

LED vs arc vs tungsten

Mark Matthews and Rob Halliday take a different look at this age-old debate

There's a word for it, I'm sure, but I can't think what the word is that means saying one thing but then actually doing something quite different. Because for all the talk of the joy of tungsten – all justified, I might add – there is a lot of LED being used in theatre lighting. And now that we're moving beyond the era of terrible LED fixtures and into the era of some really quite good LED fixtures, it is now often being used as a primary light source, alongside tungsten or sometimes edging ahead of tungsten. Plus, now that manufacturers are starting to make LED moving lights of a reasonable brightness, it's not just tungsten that's being usurped, but arc lights as well.

At least, that's the sense you get. Trouble is, it's quite hard to quantify that. Our industry isn't very good at generating numbers – we're always too busy concentrating on just getting the show on. There's anecdotal evidence – it's a couple of years, for example, since White Light commented to me that they owned more Lustr2s than scrollers. But it's hard to chart this progress scientifically, in part because every show is different and so making a direct comparison from one rig to the next is problematic – this

particularly the case when trying to make a true comparison between the power actually used by a “traditional” rig and by an “LED” rig (though a couple of shows that are currently changing their rigs from tungsten and arc to LED and a little bit of tungsten are providing an opportunity to do that kind of study, more on which another time). This lack of data is a problem when, for example, trying to make arguments to the EU.

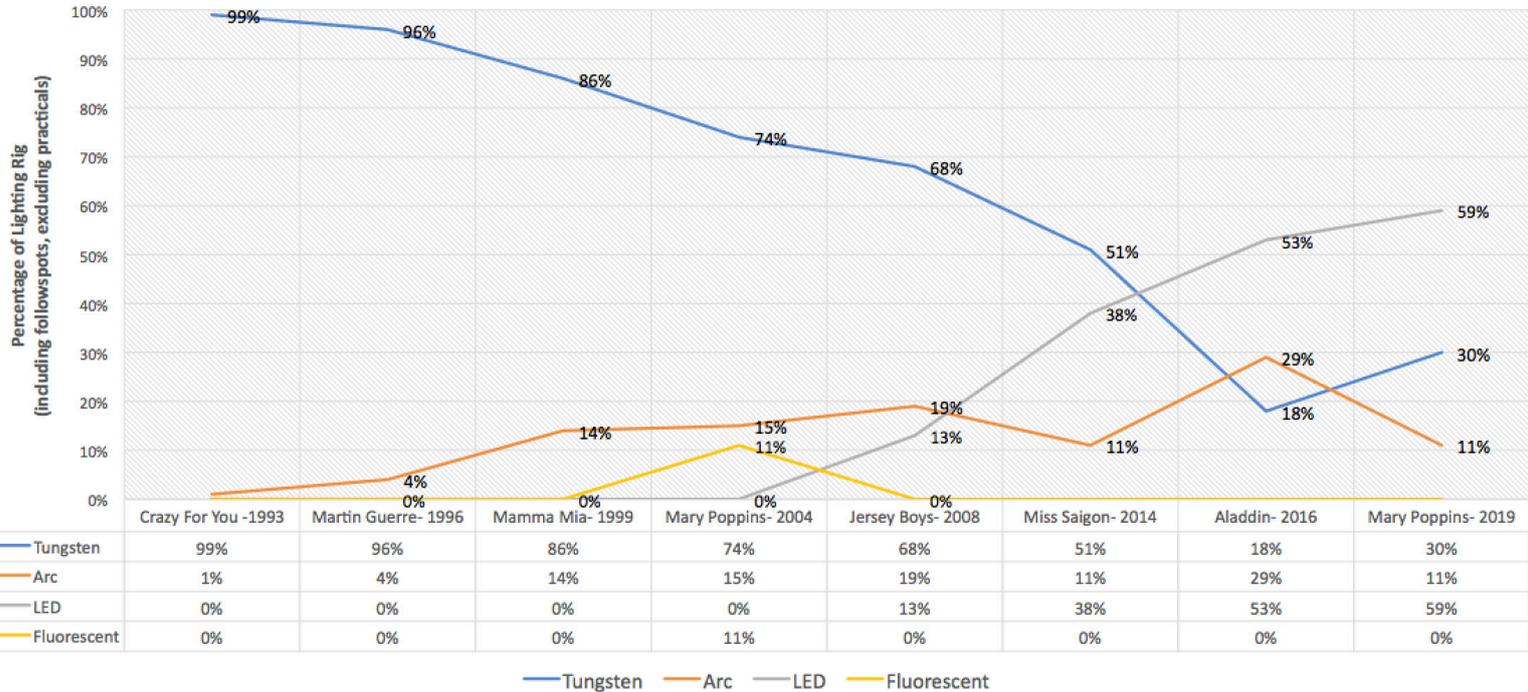
But in terms of how rapidly the world is moving to LED, we don't necessarily care about precise numbers: what we do care about are proportions, and trends...

One trend I have noticed: whatever the “hot topic” in lighting in any given year tends to become the focus of students looking for a dissertation subject. This year a number have been writing about Ecodesign and the effects it could have on stage lighting. During a spot of guest teaching at Rose Bruford, one student, Mark Matthews, started asking for suggestions on what might make an interesting variation on this subject. Which is when I started wondering out loud whether he might be able to find a way to chart these trends – to get us some actual data.

It felt like what was needed was one “control”, something at least vaguely fixed. It felt like that could be a scale or style of show. It also felt like a way to fix that might be to pick one theatre that always housed the same style and scale of show, but ideally one where the show changed reasonably regularly. In talking about it a bit more it felt like musical theatre might be a good style to pick: their rigs are usually specified from scratch for each show, and the budgets are usually big enough to persuade rental companies to purchase whatever new equipment the designer desires rather than forcing them to work with whatever is in stock.

A candidate theatre quickly became obvious: the Prince Edward Theatre in London. Only ever does musicals. Gets the big new shows. Shows are always roughly the same scale, to fit on the stage. Changes shows every few years on average. So all Mark had to do was identify the shows that had played in that theatre as far back as possible, then go find out about the rigs for each of those shows. Then, from that, identify the quantity of each type of light source (tungsten, arc, LED) in each show and then

Light Source Per Rig - Prince Edward Theatre - 1993-2019





do some number crunching to figure out the proportion of each type. His hope was that by then putting those numbers on graphs, it would be possible to detect a pattern. It sounds simplistic to say the expectation might be that tungsten would be going down while LED was coming up. The interesting questions were: how steep would each line be? And extrapolating forward, when would they cross over each other – i.e. would it be possible to predict when LED would become dominant?

Mark took this back as far as 1993, which meant researching the shows *Crazy*

for You (1993–1996, lit by Paul Gallo); *Martin Guerre* (1996–1999, lit by David Hersey); *Mamma Mia* (1999–2004, lit by Howard Harrison); *Mary Poppins* (2004–2008, Howard Harrison again); *Jersey Boys* (2008–2016, lit by Howell Binkley); *Miss Saigon* (2014–2016, Bruno Poet); *Aladdin* (2016–2019, Natasha Katz) and then the return of *Mary Poppins*, lit by Natasha Katz and Hugh Vanstone.

That's quite a jumble of shows, and of lighting designers of quite different styles – but it was about looking at percentages rather than overall equipment counts.

Digging up the information happened thanks to the usual good graces of all working in entertainment lighting. David Hersey dug out some MiniCAD files so old they had to be sent to VectorWorks to be translated into a readable format. Vivien Leone in New York, Paul Gallo's associate on *Crazy for You*, managed to create a PDF of a shop order generated in a long-gone word-processor called Q&A; it specified such delights as a "Desk Jet Plus Printer w/Prestige Elite Font Cartridge", a thing you haven't had to ask for for a long, long time.

Then Mark set to work in Excel. The result is fascinating.

Take a look at the graph. It appears that, if you get to specify the rig you want, and you have the budget to pay for it, the question isn't when LED will take over from tungsten. It's already happened, and we just didn't notice. And in fact, not just tungsten, but arc as well. And it's not a very recent thing, either, but happened somewhere in the 2014–2016 timeframe, which is also the timeframe when good quality LED sources like the Lustr2 became readily available....

There are caveats, of course. First: this is about lighting fixtures used for performance lighting, not set practicals and the like: *Mamma Mia* had a neon light up floor and *Mary Poppins* 2004 had LED set practicals, but neither are counted here (the fluorescents shown for *Mary*

Poppins are the LDDE fluorescent battens that lit the cyc). Arc in this context is generally synonymous with moving lights, but not completely: *Crazy for You* had no moving lights but has a tiny percentage of arc sources, which would have been the followspots, while *Martin Guerre* had quite a lot of tungsten moving lights. The graphs have been updated since this article first appeared in *Focus*, adding the 2014 *Miss Saigon*, which used the Mac Aura moving light and EvenLED for its cyc, and to reflect the changes made to the touring *Mary Poppins* rig for its return to London; while a blip for tungsten in the overall downward trend, this does show that arc sources are going away very rapidly, a good thing on both eco grounds (those lamps burning away with their dousters closed) and lighting grounds (many moving light arc sources are actually terrible in terms of colour rendering and consistency). Hugh Vanstone notes that he was aiming for no arc moving lights; the few that remain were down to budget and equipment availability limitations.

Of course, to do this you have to be in a position to ask for and get whatever you want in your rig. Not everyone has that luxury. But that was part of the point: to find out what people are actually asking for and getting, given a free hand. What they want is good quality LED, for its consistency and versatility – in particular, once you can shift seamlessly from

any colour to any colour in any time it becomes hard to give that up. This is on artistic grounds perhaps mixed with financial factors (no more scrolls to buy or arc lamps to replace): I'd almost bet none of these choices were made on "eco" grounds. We all want to defend tungsten, and we should because it still has some unique and very special properties. But it feels like we're now in a world where we've flipped from tungsten being for general use and arc or LEDs the expensive "specials" to the reverse. Tungsten is the special, used more sparingly for the very special moments where its warmth or the heat of its beam makes a dramatic statement in contrast to everything else.

There are countless other mitigating factors, as with all data. Are we being railroaded into buying something we don't necessarily want? Is a colour-changing light the right choice for a musical but excessive for a drama? Will we end up having to go down the LED route regardless as manufacturers just stop making the tungsten lamps we need, because of economics rather than regulation? These are all reasonable questions.

But just look at that graph again. In many ways, data doesn't lie – it represents the choices people actually make even when they're talking about doing something else, and so perhaps tells us things we don't quite want to admit to ourselves. Whatever that's called, we're doing it. Far from being

the luddites some said entertainment lighting practitioners were a year ago, when we set out to defend not tungsten but rather quality light sources, we are already embracing the future – as long as these tools do what we need them to do.

(Note: This article is an updated version of the original, which appeared in the June/July 2019 issue of the ALD's *Focus* magazine. The 2014 production of *Miss Saigon* has been added to the graph, and the figures for the 2019 production of *Mary Poppins* have been revised to reflect the actual rig for the London production of the show rather than the touring rig.) 🚫

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