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Birmingham Hippodrome

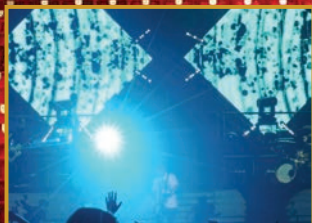
One theatre's steps toward a greener future . . .



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*The Greening
of Birmingham
Hippodrome*



With concerns about energy consumption on the rise and sources of funding for the arts under constant threat, the tale of Birmingham Hippodrome provides some exemplary lessons for theatre and venue owners everywhere. Julie Harper reports . . .

Birmingham Hippodrome successfully presents a strong programme of musicals, comedy, dance, ballet and opera to a wide catchment area, in close association with resident partners Birmingham Royal Ballet and DanceXchange. It comprises an 1850-seat main auditorium, a 209-seat studio - the Patrick Centre - four dance studios, and public spaces that include the Circle Restaurant, front-of-house bars and corporate hospitality areas. It is run by Birmingham Hippodrome Theatre Trust, an independent, not-for-profit registered charity and receives no funding. In 2010, it became the first UK theatre to be registered to the ISO14001 international standard for Environmental Management Systems and has an enviable list of green credentials, largely brought about by improvements in infrastructure and operational efficiencies.

In the last two years, over 380 halogen light fittings in the venue's front-of-house areas have been replaced with LED lighting. The new LED fittings are 75% more efficient, and have reduced the power requirement from over 20kW to just over 5kW. But this is just the tip of the iceberg in a much bigger plan.

"We started looking into 'green' issues around 2008," says director of operations, Mike Bradford, "but discovered what we actually needed was a management system to adapt those green policies and put them into action. We chose the certification route because it gave us a measurable framework in which to put ideas into practice . . . and an external auditor to check we did it properly!"

"The holistic approach of the accreditation procedure helped change the staff culture throughout the whole building, eradicating the silo mentality that plagues so many organisations," continues Bradford. "It introduced everyone to the idea of constant measuring and quantitative proving, so now everything we do from day to day considers green issues, what return on investment it gives us, how much energy we save, etc. Working in tandem with this framework, we have been able to drive a lot of projects forward."

Bradford first joined Birmingham Hippodrome as a technical manager during the major £35m refurbishment in 2001 when much of the building's inadequate 1990s infrastructure was corrected. 2012 saw the first large refurbishment since then, and a major step forward in the 'greening' of the building.

"The main stage had not been replaced in 2001 and was wearing out - not helped by *Chitty Chitty Bang Bang* putting a big hole in the middle of it - and we needed a window to do this," says Bradford. "The building never goes dark, but a natural gap between productions of just four weeks presented itself in September 2012, so we decided to take the plunge. We needed to take full advantage of this rare opportunity and looked at what else we could do in the time. There were obvious problems with auditorium lighting - cleaning, working, emergency and houselights were all on different systems, all of which were out of date; the row-end lights, main panels on stage and general house-keeping for production areas all needed modernising.

"We gradually put together a project for the four weeks . . . then, in summer 2011, we developed a leak in the orchestra pit! We worked with a building contractor on a plan to tank and refurbish the pit, and at the same time install new lifts. As if this wasn't enough, in early 2012 we decided the foyer wasn't really working and worked with Glenn Howells Architects to remodel it, along with the front-of-house areas.

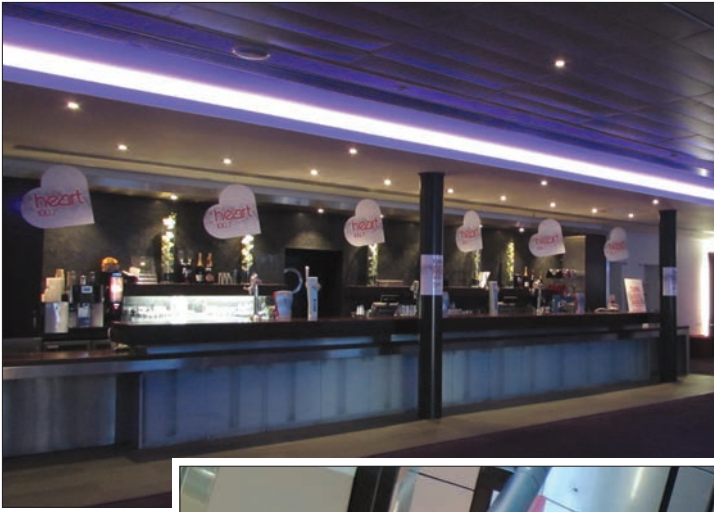
"We organised all these projects into one big four-week project - the orchestra pit alone would normally have taken 12-18 weeks - and project managed it ourselves from design stage to completion. We deliberately chose to work with small contractors to ensure timely delivery of exactly what we wanted. After all, we are the ones who need to make it all work on a day-to-day basis."

LED Enlightenment

Bradford and his team worked closely with Nick Ewins of Push The Button (PTB) and Matt Lloyd of GDS to design an energy efficient lighting solution for the main auditorium, all of which now runs off a single ETC Paradigm system. The majority of the existing halogen light fittings were replaced with GDS ArcSystem 4-cell units, with some single-cell GDS fittings in the stalls and circle ceilings, to provide optimised light levels for house lighting and working light.

The original glass auditorium wall lights were retrofitted with customised GDS LED wall fittings, the incandescent sources being replaced by GDS single-cell LED chips and wireless drivers, with a Lee 205 glass plate added to warm the colour temperature as it fades down.

The low-level capsule lamps of the row-end lighting were failing and not fit for purpose, so Birmingham



Hippodrome and PTB engineered a custom fitting to replace them, complete with illuminated row-end letters. Each is driven by a GDS power supply that can vary the intensity so they can be left at a low glow for late-comers without interfering with sightlines during the show. The large chandeliers that hang in the boxes currently have eco-halogen fittings, but will be fitted with new GDS ArcLamp Candle V1.5 when they become available later this year.

The on-stage working lights remain as fluorescent sources because, as Bradford states, they have yet to find a suitable unit that can replace fluorescent at that distance, but they are well maintained with tubes changed every two years. The newly refurbished

orchestra pit has been given a GDS Blues system, but the main backstage lighting remains as portable wholesale GU10 LED fittings, as they need to be relocated according to each show's requirements.

Production lighting has not been included in the general LED treatment, although power-hungry Cantatas have been changed for conventional ETC Source Fours, and older moving heads will be replaced with LED sources soon. "We still have 2k Fresnels as there is no financially viable equivalent for these," says technical manager Barry Hope. "But in general, we have to look at the bigger picture: firstly, the Patrick Centre caters for many new dance shows that tour out from here. The small touring venues won't have new LED technology, so we can't either. Secondly, the number of hours the main house lighting is used for during performance and rehearsal is few, so the power usage is not so great. Lastly, the outlay for an LED profile is huge in comparison to a Source Four - couple this with the number of hours it's used and the payback time becomes much longer. It's all a matter of scale: it's not the performance lighting, it's the systems and infrastructure that cost the money and need to be made energy-efficient."

A prime example of this is the foyer and front-of-house lighting. All front-of-house fixtures have been changed

This page:

Top: The front-of-house bar with GDS ArcSystem Decor fittings and RGBW LED tape architrave lighting.

Middle: GDS ArcSystem Decor fixtures FOH.

Bottom: The Circle Restaurant with GDS LED lighting and RGBW LED tape architrave lighting.

Facing page, bottom: The foyer with GDS ArcSystem 4-cell lighting.

from 12V dichroic M250s to single-cell GDS ArcSystem Decor fittings, with custom rings created to neaten up installation scars and allow extra space to insert drive fittings. The Circle Restaurant has been fitted with GDS downlights and its fluorescent architrave lighting replaced with DMX-controlled RGBW LED tape, which comes into its own as decorative lighting for corporate events. All the systems are controlled by three networked ETC Paradigm control systems, with the front-of-house areas further governed by overall light level detection to provide further energy savings.

"Our four-storey, glass-fronted foyer lets in so much daylight that we installed light sensors in a move towards introducing light harvesting measures. These sensors react to the ambient light and match them to the levels we have set," says Bradford. "We have a summer and a winter setting, as much for the difference in colour temperature as light levels, and we're still tweaking these as the seasons go by!"

Motion detection is also in operation in the front-of-house areas, reducing base level lighting to a handful of fittings that run at 20% overnight, and increase to 35%, level by level, as the security guard does his rounds, before reverting to their previous states after 15 minutes.

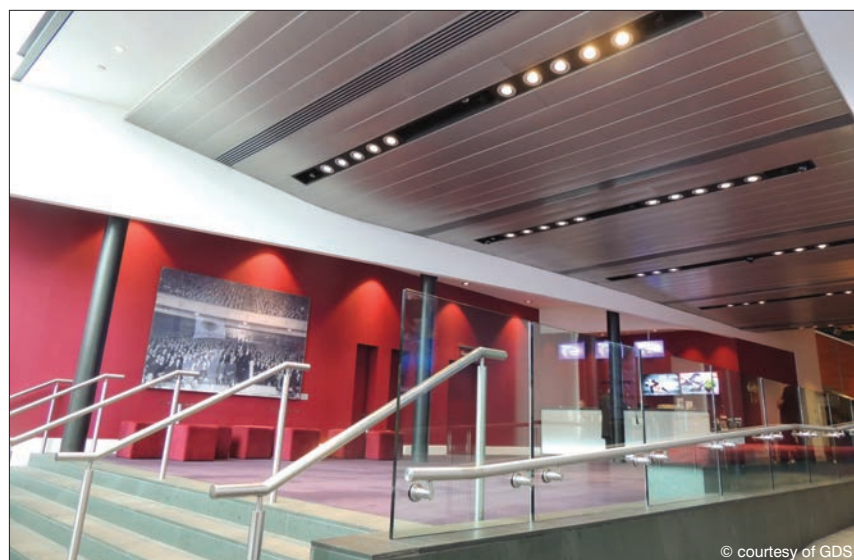
"All foyers are now GDS top to bottom, which we financed out of our reserves and based on a three-year payback period," says Hope. "Aside from the easy savings in maintenance time and lamp replacement costs, we have found that, although the unit cost of energy has increased over the years, our energy bill has remained the same. We are seeing a 30% saving made by improvements in the building for this project, without even having to upgrade plant/boilers, etc." Since 2008 the team have seen a 25% reduction in the number of electricity units used overall, and more light harvesting initiatives will be rolled out as each part of the building is developed.

Following the success of main house refurbishment and the subsequent energy savings, the Patrick Centre was given similar treatment in 2015 over a two-week closure period. A complete GDS ArcSystem 1-Cell system with D1 drivers was installed, along with a new control system using ETC Paradigm processing, Sensor3 dimmers, ETC Gio and Ion consoles, and a new floor. A GDS Blues system was installed backstage and in the rear corridor, and motion detectors installed throughout which switch off any lighting, including the exit signs, if there is no activity for 15 minutes. As in the main house, the four separate working, house, cleaning and emergency lighting systems were consolidated into one.

Similar systems are being rolled out through the remainder of the building, with dressing rooms, hospitality areas and dance studios next in line to receive such infrastructure.

The company's Green Room had already undergone a transformation in 2014 when it was gutted to create a new space and two meeting rooms, complete with LED downlights from Hazel, digital displays and touch-screen technology. "This marked the first stage of moving LED into the conference areas because we're able to test technologies in our meeting rooms before we roll it out into five hospitality rooms once we're happy with it," says Bradford. "It's about embracing the technology and playing with it, making sure you do things to a good standard."

Bradford has also implemented a system that streamlines FOH check systems in line with ISO requirements. All building security patrols at night and FOH daily checks are carried out against a series of preset questions and electronically signed off on an iPad. Results are automatically sent to the required party's inbox and any problems photographed and emailed so they can be acted upon quickly. "It saves time and coordinates the whole process," he says.



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Top: The newly refurbished Patrick Centre with GDS houselights.

Above: Row end light in the main auditorium.

"It's quick and cheap to implement, and can be customised to your business for the price of an iPad."

The 2012 refurbishment also gave Bradford and his team the opportunity to look at other aspects of the building and have proved a springboard for more efficiency projects.

Digital Signage

The remodelling of the foyer highlighted the problem of potentially out-of-date show posters, coupled with the cumulative cost of producing and pasting them on a weekly basis.

Bradford and Hope spent a long time researching digital signage solutions before choosing AMX, which was installed by PTB and commissioned by Andy Wilmott, of Inspire-Tech, in 2012. An 11-screen digital ribbon now hangs over the entrance to replace the previous row of back-lit posters; three large LG videowalls (comprising 18 screens in total) replace three sets of 6-sheet posters in the foyer and, around the corner in the front foyer bar, a further four NEC screens have been recessed into four more poster sites. Outside, a huge PVC banner advertising the current show, which was changed weekly at a cost of approximately £1000 per banner, has been substituted with a 26sq.m, 10mm-pitch digital LED screen from ADI.tv.

"Almost everywhere that there was a static piece of paper, can now be changed at the touch of a button," says Bradford. "Where the entrance banner could only promote one show at a time, it now changes every 20 seconds. We can promote and develop activities, events, shows and companies so much more efficiently and dynamically. And while the ROI from advertising ten shows instead of one is immense, what we didn't predict was the amount of engagement from the public the digital signage gives. A walk through the foyer shows you this - they've become talking points that help develop the audiences.

"At first it might not appear very cost effective to replace fluorescent tubes with a digital screen, but we save on monthly print costs, a reduction in scaffolding, site maintenance and labour costs, and on the amount of paper we throw away. While each one might not be a massive impact, the cumulative costs add up to a lot. It's not always about saving money through a 13A socket or lighting circuit."

The success of digital signage for Birmingham Hippodrome has been so significant that more is added year on year. "We constantly have digital on our brain and where we will introduce it next. We've become very knowledgeable about the subject and now offer a digital signage consultancy service to other theatres."

Compliance with Environmental Management Systems regulations has given rise to further energy-saving initiatives. All public toilets have been installed with LED lighting, motion detectors instead of light switches, and automatic hand driers, while no-touch flush systems and automatic taps cut water usage by a third.

An early move, brought in to combat the number of skips sent to landfill daily, improved methods of waste disposal. Individual waste streams are now separated at source and weighed before being sent



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Left: The new Green Room with LED downlights and digital signage.

Inset: Technical manager Barry Hope with director of operations Mike Bradford and one of the soon-to-be-updated chandeliers in the background.

Bottom: Digital posters in the FOH areas.

for recycling. A compactor replaces the skip and, during 2013/14, 116 tons of waste were compacted and sent for incineration to produce electricity for homes in Birmingham. Thirty-eight tons of glass were recycled, along with 2 tons of plastic bottles, 12 tons of cardboard and 3.5 tons of paper. This saved 176 tons going to landfill and similar measures are now being introduced for food waste.

"The aim was to focus on the quick wins in the first years, before looking to replace old systems with new, energy-efficient ones," says Bradford. "We've done all the quick fixes now, so our next move will be to start drilling down into detail to identify ways to make further savings and efficiencies. Our most recent development is to look into energy monitoring and trend analysis."

Energy Monitoring

Energy usage is manually monitored and managed in-house by Birmingham Hippodrome's operations department. STARK monitoring has been introduced to give half-hourly electricity readings, while the Facilities Department read gas and water meters and pass the results to Bradford who plots and manages them on a regular basis. "We have now reached a stage where we can examine where different usage and costs are coming from: for example, how much electricity is used by the productions' load. From these statistics, the facilities manager can check the 'diary' and programme the BMS to switch on only the amount of plant that is needed at any given time. By looking at the trend analysis and comparing all against Degree Day Data (i.e. ambient temperature in geographical region over a number of years), we can analyse if we have more plant running than we should, for example.

"Soon we will start to monitor energy around the building to discover how much energy is used in each area of the building or system, to establish where the usage is and understand the load more. We could start to separate production energy costs from



building energy costs, for example, and really identify details that will help us be more efficient still."

Birmingham Hippodrome has been able to institute these changes without the aid of external subsidies or funding. "We've done it through a combination of long-term planning and looking at the bigger picture - the building in its entirety with all the staff taking ownership for their part - and then taking sensible decisions that will have beneficial effect long into the future," says Bradford. "We always look for the right cost-effective solution, which is not always the cheapest solution.

"When we changed the main auditorium house lights to LED, we compared the cost of replacement against the energy saving, lower maintenance, and the fact

incandescent lamps are becoming hard to get and carry penalties for use. We could have chosen from many house light systems but we needed one that suited our auditorium with the warmth of tungsten, which is why we went with GDS. GDS wasn't the cheapest solution, but we knew the long-term outcome was the right solution. It's about longevity and choosing the right product or solution for the application.

"We are fortunate at Birmingham Hippodrome in that we have maintenance reserves generated by good business practice which allows us to continually maintain and improve the building. We have a 50-year

maintenance plan for the building, which we put money into every year and draw off as needed. Large capital projects and daily requirements are all planned and budgeted for. Special projects like the stage replacement are fund-raised for by our Development Trust.

"We conduct a lot of preparatory research for every project and we budget for depreciation with the assumption that it will be replaced at the end of that period. IT is the fastest-moving technology of all; we work on the basis that it will need replacing in five years, and are constantly updating and modifying it.

"It may sound like an expensive approach but the savings we make in the long term speak for themselves. You have to invest to save."

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