

Debating in the wings

Mark Ager, Stage Technologies, UK

Advances in technology make a strong case for theatres to get fully automated backstage. But should venues rush in where only scene shifters dare to tread?

Through the ages, theatre automation has played an important role in the staging of all manner of spectacular events, from the flooding of Roman amphitheatres for sea battle re-enactments to the lavish masques of the 16th century. Such feats of engineering were usually powered by human labour, or by water or horse power, until the arrival of electric motors. During the course of the 20th century, electric and hydraulic motors increasingly replaced manpower, although we still see human effort being used today in many stage-engineering tasks, for example in counterweight flying systems.

Initially, the control of these motors was crude and simple and still required the human operator to position the piece at the end of a move. The controls were on/off switches or simple variable speed systems using joysticks, the earliest examples of which were probably taken from the systems used to drive trams.

The arrival of the computer in the 1970s provided the capability for much finer tuning of speed and positioning control. The computer as a means of providing sophisticated control of stage engineering systems, heralded the arrival of automation and in turn opened up a much larger range of applications for stage engineering systems. The word "automation" has now come to encompass not only these relatively new computer-controlled systems but also the mechanical engineering systems that they operate.

Today, automation is gaining ever-wider use in a large variety of venues, where it is employed to construct temporary installations for West End and Broadway-style shows, incorporated as part of the fixed installation for opera houses and lyric theatres, or brought in to transform multipurpose venues. Furthermore, the technology provides extraordinary effects for rock concerts, product launches and other spectacles. But just how pressing is the need for automation for any new venue, or one facing refurbishment or modernisation, and what, if any, are the likely pitfalls?

The "wow" factor

The importance of special effects in live entertainment continues to grow apace, as the "wow" factor demands the use of increasingly impressive effects in film and other

The arguments for using automation become more powerful as reliability increases and capital costs reduce

media. Automation is therefore increasingly being seen as the means of providing better and more exciting audience experiences.

The ability to control multiple motors, moving together in synchronisation to precise positions, can produce spectacular effects. Recent innovations in 3D flying and control have further enhanced these opportunities.

Stage Technologies has, for example, recently flown the car above the auditorium for *Chitty Chitty Bang Bang* and flew multiple synchronised performers around the Millennium Dome.

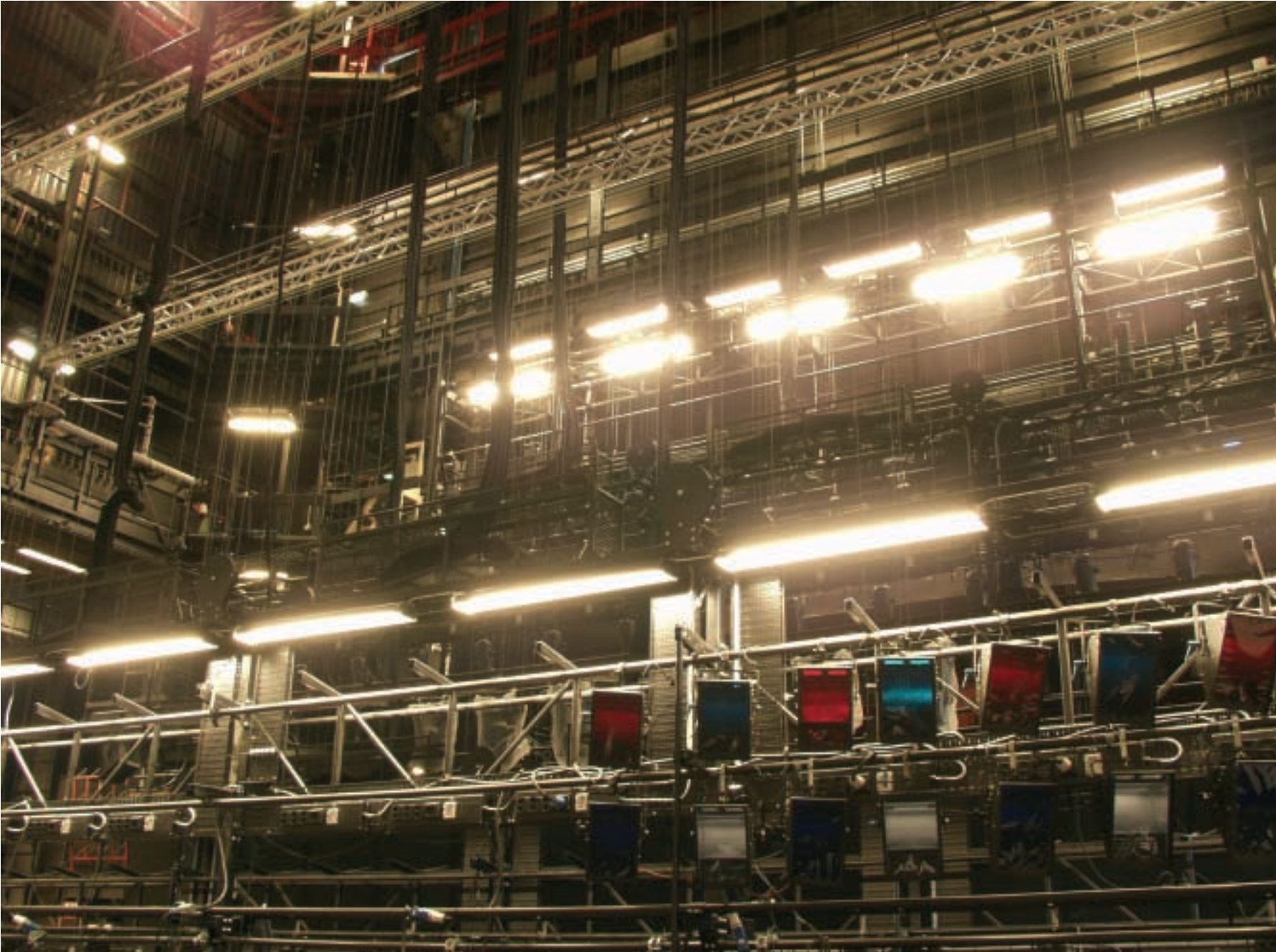
Automation is unlikely by itself, however, to produce the desired "wow" factor for anyone other than the backstage techno junkie. The best effects are produced as a result of a close understanding and co-ordination between the director, stage designer, lighting and sound designers and the automation specialists. Perhaps the biggest limiting factor at the present time is the lack of knowledge among designers as to what is now possible, and the liberation of thinking outside the box.

Away from strictly artistic considerations, automation does have invaluable use. Theatres often occupy high-value land in the centre of towns and cities and yet they are only used for perhaps four hours of the day. By using automation, the opportunity exists to create a multipurpose venue in which the dimensions of the room and its ambience can be changed at the touch of a button, allowing for a more versatile space that can be leased out for other uses. On cruise ships, where space is always at a premium, the multipurpose venue has been the norm for some time. The new multipurpose venue on the *Coral Princess* can be automatically reconfigured and changed within five minutes between a TV studio, conference/lecture room, cabaret venue or cinema.

Saving on labour

Obviously, the use of automation will often bring about a reduction in labour costs. Installation of an automation system will reduce the amount of manual labour required on stage. In a multipurpose venue, it is no longer necessary to employ massive teams to move walls and seating, when an automation system can achieve a quicker, cheaper transformation.

But automation can also create a need for manual labour. Automation systems often allow far heavier loads to be moved or lifted, meaning that designers have more freedom to



[Above] Gothenburg City Theatre: power flow over head bars and lighting bridges

[Photo] Origin8 Design



[Left] The new multipurpose venue on the Coral Princess cruise ship can be reconfigured from a conference room to a TV studio or cinema in minutes

[Overleaf] The Nomad Console - multi-user control system interface used to programme show cues

[Photos] Stage Technologies

build heavier and more expensive sets. This scenery may be more expensive and require careful manual handling.

If careful thought is given to any advantages that may be brought by automation, then savings will be made. For example, automation provides for quicker changeovers in repertory houses. The Royal Opera House, Covent Garden, London has installed a new wagon system that has enabled larger, more impressive sets to be moved around so quickly that it has removed the need for an overnight crew.

A recent estimate by a production manager using Sadler's Wells Theatre in London (a touring venue with an automated power-flying system), was that eight hours was saved on the get-in of the performance and a further four hours on the get-out. While these savings do not in themselves justify the cost of the flying system, they do represent a significant saving and provide a selling point for the venue to market to incoming tours. As more venues become equipped with this technology it can be expected that even more savings will be made, as scenery and rigging is built with a power-flying system in mind and crews become more adept at using the equipment.

The ability of venues to provide high-quality, large-capacity elevators and flying systems is therefore becoming increasingly important as they compete to attract high-quality producers or touring productions. Not only does automation offer the production a greater degree of flexibility, but the technology will also save time and money.

In some countries, notably the Netherlands, health and safety legislation has become a major reason for the implementation of automated power-flying systems. As legislation moves even further into the welfare of employees throughout Europe and the world, manual lifting of heavy loads and pulling on ropes that is now accepted as custom and practice will demand the use of automated systems.

Stacked against these very real advantages is the risk of investing in an automated system without a clear idea of whether any real advantage will be gained. There are a few cases where automation has been introduced to follow a trend without a clear idea of the benefits it will produce. Automation does not just imply new hardware but a change in working practices and staffing levels and skills. Once a venue chooses automation, these issues must be addressed in advance or there are real dangers that the true financial, safety and visual design benefits to the venue will not be delivered.

To buy or not to buy

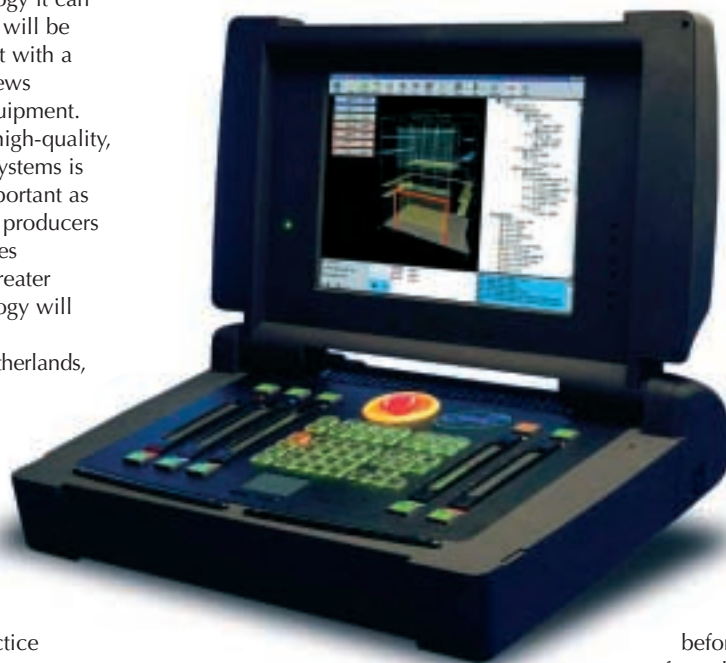
To summarise, any venue considering such an investment would be advised, therefore, to remember some key points.

Just 15 years ago, there were no standard automation systems available for the theatre and each new automation system was designed specifically for a particular project. It was impossible to be certain that the

performance of these bespoke designs would meet the customers' requirements and, historically, a number of installations failed to live up to expectations. Nowadays, there is no need to take the risk on an untested solution.

Like any change in an organisation, there may be problems if the changeover process is not carefully planned and executed. As well as the obvious physical changes to the equipment, there will also be changes in working practices and methods of operation to consider. When handled well, the change to the new technology and its associated working methodology will be embraced by crews, including those who have never used computers before or encountered the new technology.

Counterweight and other manual systems are very cheap to maintain and knowledge of their maintenance is widespread. Automation systems require some specialist skills to maintain and service them and, although these



costs are relatively small compared with the purchase cost of the system, they will need to be taken into account on an annual basis.

An automation system consists of three primary components: the mechanical system, the drive amplifiers and the computer control system. Each part of the system can be expected to have a different lifespan. The good news is that the mechanical systems are likely to last for at least 40 years, if not longer. For example, when the Royal Opera House, Covent Garden, was refurbished, the lifts and the counterweight flying systems were still functioning after around 100 years of operation. There are many similar examples. In a mechanical system installed in a theatre, each part of the mechanical systems is probably in operation for an average of only a couple of minutes a day. This should be compared with the manufacturing industry where machines are designed for use 24 hours a day, seven days a week. Gearbox manufacturers expect a gearbox

to be run in over a 1,000-hour period. In the theatre, the same gearbox will have barely been run in after 10 years' use.

Venues should be aware that the life of the components within the mechanical system might be affected by the lack of use over long periods. For example, gear trains that only turn once every six months may end up running without oil and this could result in seals sticking to shafts and then tearing when first turned. This can be mitigated by following good maintenance practices to ensure that mechanical components are serviced to a schedule that ensures that the components' minimum run rate is achieved.

For the drive amplifiers, the lifespan is about half that of the mechanical components. This lifespan is rarely dictated by the individual components wearing out. It is more likely that changes in technology will lead in time to a natural obsolescence.

The third part of the system, the control, has until recently been the most specialised area.

Consequently, volumes are low and, over time, maintenance spares for the electronics become less available. Volumes for use in the entertainment industry are relatively small, but the sophisticated control required by venues is now becoming mainstream in the manufacturing industry and there is no longer the need to provide venues with so much custom or specialist electronics. Indeed, major drive manufacturers are now including control capabilities within their drives that not only reduces the costs of the automation system but should also improve long-term support and maintainability.

Recognising that some parts of the system will need to be replaced before others, it is essential to ensure that, from the outset, the interface between mechanical/electrical/control elements is clear and standard. Customers should be particularly wary of accepting non-standard/custom ways of providing automation. Patch panels, for example, while saving on cost by allowing a smaller number of drives to interface to a larger number of motors, cause numerous problems and increase costs of maintenance.

Automation is still relatively new and only a minority of venues have it, but the number is growing fast. The arguments for using automation become more powerful as the reliability dramatically increases and the capital costs reduce. It is important that new-build venues, or those that are being refurbished, plan the infrastructure required for the future, because this technology is fast becoming accepted as the only way forward. The arguments for using automation are so powerful that it is not unreasonable to assume that in 40-50 years' time automation systems will be commonplace both for touring shows and venues, and that manual systems will be used only in exceptional circumstances. ●

STAGE TECHNOLOGIES



Stage Technologies occupies a unique position within a global market place offering our clients an unrivalled blend of engineering skills from mechanical and electrical through to software and electronic, all under one roof. With such a broad spectrum of engineers working solely on automation applications for the entertainment industry, we are able to offer our clients leading automation architecture combined with our understanding and empathy for the creative industries we are supporting.

We are an internationally recognised leader in our field, working in venues around the World. From rock and roll tours to dramatic theatre, in venues from Australia to Iceland our equipment enhances the movement of scenery and the flying of performers. We provide automation for projects from a single motor through to complete turnkey solutions requiring the design and construction of complex machinery and control for large, multi-axis venues.

Engineering Solutions

Stage Technologies Limited

Aberdeen Lodge, 22 Highbury Grove, London, N5 2DQ UK

Tel: +44 (0)20 7354 8800 Fax: +44 (0)20 7359 1730 automation@stagetech.com

www.stagetech.com