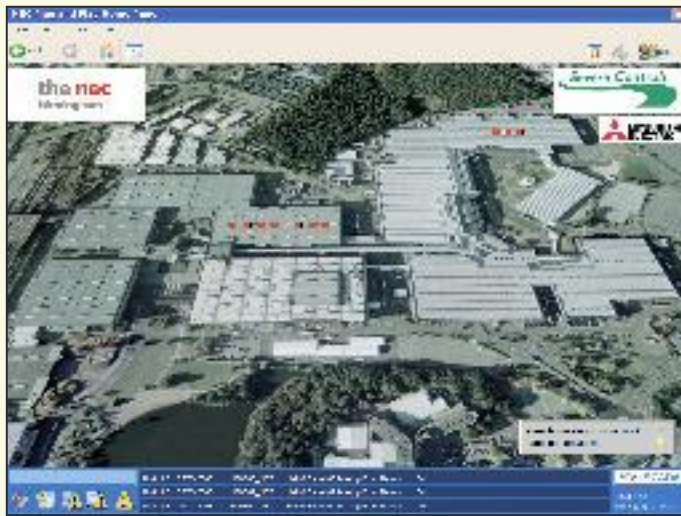


SHOW OF POWER FOR NEC



NEC gets Plug and Play.



It's show time at NEC exhibition centre.

The National Exhibition Centre (NEC) welcomes over three million visitors each year to hundreds of trade and consumer shows including Crufts, Gardeners World and The Clothes Show Live. It is the UK's most successful exhibition venue with over 40% of UK exhibitions held on the site every year. It is also a successful player on the world stage being one of the few international exhibition venues capable of staging major global events such as ITMA (The International Textile Machinery Exhibition), one of the largest trade exhibitions in the world.

With 21 halls totaling 200,000 square metres (two million square feet) it is also the biggest exhibition centre in Britain and seventh largest in Europe. The flexible, flat-floored, interconnected halls offer endless possibilities for all types of exhibitions and events.

Until recently, providing power to the tens of thousands of stands

built every year was a complicated and labour intensive process involving thousands of metres of temporary cables being installed by an army of electricians. It was also a time consuming exercise, adding time to the build-up and breakdown of an exhibition.

All that has now changed thanks to a fully automated control system designed and installed by Gloucestershire-based Severn Controls, one of the UK's leading specialists in integrated control and energy management systems, and one of the few companies in the field able to provide panel design, build and software development in-house.

Severn Controls was initially approached by a wiring contractor that was bidding for the installation of sockets, cabling and panels for a system to upgrade the power supply to seventeen of the twenty-one halls at the NEC. The company needed a partner to provide software and panel

Severn Controls show of power for NEC 'Plug and Play' stand-wiring solution.

building. The NEC team wanted a system that included fixed wiring, fixed sockets and panels, which allowed for automated control over the entire system.

Having prepared and presented an initial proposal as part of a joint bid, the contractor subsequently withdrew and Severn Controls was invited to prepare a direct proposal for panel design, build and software development.

Having had the opportunity to discuss the NEC's requirements in more detail Severn Controls now proposed controlling the entire power supply via a SCADA (Supervisory Control and Data Acquisition) system using bespoke software that would provide greater flexibility and allow many more functions to be automated. A simulation of the SCADA system was created to demonstrate how the power supply would be configured to enable operators to control all panels, sockets, meters, etc. The system proposed would allow NEC to switch power on and off, allocate single or 3-phase current, limit supplies and monitor power consumption. The on-screen demonstration so impressed the project team that Severn Controls was awarded the contract with an order value of £2 million, to fully automate the power supply to seventeen of the halls within the NEC.

The new electrical infrastructure, called "Plug & Play", will provide power to shows taking place at the venue from summer 2008. It is part of The NEC's £40m venue improvement programme and represents an innovative yet technologically proven solution to exhibition stand-wiring. The new electrical infrastructure will not only comply with the latest European safety standards, but will create the platform for the dynamic and robust provision of electrical mains to exhibition organisers and exhibitors at no extra cost.

To understand the full potential of this automated power supply, consider the manual system that it replaced. Previously, the operation was entirely manual. Power was supplied via busbars located within a network of service

subways running underneath all the halls. Ducts running at 90 degrees to the subways carried power cables to exhibition stands.

When wiring contractors received the exhibition floor plan showing where stands were located and sockets were required, they marked the location of each socket on the floor of the hall, lifted the nearest duct cover and inserted one end of a power cable into the duct and then went into the underground subway to connect the cable to the busbar.

Setting up manually could take up to two weeks and only then could carpets be laid and stand contractors begin to build stands.

Then, before the exhibition opened, the contractor re-entered the subway, put in the fuses and turned on power to the stands. The power supply then remained on for the duration of the exhibition until the mains team isolated the services at the end of each day, energy was wasted due to the time taken for the electricians to return to the subways and isolate the supplies. When the exhibition closed and stands were removed, carpets lifted; contractors reversed the process and the cables were disconnected and put into storage, ready to go through the same process again for the next exhibition.

Besides the significant labour costs involved, the downtime required to wire each exhibition meant that valuable exhibition time was lost.

Contrasting the old with the new not only highlights the significant advances in control technology since the 1970s, but also demonstrates the enormous potential of the Severn Controls' SCADA system.

Using PLC and SCADA packages supplied by Mitsubishi Automation, Severn Controls created a fully automated system. In addition they then created a bespoke booking/configuration utility written as a vb.net web application (SQL 2005 Database).

The entire NEC is now pre-wired. Sixty-five electrical distribution panels are installed within the subways and almost 4000, 63A sockets permanently

fixed in the various ducts. The sockets are hardwired back to the distribution panels and their locations accurately marked on the SCADA screens. Pulling points are provided in the floor enabling extension leads to connect the electrical supply to power points on the stands. NEC mains teams report that the new system is far more flexible than the old, because fixed sockets are so much easier to locate, and faults are easier to find and rectify.

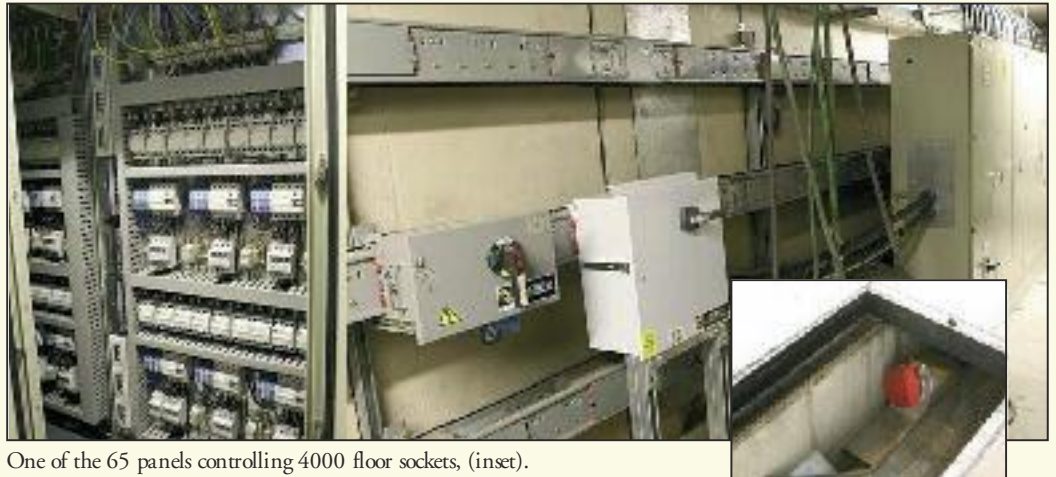
But the most significant advantage of the new system is the ability to remotely control multiple functions via SCADA. Operators in one of two control centres (more are planned) work on 42" screens displaying an aerial photograph of the NEC. Overlaid on the image are icons representing every panel and socket in the twenty-one halls. This gives the NEC unprecedented flexibility, because while the layouts for exhibitions are being created the information is simultaneously entered into the database.

The NEC and its customers both benefit from the greatly enhanced functionality of the Severn Controls system and the vast amount of information it is able to provide.

For example, before the stand builders are due to arrive, the SCADA system accesses the exhibition database, extracts the information it needs, sorts it and sends it to the required panels in the correct sequence. When the exhibition closes, data from the panels provides accurate billing information.

The system also makes it much easier, and therefore quicker, to identify power supply problems, even on individual stands. Previously, faults reported to the exhibitor helpdesk were passed to the mains section and, if confirmed, an engineer was despatched to the subway to check the supply and change fuses (the most likely cause of a breakdown) if required. Now, even before the exhibitor can contact the helpdesk, the operator knows what the problem is and is making arrangements to remedy it, which means that power can be restored very quickly. Naturally, if there is a problem with an MCB or RCD, an engineer will still need to visit the stand to ensure that it is safe to return the power.

If the exhibition organiser needs to accommodate an extra stand at the last minute, the operator can click on a socket icon



One of the 65 panels controlling 4000 floor sockets, (inset).

in the correct location and set up the required current. He can also add a trip to ensure that the agreed supply isn't exceeded, set the on-time and off-time, and select a single or 3-phase supply and enable it, all from his workstation.

Similarly, if a few days into the show an exhibitor asks for an additional 15 amps to power a new piece of equipment, he'll be surprised to find that three clicks of the mouse later he has an updated supply. It really is that easy, even after the show has opened.

Yet despite this impression of ultimate control, the SCADA package is not essential to the operation of the new power supply control system. It is, in effect a supervisor that enables the NEC to configure, set-up, monitor and control the power supply and, once the instructions are entered into the PLCs, everything will operate perfectly as a stand alone system.

Whilst the functionality provided by the Severn Controls system has exceeded NEC's expectations, neither party has lost sight of the fundamental requirement to maintain power to exhibitions, which is why a number of safeguards have been incorporated.

For example, to eliminate human intervention – accidental or deliberate – Severn Controls carried out a risk assessment on its own specially developed configuration and operating software. In addition, they also commissioned Ingenuity, a leading software testing house to QA test the complete system.

The system is also designed to ensure that a single panel is the largest unit that can be turned off, and even if an operator does accidentally click the wrong button, a series of warning messages require confirmation.

Each panel is independent and equipped with a PLC, so that once its configuration is downloaded it will continue to supply power as instructed (e.g. switch on at 8.00am, switch off at 6.30pm) even if the server and the network both fail.

The system is also designed to protect the infrastructure. It will show if stands are using more current than was ordered and allows operators to limit any overload. This ensures that panels can't exceed their maximum current, cause a circuit breaker to trip and cut off power to other exhibitors. The system also tells the operator if MCBs, RCDs and other devices need to be manually reset.

If a panel develops a fault, its on-screen icon flashes a yellow alarm to alert the operator. Clicking onto the image of the appropriate hall brings up a floorplan, highlights the faulty socket with a similar yellow alarm, and displays a text panel identifying the problem. And even if SCADA loses communication with a panel, engineers can use hand-held Human Machine Interfaces (HMIs) to reconfigure, adjust or modify the panel as required. Latching relays are fitted to all outputs to ensure that if the CPU does fail, power will stay on indefinitely. As the NEC team points out, this option is preferable to power being lost.

The Severn Controls system is believed to be the largest single power monitoring installation in the UK by some margin, and is capable of providing vast amounts of information to NEC managers. The statistics are equally impressive: The 65 panels can each supply 30 circuits and each circuit has two sockets, which adds up to 1950 circuits and 3900 sockets. Every panel and every circuit also has a power meter so the system



One of the 5 control rooms at NEC Birmingham.

boasts over 2000 power meters, which map the complete energy usage of the site. And every circuit is fitted with a timer that can be set to turn on and off at predetermined times before a show opens and closes, so energy cannot be wasted.

The NEC is confident that the automated system will create many opportunities in the future. The potential savings in time alone, over the huge number of shows staged at the NEC, could enable the centre to stage more exhibitions and significantly increase its profit per square metre. In addition, the cost of labour is reduced, as is the cost of hiring cables. However most importantly is the reduction in energy costs and consumption with the resultant reduction in their carbon footprint.

Commenting for The NEC, managing director Kathryn James says: "The new system represents a significant investment in the overall modernisation of The NEC and is a real step forward for us in our aim to be better equipped to deliver the needs of today's and tomorrow's exhibitions."

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