

Theatre Automation, past and future?

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My first encounter with automation, then called power flying, was at the Barbican theatre in 1983. I persuaded the RSC that I had the skills to maintain the new power flying system which had been installed a year before. Eighty-two winches, linked (via a manual patch panel) to 12 drives (each hand built, with a host of control cards), and a rather large control desk (over three metres long) that allowed the operator to move the bars to one of two selectable positions. (There were only twelve drives as each one was so expensive).

systems for many years, leading one respected director to state 'I do not have computers on my shows!' (even though the Barbican system did not use a computer).

The host of new musicals such as Phantom and Miss Saigon led to a push for automation in the West End. Those systems were again very much custom designed and manufactured for a particular venue or show.

Not only was there the challenge of meeting the tight deadlines, with winches and equipment



The automation control desk at the Barbican theatre 1983

At the time the only other automation system in the UK was in the Olivier Theatre which had 160 hoists, and 35 drives controlled via two PDP 11 computers (one for the control, the other to control the automatic patch system which worked like a telephone exchange). (Ref: Dick Brett article¹)

The system at the Barbican didn't have a computer, relying instead on a host of custom-built electronics that worked together to position the bar. Both systems (National & Barbican) had been custom designed for the venue and hand built, pushing the available technology. The resultant lack of reliability of those systems gave a bad name to automation

arriving during the technical rehearsals and getting integrated in the show, but also when a director or designer wanted scenery to move faster, there was then a scramble to find a new gearbox, or modify the equipment with some new chain link etc.

When we set up Stage Technologies in 1994, we had the idea that (much like lighting and sound), the automation components, desk, drives and winches should be products designed independent of venue. This was key in the West End market where the lead time for a show would be 4-12 weeks, and the winch designs would be dependent on which gearboxes were available off the shelf, that would fit the particular show.

Our idea was that if we could specify standard winches and the control for them, then they could service a wide variety of

¹ For those interested refer to the Back Brett article on the National Theatre Power Flying System, also maybe the Barbican Theatre PFS (though I have not seen that!).

shows, rather than a particular production. These units could then be held 'on the shelf' – ready to go out to a production. There was a necessity to spend more on design/manufacturing the various products so that they would fit into a variety of shows, rather than being designed for the specific needs of a single show, which led to the rental model being more appropriate. (It would have been difficult to persuade show one that they needed to pay for the features that might be needed for show three). It wasn't a new idea – lighting and sound had been doing this for years, and indeed Scenic Technologies (part of PRG) were doing similar before us on Broadway. We just happened to be at the right time and place for the idea to take off. We called the idea theatre automation, introducing the name that had been used by Scenic Technologies on Broadway into the West End and beyond.

The concept is now pretty much established as the way to provide automation, and you can see echoes of those early products - the Acrobat control desk and the Big Tow winch still surviving in automation designs today.

The Big Tow provides a wonderful example of the new approach, designed for Stage Technologies by the great Mike Barnet – the man who brought engineering to the stage. It was built around Mike's idea that in the theatre one of the three dimensions needed to be as small as possible (unlike winches at the time that tended to be very box-like). That in turn meant that it needed to have a zero-flee mechanism, expensive servo motor/encoder and more money spent on the design/manufacture. The narrow dimension – 8"/200mm – was perfect for fitting within a show deck, or mounting side-by-side in a power-flying house. Mike's idea (later refined by Ewart Richardson) worked brilliantly. As far as I know there are still a few of those original machines knocking around the West End today, having performed many thousands of shows. Incidentally, the name came from an injury to my then business partner John Hastie during very early testing: an electrical fault to the winch caused a large piece of steel to fall on John's toe, and the Big Tow name was born.

That product showed the benefits of the approach. The development process that started with a winch suited for the West End market with a spec. of 125 or 250kg, and speed of 1.5m/s developed into a huge range of winches that reach speeds of up to 6m/s and loads of up to four tonnes, flying performers in Cirque du Soleil's Las Vegas productions, to lifting scenery on cruise ships

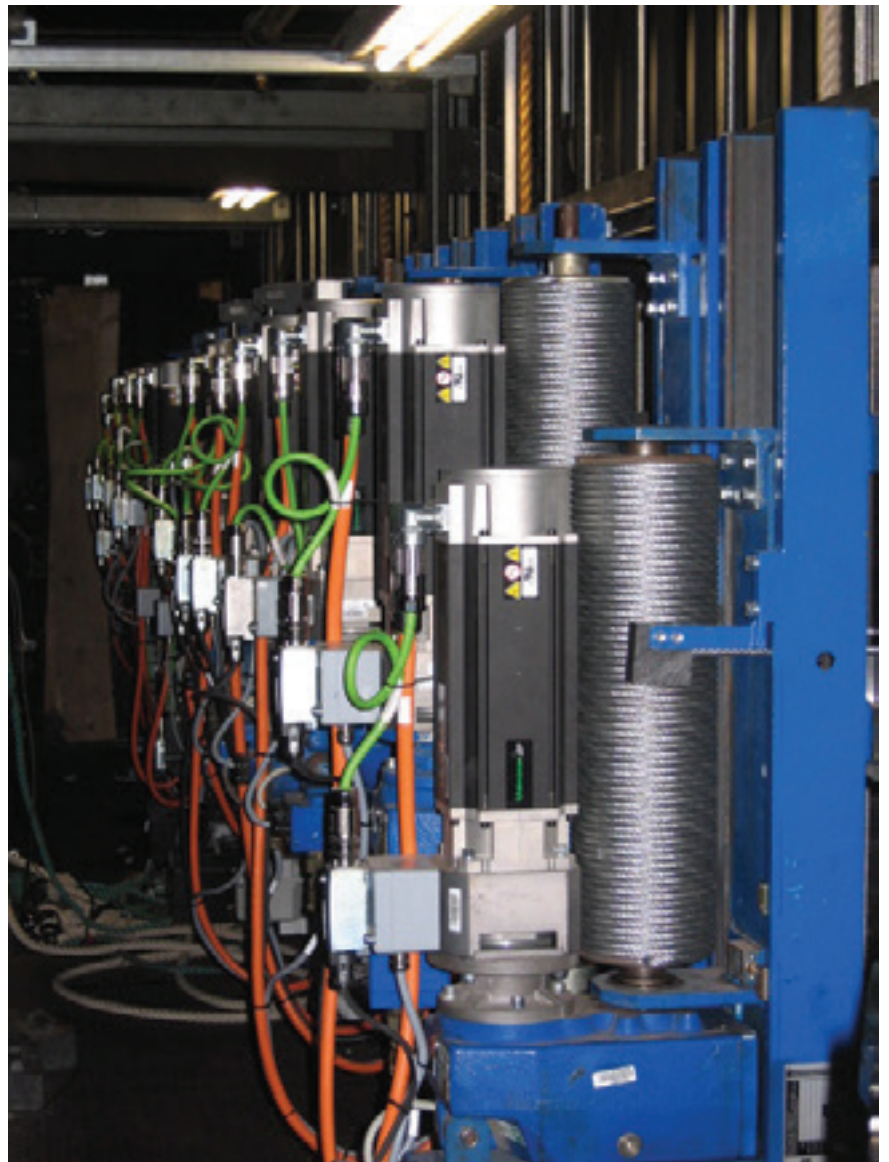
and beyond. Today there are over 4,000 in use around the world, not to mention the many copies.

However, one question that continually appeared during my time at Stage Technologies/TAIT at the various conferences and from customers, that has still not had a satisfactory answer is:

When will there be a way of linking the products of various automation providers together? So that (much like lighting, sound and AV), users can plug together equipment from different manufacturers themselves, without the need to go back to the automation companies. Will there ever be an automation DMX (the ubiquitous standard in lighting that allows products from multiple companies to be linked together)?

We have not, in the intervening 30 years, moved forward on standard solutions

Big Tow winches set up as counterweight-assists on the fly floor for 'Love Never Dies'



where the automation components from multiple suppliers can be connected together seamlessly, and it is difficult to see how it will come about. And the simple answer is that we still have not yet reached that point. There have been various arguments put forward as to why it is not practicable:

1 A need to ensure that the safety-system as a whole operates correctly. This is a key requirement in a sector where there are many life-threatening hazards.

2 The difficulty in identifying where a problem lies when equipment doesn't function correctly, a real challenge when there are a host of elements that could cause failure from a host of suppliers from mechanical, electrical, control or software.

3 The protocols required for an automation DMX are more complex than that required for lighting.

Whilst these arguments clearly have some merit, there is no doubt their power has diminished over time:

1 There is now a much higher level of training and understanding within the industry (and in the wider world) on how safety systems need to operate, and the various components that make up the system. Standards are now available (there was very little legislation back in 1990s) to provide a framework for safety evaluation.

2 The level of understanding within the community of how the various components function, combined with a much higher level of reliability (we are now using industrial drives that are manufactured in millions against those custom drives that were built for the National & the Barbican). That knowledge leads to a better conversation around the reasons for a system not working.

3 Whilst that might have been true 15 years ago, it certainly is not the case now - there are complex protocols for digital sounds, lighting and A/V and yet products from multiple companies are used side-by-side.

The need to overcome the issues has become increasingly apparent. Theatres, shows and rental shops are now filled with a variety of equipment which cannot be easily configured/linked and generally needs to be commissioned, serviced, reconfigured and maintained by the company that provided the initial system. Further the need to use the skills of a remote company adds both cost, delay and complexity when trying to schedule work around the needs of a working theatre.

Worldwide there is a wealth of local talent in

mechanical, electrical, and control engineering that is often more local to the venue/show – and is at the moment poorly used, as they do not have the equipment-specific knowledge to work on the automation system.

It has also been against the interests of the automation companies to make the interconnection work. If a company has a range of products, project and support services, then they don't want to make it easy for opposition to take some of their business. Their business model has mitigated against solving the problem.

Enforced idleness during lockdown led me to think through the issues surrounding the theatre automation industry. The dream of 'automation for all' that we had in the early days of Stage Technologies seems in some ways to be moving further away. Whilst there is an increasing use of automation at the high end, the vast middle ground of theatres still sees automation as too expensive and inaccessible. If anything, the number of automation companies is decreasing, not increasing – and it becomes harder for new players to enter the market.

XM Automation was born out of a desire to change the landscape and provide an alternative to the established players, provide more choice and more than that, to try to solve the problem of an automation DMX.

The key to that plan is a business model that relies on only selling the control desk/UI, with all other aspects of the project being provided by others. This, based on the fact that whilst the control desk/software requires a lot of specialist knowledge on the specific needs of the live-entertainment industry, the rest of the automation system from mechanics, electrical and control systems can be provided by a far greater range of suppliers. The business model then forces an open approach to building an automation system. For the business to succeed it is key to work with partners who can provide all other components from winches, control systems, to project management and engineering services.

Do we have an automation DMX defined – a simple standard to enable users to link equipment from multiple companies? Not yet, and I'm expecting it will take some time to evolve. However, I am sure that it will become self evident over time.

In my view standards get invented in two ways: the first is that a group of people go off in a room and some (many) years later come up with a standard that often is too late and/or too complex for the problem that was to be



The XMove control desk (the colour playbacks echoing those on the original desk at the Barbican Theatre and several since

solved. The group has tried to cover every eventuality, maybe protected their own vested interests, and the technology has moved on.

The alternative is simply to say – well if you do this then it will be easy to connect into the XMove environment. If there is a reasonable-sized market that is using XMove, then it will make sense for suppliers to meet the emerging standard. It will make it easier for them and the customer is more likely to buy their equipment.

My theory is that by requiring openness as the key driver of the business model, the solution will naturally be found over time.

Of course it's a challenge and will take some time to establish the networks and partnerships that the approach requires, and although the raw talent is available worldwide, it will also take time to build the skills required for the new approach.

Training is key, and the essential to success of XM. It has been a challenge for many years that there is too little training in automation (unlike lighting and sound). It is a growing part of the industry that needs more people involved. It also has a major effect on the overall performance that is not always

understood. Part of the desire behind XM is to provide better training opportunities: free downloadable training for offline use and also a full-featured live 3D model of the stage that can be configured in 10 minutes. This allows both the training of operators and also to get designers to think about how the transitions and transformations that happen on stage can be choreographed.

It is the start of a journey, and I am sure there will be some twists and turns along the way. However, I am sure that ripples from the pebble will spread and the approach will challenge accepted thinking for automation in live entertainment, which will both help expand the market, and also create a more inclusive and collaborative engineering approach within live event automation.