



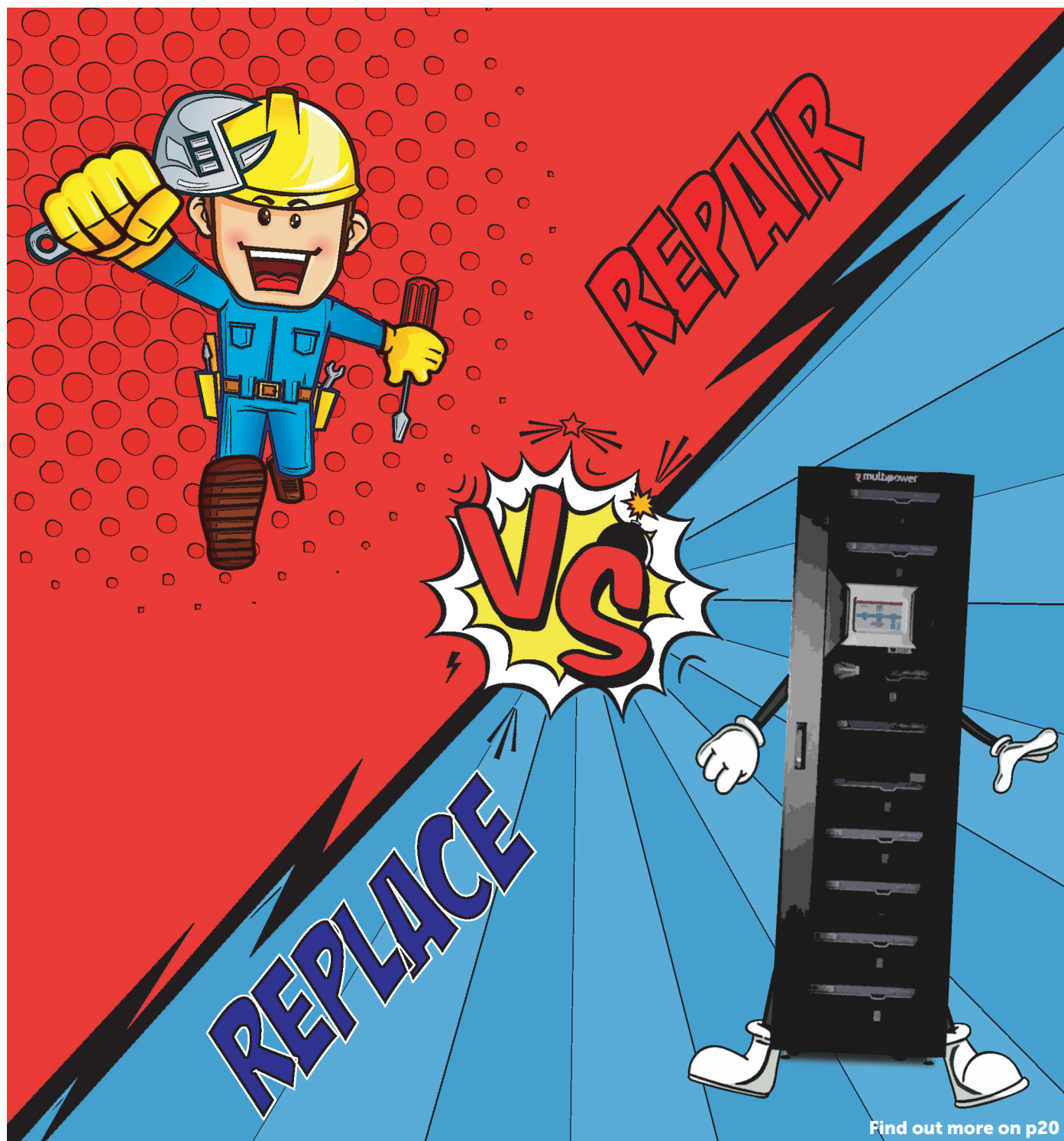
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Electrical Review

April 2019

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The recipients of 2018 Awards included: Noriker Power battery storage facility - Entry by Vertiv; Indectron Shield House data centre - Entry by Sudlows; The Queens Hotel, Penzance - Entry by Chubb Fire & Security; Project Beagle, Ingenuity House - Entry by zencontrol ltd; Chertsey Water Treatment Works - Entry by Danfoss Drives and Heathrow Airport, Electric vehicle charger installation - Entry by R.L. Freemantle Electrical Ltd

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All winning entries will also be considered for two additional awards – Project of the Year and Product of the Year, both presented by Riello UPS – and recipients will be announced during the Awards evening.

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Recolight supports proposals to tackle non-compliant product

Recolight has welcomed new proposals from the Department for Environment, Food and Rural Affairs (Defra) to make online marketplaces responsible for compliance with producer responsibility legislation.



Defra's consultation to reform the system for waste packaging identifies the "growing problem of non-compliance through online marketplaces."

The solution proposed by Defra is to create a new class of 'producer'. This would make online marketplaces responsible for the compliance of all products sold through their websites, that are imported into the UK.

"The Defra proposal will, at last, tackle this major problem. The solution they have come up with is particularly elegant. Producers based inside the UK who sell through online marketplaces continue to take direct responsibility for their products. But where the producer is based outside the UK, that responsibility would fall upon the online marketplace," commented Recolight CEO Nigel Harvey.

"At a stroke, this would bring product from thousands, or even tens of thousands of producers, predominantly based in China, into compliance. Those producers would not need to individually register with compliance schemes. Instead, product data, already captured by online marketplaces through sales transactions, would be aggregated and submitted as a part of their own compliance process.

"The process would be simple to audit, simple to administer, and effective at capturing a high proportion of non-compliant product. Enforcing UK legislation on a large number of companies based on the other side of the globe is high on impossible. Focusing instead on a few online marketplaces could really drive compliance."

The Defra consultation closes on 13 May 2019.

HPA welcomes ban on gas boilers in new homes

The Heat Pump Association (HPA) says the government's announcement in the Spring Statement 2019 that gas boilers will be banned in new homes from 2025 is a step in the right direction. It also supports the comments made by the Committee on Climate Change in their recent report, UK Housing: Fit for the Future?, which called on the government to get serious about tackling emissions from homes.

The HPA believes that it is vital that consumers are made aware of the potential of heat pumps for low carbon heating. Heat pumps supply more energy than they consume by extracting heat from their surroundings. Currently, heat pump systems can supply as much as 3kW of heat output

for just 1kW of energy input.

Graham Wright, HPA chairman, said, "Although heat pumps can save considerable carbon emissions, this has not been recognised yet in building regulation and the UK needs a mechanism to enable us to take advantage of the 10 years of investment in renewable power generation, which has seen a significant reduction in the amount of CO₂ emitted per kWh generated.

"Further investment in training is also required to enable the current cohort of boiler installers to be able to install renewable technologies, a task that the industry understands and will be working with all stakeholders to ensure we achieve."

Gas Safe Europe calls for tighter safety rules

New rules introduced in Scotland to improve household safety could be even tighter, says industry specialist Gas Safe Europe.

Under the regulations, every home in the country must have a smoke alarm fitted in the living room and in areas such as hallways and landings. There must also be carbon monoxide (CO) alarms where there are fixed combustion appliances.

Until now, such standards had only applied to private landlords and new builds, but as of February 2021 they will apply to all homes in Scotland.

"While these new regulations are to be welcomed and are ahead of England and Wales, they still do not go far enough," said John Stones, managing director of Gas Safe Europe. "While it is easy to realise if

a smoke alarm is working when you burn the toast, a CO alarm is an entirely different matter because the sensor may be defective and therefore incapable of detecting any CO that might be present in a room. You can't fully test a CO alarm without exposing it to a test gas.

"Research has shown that around 15% of CO alarms are defective before they even get out of the box, and a further 45% have been found to fail within three to four years – despite the 10-year warranties given by the manufacturers with their alarms," he added. "Just because the battery is working does not mean you are safe. Without a fully functioning CO sensor, the alarm is not going to warn a homeowner or tenant that they are at risk from deadly CO."





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ACI urges better cable specification



The Approved Cables Initiative (ACI) believes manufacturers hold the key to helping specifiers make better cable choices.

A rise in the number of cable failure reports has prompted the ACI to make the announcement. Instances reported relate to where cable is compliant with relevant standards yet not fit for the intended purpose and installation environment.

ACI is advising specifiers that before making important cable specification choices, it would be wise to speak with relevant manufacturers to ensure the appropriate standard is chosen, and therefore the suitable cable, to ensure the delivery of a safe and functional solution.

Dr Jeremy Hodge, British Cables Association secretary general and ACI director said, "Just because a product is compliant with a standard doesn't mean it is necessarily fit for the purpose intended. We receive many reports of cable failure, where the cable purchased doesn't perform properly. In most instances, the issue lies with the fact these cables were not properly specified in the first place, rather than the problem being linked to a faulty or substandard cable."

"While cable compliance will be high on the list of requirements when specifying cable, a lack of specific cable knowledge and cable standards knowledge can mean that choices are not always made correctly, particularly when specific performance requirements, such as fire safety, are involved."

"The questions that the specifier should be asking are: is this cable appropriate for the intended purpose and installation environment, will it provide the desired performance, and does it comply with all the necessary specification? Where the answers aren't clear or forthcoming, checking with the manufacturer should quickly deliver the necessary information."

The ACI is also aware of several instances where non-standard cable, in particular CY, YY and SY cable, is purchased yet doesn't meet the criteria for which it has been specified.

New apprenticeship awards announced

The Apprenticeship Management Group has unveiled the categories for their nationwide search for the best apprentices and employers.

The company, which looks after the apprenticeship training programmes and apprenticeship levy for the Electrical Distributors Association, Builders Merchants Federation, British Coating Federation, Furniture and Interiors, Skills and Training Alliance and water and other utility companies, has launched its own awards initiative to find "the people that make a difference in the work place," explained managing director John Henry.

"We look after a number of federations

and organisations, but we want to open this competition to not just those; we are looking for the best apprentices out there and we want to recognise their personal achievements and contributions to their employer businesses.

"An apprenticeship can be a fast track to a career in an array of industries and we have many extremely talented individuals out there. This is our way of acknowledging them," he added.

The categories are: Apprentice Champion of the Year, Employer of the Year, Advanced Apprentice of the Year, Intermediate Apprentice of the Year and Rising Star of the Year.



UK electronics sector leads growth in 2018

The UK electronics sector experienced the fastest growth of any manufacturing sector in 2018, according to a new report by Santander and Make UK, the manufacturers' organisation.

Despite representing less than 5% of UK manufacturing output, the sector generated £19.4 billion in turnover and £8.4 billion in gross value added (GVA) in 2017. After a period of decline that started in the early 2000s, the sector experienced a major rebound in growth in 2017 and 2018: up 4.4% and 12.4% respectively.

The report identifies four key areas which present opportunities for continued growth for UK firms: developing the products required for increasing number of new smarter devices; capitalising on the rise of digital medicines; focusing on export demand from relatively untapped markets like Asia; and the roll-out of 5G across the UK's main cities.

Paul Brooks, head of UK manufacturing

at Santander UK, said, "The UK electronics sector continues to punch above its weight and, with the fast growth in technology, is well placed to cement itself as a core manufacturing sector. Increased automation and new technologies are linked to the success, but the sector needs to remain focused on growth, being agile and developing cutting-edge products to drive increasingly powerful and smart digital technologies."

"Competition for global high-tech supremacy is increasing, but these results show that UK manufacturers are among the world leaders. The sector has experienced the fastest growth of any manufacturing sector in 2018 and contributed a disproportionately large amount to UK GDP, added Seamus Nevin, chief economist at Make UK.

"But the sector will need support from government and finance if it is to capitalise on the export opportunities coming from Asia and elsewhere."

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GOSSAGE

People power

There is still that fond belief around that we in the UK have far more influence upon our political masters than do those living under the yoke of a totalitarian government, like the Communists running China. Increasingly I wonder whether this isn't just a convenient myth.

Just as here, street protests over pollution and other environmental hazards caused by fracking are increasingly common in China. As in the UK, these are often organised over social media. To date, our homegrown protests, even when endorsed by the relevant local authority – as has occurred in Lancashire and in Derbyshire – have met with completely deaf ears from the national government.

In contrast, Associated Press has revealed details concerning a region in western China, where drilling for shale gas has been banned “after a protest by residents who suspected fracking work caused a series of earthquakes that led to two deaths”.

Admittedly, the public statement does not explicitly link the 4.9 magnitude tremors on the Richter scale to the fracking taking place. But in the next breath it acknowledges residents’ “suspicions” that fracking “had been responsible for the earthquake and deaths”.

Here in contrast, a group of eminent scientists have taken the standard establishment path, and written a letter to the Times warning about fracking’s contribution to climate change. They ask: “Is it not time that our leaders and scientific community withdrew their support for fracking and engaged in the challenge of transforming our society to meet this existential challenge?”

In response, the professors seem to have received a deafening silence. Much as have the local protestors in Lancashire and Derbyshire.

Energy star-crossed lovers

Rightly, the European Union has long touted the effectiveness of its mandatory A to G energy labelling scheme for electronic equipment. It is already saving the average British household over £100 a year on electricity bills.

The argument has always been that the labelling’s great effectiveness is that it is legally binding. And not just a voluntary arrangement between consenting manufacturers.

However, there is one electricity consuming sector of great importance which remains out with the eco-labelling scheme. That sector is office equipment, the likes of VDUs, computers and imaging equipment.

At the behest of US manufacturers of such equipment, way back in 1992 the American government officially endorsed a purely voluntary, self-policed scheme. It was called Energy Star. And within a dozen years, as such equipment became ubiquitous, this label has become automatically recognised throughout much of the OECD.

Even though it is essentially a pass/fail. Rather than a graded mechanism as sophisticated as the A to G ratings to be found on lightbulbs, TVs, washing machines et al throughout Europe.

This has long been a source of irritation to the purists. So much so that last year was the last one in which any newly marketed such office equipment sold in Europe would be permitted to be badged with the Energy Star. The intention was always that this equipment would henceforth bear that familiar A to G label instead.

However, negotiations on defining the precise criteria to achieve this more detailed label have yet to be agreed. And may well not be for a couple of years yet. Which is why if anywhere in the European Union, you are seeking to buy the latest computer equipment, there may well now be no label visible to inform you about its likely electricity consumption.

“The convolutions of a smooth-lipped shell”

There has been great astonishment that one of the oil majors, Shell, has announced its intention to become the world’s biggest power company within 15 years. The multinational thinks electrification will grow rapidly, and is apparently eyeing double digit returns from “smart trading and the management of flexibility.”

Fresh from taking over First Utility, the largest of the Big Six challengers, (without ever bothering to inform its customers) Shell’s New Energies director Maarten Wetselaar is stressing that the company is not so interested in legacy power sector business or economics, but will concentrate instead upon “intermittent demand and supply.” For verisimilitude, it has now bought up the DSR aggregator Limejump and the home battery storage firm Sonnen.

For the past quarter century Shell has concentrated entirely upon the oil and gas markets. But those with long memories may recall that back in the 1980s, Shell’s then senior directors made some bold steps into the demand management market. It developed Emstar, under its former superstar Richard Tinson, into the largest energy services company in Europe. It also placed the maverick Colin Gibson as CEO of Thermocomfort, who turned it into the UK’s largest cavity wall insulation firm.

At the same time, BP had similar ventures. With BP Energy as a third-party financing giant, and co-ownership of the Danish firm Rockwool, the world’s second largest insulation manufacturers. But then, Shell senior management changed. As did that of BP. Both took the view that they should return to concentrating upon their historic role – the production and marketing of fossil fuels.

So, both oil majors abandoned their energy management interests. The question therefore arises: how long before Shell gets bored with “new energies”, and returns to concentrating upon the oil and gas market again?

“Every man according to his work”

Fascinating latest figures tabulating actual employment in the low carbon sector, supplied by the Office for National Statistics. In 2017, 209,500 people had jobs in this sector. Of these, 135,000 were in the energy efficiency subsector. Plus, some 42,000 people in renewables. Of which 5,000 are working on onshore wind. Which is incidentally about the same number of folk as are involved with nuclear generation.

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A breath of fresh air

Building engineers and consultants keen to achieve the best results for their clients, are placing an emphasis on the integration of effective CO₂ monitoring and measurement, says Priva UK & Ireland sales manager Gavin Holvey.

Technical and trade media have contained a great deal of discussion in recent years about the contribution that key building systems – notably lighting – can make to the overall performance of a building and its personnel. But to date there has been rather less coverage of the role that monitoring and maintaining recommended concentrations of CO₂ can play in keeping staff healthy and productive.

The need for good, consistent air quality is not difficult to comprehend when one considers that the majority of workers spend about half their waking hours in their workplaces. Maintaining adequate indoor air quality, by both diluting indoor air pollutants and ensuring they are removed from the building through effective ventilation should therefore be a galvanising concern for building managers and engineers.

The vast majority of workplaces fall well within long-term (8-hour) exposure limits of 5,000 ppm, as outlined by the UK Health

and Safety Executive. But this very much represents what might be termed the ‘outer limits’ of acceptability, with multiple studies revealing that complaints of drowsiness and poor air may rise notably with CO₂ levels in the region of 1,000 to 2,000 ppm. Beyond 2,000 ppm, symptoms and complaints are likely to increase significantly, with employees more likely to register headaches, sleepiness, reduced powers of concentration, and even nausea.

A recent study produced by teams from Oxford Brookes University and LCMB Building Performance (with backing from EMCOR UK and Innovate UK) makes for especially insightful reading. Workplaces involved in the study were equipped with Internet of Things-enabled sensors to monitor CO₂ levels, with employees sent numerical, proofreading and Stroop tests via email up to three times each day.

With lower CO₂ levels, employees’ test scores improved by up to 12%, whilst in one of the buildings tested people worked 60% faster with reduced CO₂ concentrations. This

led them to complete tests in a mean time of 8.2 minutes – compared with 13.3 minutes when more CO₂ was in the atmosphere.

The implications of sustained problems with CO₂ for a company’s productivity, financial viability and even retention of staff could be long-term – particularly so if it’s a topic that is not on the building management team’s radar from the get-go, meaning that it could take a considerable period of time for it even to be detected as a problem. The good news is that, thanks to recent developments, it’s never been easier to implement CO₂ measurement technologies.

ACCURATE AND AFFORDABLE MEASUREMENT

The availability of cost-efficient standalone solutions for the monitoring of CO₂ levels has improved significantly over the last decade. Sensor-based systems make it possible to measure CO₂ concentrations in multiple locations, and they can often be easily expanded and calibrated. Although such systems require occasional checks, most will work effectively for many years.

For those with larger budgets, instruments that measure CO₂ as well as temperature, relative humidity and other gases (for example carbon monoxide)

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are also available. Similarly, for the more ambitiously-inclined, it is also possible to invest in multi-room controller systems that make it possible to manage climate ceilings for heating and cooling, as well as administer induction and VAV systems, fan coil units and other primary room systems. With such a configuration it is very easy to achieve an overview – and overall control – of a working environment.

Once measurement systems have been successfully implemented, building managers can take other steps to improve CO2 levels. Reviewing room layout is one such consideration, with the possibility of improving air-flow as a result.

Then there is the matter of newer buildings, where windows are often sealed and air-conditioned as standard. It is often the case that increased energy is expended on cooling via air-conditioning systems and the unnecessary creation of additional greenhouse gas emissions in the atmosphere. Indeed, close monitoring of CO2 levels during the EMCOR study revealed that fan speeds could be decreased by up to 50% without negatively affecting CO2 levels in the workplace.

IMPULSE TO ACT

For companies who haven't made CO2 a particular priority in the past, it makes sense for their building management teams to seek the guidance of vendors who have invested in

“ The need for good, consistent air quality is not difficult to comprehend when one considers that the majority of workers spend about half their waking hours in their workplaces ”

specialist support capabilities, making it easier for them to specify, implement and monitor cost-efficient systems that can deliver lasting improvements.

Many of the leading names are also working to satisfy the requirements of building standards and codes of practice that have achieved worldwide traction. For example, the International WELL Building Institute's WELL Building Standard – now generally regarded as the global tool for advancing health and well-being in buildings – offers extensive coverage of air quality issues, including CO2.

For companies who can show they have achieved alignment with such standards, there are obvious benefits in terms of their appeal to more health and environmentally-conscious employees. It can also mean a boost to general perceptions of a company both inside and outside its specific sector, and open up an additional angle for marketing and promotion.

Along with lighting, heating and noise, reducing CO2 levels is now one of the most effective ways in which employers can make a real difference to their productivity and the wellbeing of personnel. Now, more than ever, the tools they require are firmly within their grasp. **ER**



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Planning ahead

Peter Westwood, data centre director, SPIE UK, takes a look at energy efficiency within the data centre, and how addressing capacity planning challenges could be the key to a more environmentally sustainable, cost-effective facility.

The growth of data generation on a global scale is proving to be a driver of increased data centre energy consumption. In fact, there are predictions that show a trebling of data centre energy consumption in the next few years. With this in mind, providers and owner occupier organisations must constantly manage and rationalise their power strategies to meet the increased data volumes.

Traditional data centres didn't used to

experience network spikes because physical servers had excess capacity, often only supporting single applications due to them being regularly sized to manage peak data needs. As a result, normal utilisation was as low as 20%. With virtualisation and cloud computing, servers are highly utilised, being covered by fewer locations, which results in network traffic continually changing.

The Spring 2007 Data Centre Users' Group survey found over 70% of participants used hot-aisle/cold-aisle configuration to increase

cooling capability to respond to higher data demands. The survey findings also revealed that over 60% incorporated air management technology to reduce hot air recirculation.

Providers and organisations are currently working to develop ways to respond to this huge expansion in data traffic. Part of their strategy is to create flexible capacity usage plans. However, these also need to meet service level agreements and avoid risk of downtime or breaching capacity ceilings – both of which are a significant challenge. ►

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Put simply, building in spare capacity can increase operating costs.

So how can data centre companies mitigate this issue and create a more efficient facility?

Firstly, proactive planning data centre operators can move towards optimising the capacity of their data centres to meet the needs of IT and business services with just-in-time deployment. Smarter data centre capacity management can help them determine what they need to buy and when.

In the past, operators of data centre operations relied primarily on manual data management to understand how the facility's requirements were changing over time and growing in capacity and performance. Scaling up would usually mean to overprovision, compared to normal operations which, in turn, increases operational expenditures including power consumption.

Virtualisation can also help with some of the physical issues of managing data centres, using less hardware to handle more workloads. Flash storage is an alternative solution, due to its ability to handle the random input (IO) patterns more efficiently than legacy disk-based storage.

Inefficient data management still contributes to storage waste, even on flash-based systems. But flash-based storage is a way to deal with over provisioning, to reduce energy consumption, creating the storage performance needed but in a smaller footprint. This space utilisation efficiency is also important to operators for improving resilience of existing facilities. It can also assist in reducing power in the

data centre, contributing to performance improvements.

Today's world is rapidly changing, and data transition is at the heart of it. So, what can operators of data centres look to do when seeking demand management improvements and greater operating characteristics?

1. Data Centre Management systems for capacity management can help determine equipment and infrastructure provisions by reviewing the utilisation and existing capacity of rack space, rack power, UPS

Smarter data centre capacity management can help to determine what to buy and when

power, upstream breaker or panel power, cooling, fibre or data port connectivity at the rack, patch panels, and switches. This can determine usage levels of the required components and whether each one of them is fully utilised or has additional capacity. By maximising capacity of space, power, and networking, data centre organisations can make significant resilience and performance improvements.

2. Studying the IT equipment with a view of moving to the new ASHRAE operating standards could greatly assist in reducing energy demands by elevating

environmental conditions.

3. Promoting the corporate responsibility and social need for green solutions will contribute towards avoiding the huge predicted increase in data centre energy consumption.

4. Considering different architectures such as Open Compute projects or high-density racks instead of standard cabinets can lead to greater improvements in space utilisation.

5. Applying the latest innovative cooling technology coupled with better energy management arrangements will provide an increase in return on investments.

6. Taking into account the location, annual weather conditions, site constraints, and user requirements will help develop a best fit data centre cooling strategy for the options available.

7. Users can consider the utility service options with associated charges for possible minimisation of peak demands, resulting in cost benefits.

By properly planning ahead, data centre capacity management companies will achieve better efficiencies with their physical infrastructure and data centre configurations. Additionally, it will identify potential risks, anticipate sources of failure, increase operational efficiency, and achieve dynamic intelligent operational management. All of which will significantly contribute to a more environmentally sustainable and cost-effective data centre industry. **ER**

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The ultimate power struggle: repair or replace your UPS?

Riello UPS data centre efficiency expert Chris Cutler weighs up whether operators should maintain an ageing uninterruptible power supply (UPS) or take the plunge and invest in a completely new system.

It's a dilemma every data centre operator or IT manager will face at some point. Your UPS has provided sterling service for several years, but it's definitely seen better days.

Do you maintain it, even give it a bit of an overhaul so it can carry on doing the job for a while yet? Or do you bite the bullet and replace it with a new system delivering the efficiency and performance enhancements provided by the latest technologies?

Which side of the superhero divide do you fall on? Do you repair or replace? Will the long-term gains make up for the short-term pain of the disruption and additional capital expenditure?

Of course, there are certain circumstances where you won't have this choice. Perhaps support from the Original Equipment Manufacturer (OEM) has finished. This tends to happen when a model's been phased out of production for a few years. In that case, spare parts are hard to find, making maintenance prohibitively expensive, if not practically impossible.

It could be the firmware isn't compatible with current security protocols, meaning your UPS is vulnerable to communications problems or even cyber-attacks. Or maybe your uninterruptible power supply simply isn't capable of meeting your present and future load requirements. Basically, it's not fit for purpose anymore.

In any of these situations you'll need to replace your UPS with a new system. But assuming your UPS isn't coming to the end of its useful service life, what factors will influence your choice of whether to overhaul or upgrade?

PLANNING FOR THE FUTURE

It's important to assess the state of play with your whole IT infrastructure, not just your UPS. If your facility is nearing capacity or full of ageing equipment, it could be that outsourcing to a colocation could prove to be a more cost-effective solution. That'll see the vendor take responsibility for managing the UPS system.

Likewise, think about your load requirements. If you're running at near full load and expecting your power demands

●● Replacing an uninterruptible power supply doesn't always mean 'bigger is better' ●●

to carry on increasing, then you're going to need a larger capacity. Can this be achieved by adding to your current system? Or are you limited by how many modules or units can work together in parallel?

Alternatively, what if your current UPS is lightly loaded and your future plans are unlikely to see that situation change too drastically – is downsizing practical?

Replacing an uninterruptible power supply doesn't always mean 'bigger is better'. Downscaling to smaller units is likely to enhance overall efficiency, reduce the number of batteries you need, and cut maintenance costs.

MAINTAINING THE STATUS QUO

Choosing to continue running a legacy UPS gives you a couple of options. You can

'run to fail', which is slightly misleading as UPS maintenance and regular servicing are still undertaken. It's just that there's no significant investment to improve system performance.

However, this approach increases the risk of sudden system failure. This sort of reactive 'time and material' maintenance also becomes incredibly expensive once a unit is around 10 years old. It's a short-term option if you plan on consolidating to the cloud or colo, but it's ill-advised for mission-critical environments.

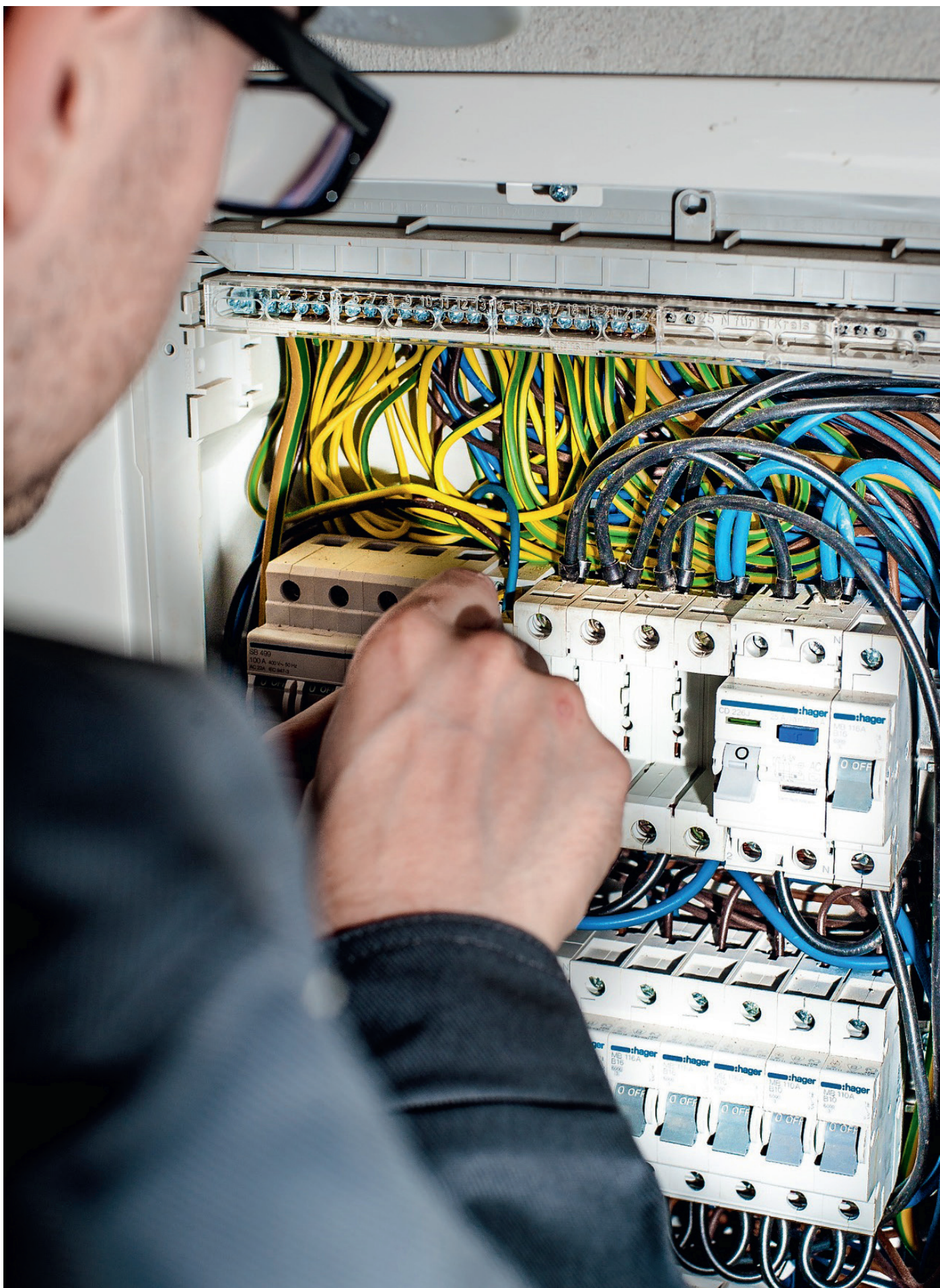
The alternative is to upgrade or overhaul your UPS. In essence, this aims to prolong the unit's lifespan by proactively swapping critical components such as fans and capacitors ahead of their typical end-of-service life.

Overhauls reduce the risk of serious system failure and help optimise performance. But they aren't a silver bullet. Many components simply aren't cost-effective to replace, and in effect, an overhaul simply delays the inevitable. Whether it's sooner or later, the UPS will need replacing.

INVESTING FOR THE LONG-TERM

Replacing a legacy UPS with a new unit inevitably involves a significant up-front capital investment, while there's also a heightened short-term operating risk during the changeover period. But these drawbacks are balanced by several advantages.

Firstly, UPS technology has evolved massively in recent years. If your UPS is 7-10 years old, it's likely to be a transformer-based static tower that needs masses of expensive air conditioning to keep it running safely. These old-style systems only ►



	Legacy 120kVA N+1	Modular MPW 126kVA N+1
Load (kW)	96	96
UPS Efficiency (%)	91	96.20
Total UPS Input Power (kW)	105.50	99.79
kWh Price	£0.09	£0.09
Total Electricity Cost Per Year	£83,171	£78,676
Saving Per Year	–	£4,495
Saving Over 10 Years	–	£44,950

offer peak operating efficiency of 85-92% – they're even less efficient at low loads – resulting in significant losses.

Modern UPS power supplies, manufactured using transformerless technology can achieve anywhere from 94-99% efficiency and are capable of such performance even running low loads, meaning less wasted electricity. Cooling costs are cut considerably too because they generate less heat.

Another energy-saving aspect of new UPS systems is that it's far easier to right-size them at initial installation. The advent of modular UPS, in particular, means a new system can be rated far closer to the actual load profile, without losing out on redundancy.

They're scalable too, so when the time comes to expand, this can be achieved either by adding in extra power modules (with modular configurations) or paralleling extra units (for non-modular systems). Such 'pay as you grow' flexibility gives far greater control over the total cost of ownership (TCO).

Small improvements in efficiency – even just 1% – can produce sizeable savings. Look at the impact replacing a legacy UPS with a modular system such as our Multi

Power (MPW) can have (see table above).

These figures don't even factor in air conditioning costs, which would be considerably higher in the legacy installation.

Small improvements in efficiency – even just 1% – can produce sizeable savings

ADDITIONAL BENEFITS

Compared to old-style massive monoblock systems, modern UPS take up less space and are far lighter, making transportation and installation easier and more cost-effective.

For comparison, a legacy 800 kVA UPS (minus any batteries) weighs nearly four tonnes (3,950kg) and requires 3.2m² floorspace. If such a unit was replaced with a Multi Power (MPW) modular solution, the three necessary cabinets combined

would only need 1.89m² and even when populated with power modules would only weigh 1,760kg – less than half the weight and just over half the footprint.

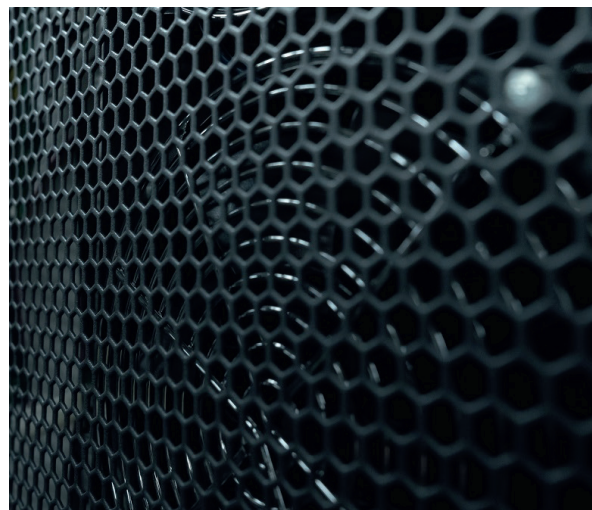
The freed up floor space is available to install lucrative server racks or additional batteries that could be deployed for energy storage schemes such as demand side response (DSR) – either way, that's additional revenue streams to explore.

Add in the fact that newer systems incorporate user-friendly touchscreen communications and offer cloud-based remote monitoring capabilities too, which give operators greater control and help to bring day-to-day operating costs down.

A final point to remember is that many of today's most efficient UPS systems feature on the government's Energy Technology List (ETL). This is part of the Enhanced Capital Allowance (ECAs) tax scheme and allows companies to offset buying new equipment against their profits. Basically, an incentive to tempt firms to take a long-term view by investing in more energy efficient equipment. In this case, it could reduce the cost of buying a new UPS.

ECONOMIC AND ENVIRONMENTAL GAINS

Replacing an ageing UPS with new might make a short-term dent in your finances, but the longer term benefits pay for itself many times over; with Improved performance, enhanced efficiency, reduced energy bills, and greater control over the total cost of ownership. For many data centre operators contemplating the next move with their critical power protection systems, these advantages should make a compelling case. **ER**



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Embracing change



David Hall, VP Power Systems UK & Ireland at Schneider Electric, explores why utilities need to be smarter when selecting switchgear and outlines the advantages of embracing the latest innovations generating change in the offshore wind sector.

Climate change represents one of the most major challenges we face as a planet today – one that spans social, economic and ecological impacts. As the UK continues to move towards more sustainable energy sources, it needs to keep up its growth in order to succeed in its target of reducing the carbon intensity of energy generation to 50-100g CO₂/kWh.

In order to meet these targets, the UK government is committed to building an additional 2GW of offshore wind capacity by 2020. This means that in just under a year, wind power could generate a fifth of power in the



continues to reduce its reliance on fossil fuels, utilities companies are under greater pressure to improve the efficiency and reliability of their power supply and ensure it is future proof. After all, a green and reliable supply of energy is the foundation on which smart industries run and economies grow. Yet the growth of offshore wind poses new and unfamiliar challenges.

More support and funding means offshore wind farms are growing larger, and more innovation in the space means that they can be installed further out to sea. Turbines are also increasing in size to generate more energy, with 10MW+ machines likely in the future.

Whilst more renewable energy is of course vital, the drawback of large farms is that bigger turbines and longer cables are required to connect the generated power to the grid. Longer cables in particular can lead to inefficiencies in transmitting the generated energy, meaning that the energy that is generated at the turbine may not fully reach the shore to be added into the grid.

One of the keys to keeping the system efficient is investing in the latest switchgear technology. Without an innovative approach to high-voltage switchgear, utilities run the risk of more expensive equipment and more frequent power losses.

Traditional 72.5kV switchgear is costly, heavy and intended for the transmission of power from generation site to electrical substation. It can no longer scale with the complex demands of our burgeoning offshore capacity. As such, a new generation of 72.5kV equipment has been developed, conforming to all the applicable High Voltage standards, but with all the benefits of a Medium Voltage switchgear.

Utilities have to be smarter when selecting switchgear and should not be afraid of more innovative solutions. New designs have been built to be future proof. For easier transportation, installation and maintenance they should prioritise solutions that are compact and lightweight. New innovations also boast strong safety advantages, such as certified internal arc rating, which was not designed into previous solutions.

The latest solutions are also designed with a modular approach, allowing individual panels to be arranged as a switchboard via a common busbar. This

provides multiple configuration options, providing greater flexibility.

Another development is the use of connected technologies from the Internet of Things (IoT). IoT technology is crucial for the smooth running of modern networks, and the latest solutions are IEC61850 automation ready, featuring digital protection relays, condition monitoring of cable connections, humidity, temperature and gas-pressure monitoring all with remote, real time value indication. This all helps to ensure solutions are as resilient as possible, staying in good condition in harsh environments, particularly as maintenance at offshore facilities can itself be challenging due to ever-changing weather conditions.

For improved cost efficiency, utilities should seek out switchgear with maintenance-free high voltage parts including sealed-for-life vacuum

“ In just under a year, wind power could generate a fifth of power in the UK ”

interrupters. Purchasing equipment that comes as a complete unit will also keep installation costs from spiralling.

Above all, they should take advantage of digital innovation. The latest generation of switchgear contains Internet of Things connected sensors, protection relays and discreet devices that offer real-time condition monitoring. Embedding the common protocol of IEC61850 enables this to be achieved quicker and more cost effectively than established solutions. A reduction in supply failures and an increase in equipment lifespan can mean an offshore generation facility suffers less down time due to maintenance. With unreliability of supply being the age-old criticism of wind power, this move brings wind one step further towards full integration into the grid.

By embracing switchgear innovation, utilities and operators can meet the demands of our diversifying energy mix. The potential of offshore is enormous, it only needs continued support and creativity to help it reach its second wind. **ER**

UK. In addition to its environmental credentials, building offshore wind turbines is cheaper than investing in new gas or nuclear power stations.

Last year, almost a third of the UK's electrical energy came from renewable sources between July and September, as wind turbines alongside solar panels helped achieve a quarterly record for green energy. 2018 was a good year for wind power in general, with records being broken during 'the beast from the east', and Storm Diana.

While the transition to renewables is good for the environment, it will be a challenging one for utilities. As the country



Surging ahead

The growing sophistication of today's electronic equipment calls for more stringent safety measures. Helen Johnson, technical sales director, Surge Protection Devices Ltd, discusses the levels of lightning and surge protection required in order to meet the new British and European Standard, BS EN 62305.

Recently introduced standards put equal importance on protecting the electrical installation and electrical equipment as well as the building itself.

As technology increases, consumer's demand that the electrical items we use get smaller, which means the components inside are also smaller. The reduction in the size

of these components over the years now makes electronic equipment very sensitive to over-voltages.

An over-voltage, or a surge as they are generally called, are short spikes in voltage, which unknown to most people are occurring all the time. As the components inside the electrical equipment we use are so small, they are slowly degraded by these

surges, which gradually shorten the lifespan of the equipment.

This phenomenon affects everything that is plugged into power, from your household electronics through to industrial machinery and computers. Many computer systems are now networked and rely on each other to operate. Therefore, if one part of the system gets damaged due to lightning

“It takes 20 years to build a reputation and 5 minutes to ruin it. If you think about that, you’ll do things differently.”

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or surges, the whole system will not operate. The consequential losses suffered during such events i.e. downtime and lost production, can be very high.

A Type 1+2+3 combined lightning and surge device must be installed if the building is fed by over-head lines, or it has an external lightning protection system. When lightning hits the external lightning protection system (or over-head power lines) the lightning travels down the cable to the main incomer of the building.

Although the external lightning protection system is earthed, only 50% of the total voltage from a lightning strike will go to earth, the other 50% (possibly up to 100kA) will travel across the cross-bond on to the incoming panel and out onto the electrical circuits in the installation. This

creates a massive risk to the property and to any life inside.

The Type 1+2+3 combined lightning and surge device is usually fitted in a separate enclosure and mounted next to the main board. They are wired in parallel to the supply, and can either be fed directly from an existing breaker in the board, or you can install connection blocks off the main board and wire the device into these connection blocks.

If the building has sub-distribution boards more than 10 metres away from the incoming panel, these boards will require additional protection. A Type 2 device is usually sufficient here, unless the panels/sub-distribution boards feed external circuits such as car park lighting, CCTV etc. then these should have a combined Type

Over-voltage affects everything that is plugged into power, from your household electronics through to industrial machinery and computers

1+2+3 device fitted as standard.

In all other installations, where the building does not have an external lightning protection system and is fed by underground cable, then a Type 2 surge arrester is ►





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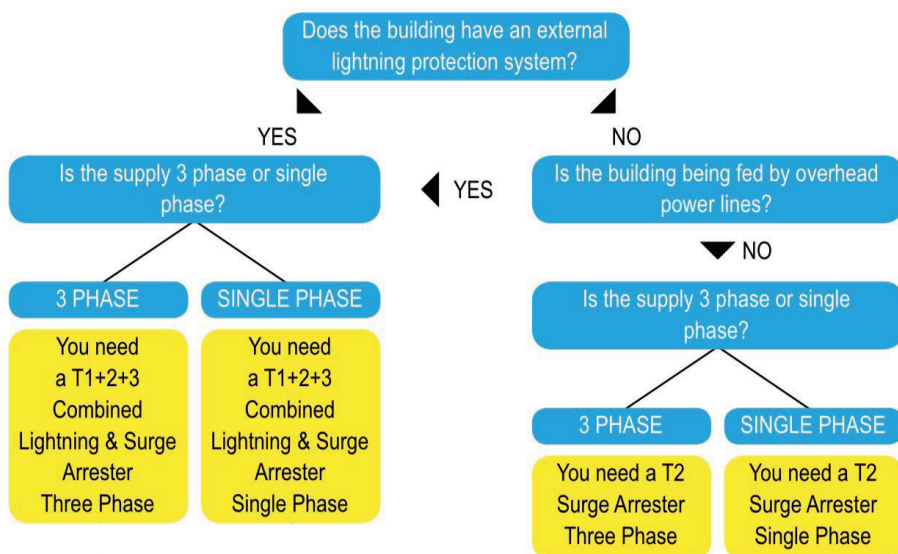
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**Type 1**

What it does	Where to use it
Protection against direct lightning strikes	At the mains incomer of any electrical installation where external lightning protection is installed or is fed by overhead lines.

Type 2

What it does	Where to use it
Surge protection	At the mains incomer of any building that doesn't need any lightning protection and for use on any sub-boards more than 10-15 meters from the main panel.

Type 3

What it does	Where to use it
End equipment protection	On any piece of equipment where a low let through voltage is needed.

sufficient. This Type 2 device can sit on the main board, where it will protect all outgoing circuits. If there are any sub-distribution boards 10 metres away from the main board, then these will also need protecting with a Type 2 device. The reason for this is because surges can occur from anywhere in a building. Usually we think about the surges coming in from the mains, but generally this is not the case. Only about 20% of surges occur from outside the building. Whereas 80% of surges are generated from within the building, due to things like switching events.

DOMESTIC INSTALLATIONS

Under the 18th Edition guidelines, as of January 2019, surge protection has been a requirement. This is because the surges that have always occurred in our systems now pose a threat due to the increasing use of more sophisticated electrical equipment.

As you can imagine, the equipment we use every day is getting more technical, but also smaller. Which means that the components inside are getting smaller, so more susceptible to damage from any over-voltage. The 18th edition states the only instance surge protection may not be installed in a domestic situation is if the value of the surge protection device exceeds the value of the electrical installation, or a risk assessment has been carried out to prove the property does not require protection.

MAIN INCOMING POSITION

Most modern and the latest designed Type 1+2+3 combined lightning and surge arresters will have common and differential mode protection (all mode arresters). This means that these new devices protect not only from phase to earth and neutral to earth, but also phase to neutral and phase to phase. The advantage of an all

●● **A Type 1+2+3 combined lightning and surge device must be installed if a building is fed by overhead lines** ●●

mode arrester is a very low let through voltage between all conductors, less than 600V. A device of this type will be able to handle direct lightning currents as well as protect sensitive electronic equipment from damages up to 10 metres away.

SUB-DISTRIBUTION BOARDS

Type 2 devices commonly referred to as surge arresters, are generally fitted

at the sub-distribution board position. They take out of the system internal surges from switching events, which can damage sensitive electronic equipment. Any sub-distribution board more than 10 metres away from the arrester at the main incoming position should have a Type 2 device fitted. They have visual indication of status and should be checked regularly to see if they remain active.

FINAL CIRCUITS

Type 3 arresters are generally fitted to stand alone pieces of end equipment fed from sockets, but not exclusively e.g. a fire alarm panel more than 10 metres away from a sub-distribution board, which has a Type 2 surge protection device fitted.

CONCLUSION

As can be seen from the above, the number of applications and the technical requirements for surge protection devices are scaling up, in order to keep pace with our demand for better, faster, ever-shrinking technology.

If you are unsure of what is required, it is worth remembering that these standards have been revised for one very important reason; safety. It is our combined responsibility to educate ourselves and others, ensuring we continually set the (correct) standard if we are to remain protected. **ER**



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New rules

Gary Parker, senior technical support engineer, ECA, takes a closer look at surge protection and the changes made to the 18th Edition.

Surge protection devices (SPDs) are used in electrical installation systems to protect against transient over-voltages (or voltage spikes) that can cause damage to electrical equipment by overloading components. These electrical surges can result from sources such as lightning or the switching on or off of large electrical loads elsewhere in the network. SPDs are designed to divert the excess current to earth, protecting electrical appliances and systems.

The 18th Edition of the IET Wiring Regulations, which as readers will know came fully into effect on 1 January 2019, has brought important changes to SPD requirements. With our increasingly complex dependence on electronic devices, automation and IT, in both domestic and commercial environments, the possible consequences of over-voltage damage to vulnerable equipment and components – ranging from the loss of critical data on computer systems to the disruption of industrial plant, machinery or vital infrastructure – can be significant, costly and hazardous.

Another factor that has driven change has been the growth in the deployment of renewable energy sources such as solar photovoltaic (PV) panels and wind generators. These installations rely on many electrical components and monitoring systems, but because of their locations – above properties, in fields or on hilltops – they can be vulnerable to surges caused by lightning.

WHAT CAUSES SURGES?

Lightning strikes produce the largest transient over-voltage events in electrical installations, creating surges of thousands of volts lasting less than a millisecond. These can result from direct strikes, but also strikes up to a kilometre away from the installation.

Man-made surges arising from switching event transients on the network, though much smaller in scale, are more frequent and

can stress electronic components, causing unplanned outages, damaging or degrading equipment – and ultimately result in equipment failure.

WHEN IS SURGE PROTECTION NEEDED?

Chapter 44 of the 18th Edition of the IET Wiring Regulations deals with 'Protection against voltage disturbances and electromagnetic disturbances'. Section 443 has been redrafted, removing the earlier 17th Edition's 'AQ criteria' risk assessment process that considered external environmental conditions that influence lightning.

Instead, the 18th Edition establishes that SPDs need to be installed by electrical contractors to protect against transient over-voltages in situations where there may be serious consequences. Effectively, the process has been simplified and the emphasis in approach has shifted from considering whether SPDs should be installed, to installing SPDs unless it's established that they're not required.

If a risk assessment is not carried out, the regulation states that SPDs shall be fitted in all cases.

WHAT TYPES OF SURGE PROTECTION ARE REQUIRED?

SPDs are classified into three different types (Types 1, 2 and 3) according to their standard and the types of transient over-voltage they are required to handle:

'Protection against transient over voltages shall be provided where the consequence caused by over-voltage could:

- (a) result in serious injury to, or loss of, human life, or
- (b) result in interruption of public services and/or damage to cultural heritage, or
- (c) result in interruption of commercial or industrial activity, or
- (d) affect a large number of co-located individuals.'

TYPE 1 SPDS

Also known as equipotential bonding SPDs, Type 1 SPDs are designed to be deployed at the origin, where services enter a building or facility, and protect against major surges from direct lightning strikes. They are not, however, designed to protect sensitive electronic equipment or electrical systems from switching transients. They should therefore be used and coordinated with Type 2 devices.

TYPE 2 AND 3 SPDS

These are designed to protect electrical and electronic equipment from the secondary effects of indirect lightning and against switching transients, by reducing the transient over-voltage to safe levels. Type 2 SPDs can help prevent the spread of over-voltages in electrical installations and are usually installed in distribution boards.

Type 3 SPDs, which have a low discharge capacity, can be used to supplement Type 2 SPDs to provide protection for sensitive and critical loads. These SPDs should be installed close to the equipment to be protected.

The use of a combination of SPD types, effectively acting as a cascaded protection system, is recommended to provide coordinated protection from transient over-voltages. Many types of SPDs are available, including combined SPDs in a single unit (such as Type 1+2+3) for simplification of installation and maintenance, and reduced cost.

The correct installation of SPDs is also vital to ensure maximum protection, not only for electrical safety, but also because poor installation techniques can reduce their effectiveness. For example, connecting conductors should be kept as short as possible, as this will minimise any additive voltages on the connecting cables.

Full guidance on the specification for connections is available in Chapter 44 section 443 of the 18th Edition. **ER**



●● The use of a combination of SPD types, effectively acting as a cascaded protection system, is recommended to provide coordinated protection from transient over-voltages ●●



What's all the Rack-IT about?

Mandeep Jandu, cloud, data centre and telecoms infrastructure specialist at The Rack and Cable Company UK Limited, outlines the role of the rack, as well as some key considerations when it comes to purchasing your equipment.

IT hardware, whatever form it takes, must reside in some form of cabinet, rack or enclosure. In a small office or home office, it may be a simple Wi-Fi router on a desk or mounted direct on a wall. SMEs may use simple wall-mounted racks or cabinets.

In larger organisations, corporates, governments and NGOs where IT is deployed in its tens of hundreds, we procure floor standing enclosures and cabinets.

To all racks or cabinets that host IT equipment, electrical power has to be provided and this is usually in the form of single-phase feeds. In some instances, single phase electrical feeds are being upgraded

to three phase electrical feeds, due to IT hardware becoming ever more power hungry in today's virtualised world.

SIZE MATTERS

Racks and cabinets take up and occupy space, generally measured in square metres. In times gone-by these spaces were on premise i.e. in the same building as the people using the technology. In more recent times, they are located in purpose-built data centres or colocation centres.

Whether on-premise, purpose-built data centres or co-located space, they all have one thing in common: cost. Therefore, designers need to consider the rack dimensions (WxHxD) suitable for the IT

hardware that will serve the business and ensure space is optimised and balanced between costs and needs. The more IT a business requires, the more racks are needed, and more racks equal more space.

There are two widths associated to a rack:

1) There is the inner frame – a frame within a frame which is generically known as the 19 inch mounting frame. The hardware is made to 19 inches wide to fit the racks.

2) The rack's external frame can measure in width anywhere from 600mm, 700mm or 800mm.

Rack depths have also changed over time, as have the depths of the hardware. Racks that measure 300mm were used for patch ►

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panels and small IT equipment. The 600mm deep rack was mostly associated with telecoms systems, but when the data centre industry really took off in the late 90s, the 800mm and deeper became more prevalent due to the changing hardware and the space needed at the time.

The third dimension is the height of the racks. Rack height is generally measured in U-space. Today, 42u racks are prevalent, but all heights are visible in the data centres. These range from 6u wall mountable through to 52u heights depending on the floor to ceiling height gap. Racks come in all heights, widths and depths and that is what the Rack-IT is about – accommodating IT hardware.

Racks and cabinets are specifically designed for IT hardware and of course everything installed will add to the weight of floor-standing racks. The rack must be robust and sturdy to mount and retain the IT hardware, and the limitation of the rack must never be breached. Keep in mind, the rack and cabinet may support the IT weight, but the supporting floor must be able to do the same!

Once a decent, robust, fit-for purpose rack is selected for purchase, they can have a life span of over 25 years, but this is of course limited to how quickly IT outgrows the rack dimensions.

LIMITED ACCESS

Enclosures, cabinets and racks must also provide security. In other-words they should not be accessible to just anyone – so racks are manufactured with some form of locking mechanism on the doors.

This could be a key, a digipad, biometric scanner, ID card or a combination. Enclosures aren't just limited to racks or cabinets, but in data centre environments also include cages within which racks are enclosed. These enclosures must themselves be secured.

In some businesses, each enclosure is secured as are the racks and cabinets. To do this, entry into the enclosure and opening of just the rack door must be governed through ITIL incident and change management.

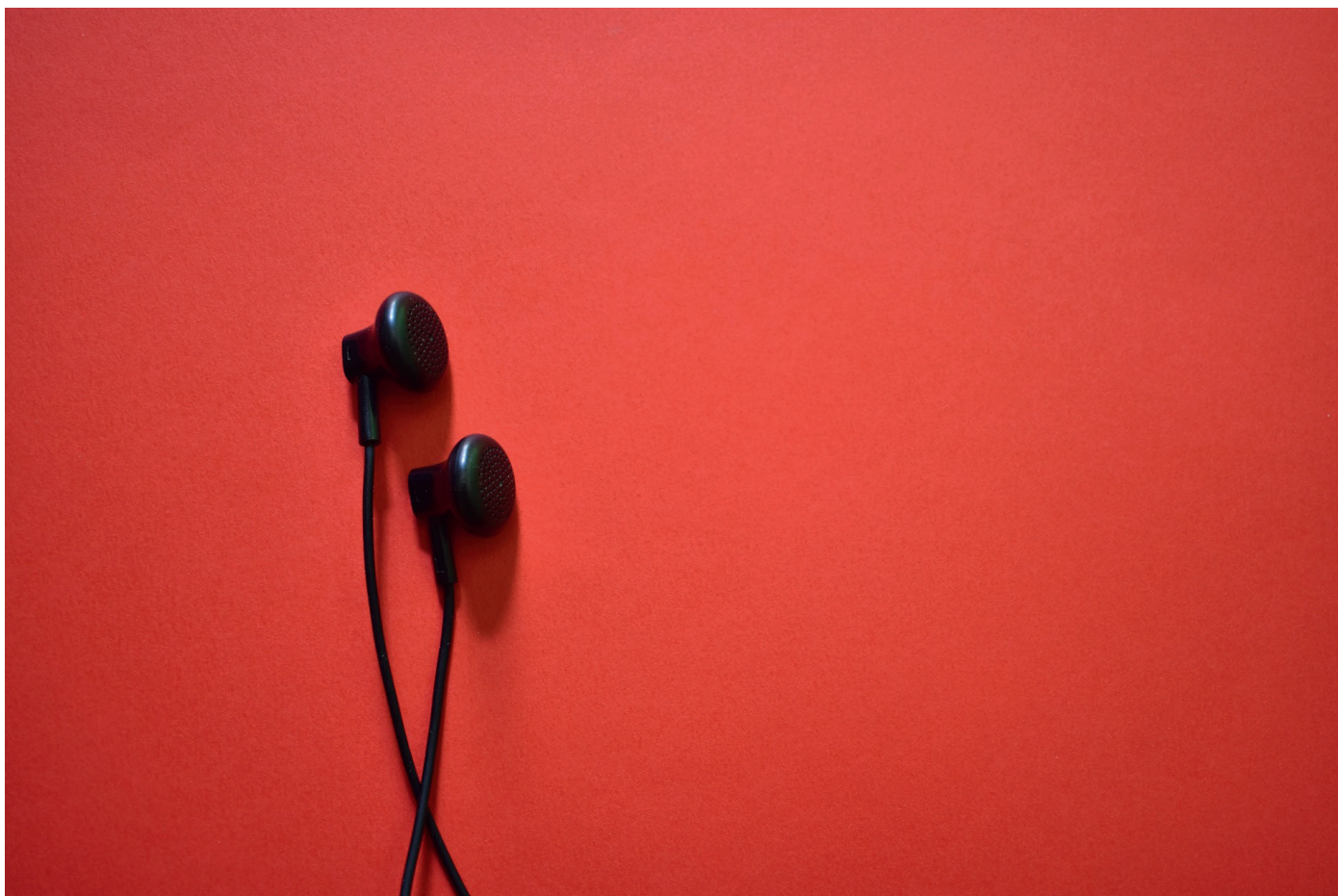
Whilst security has a key function in

making access limited to authorised persons, there is the human element to consider. Take for example structured cabling and ease of installation/de-installation of IT hardware, maintenance and break fix works and the density of the hardware installed. The question is: can it be worked on easily?

A good quality rack balances the structured cabling to the network and servers with the power strips and the relevant power cords. Racks need adequate space to accommodate the IT hardware, power leads and cords, as well as the structured cabling systems whilst supporting security and ease of access to them.

CONCLUSION

In today's cloud systems, data centre and colocation environments, the role of the rack is integral in its ability to host the vast array of IT hardware and structured cabling systems required for business. An often underrated but unquestionably critical component, racks, cabinets and enclosures house our hardware and essentially our modern world. **ER**



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Conference Agenda

Jim will discuss the changes, walk you through the calculations using his new worksheets and explain how the 2018 edition is used in arc flash studies. Jim will cover:

- Overview of changes to the 2018 Edition
- Arc Flash circuit dynamics and testing
- Electrode Orientation VCB, VCBB, HCB, VOA, HOA
- Enclosure size correction factors for different sizes
- New Interpolation Method for improved accuracy.
- Working distances, gaps and arc duration
- New Incident energy and Arc Flash boundary calculations
- Arcing current variation factor
- And Much More – Full agenda available upon registration

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Back to basics

Marian Petrescu, general manager at Voxility, examines practical ways to keep your data centre secure at rack level.

There is no doubt that today's vast web traffic comes along with a lot of preparation in the data centre and the demand for digital content will continue to fuel data centre market growth. The need for larger, instant capacity, which is forcing data centres to take on more power, racks, and hardware, is a result of the increased use of media and Internet-connected devices constantly feeding the networks.

As more and more industry sectors are now reliant on the internet, it is not surprising that cyber threats have become a significant problem. With the rise of increasingly complex DDoS attacks, businesses have never been so determined to secure assets from malware. Due to their distributed nature, they become harder and harder to fend off.

While online verticals such as financial services, gaming and e-commerce have

typically been the most vulnerable, any organisation with a serious online presence is now a potential target. In response to the data centre customers' needs for assurance of total reliability and security, both physical and virtual "safety" are a high priority for IT operators.

“Securing your assets is absolutely critical to prevent equipment failure and user downtime”

SECURING YOUR SERVERS

Data centres themselves must be secured. Increased virtualisation and software-defined processes mean that more and more businesses are sharing server racks and colocation space instead of having dedicated rooms/cages.

The importance of securing hardware is greater than ever thanks to this increasing complexity of legacy environments. As a result of dynamic changes involving increased flow of people, power, and assets, data centre management is much more difficult and prone to blind spots.

Easy access to your shared floor space and equipment may lead to unintentional issues occurring. Such risks should be managed and solved by data centre approved engineers, but there are practical and proactive steps you can take to ensure maximum safety of your servers.

POWERING AN 'ALWAYS ON' BUSINESS IT INFRASTRUCTURE

Data centres are likely to have written logs, restricted access and video surveillance in place for supporting a secure facility, but less urgent problems are often overlooked. The logical move for individuals looking to create an impenetrable security strategy, both online and off is to ensure server rooms and individual cabinets are locked.

For rack-level security, you have many choices. Varying in price and complexity, they all have pros and cons. Key cards, biometric scanners, locks, fobs, cameras and even security officers. They all offer a range of access control to servers but still one or more systems will leave your hardware penetrable.

LOCKS AND KEYS

A traditional method of securing racks is to bolt them to the floor – this may not be the most sophisticated but it is effective.

All modern cabinets and enclosures are likely to come armed with a simple lock but there is no way to track and monitor who has, and who has had, access. As well as not being scalable, this could be costly if a key is lost as every enclosure will have a separate key and all employees with access will need a copy.

Another option is a combination dial lock. Use a code to access the cabinet, which can also be overridden with a key, to improve efficiency and security. However, this presents some of the same issues as a traditional lock, and codes must all be set and changed manually.

ADVANCED DATA CENTRE TECH FOR A SECURE ENVIRONMENT

Racks, cabinets and enclosure security has stayed low-tech over the years. Recently, the traditional lock and key has benefited from technological advances, especially in software-defined environments. IoT and biotech allow for entirely new monitoring and locking capabilities.

A card reader lock – or swing handle locks – grant access via a swipe card. Users can monitor who accesses the server, when and how often, as well as other insights. With some higher-spec models, you can even set specific access times.

Card readers are easily monitored and integrated within existing control systems while removing the need for manual

“As more and more industry sectors are now reliant on the internet, it is not surprising that cyber threats have become a significant problem”

modification of locks, which would be the case if each one of your servers was accessed by a manual pin code for example. However, as with legacy keys, there is no way to ensure the legitimate owner is the one using the card.

One innovation that is being deployed by companies is biometric scanners. For mission critical data, you may consider biometric locks. Using a finger or palm print as means of authentication ensures that your racks are the utmost secure.

Security may also be enhanced through deploying sensors. A light sensor may be programmed to send an alert when the lights get turned on. The same can be done when room temperature reaches a certain threshold,

or whichever other variable is of concern.

Equipping any environment with this level of security will take longer, with implementation periods exceeding other options, but its necessity should be drawn from the nature of your data.

MAKE SECURITY HAPPEN

Securing your assets is absolutely critical to prevent equipment failure and user downtime. Today's data centre technology is highly performant and it continues to evolve at a rapid rate.

When it comes to protecting the data centre, data security is just a part of the process. Prevention strategies and disaster recovery plans can make an important difference when faced with a natural disaster.

Security could also be enhanced from an operational point of view. Positioning business managers and IT leads within close proximity of servers is also helpful, as the ability for quick access can be invaluable in case of an emergency. The industry can often overlook the value of an employee close by in a software-defined domain.

All in all, the right method is different for everyone. But there's no room for trial and error when referring to "data safety". As more and more companies are focusing solely on their online presence, security is now one of the highest considerations on operators' set of priorities. **ER**



Case study: In perfect harmony



When transformers on a prestigious diamond mining vessel started experiencing the classic symptoms of harmonic noise related problems, CP Automation was on-hand to help.

Namibia in southwest Africa has 3,700 square miles of diamond concession at sea, which is expected to yield millions of carats of marine gemstones for the next five decades. To ensure the vessels carrying out this mining are equipped, supply, installation and repair specialist CP Automation helped mitigate harmful harmonics on onboard the prestigious Debmar Pacific diamond mining vessel.

Land-based diamonds in Namibia are expected to run out within the next decade. To avoid a shortage, the government of Namibia has been strengthening its offshore diamond mining capacity.

In a joint venture between the Namibian government and De Beers Group, Debmarine Namibia, the country's leading marine diamond mining company, was established in 2002.

The company operates five diamond mining vessels including the Debmar Pacific, which mines diamonds from the ocean floor using advanced drill technology.

Having been built in 1977, the Debmar Pacific was in urgent need of electrical system upgrading. Debmarine Namibia was having problems with a particular lighting circuit, in which several transformers were blowing due to suspected poor power quality supply. This was a highly typical symptom of an electrical circuit experiencing harmonic noise related problems.

Actom Energy, electrical engineering specialist in South Africa, was chosen to design, manufacture and install an active harmonic filter control panel to the vessel to alleviate this problem.

Actom needed to source a harmonic filter fast, and based on a recommendation from De Beers, called upon CP Automation. Using the information supplied by Actom and De

Beers, CP Automation advised the use of an ADF P100 active dynamic filter by Comsys.

WHY ARE HARMONICS A PROBLEM?

This problem generally arises from the use of variable frequency drives (VFDs) and other non-linear loads. A load is considered non-linear if its impedance changes with the applied voltage. This change means the current drawn by the non-linear load will not be sinusoidal, even when it is connected to a sinusoidal voltage.

Non-sinusoidal loads contain harmonic currents that interact with the impedance of the power distribution system to create voltage distortion and power quality

“Harmonic filters cancel out the noise and keep transformers cool and working efficiently”

problems, which heat the transformer. This explains why the previous transformers broke in the lighting circuit on the Debmar Pacific.

Harmonic filters – as the name suggests – remove harmonics. However, they also correct the phase of the fundamental currents, converting non-linear loads into linear ones. They cancel out the noise and keep the transformers cool and working efficiently.

“We can’t stress enough how much of a positive impact the right harmonic filter can have on a company’s environmental performance, lowering energy consumption

and improving productivity,” explained John Mitchell, business development manager at CP Automation.

“With this in mind, we were confident the ADF P100 was a perfect match for Actom’s project, and that it would put an end to the previous transformer issues.”

The ADF P100 active dynamic filter also brings the added benefits of a high-power density, while being relatively small in size, which makes it ideal for small and medium size applications where space is precious, such as onboard a mining vessel.

Gregory Webb, instrumentation technician at Actom Energy said, “Installing this filter was straight forward and engineer-friendly. It has continued to perform well since installation, as demonstrated by the lack of issues with the transformers in the lighting circuit, as we had seen before commissioning the harmonic filtering.”

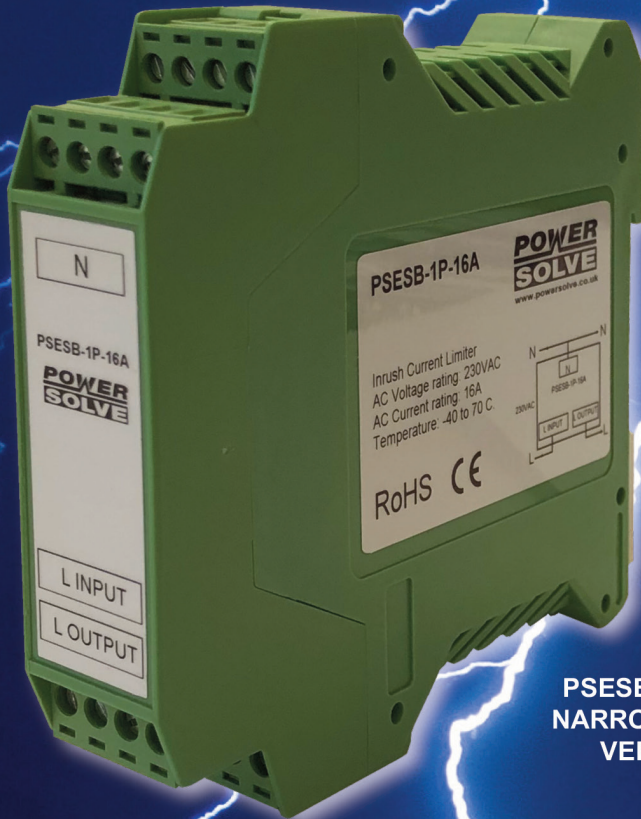
The Debmar Pacific continues its operation off the southern coast of Namibia. To add to this fleet, the De Beers Group has since confirmed that the construction of the world’s largest diamond mining vessel has commenced and will begin operation in 2021.

This new vessel, along with the current Debmar fleet vessels, will make accessing the millions of carats of marine gemstones possible, with expert harmonic filtering onboard to ensure electrical systems are safe, trouble-free and long lasting.

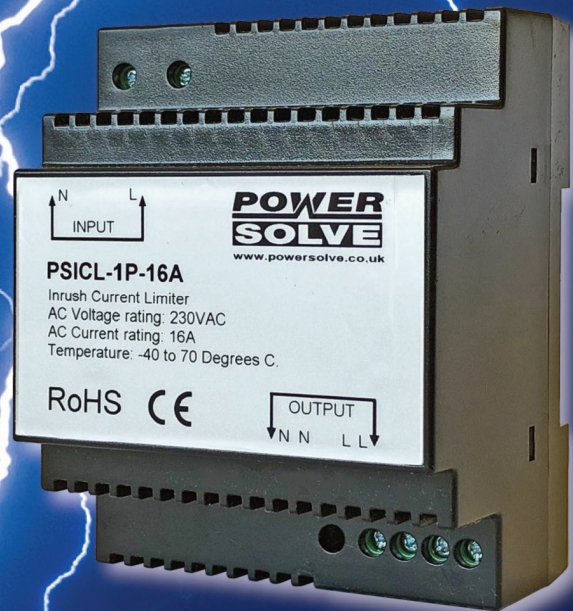
Namibia’s land-based diamond excavation may be reaching its end, but now, the country is taking diamond exploration offshore. With these vessels, the country can continue reaping the rewards of its lucrative diamond mining industry, without the limits of the land — or disruptive harmonics. **ER**

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VERSION**



**PSICL SERIES
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The PSICL Series is a range of inrush current limiters designed to protect against unintended fuse or circuit breaker activation caused by peak currents. The benefits can result in reduced cable cross section and the use of smaller and faster circuit breakers. These are not simple NTC devices and feature current control circuits with integrated bypass relays.

Applications:

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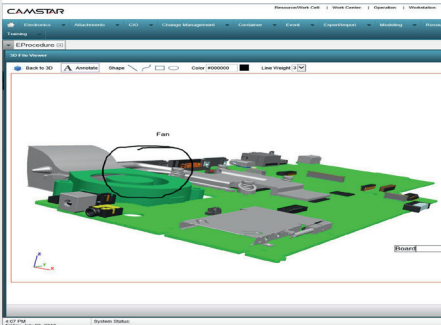
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MES SOLUTION SUITS ELECTRONICS MANUFACTURE

Siemens has announced the introduction of Camstar Electronics Suite software, an innovative manufacturing execution system (MES) for electronics.

Building on the successful enterprise-level platform for integrated circuit (IC) manufacturing, this powerful, configurable and scalable MES solution enables printed circuit board (PCB) and box assemblers to meet traceability requirements, improve efficiency levels and control manufacturing operations through direct Internet of Things (IoT) connectivity with machines and production lines.



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www.plm.automation.siemens.com

EFFICIENT TESTING OF SUBSTATION AUTOMATION SYSTEMS

StationScout simplifies testing the automation, control and SCADA communication in an IEC 61850 substation automation system (SAS).

Running on the digital substation test set MBX1, StationScout visualises and analyses the communication in an SAS in an unprecedented way. The topology is determined from the engineering data in Substation Configuration Language and displayed intuitively.

StationScout supports engineers throughout the entire life cycle of an IEC 61850-based SAS with a combination of simulation and testing functions. A cyber secure connection to the substation network can be established and IED simulations can be performed.

StationScout allows for SCADA testing using two methods. First, all alerts, switchgear status signals and measurement values are produced by simulating the IEDs. Second, StationScout simulates the client to verify and record if the real relays send the correct alerts and status signals.



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FLIR X6900sc SLS and FLIR X8500sc SLS thermal cameras provide the faster frame rates, shorter snapshot speeds, and wider temperature ranges needed for the most demanding applications.

These outstanding thermal cameras feature strained layer superlattice (SLS) detectors filtered for longwave infrared. These SLS detectors produce high frame rates and wide temperature ranges, as well as integration times that are more than 12 times faster than their midwave counterparts.

FLIR combined this advanced technology with popular features of high-speed visible cameras, such as remote triggering and precise synchronisation, to produce high-performance cameras that can capture meaningful data for anything from aerospace research to composite materials testing.



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www.flir.co.uk

FLUKE 1660 SERIES MULTIFUNCTION INSTALLATION TESTERS WITH FREE EXTRAS

Until 30th June 2019 and while stocks last, Fluke UK is offering two 1660 Series Multifunction Installation Testers with a free innovative T6 Electrical Tester plus data management software.

The Fluke 1664 UK-T6 comprises a 1664 FC Multifunction Installation Tester with a Fluke T6-1000 Electrical Tester plus free Fluke DMS Data Management Software; the Fluke 1663 UK-T6 comprises a 1663 Multifunction Installation Tester with a free Fluke T6-600 Electrical Tester plus Fluke DMS Data Management Software.

Fluke T6 Electrical Testers with FieldSense Technology make troubleshooting safer and more efficient by allowing electricians to take simultaneous voltage and current measurements, not just detection, without test leads.



Fluke
www.fluke.co.uk

FLUKE INTRODUCES NEW HIGH-ACCURACY LASER LEVELS

Fluke has introduced a new series of point, line, and rotary laser levels with improved performance, engineered by Pacific Laser Systems (PLS).

The 11 new lasers provide bright, crisp reference points and lines for accurate indoor and outdoor layout. Most models are available as red (R) and green (G) variants. The PLS 3R and 3G, PLS 5R and 5G, PLS 6R and 6G, PLS 180R and 180G laser levels are accurate to $\leq 3\text{mm}$ at 10m and built to provide IP54 dust and water resistance and to withstand a 1m drop.

The PLS 3R and 3G offer three point directions; the 5R and 5G offer five point directions; the 6R and 6G offer four point directions, plus a 180 degree horizontal and vertical line; and the 180R and 180G offer a horizontal and vertical line.



Fluke • 020 7942 0708
www.fluke.co.uk

TWICE AS FAST CHARGING WITH SCOLMORE'S TWIN USB CHARGING PORT

Scolmore has upgraded its 13A 2-Gang USB socket which now features two USB charging ports – both capable of delivering 5V 2.1A simultaneously.

This allows for optimum charging of two devices at the same time, without fear of fluctuations in the power supply interfering with the charging process.

This redesign of Scolmore's USB sockets sees the location of the USB ports on the 2-gang socket moved from underneath the switch and socket outlets to above each individual socket outlet on the outer edge of the plate.

The new 1 and 2-gang USB sockets are available in all Click ranges - Mode, Polar, Deco, Deco+, Definity, Define and Metalclad. The redesigned PCB means the majority of the range will fit inside a 25mm back box.



Scolmore • 01827 63454
www.scolmore.com

SANGAMO LAUNCHES NEW BLUETOOTH TIME SWITCHES

Sangamo, has added new Bluetooth-compatible timers to its DIN Rail Time Switch collection. The new range will help manage costs in residential, commercial and industrial applications.

It uses Bluetooth technology to programme the timer and is compatible with Android and IOS, and applications include lighting, security, heating, ventilation, irrigation and horticulture. The current Sangamo DIN rail time switches use Near Field Communication (NFC) to programme the timer from an Android device.

As well as Bluetooth communication, the new time switches feature zero-crossing technology supporting up to 600W LED load. This technology protects the relay contact and extends service life, therefore helping the lighting controls to match the long lifespan of LED lighting systems.



Sangamo • 01527 515 150
www.sangamo.co.uk

LLE FLEX CC MODULES OFFER FLEXIBLE LED LIGHTING

Flexible, linear constant-current LLE FLEX CC advanced modules from Tridonic provide efficient LED modules from a reel which are easy to install thanks to a 3m adhesive tape backing.

The LEDs are provided on a 14mm wide and 25m long reel which can be split every 140mm. Each 140mm segment contains 16 LEDs that produce a homogeneous light with no shadows and come with AVX terminals and solder points for simple wiring.

The LLE FLEX CC ADV LED modules have a typical luminous flux of 1,250lm and achieve a module efficiency of up to 209 lm/W. They are designed for use as part of an LED system solution comprising of the linear module and matching SELV LED driver. In this configuration, they achieve a system efficiency of up to 182 lm/W.

The LED modules are available with colour temperatures of 2,700K, 3,000K and 4,000K, in each case with Ra > 80 and Ra > 90.



Tridonic • 01256 3743000
www.tridonic.com

FLEXICON OFFERS A FAST-FIT WITH NEW IN-LINE DIVIDERS

Cable protection specialist, Flexicon has extended its FPAX range of in-line dividers to accommodate larger size, non-metallic flexible conduits including 42mm and 54mm.

Flexible conduit allows designers and installers to combine and protect different sizes and types of cables, from end to end, in one system. In-line dividers enable circuits to be divided and the conduit system to be adapted, thus offering flexibility while still maintaining system integrity.

With one larger entry and two smaller entries, the FPAX accessory allows a conduit system to be split in to two smaller diameter conduit runs. This can be beneficial when space is restricted, or multiple conduit runs and routings are required, such as on industrial machinery.



Flexicon • 01675 466900
www.flexicon.co.uk

QUARTZELEC EXTENDS SECTOR WINNING RANGE OF TERMINAL BOXES

With demand for certified and fault tested main and neutral HV terminal boxes undergoing a significant rise due to growing customer safety requirements, Quartzelec, has re-certified its range of Phase Segregated Terminal Boxes to the new IEC standards which includes adding full earth bonding.

The additional earth bonding ensures all external surfaces remain at the same potential. It is a safety feature that allows any electrical charge, created by the inadvertent energisation, from internal or external sources, possible by accident like a lightning strike or even static, to be safely discharged to earth via a dedicated conductor.

Quartzelec supplies a complete range of fault tested ATEX and IECEx certified main and neutral terminal boxes suitable for applications up to 15kV for hazardous area applications.



Quartzelec • +44 (0) 1788 512512
www.quartzelec.com

MARTINDALE'S 18TH EDITION CERTIFICATION SOFTWARE

With the 18th Edition now fully in force, using Martindale's ET-Link certification software is a great way to stay up to date with the latest certificate changes.

The updated PC software includes the new 18th Edition certificates which can be either auto filled from test results saved on-site using the ET4500 multifunction tester, or entered manually. The print function in the PRO version allows plain paper forms to be printed for completion by hand.

The certificates include all the latest changes and the Initial Verification and Periodic Inspection updated.

The ET-Link software is unique in being able to upload circuit and installation information from your PC to the ET4500 as well as downloading all the results. Upload client, location, distribution board and circuit information before arriving on-site to simplify testing and the saving of results at the installation.



Martindale Electric • 01923 441717
www.martindale-electric.co.uk

THE FUTURE OF LIGHT IS DIGITAL

Zumtobel is striving for the use of its innovative LED solutions to empower the latest in wireless technologies dubbed – LiFi.

The newest trial, conducted in partnership with pureLiFi, uses LED lights to send large amounts of data while appearing as normal LED light to the human eye. As part of the trial, Zumtobel has installed pureLiFi's system, alongside its LED lights. The system enables a data transmission via an LED luminaire at high-speeds through small adjustments in the LED's brightness.

The result is a high-speed Internet connection that is more secure, reliable, and able to deliver bandwidth far beyond the capabilities of conventional wireless communications like Wi-Fi.

LiFi is more secure and virtually interference free compared to other wireless solutions. The technology will enable them to leverage vast frequency spectrum resources of visible light. Zumtobel aims to evaluate the market demand for this ground-breaking technology over the coming months.



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Based in the UK for the last 50 years, we've worked together with a multitude of customers in all environments globally and since 1990 have installed more than 640,000 generator sets around the world, with as much combined power generation capacity as the entire UK power grid.



To find out more,
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