Lyon, San Francisco Opera, Salzburg Festival, La Scala, and American Ballet Theatre. In addition to his work in performance, he is a founding partner of Schuler Shook, a theatre planning and architectural lighting design firm.

Nicole Pearce is an international lighting designer for dance, theatre, and opera. Collaborations in dance include work with the Joffrey Ballet, Atlanta Ballet, Houston Ballet, Boston Ballet, Mark Morris Dance Group, Jessica Lang Dance, Aszure & Artists, Hubbard Street, Alvin Ailey American Dance Theater, Birmingham Royal Ballet, The National Ballet of Japan, Malpasos Dance of Havana Cuba, Nederlands Dans Theater, and American Ballet Theatre.

Lee Fiskness has been lighting director at Santa Fe Opera for 17 seasons and has designed lighting for companies including Steppenwolf, Goodman Theatre, Opera Colorado, Kentucky Opera, and Milwaukee Repertory. Fiskness has also worked on lighting teams for TV shows, including *The Oprah Winfrey Show*.

Andrew Vance is lighting supervisor for Alley Theatre and a Houston-based lighting designer. Vance has been involved with over 100 productions and nine world premieres, with recent credits including Alley Theatre, Dirt Dog Productions, 4th Wall Theatre Company, and Obsidian Theatre.



Duane Schuler.

Paul Whitaker: How are LED sources impacting the design process?

Lee Fiskness: As a designer, LEDs are just another tool in the tool bag. I haven't changed how I design conceptually with the change to LED fixtures; I'm just now using LED fixtures as opposed to color scrollers or cyc units. The major exception to this is in practicals, specifically anything that needs to be wireless. More and more, we are moving to LED sources for wireless so that we can have smaller batteries, longer battery life, and more expectation of what a wireless practical can do.

Nicole Pearce: I do a lot of work in dance and time is always at a premium. I have a world premiere coming up with ABT and I will have five hours and 55 minutes to stand it up. When LEDs surfaced, no one was accounting for the time it takes to come up with the color itself.

While the LED sources are a blessing because you can change them on the fly, you also have to account for the time it takes to come up with the color palettes before you can address the design itself. I've started asking companies if I can go to the shop to make up color palettes before we get to the theatre so that time isn't lost, and this has proven successful.

In a medium like dance, where time is always the biggest consideration, it can get in the way and you have to find other ways to navigate that concern.

Andrew Vance: The first couple of shows I designed with a lot of LEDs, I would go into the space and pick the colors when I arrived on the scene. I found this slowed my process down. Now, I bring 35 color palettes and I know that these are my colors for the show. If I need more, I can add them, but at least there are 35 I can jump to really quickly that will cover most of what I need.

Whitaker: I remember spending hours selecting 24 or 32 colors for a color scroll. This was a good exercise during the design process because it

forced you to make choices for each moment. I'll admit that I don't always do that anymore, because first with CXIs and now with LEDs, I know I can figure it out in the space. I'll always have an idea but, for better or worse, I might not be as specific about it ahead of time.

Duane Schuler: It does change our thinking. Now, we say, "I have these 35 colors and I'll be fine." But we have to be careful to prep enough these days because between LEDs and movers, you can be lazy before you get to the theatre if you're not careful.

Pearce: Yes, exactly. I've had to reteach myself how to prepare using all of these tools because, as Duane is saying, you can run the risk of being lazy before you walk in the door. I find that as long as I prepare myself with an outlined plan, then the process is more relaxed and there's an opportunity to have those brilliant moments of "What if we tried this?"

Jacob's Pillow told me that they are considering adding LED ellipsoidals to the booms for their rep plot, but that leads to more questions of color and who thinks what color is what and how to navigate all of that with a room full of interns as your crew as opposed to a qualified programmer. Whoever is using that equipment has to have the knowledge and experience to navigate around this quickly because time is so limited in some cases.

Fiskness: You could probably make an argument that this allows the designer to focus energy and attention on storytelling or the non-technical parameters of the design.

Whitaker: I love the benefit of not having to have a crew call to change the color for a system of lights. The fact that LEDs allow us to move so quickly, adjusting on the fly, with the cast on the stage, often makes the work more "present." This is a great resource that frequently improves the design.



Nicole Pearce.

Whitaker: How is the transition from tungsten to LED impacting the industry?

Fiskness: When the Source Four came out in the '90s, I remember a few designers lamenting the beautiful warmth and the nice hot spot of an Altman. It didn't take very long before that was laughable because of all the advantages the Source Four offered.

Just like the LED, the incandescent is one tool available to us and taking it away feels like we are losing something; this is an appropriate feeling. It's a shame that we can't have wide use of all the possible tools we can use in our trade.

Schuler: The idea of losing a 5K with a scroller on it hurts me, more than losing the PAR can. There is something about a 5K Fresnel; nothing else that matches that light quality. But I'm sure they will go away as well. It's a changing industry.

Fortunately, manufacturers are stepping up and making some really great products to help ease the pain of losing the tungsten.

Years ago, at the Guthrie, we had just upgraded the fixtures from incandescent to haloge. Everything was brighter, and we were all so thrilled. I was lighting a show with the set designer Desmond Heeley. We had



Andrew Vance.

done a few shows together before and I could tell that he wasn't happy. When we stopped for coffee, I asked him what was wrong, and he said, "What happened to all the friendly lights?" He remembered the color temperature of the incandescent as being what he expected the light to do and the halogen was putting an edge on everything, shifting the quality just enough that it felt wrong.

Pearce: Another, possibly bigger, more philosophical question is, how is our eye shifting into accepting the range of LED sources and what they are capable of and how is that going to define what we do going forward? Because, eventually, it may just shift all to LED and that may be the new normal.

Vance: If you look at how *Phantom of the Opera* was lit in the '80s and how musicals are now lit, there's such a dramatic difference, in the intensity if nothing else. So, I think it is a valid concern how LEDs are changing our perceptions.

Fiskness: I suspect this could extend into a further conversation about the expectations of scenic designers and directors as it relates to some of the technology that they see and assume that all theatres have readily available.

Vance: A lot of directors now assume you can just turn the entire stage red or blue and that's becoming part of the expectation versus having to wait to make the color change at the next crew call.

Schuler: There is a baseline expectation that has changed completely in the last 10 years. The combination of LEDs and moving lights has done this. When we say that we have to do a color change on that light, people look at us cross-eyed, like, Why's that? Why would you still have anything that doesn't change automatically?

Whitaker: How are you using LED sources?

Schuler: Good LED fixtures have most of the color we need. But the thing to make clear is that an RGB LED fixture is just not the equivalent to anything we need or want in our industry. It has to be RGBW, RGBA, or a seven-color fixture. To get the colors that you need to have in a serious rep plot, the fixture has to have more than just three-color emitters.

Whitaker: Some fixtures are better at lighting people and some are only good for lighting scenery. At this point, I would only use three-color emitters to light scenery if another fixture with more emitters was not available.

Fiskness: I'm really having issues with non-homogenized LED sources. I find that they are limited in the ways

they can be used. There is a time and place when they are perfectly fine, but also any number of situations when it is unacceptable not to have homogenized color.

Schuler: Yes. When a non-homogenized fixture gets cut off by a border and you are not getting the full beam, you can have issues with the color-mixing.

Whitaker: In smaller rooms where the fixtures are exposed, the non-homogenized fixtures can be a real issue. When you have a single backlight on a singer at a microphone and the floor is pink, but the audience can see the red and blue LEDs, it can become visually confusing.

Fixtures that require lenses can also be a concern. Without the lens, you often have a lot of punch but when you put in wide lenses you lose much of the output.

Fiskness: I agree that lensing can be problematic. When you go to conferences and see all of the LEDs, many are very bright, but with a 5° beam. What will those fixtures look like at 30° or 40°, because in the theatre you might have to fill the stage at an 18'-high trim height? The tight beam angle is great, but can the fixture also play really wide? A fixture with a built-in zoom can be advantageous over a fixture with interchangeable lenses.

Whitaker: I prefer zoom fixtures as well, but often the issue is noise. Because often they are not made specifically for theatre, zoom motors can be loud and distracting. The other issue is fan noise. Looking at one fixture in a shoot-out or on a loud show floor, the fan noise might not seem that bad. But when you have 30 fixtures in a quiet theatre, it can become an issue.

Whitaker: Where are you using LEDs in your plots?

Schuler: I think the LED backlight system at Santa Fe Opera is something to dig into a little, bit because Lee spent a long time—three or four

years at least—looking for the right fixture to replace CXI scrollers on the PAR can backlight system. I'll confess that when you told me that you'd made the decision to replace it with the ETC Series 2 Lustr I wasn't convinced that this was the best replacement but, in the end, I have to say it worked beautifully.

Fiskness: We had a checklist of things we needed the fixture to accomplish. We kept demoing fixtures, eliminating any that weren't homogenized because of how our coves work. We tried non-homogenized fixtures and it was hugely problematic, specifically with white floors, and the rainbow "halation" we got on the architecture. We wanted something soft, with the punch of a PAR can, and a wide a range of colors that we didn't have with our current system.

We went back and forth with a lot of fixtures and, optically, it was hard to find the intensity of the beam spread that we needed. We wanted to be sure that we weren't sacrificing a good "no-color" PAR can-type look. We then moved to the Luster Series 2 for all of the color ideas. Of course, this blew everything we had out of the water with saturation of color and intensity. Ultimately, we ended up keeping a system of Source Four PARs in the rig so if the designer needs the quality of an incandescent, we still have that option. The PAR cans got used over the season; however, I think we could get rid of them at some point and be fine. A little R119 in the LEDs and they were soft enough to get an even blend.

Whitaker: Does anyone have any experience moving older projects into LED?

Pearce: I have done this for the Jerome Robbins Trust [which oversees and licenses productions of the choreographer's works] a couple of times and it's overwhelming for some of the pieces. A PAR 64 backlight system at Rosco 80 at full is 15% for

an LED backlight system, so it's really a big shift for a legendary piece of work to make that translation. It's not the kind of thing you want to leave up to just anybody because it can get out of hand really quickly.

Schuler: Nicole, would you say in the end that it can be a successful translation, or do you always walk away thinking, Gee, it's not what it used to be.

Pearce: I ended up with a little bit of, Gee, it's not what it used to be, because even at 15% it was still overwhelming, giving a blue highlight to their heads that petered out on the floor. It can be a little unsatisfying for something that was created with a gentler system.

Whitaker: How are LEDs impacting the lighting supervisor?

Fiskness: As a lighting director, LEDs have simplified our world in a lot of ways. The most complicated part of integrating the LEDs has been the programming side of it, but we can overcome that, and now I think we can cue just as quickly with LED as we can any other kind of fixture.

As far as the rig, it's really simplified. At Santa Fe, we used to have five-pin cable, two or three different kinds of four-pin, Ethernet, and power across in each cove. Now we have only the four-pin for the five remaining 5K scrollers and everything else is five-pin DMX. Of course, we've also had to greatly increase the network capacity of our space to accommodate the number of DMX addresses. But, in our process, it has only benefited us and the designer as there are more color options.

Vance: I definitely agree with Lee. For us, it's not been that big a change to move from a conventional plot to LED fixtures because, essentially, a light is a light; it's just a question of what cable do you plug into it. We all have had to become network engineers over the last couple of years to figure out how to get the data everywhere it needs to go.

Programming-wise, we have some really good programmers here who have built a good stock of color palettes, so they can work with any designer and have something that is acceptable to begin with and adjust as needed.

At the Alley, we are looking at some capital upgrades and we're considering LED movers. I've narrowed it down to one or two but am hesitating to invest, concerned that something better will come out right after we purchase. Also, like Paul was saying, we can do shoot-outs all day but until we get 26 of them in the air, we're not going to know exactly what everything is...and how loud they are is always a concern in our spaces.

Fiskness: Andy is bringing up a very good point: These fixtures are incredibly expensive, especially the good ones, and the technology is changing so rapidly. I'm finding it is a multifaceted problem. If I need a new



Lee Fiskness.

Source Four, I feel pretty confident that I can buy a new Source Four and it will blend into our rig. However, even buying other LED fixtures, even the same fixture, is complicated. To combat this in Santa Fe, we overbuy quite a bit so we have a lot of spares. They are really expensive to fix or replace. With new fixtures constantly coming out how do you make wise investments in a rig?

Vance: Lee brings up a very good point about maintenance of the fixtures in a stock situation. It's really easy for my crew, or any crew, to go out and change a lamp when one of our movers dies or a Source Four goes out. But once the LED array starts going down, there isn't much we can do about it, except send it back to the factory. This brings up the whole point of how many spares do we keep on hand. How much do we plan on maintenance every year? What is the cost of this ultimately versus the cost of the fixtures? As an example, in our large space we have some 40-odd RGBW fixtures as our house lights. We anticipated them lasting eight years and, here we are at three-and-a-half years in, we've already seen some failures of a larger portion of them than we anticipated.

Whitaker: What are the pros and cons of tape light?

Vance: Just to talk briefly about scenic designers...one thing we run into here at the Alley all the time is that every set has miles and miles of LED tape in it at some point, whether it needs it or not. And that's always a challenge. It's either a last-minute thing or such a large project that by the time scenery gets us all the pieces we need to do it, we have to rush to get everything all done.

Fiskness: I have two soap boxes that I need to get on with LED tape:

- 1) It's great what the tape can allow us to do and we've done some astonishing things with it, but it's not always the right thing, especially if we're trying to be

budget-conscious. It can feel wrong if the color is not rendering properly, specifically on the warm tones.

2) It is not as cheap as people think it is. To do an LED install properly is quite expensive, especially when taking labor into consideration. While there are a lot of different products out there, a ton of advance notice is needed to get everything properly ordered. It's a lot of work to install and a lot more work than people realize.

Vance: We've made a rule at the Alley that if a scenic designer designs in LED tape, it comes out of the scenic budget to help ensure that it is truly integral to the design.

Pearce: It is not the Band-Aid that everyone thinks it is. At a certain point, you get what you pay for and that's a hard conversation to have with set designers, directors, and producers. It's difficult to navigate these conversations to reassure the team that the extra expense is worth it.

Conclusion

LEDs are changing how we design and profoundly altering our industry. As we inevitably move toward an all LED future, lighting designers and

lighting supervisors are learning how to assimilate LEDs into their light plots and how to work quickly and efficiently with this new technology. While everyone on our panel has faced plenty of challenges with LEDs, there is a consensus that, as the technology improves, and we learn how to better integrate these fixtures into our plots and our process, LEDs are providing new and exciting opportunities. 📶

Paul Whitaker is a principal theatre consultant and architectural lighting designer with Schuler Shook.

Projects include El Teatro Nacional de Costa Rica, Cincinnati Music Hall, Palace Theatre in St. Paul, Kracum Hall at Carleton College, Howard Theatre, and Janet Wallace Fine Arts Center at Macalester College. In addition to his consulting, he continues to work as a theatrical lighting designer Off Broadway, regionally, and internationally. His theatrical credits include work at the Public Theater, Playwrights Horizons, Second Stage, Atlantic Theater Company, Guthrie Theatre, Alley Theatre, Hartford Stage, and Yale Repertory Theatre, among others.



Paul Whitaker.