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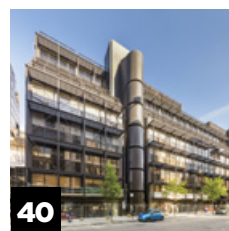
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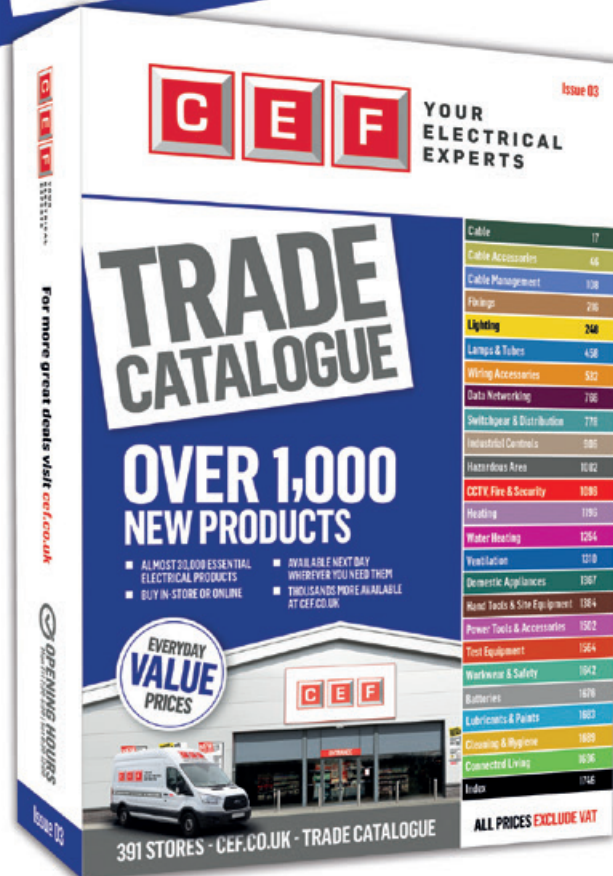


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EDITOR'S COMMENT

Happy first issue of the decade Reviewers. It's that time of year when normality has just about resumed, and most of our New Year's resolutions have fallen comfortably by the wayside. Although if you've managed to complete dry January, I salute you, January is depressing enough as it is.

Although 2019 was admittedly a bit of a bummer in places, that means there is always room for improvement, and here at Electrical Review HQ we are all for improvements. Last year, ER magazine got a revamp, so to keep up the momentum, we will be launching a brand-new website in the coming weeks, so keep your eyes peeled.

And of course, this year we also have our third annual ER Excellence Awards, taking place on 21 May at the gorgeous Christ Church Spitalfields in London. Entries are open until 6 March and are free via our website, so if you've got a product or project worth shouting about, we want to hear from you!

As always, I'm always seeking new faces for the issue, so if you'd like to get involved, please don't hesitate to contact me via clairef@electricalreview.co.uk.

Claire Fletcher, Editor

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Face-to-face energy sales on the rise, says Cornwall Insight

According to Cornwall Insight, domestic energy switches made in a direct manner – either face-to-face or telesales – are increasing, following a decline after new regulations to control direct energy sales were implemented by Ofgem in 2009.

The latest research from Cornwall Insight's *Domestic Energy Sales Channels Report* shows a resurgence in the number of domestic energy switches acquired through face-to-face channels. Data shows it increased by 38%, reaching 1.1 million switches in the year leading up to 30 September 2019. Telesales has seen a similar boost, albeit at a much slower pace, rising 7% in the year to 1.6 million switches a year.

Electrical Apprentice of the Year competition completes first stage

The first stage of this year's Electrical Apprentice of the Year competition has now come to a close. Running between September to Christmas Eve, more than 540 electrical students across the UK took part in the first stage of the competition – an online exam comprising 40 multiple choice questions relating to electrical installations.

The competition's panel of judges will now work their way through all the entries to see who goes through to the next phase of the competition. The top 20% of entrants from stage one will go on to the second heat of the competition, where they will take part in a two-hour written exam, which will be held at several locations across the UK.

The top eight students from the second heat will go on to take part in the grand final on Tuesday 2 June 2020, at the headquarters of one of the competition partners, the Scolmore Group, where they will complete a series of practical tests followed by a technical interview with NICEIC and ELECSA technical experts.




UK A FRONT RUNNER IN EV CHARGING, SAYS NEW RESEARCH



New energy consultancy Delta-EE has launched a report into public electric vehicle (EV) charging infrastructure, highlighting the UK as one of the leading European countries for charge point infrastructure.

UK infrastructure offers nine EVs per public charge point, a better ratio than recommended by the European Commission of 10 EVs per charge point. The report goes on to state that, to date, the government has invested around £300 - 400 million in public charging infrastructure, which has been key for the EV industry's success.



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ANNUAL SURVEY SHEDS LIGHT ON ATTITUDE TO STEM IN SCHOOLS



The *Engineering Brand Monitor*, an annual survey carried out by EngineeringUK, has revealed the proportion of 16 to 19-year-olds who would consider a career in engineering has increased significantly since 2016 (45% compared with 37%).

Additionally, the majority of teachers and parents held positive views of engineering, with 80% of STEM secondary teachers and 68% of parents believing a career in engineering would be desirable for their pupils or children.



Industry responds to PRS electrical checks announcement

ESE, ECA and NICEIC have responded to the announcement of the imminent introduction of mandatory electrical safety checks in the Private Rented Sector (PRS).

Martyn Allen, technical director at Electrical Safety First said, "The commitment by the government to bring mandatory electrical safety checks into force is a success for millions of renters and their landlords in England.

"But, while we welcome this crucial step in protecting tenants, electrical safety should not be a 'tenure lottery'. Electrical Safety First would like to see this regulation extended to the social housing sector in the very near future."

Mike Smith, technical director of the ECA

added, "The dangers posed by electricity need to be taken seriously and they should be properly managed. It's vitally important that landlords have the information they need to fully understand and carry out their new legal obligations. And that testing and inspection is carried out by an enterprise that's been certificated by a reputable third party as competent to carry out these activities."

John O'Neill, technical director at NICEIC & ELECSA, also commented, "We look forward to working with landlords to ensure they understand the benefits of using registered electrical contractors to undertake the testing and inspections that will be vital to keep tenants safe."



Industry needs to attract the brightest talent, says SELECT MD

The need for more young people to join the electrical industry in Scotland has never been greater – and those who do so will have an "opportunity for life", SELECT managing director Alan Wilson has said.

Speaking in a video interview, the head of the trade body for the electrical profession in Scotland has claimed anyone entering the industry has "a really bright future ahead of them" and that fresh talent is urgently required to meet the ever-increasing demand

for new technology and electrical services.

"We need to work hard to get schoolchildren more involved and interested at a younger age and for them to see that the whole range of work an electrician does impacts across their lives."

He added, "Being an electrician is at the very top of the construction industry tree in terms of opportunities and skills and that's why we want to attract good quality young people who will bring a great benefit to all our lives going forward."

RECORD EV SALES BREAK NATIONAL GRID'S SCENARIO



Electric vehicle (EV) sales bucked the overall 2019 trend of falling car sales, with figures from the Society of Motor Manufacturers (SMMT) showing that battery electric vehicles (BEVs) registrations have risen by 144% to 37,850, exceeding two of the National Grid's FES forecasts.

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G O S S A G E

Less is distinctly more

There has been much rejoicing at the trend away from fossil fuel generated electricity over the past decade. Even the gloom mongers, who noted that in 2019 the overall amount of UK renewable energy generated didn't increase, shouldn't have missed that, even so, its proportion of the overall market nonetheless increased by 3%. Because total electricity generation fell by another 9-terawatt hours (TWh), ensuring a 6% drop in fossil fuel generation.

This happened because there was another remarkable shift in Britain's electrical system throughout the 2010s – which somehow seemed to escape the headline writers' attention. Overall, the total amount of electricity consumed fell by a massive 15% between 2010 and 2019, with the economy using 58 TWh less electricity in 2019 than it did in 2010.

That is enough electricity to power half of Britain's cars and taxis, even if they were all electric vehicles. Which means acknowledging the sagacity of National Grid's much-mocked forecasts regarding how minimally an all-electric vehicle fleet need impact upon overall consumption numbers.

Or to put it another way, the 15% reductions achieved have been higher than the potential maximum output of the two new nuclear power stations so vigorously promoted by the Conservative Government over the same period, Hinkley Point C and Sizewell C.

Mind you, back in 2010 the official forecast was that, by 2020 we would be consuming almost 30% more electricity than we actually are. No wonder nobody is much bothered just how far behind schedule both of these nuclear power plants now are.

Follow the money

The regulators at OFGEM have decided to investigate whether electricity supplier Utilita broke a price cap introduced in April 2017, by overcharging customers with prepayment meters. These tend to be amongst the poorest and most disadvantaged households.

OFGEM has clearly got the bit between its teeth, because already this year it has fined iSupply £1.5m for breaching the price cap, by overtly overcharging these customers. And last summer, Shell Energy celebrated taking over First Direct by paying just under £400,000 for a very similar offence.

I do hope that OFGEM's new boss, the former energy civil servant Jonny Brearley, will reassure us that absolutely all the money collected from such fines will be awarded to charities helping reduce the numbers of those in fuel poverty. There have been some nasty rumours around regarding the precise proportion of such funds that really are spent on helping the most deserving in society.

Nuclear spring

Fukushima is planning to transform itself into a renewable energy hub, almost nine years after it became the scene of one of the world's worst nuclear accidents. The prefecture in north-east Japan will forever be associated with the triple meltdown at the Fukushima Daiichi nuclear power plant in March 2011.

But in a most ambitious project, the local government has vowed to power the region with 100% renewable energy by 2040, compared with 40% today. The 300 billion-yen (£3bn) project, sponsors of which include the government-owned Development Bank of Japan and Mizuho Bank, will involve the construction of 11 solar and 10 wind farms on abandoned farmland and in mountainous areas by the end of March 2024.

Wouldn't it be nice if the land around Chernobyl in the Ukraine, sterilised since the world's worst nuclear accident one-third of a century ago, could be brought back into equally productive use? Instead of just being abandoned entirely to ghoulish followers of a Netflix television series.

A port in any storm

The Global Warming Policy Foundation (GWPF) is the well-funded campaign that seeks to throw cold water upon the threat of climate change, by disputing its seriousness. Its board seems to be made up entirely of somewhat elderly gentlemen of a distinctly Conservative persuasion. There is a distinct dearth of qualified engineers, let alone recognised climatologists, amongst them.

Founded by that arch-climate change denier Lord Nigel Lawson, its leadership has now passed to Terence Mordaunt who donated £100,000 to the official pro-Brexit campaign and who co-owns Bristol Port.

Mordaunt has previously claimed that the link between rising carbon dioxide emissions and climate change is unproven, and that he is concerned climate-friendly policies will push up electricity costs for his business – precisely the issues the GWPF regularly campaigns on.

Featuring on the *Sunday Times Rich List* with an estimated wealth of £380 million in 2018 (up £122 million from the year before), Mordaunt has made significant donations to the Conservative Party. He has given a total of £34,600 in a personal capacity, and £264,500 via First Corporate Shipping and First Corporate Consultants, both of which he co-owns.

First Corporate Shipping donated £25,000 to Boris Johnson's Conservative leadership campaigns last May. Six weeks after receiving the donation, Johnson endorsed the idea of making six UK ports, including Bristol, tax-free. He has subsequently awarded £100,000 to Bristol Port ostensibly to help them prepare for Brexit. Which is curious, given that the Port's management had long since declared it was "Brexit-ready".

Immediately after the December General Election, Mordaunt's GWPF issued a press release celebrating Boris Johnson's victory. It harrumphed that he now had, "the mandate and the majority to reform climate and energy policy, in such a way that it won't undermine Britain's international competitiveness, hurt businesses and burden households with rising costs".

I fear that Mordaunt and his pals may not be tremendous admirers of the Swedish school child Greta Thunberg, whose impassioned speeches on climate change's implications have so inspired many people of a somewhat younger generation than those controlling the purse strings at the GWPF.

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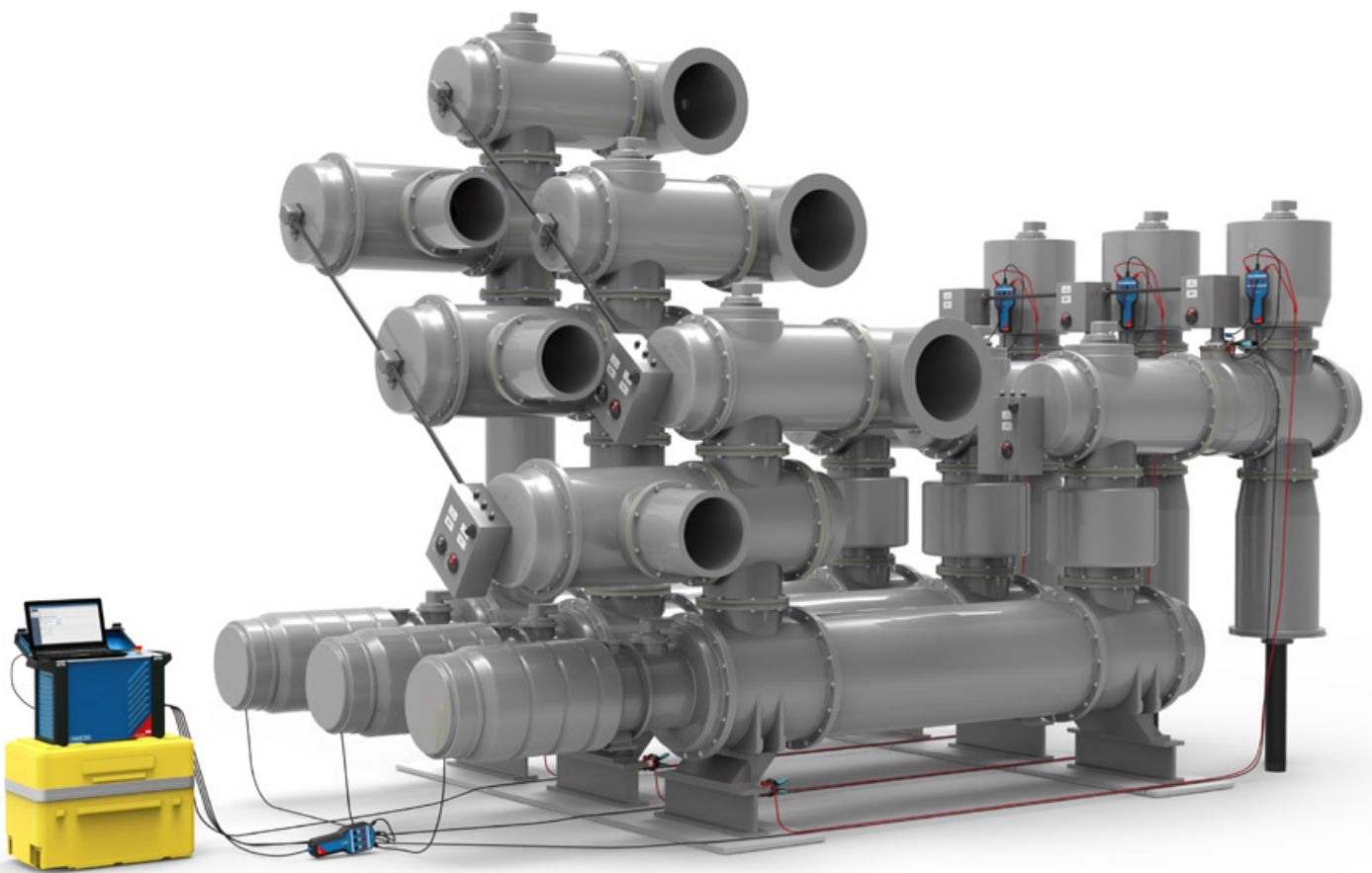
Visit the website to check out this year's awards and submit your entries by 6 March 2020.

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OMICRON:

Staying grounded

Orlando De Leon of OMICRON electronics UK Ltd, outlines the main challenges specific to testing circuit breakers installed in gas insulated substations with both sides grounded.



When it comes to testing circuit breakers installed in a gas insulated substation (GIS), the main challenge is the safe access to the high voltage conductors and/or terminals. In GIS systems, the high voltage terminals are normally fully enclosed within the housing, therefore it is not possible to connect test instruments directly to the high voltage conductors and/or terminals. The common approach is to use the connection path provided by the built-in earthing

switches. The earthing switches will commonly have insulated terminations externally on the GIS with an external bolted linkage to the earth structure of the GIS called ground connections.

The circuit breaker is tested via an inductive current change measurement, using the parallel ground connection of the circuit breaker while the GIS remains grounded on both sides. *Figure 1* shows the electrical diagram for the set-up.

The current sensor is a Rogowski coil that

is laid around the ground connection of the earthing switch, as shown in *Figures 2* and *3*. This connection ensures that intrusive changes or additional connections are not needed to be made in the GIS, therefore there is no added risk taken by removing a ground connection or de-commissioning bay parts of the GIS.

The test is performed by injecting a DC current (up to 200A) through the circuit breaker/housing of the GIS using ground

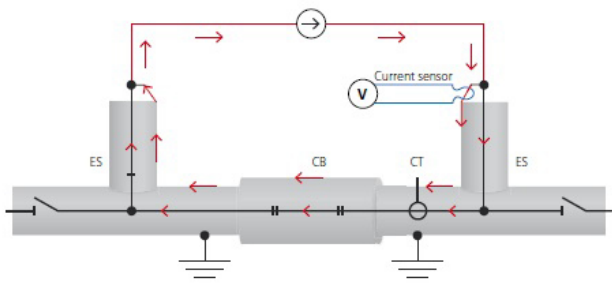


Figure 1: Electrical diagram for a current sensor arrangement on a GIS

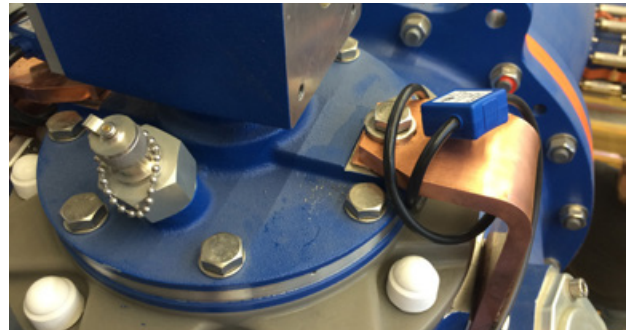


Figure 2: Rogowski coil connection on an earthing switch



Figure 3: Rogowski coil connection on an earthing switch



Figure 4: Current injection and Rogowski coil connection on an earthing switch



Figure 5: Current injection and Rogowski coil connection on an earthing switch

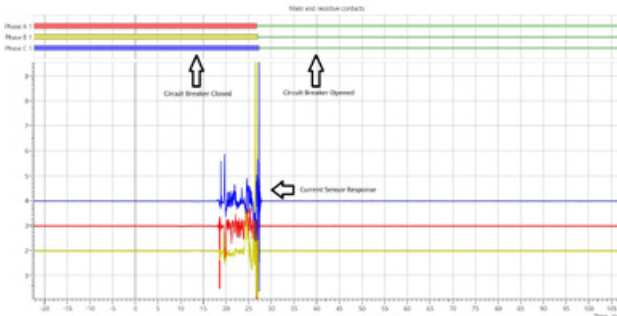


Figure 6: Diagram opening operation

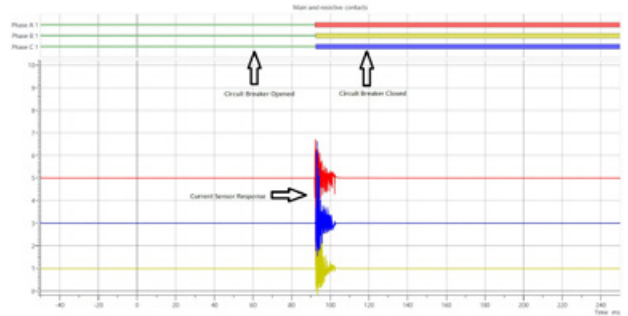


Figure 7: Diagram closing operation

connections of the earthing switches, as shown in Figures 4 and 5. The current clamp is for the current injection and the black Rogowski coil is the current sensor in both figures.

If the circuit breaker is closed, this current will take two different paths, the main contacts of the circuit breaker and the housing of the GIS. Once the circuit breaker is opened, the only possible path for the current will be the housing of the GIS. This

condition is shown in Figure 6 where the circuit breaker is in a closed position and when the circuit breaker opens and the change of states is measured by the current sensor.

If the circuit breaker is open, the current will flow only through the housing of the GIS and when the circuit breaker closes the current will take two different paths, the housing of the GIS and the main contacts of the circuit breaker. This condition is shown in Figure 7 where the circuit breaker is in an

open position and when the circuit breaker closes and the change of states is measured by the current sensor.

The current sensor will measure the changes in the current each time an operation is made. The current change that is measured through the ground connection of the circuit breaker is then used to determine the opening and closing times, while the circuit breaker remains grounded on both sides throughout the entire measurement. ER

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Controlling your costs

Louis McGarry, sales and marketing director at Centiel UK highlights the importance of factoring in total cost of ownership when it comes to your UPS and provides us with some invaluable tips on keeping costs down.



When it comes to replacing or purchasing a UPS, the focus generally seems to be on the upfront cost of hardware. However, ongoing costs can result in far greater expenditure if an incorrect configuration is selected at the outset and that UPS doesn't have the flexibility to be adapted to future load requirements (less or more!)

When considering a budget, there are many elements to think about including pay as you grow options; CapEx versus OpEx, the cost of future replacement parts, any remedial work, plus maintenance costs and running costs to name a few. It is important to be clear about the role of the UPS and to talk to those experienced in ensuring the correct system will do the job of protecting the power of an organisation, in the most available and yet efficient way possible.

Right sizing

Right sizing is key to managing budgets over both the short and long term. The initial purchase price is less if a smaller system is actually re-

quired and so are ongoing running, maintenance and replacement costs.

I recently helped a multi-media company replace a legacy UPS. A 200 kVA UPS was running at 85% efficiency because it had been sized 15 years ago to support an infrastructure that never reached full capacity. This is a typical scenario where the replacement of an oversized and

The key to developing an efficient and agile system for protecting power, is regular review of the load and ongoing monitoring

inefficient UPS could offer significant savings for the client. We switched this for a 50 kVA N+1 system running at 97% efficiency.

The new UPS system was right-sized to protect the actual load and because it was a modular system, it offered the benefits of N+1 redun-

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dancy and scope for future ‘pay as you grow’ expansion as required. We reviewed the total cost of ownership (TCO) of the new system compared with the old UPS. These calculations took into consideration the efficiency of the new UPS at its actual load, plus the cooling requirements to maintain the environment based at a conservative cost of 10p/kW hour. We calculated the company could save up to £30K within five years in energy alone.

We see this situation a lot, where a full review of the UPS system and load requirement can result in a smaller, more efficient UPS being used, which still offers the flexibility to grow to the demand of the infrastructure. In this way multiple savings are the outcome of a right-sized, efficient solution. For larger installations, the cost savings can be even higher.

Autonomy

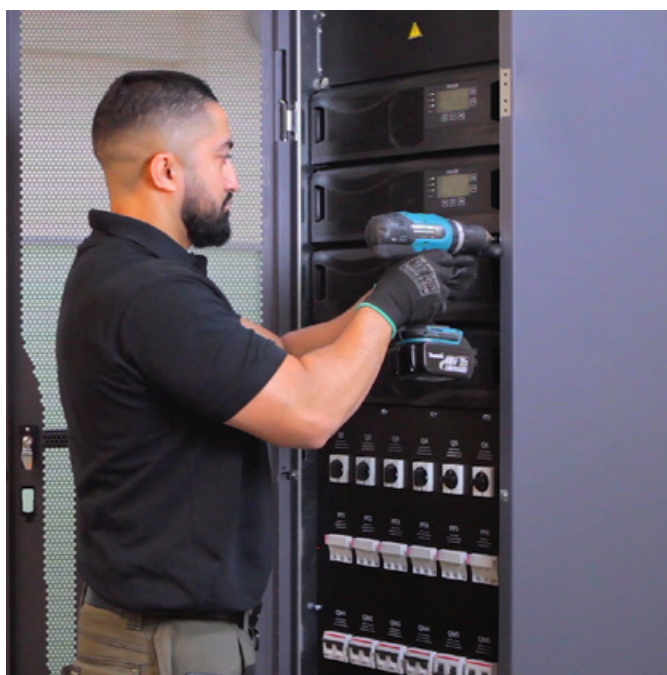
Another consideration is a lower autonomy. I usually hear a few people take a sharp intake of breath at this point! Historically, when a generator isn't available, on-site battery banks can be sized from one to two hours, and even when a generator is available, autonomy is still sized at around 30 minutes. Is this really necessary?

Reducing the autonomy can dramatically reduce the amount of batteries needed, in-turn reducing the amount of space required to house many tonnes of VRLA blocks and importantly the power associated to keep them cool (and at 10p/kW h this soon adds up.)

Becoming agile

Becoming more agile is another way to keep control of budgets. This requires careful management of the system that's been installed. Modular systems all using the same sized modules can be interchanged as necessary.

I recently worked with a data centre that had adopted a completely decentralised approach, creating a group of small data centres on one site with a standardised infrastructure. This includes each data centre having the same type of modular UPS and standardising the rating of UPS frames and UPS modules so that they can be re-prioritised



dependant on load demand.


This approach allows the modules to be redeployed between the data centres based on priority, to ensure redundancy is kept at the most critical sites. It also means, if there are any issues, modules can be ‘hot swapped’ avoiding any risk to the load – zero downtime. This is an example of agile critical power solutions supporting an agile infrastructure environment. Availability has been maximised while at the same time minimising costs.

To ensure a high-level of power protection while minimising the budget, the best value for money approach is to calculate the TCO properly

Installation is the start not the end

The key to developing an efficient and agile system for protecting power, is regular review of the load and ongoing monitoring. It may be possible to reduce the autonomy to say just five minutes by putting in a better battery monitoring system for example. SNMP monitoring and keeping up with maintenance also means you can potentially make better use of the resources you have and ultimately reduce TCO.

Therefore, installing a new UPS, closing the door and forgetting about it is not the future of efficient, agile systems. It is also not the best way to keep control of costs. Nor does it take full advantage of the true modular nature of the most modern UPS solutions.

Therefore, to ensure a high-level of power protection while minimising the budget, the best value for money approach is to calculate the TCO properly. The numbers do not lie! Choosing a reliable supplier who will act in your best interest as a trusted advisor and provide ongoing support is also essential. 

WEEErk it

Nigel Harvey, chief executive at Recolight Ltd explains how specifiers can work the WEEE system to get their waste lighting recycled free of charge.

The roll out of LED luminaires continues as more companies and organisations seek to reduce their energy consumption and improve the controllability of their lighting. That means more and more traditional light fittings and fluorescent lamps are being removed and replaced.

It is important that when specifying the lighting equipment for such new projects, engineers give proper consideration to what will happen to the waste lighting that results. And if specifiers are smart in the way they address this requirement in their specification, they can ensure it is collected and processed free of charge.

The waste electrical and electronic equipment (WEEE) regulations require suppliers of new electrical equipment to finance the recycling of old equipment being replaced. So, including this obligation within the specification can prevent some suppliers from seeking to avoid the obligation through their terms and conditions of supply.

The collection and recycling of such obligated waste is usually handled by a WEEE scheme – unless they are very small, suppliers must join such a scheme to comply with the WEEE regulations.

Once collected, waste fluorescent lamps must be recycled in one of a handful of specialist facilities in the UK. The lamps contain mercury, which needs to be carefully managed to avoid contamination to people

or the environment. Waste fittings must be recycled at other facilities – they will normally be shredded, and then separated into their component materials ready for further processing, and then introduced back into the raw material supply chain.

If the waste is simply provided to a scrap merchant, there can be no certainty that the same high environmental standards are applied

Contributing to increasing recycling rates

The lamp recycling rate was around 48% in 2018. This fell short of the target set by the government that year. So insisting that recycling is undertaken by the supplier's WEEE scheme is a way of making sure that the waste equipment is properly recycled, and actually gets counted within the UK's WEEE system.

WEEE schemes also have a duty to ensure that the recycling they manage is undertaken in accordance with statutory guidance providing





details of the best available treatment, recovery, and recycling techniques. But if the waste is simply provided to a scrap merchant, there can be no certainty that the same high environmental standards are applied.

If we are to continue to increase UK WEEE recycling rates, we all need to be vigilant to any indication that some businesses may not be recycling lamps. It is all too easy to put fluorescent tubes in the bottom of a skip. Throw on a few bricks, and they have disappeared. Not only is this very bad environmental practice – it is also unlawful.

Beware non-compliant product

Specifiers should particularly be wary of buying non-compliant product. A recent survey showed that 76% of LED lightbulbs available for sale in the UK on a leading online multi-seller marketplace were not compliant with the WEEE regulations. That meant they are not contributing to the cost of UK lamp recycling. And if they are not compliant with WEEE (where becoming compliant is relatively straightforward), how likely is it that they also comply with other legislation such as electrical safety?

The lighting industry and sustainability


There is no doubt that lighting has done a lot to promote sustainability. LED products have much longer lifetimes, far greater system efficacies,

are more flexible and controllable, and do not contain mercury.

In time LED will materially reduce the proportion of energy used for lighting. It is widely accepted that lighting accounts for around a fifth of electricity consumption. As LED products are more widely adopted, that proportion can be

Lamp recycling rates in the UK have grown faster than any other waste electrical equipment category, from 19% in 2008, to 48% in 2018

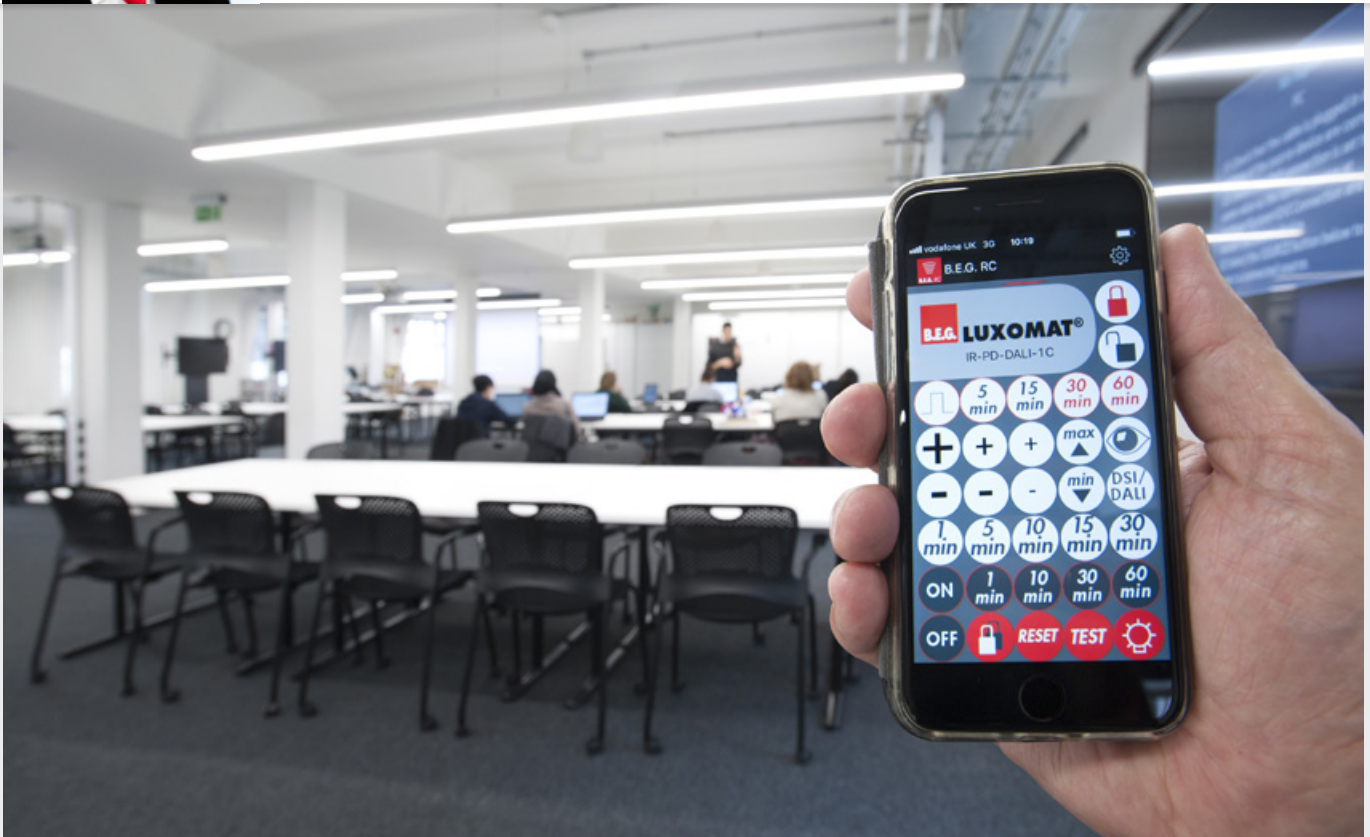
expected to fall significantly. The associated reduction in greenhouse gas emissions is a vital contribution to sustainability and tackling the climate emergency.

Lamp recycling rates in the UK have grown faster than any other waste electrical equipment category, from 19% in 2008, to 48% in 2018. The lighting industry is unique in taking such an effective, sector specific approach to waste and recycling. With specifiers, wholesalers and manufacturers working together, the industry can be justifiably proud of its recycling record, and this additional contribution to sustainability. 

BEG: Amazing spaces



Paul Jones, director, UK and Ireland at BEG Lighting Controls, discusses how flexible lighting controls can transform public buildings into super-efficient, multi-use spaces.



It's well known that the spaces in which we live and work have a significant impact on our wellbeing throughout the day. What is sometimes overlooked is the significant part lighting plays in the comfort of a space for its occupants, be that employees, school children, patients or customers.

Lighting not only has the power to subconsciously change temperament and emotions, it can even be used to shape and change spaces and subliminally direct our behaviour.

Thanks to recent advances in lighting controls technology, lighting designers can now take full advantage of these 'human centric lighting' techniques to make any public space fully adaptable and flexible to suit the full range of activities that might take place in the building.

What lighting controls tech is available?

Here at BEG Lighting Controls, we believe that lighting solutions should be able to be as creative as the imagination of the lighting designer. We

work tirelessly to develop lighting control products to answer every potential requirement of the lighting industry – with the hope that whatever might be dreamt up to meet an FM's need, there is a lighting controls solution to make it possible.

The most common features required are energy efficiency and cost savings, for obvious reasons. Our occupancy sensors know when the room or space is in use and adjust the light accordingly. We also have sensors which evaluate how much natural light there is and adjust the output of the luminaires accordingly.

We have sensors which can be time activated, sensors which can be linked together to work as a set, or independently, as needed. We have sensors that work at very high ceiling heights across a wide area, or can be shielded to work for just a small section of a space. We also have sensors which can change the warmth of the light as required and can dim or brighten as required.

And our switches offer the same level of complete flexibility. Lighting

can be controlled by a simple wall switch, adjusted from an app on a mobile phone, or operated remotely from a central unit.

When lighting designers are aware of all that can be achieved through lighting controls, they can take advantage of every small and affordable trick which can make a huge impact.

Different lighting for different types of building

By creating this level of flexibility, we have enabled people to achieve their perfect lighting designs across a huge range of buildings, such as offices, restaurants and hotels, health centres and schools.

Commercial and public buildings often have key similarities in their needs. They are all likely to have offices within them which will require good lighting levels for PC work. They will have corridors which might not need to be lit brightly when not occupied and they will generally have reception areas which need to be welcoming all day long.

Lighting not only has the power to subconsciously change temperament and emotions, it can be used to shape and change spaces and subliminally direct our behaviour


Whether creating intelligent lighting schemes for offices and work spaces – such as the bespoke lighting systems BEG designed for two refurbished call centres for a large UK broadcasting company – or creating creating flexible lighting for hotels and restaurants which might need different modes for customers and cleaners, it can be done.

School buildings have another set of requirements, and BEG Lighting



Controls recently undertook a project for the brand-new John Keats Primary Free School in London, whose ethos is focused on providing an enhanced learning environment for its pupils. The building’s lighting had to be designed and controlled in a way that would maximise the pupils’ comfort, concentration and alertness. We also helped them make the most of their spaces by creating multi-purpose rooms.

In health centres, the lighting design brief is somewhat different, the key focus being on safety, hygiene, and energy savings. Corridors and communal areas need to be well lit to ensure that medical staff can do their jobs around the clock whilst on wards, and patients can be well rested and peaceful at night.

It is inspiring to see how the great strides that are being made in lighting controls technology are being used to their maximum potential in buildings designed for such different purposes. We believe in pushing the boundaries of what is possible with creative lighting solutions and we love to see our products helping to really make a difference to an entire building’s environment and the experience of everyone using it. 





Put up a (safer) parking lot

Saima Shafi, sales and marketing director at Goodlight, discusses how new LED lighting technology is evolving to make car parks safer, smarter and brighter.

With the dark winter months upon us, lighting is even more of a pressing issue for car park managers. Many will be considering steps they can take to provide safer and more welcoming parking spaces without increased maintenance and energy costs. Here, well-controlled LED lighting can be an asset.

In 2004, the British Parking Association launched the Safer Parking Scheme. This awarded a 'Park Mark' to facilities which met specific criteria for deterring criminal activity and vehicle theft. One of the four award criteria listed is 'Appropriate Lighting.'

As of 2016, one in four car parks had been deemed worthy of the award, an impressive figure that assures car park users that facilities have been designed and managed with care. It also suggests though that more could be done to make both public and private car parks safer facilities. Whether for stores, businesses or offices, the unique features of LED lighting including its energy-efficiency, illumination and reliability, are perfectly suited to meet the specific needs of car parks.

Our LED lighting products have recently been rolled out across a number of large-scale international train station car park projects, introducing many benefits to these spaces. The outdated fluorescent and metal halide luminaires in car parks at Ashford, Ebbsfleet International, St Pancras International and Stratford International were upgraded to LEDs in a recent project. The upgrade included over 3,000 LED luminaires. Improved illumination was provided to over 8,000 spaces in total and the car park operators achieved up to 80% energy savings.

Another of our exciting projects saw the replacement of over 1,000 individual lights with long-life LED lamps in the stairwells and car

parks of a Grade 2 listed Bristol eco apartment complex. The installed LED lamps have a 50,000-hour life span, effectively eliminating the need for regular replacement. Furthermore, in an ongoing roll-out project for a national supermarket chain, LED lamps and luminaires provided energy efficient, low maintenance LED lighting into over 100 existing car parks and store canopies. Thanks to the new car park LED lighting installations, all the projects saw improvements in cost efficiency, carbon footprint and management.

Not only does LED technology simplify maintenance but also lowers the associated maintenance costs

A visible improvement

Car parks require bright lighting that not only illuminates the space adequately for it to be shared safely by drivers and pedestrians, but also enables security cameras to spot anti-social behaviour. LED lights offer an even spread of light without shadowing or glare, while also delivering the required brightness.

In the case of the international train station car parks project, the newly-installed LED lights form a 360° beam angle, they are retrofittable and can upgrade existing lighting with limited inconvenience to car park owners and users. In providing new LED lighting for the supermarket

chain's car park, the retrofittable LED lights avoided the need to relocate columns or alter existing buildings nearby.

In the case of outdoor car parks, LED lighting can respond swiftly through wireless control systems to different environmental changes such as weather conditions and light levels, all vital to keep the facility safe and well-lit at all times.

Controlled solutions

The benefits of such a tightly controlled lighting system extend beyond swift responses to the external environment. These systems can also be wireless and of great benefit to facilities managers, who need to respond to lighting problems in car parks quickly to avoid damaged vehicles or injured pedestrians.

Issues can be identified through automated wireless LED lighting control systems which cater for 'active' maintenance support, in addition to delivering 'reactive' lighting maintenance solutions fast and effectively. Many of these systems, can be coupled with infrared cameras to allow for security management too, something facilities managers will also find helpful. It should also be noted that wireless lighting control systems are easier to install than wired-in systems, providing minimal inconvenience to car park owners and users.

Not only does LED technology simplify maintenance but it also lowers the associated maintenance costs. Automated LED lighting control systems reduce the need for surveys and site visits, especially with self-test features which alert facilities managers to faults as soon as they occur.

In addition, the LED lights themselves have a seriously impressive lifespan and quality LED lighting manufacturers now offer a five-year guarantee on their products. In fact, LED lamps and luminaires rated at 50,000 hours last three times longer than typical fluorescent lights, giving further savings to site operators.

Overall, automated wireless LED lighting control systems give the flexibility that car park managers need to operate their sites effectively and substantially decrease their maintenance costs.

Energy costs


Whilst the benefits of installing LED lighting are clear, stretched capital budgets unfortunately hold many car park operators back from embrac-

ing the technology. However, the installation of LED technology can be funded through the savings made each year on energy bills via a tax-efficient lease-purchase scheme.

For example, a car park which implemented LED lighting and controls under such a scheme could expect to save 87% on their energy bills and pay back their installation costs in under two years. In the case of the recent station car parks project, the new lighting provided up to 80% energy savings, upgrading to LED lighting alone.

Automated LED lighting control systems reduce the need for surveys and site visits

Furthermore, as consumers become more attuned to their carbon footprints, a 'greener place to park' is something that parking providers could potentially use as a selling-point to promote their facilities against competitors.

With significant benefits to car park users and managers, and a straightforward path both to implement and fund the transition, LED lighting in car parks will eventually become the norm. 



The road to success

Matt Evans, product engineer at Future Facilities, explains why thermal management is essential to the future success of electric cars.

The days of diesel-powered and petrol-fuelled cars are numbered. Numerous countries around the globe have announced their intention to implement a complete ban on the sale of vehicles using fossil fuels, with both the UK and France pledging to outlaw purchases by 2040.

It's no exaggeration to say this represents the most seismic shift in the automotive industry this century. And as with any significant evolution, it brings along a great deal of excitement, but also a large number of challenges.

Engineers will be thrilled to experiment with the possibilities of lithium-ion battery powered cars – much like the vehicles Tesla and other manufacturers are already producing – on a larger scale moving forward.

But the tricky part will be how they stand-up to direct comparison with traditional internal combustion engine (ICE) powered cars. The absolute minimum requirement will be to match these legacy vehicles when it comes to variety, reliability, handling and that all-important intangible driving experience.

That's to say nothing of the peripherals that we've all become accustomed to — satnav, air-conditioning, heating and in-car entertainment to name but a few. Will electric cars be able to rise to the challenge of matching, or even surpassing, ICE vehicles in all these aspects?

It's certainly not a journey that will be taken in cruise-control. Innovative solutions will be needed to ensure that electric cars are able to reach their full potential. And this is especially true when it comes to the thermal management of lithium-ion batteries and other vital components.

Thermal challenges

In traditional ICE powered vehicles, thermal management is primarily focused on removing heat from the engine, which unsurprisingly, runs fairly hot. Of course, reducing any possibility of the engine over-heating is crucial for reliability, but for the most part, the tolerances of operating temperatures for mechanical components are quite generous — particularly when compared to the components in all-electric vehicles.

Numerous countries around the globe have announced their intention to implement a complete ban on the sale of vehicles using fossil fuels, with both the UK and France pledging to outlaw purchases by 2040

Lithium-ion batteries must be kept within a strict, narrow window of operating temperature. Anything below 0°C and the chemical reactions within the battery will slow down, impacting performance and range. Go above 30°C and the battery begins to deteriorate exponentially — past 40°C irreversible damage will likely occur.

The optimal temperature range for these batteries tends to be between 20°C to 30°C, which may be easy to achieve in a vacuum. However, cars

operate in areas where environmental temperatures have wide variability. In the UK alone — not particularly famed for wild swings in temperature — lows of 0°C and highs of 35°C are fairly common. So, even in quite temperate areas, some days the batteries will need to be warmed up, and on others cooled down below ambient.

Unfortunately for engineers, these are not the only challenges when it comes to thermal management of electric cars. Careful, precise management of the power electronics components is vital — otherwise ‘thermal runaway’ becomes a very real danger.

Simply put, this is a situation where increased ambient temperature changes the operation of the power electronics device, leading to a vicious cycle of further temperature rises. As the junction temperature elevates, the on-resistance of transistors increases, which in turn creates more heating of the junction. The end result is electronics burning out and components failing, which could be incredibly dangerous in automotive applications.

Another obstacle engineers must overcome lies with the electric motors used to power electric cars. Because of their axle-mounted position, cooling electric motors is a much more complex challenge than with traditional ICE vehicles, where the motor is located in the engine bay with plenty of opportunity to benefit from airflow emanating from the front of the car.

Success through simulation

Looking at the scope of the challenges the automotive industry faces as it transitions to producing electric vehicles at scale, it’s clear that thermal simulation will be absolutely critical to their success.

Prototypes are costly and time-consuming to produce, especially when


you consider the large number of components that a product as complex as a car will contain. Thermal simulation provides a solution that allows engineers to extensively test a system in a full range of operating environments, identify any thermal issues, then design and optimise a solution in a matter of hours or days — as opposed to weeks, months or even years.

However, if simulation is not carried out in an extensive and intensive manner, manufacturers will simply face the same old problems. When it comes to designing electric vehicles, engineers need the tools that can perform a full, detailed, analysis.

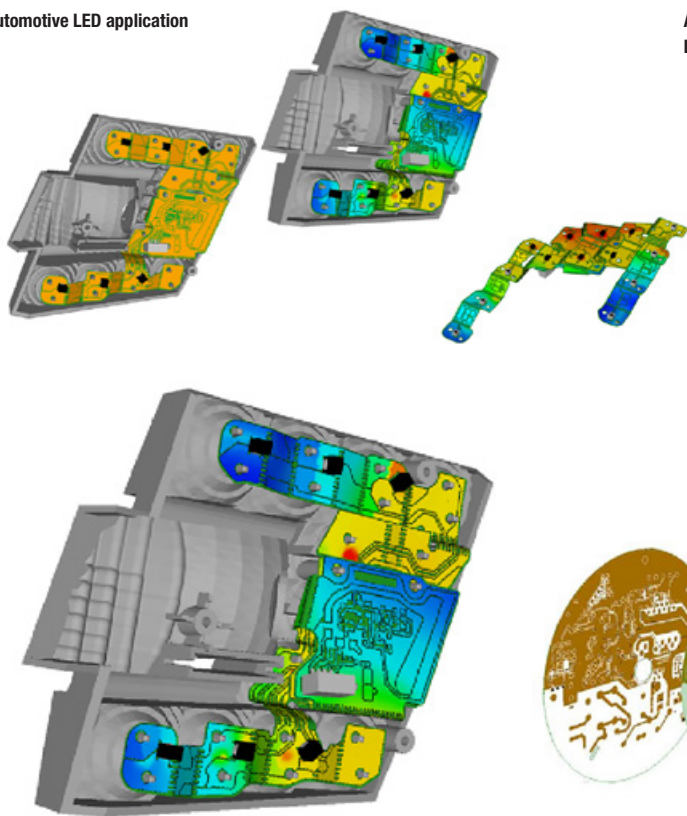
In particular, engineers must be equipped with computational fluid dynamics (CFD) software that can import, handle and solve the complex geometries involved in automotive design, where electronics are designed to fit into the limited space available, often within curved body shells or dashboards. Unfortunately, this is something legacy thermal simulation tools too often struggle with.

Evolving technology

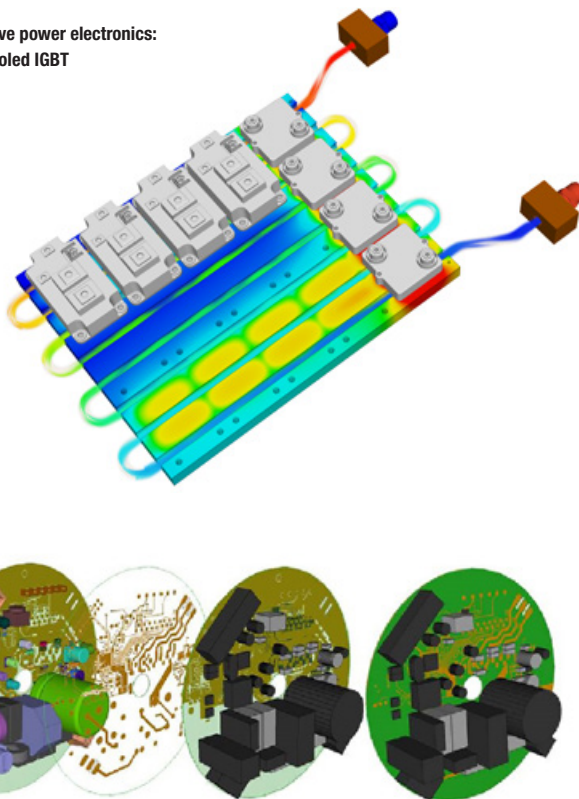
2040 might seem a long way off as we’ve just entered the 2020s, but the deadline will still loom large in the mind of car manufacturers. Especially given technology is constantly evolving, presenting new challenges in terms of thermal management. Many industry experts are already looking eagerly at the potential of solid-state batteries to replace lithium-ion and provide faster charging coupled with reduced weight.

With this shifting landscape in mind, the flexibility, reliability and accuracy of thermal simulation using CFD software for electric vehicles will prove a vital partner on the road to continued success for the automotive industry. 

Automotive LED application



Automotive power electronics:
Liquid cooled IGBT



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Roadblocks

Lloyd Bonson, director and senior consultant at ECV Consulting Ltd, explores the barriers preventing EV adoption.

Electric vehicles are the current answer to the ecological problem that has been around for decades. Since the 1970s, emissions legislations have been introduced in various parts of the world, which have seen a reduction in the production of greenhouse gases. There are still issues surrounding climate change and the effects of fossil fuel burning, but there are scientific reports that the tides are turning.

With congested roads a factor in many major cities, can electric vehicles really prove to be the answer? They can. But it does require a change in thinking, and for businesses, potentially a complete overhaul of their ways of working.

The lack of infrastructure is seen by many as a barrier to electric vehicle adoption. Add to this concerns about the ability of the National Grid in the UK to cope with influx of vehicles expected to hit the market, and it's easy to see why there is a hesitation. 2019 saw electric or electrically assisted cars account for 10% of new registrations in UK, and with more electric cars, vans and even trucks promised over the next 24 months, this is a major worry.

Is enough being done to reduce the fear of electrical network capacity? Certainly there have been significant announcements regarding new, renewable power generating sites, and the increase of wind and solar farms across the country would back this up. Whether or not substations are sufficiently equipped for this influx is another issue, and that's before we look at who pays for the cost of updating outdated hardware.

Can power storage solutions offer an answer to those concerned about peak periods? It is certainly thought so, especially with the increase in smart technologies and connected services. The ability to offer a cost effective, safe and convenient charging solution is a must for anyone considering the switch.

The electrical grid isn't the only issue in terms of available capacity. As mentioned previously, the public infrastructure is still not at required levels. There are around 10,000 publically available charge points in the UK at present, with plans to double this within the next two years.

Whilst the UK petroleum industry states there are only around 8,500 petrol/diesel forecourts, the total number of pumps is estimated to be a little over 62,000 – six times the number of EV charging outlets.


This is without taking into consideration the reduced time to refuel a petrol or diesel vehicle against the recharge time of an EV. There have been reports of electric vehicles queuing for available spaces to recharge at public facilities. Clearly, capacity is soon going to be a problem.

And finally congestion. It's noticeable that vehicles have become bigger over the last 40 years. Safety legislation such as crumple zones, side

There are around 10,000 publically available charge points in the UK at present, with plans to double this within the next two years

impact bars and pedestrian impact safety have all had an influence on car design. Added to this the increase in average adult height, and the rise of the SUV it's an easy plot to follow.

The issue with bigger vehicles is that the roads in our towns and cities aren't getting any bigger to accommodate them. Councils are looking at traffic calming measures such as speed bumps and one-way systems to reduce speeds and control the flow of vehicles – all of which can add to congestion. The obvious answer is to look at smaller vehicles, and some manufacturers have focused on inner urban transportation as a way of establishing their foothold in the electric vehicle market.

We all need to be aware of the challenges moving forward, and as long as correct dialogue is maintained between the electrical industry, automotive, consumers and government; then maximum capacity is nothing to be afraid of. 

Thinking beyond the charger

Seth Townsley, energy marketing manager at Schneider Electric, highlights what's needed in order to ready our electrical infrastructure for the rise of electric vehicles.

With the UK setting ambitious emissions reduction targets over the next few decades, electric vehicles are often cited as the solution to keeping the country on the road while cutting out fossil fuels.

In the third quarter of 2019, just over 2% of new cars licensed in the United Kingdom were fully electric vehicles (according to ONS figures) with industry pundits forecasting an acceleration in adoption during 2020. However, with this early success arrives both challenges and opportunities for stakeholders throughout the energy and transport industries – from vehicle manufacturers and fleet operators to utilities providers and even consumers themselves.

For vehicle manufacturers, there are large groups of customers who, by moving to EV truck fleets, for example, can cut their vehicle operational and maintenance costs by up to 50%. On the other hand, it is not easy for auto manufacturers to flip a switch from producing internal combustion engine (ICE) vehicles to EVs. Factory physical infrastructures will need to modernise, and manufacturing lines for both types of vehicles will need to be maintained for quite a few years.

Modern smart charging stations make highly efficient use of the grid

For electrical utilities, a robust network of EV charging stations represents a major opportunity for selling more electricity to consumers and for increasing grid efficiencies with new access to more stored energy.

New smart charging stations can provide services that can help improve power quality and reliability. EVs and digital innovations drive energy efficiency improvements by coordinating charging systems to grid capacities, thereby improving energy efficiencies and reducing the need for new lines and transformer stations.

Even repurposed EV batteries used as storage can offer the possibility of regulating the grid or smoothing out peak demand when used as energy storage. This network “service” represents economic value. EVs are thus a significant source of flexibility in electricity demand.

Enhancing flexibility with modern EV charging stations

Modern smart charging stations make highly efficient use of the grid. Current charging profiles of EV drivers indicate that they charge three times a day, often in the morning, lunch or during the evening. Therefore, instead of investing in large connections to the grid that are expensive and inefficient (since they are not in use for most of the day), a more pragmatic approach is to invest in a charging station that offers a battery storage option. When drivers want to charge their vehicle, they can source their power either from the grid or from the battery storage. The charging station can be programmed to optimise the lowest price scenario for that particular time of the day.



The new charging stations are also flexible in the ways they can source their energy supply. For instance, the stations can repurpose lithium-ion automobile batteries as an OEM-packaged energy storage option. As ICE cars lessen in numbers while EVs increase, used lithium-ion batteries from ICE cars will present a low-cost option for supplying energy storage to some of these charging systems.

On the other hand, fleet intensive organisations that house and operate hundreds of vehicles throughout the day, can use solar or wind power installed on the roofs of their facilities to charge their EV battery storage. Smart charging stations are configured and designed so that they can use both traditional grid power in addition to solar and wind resources. In addition, any excess power produced can be sold back to the grid if grid demand is high and the battery control system suggests such an action.

Depending on the region, power purchased at night or at a time when the grid is at a low load, can be 10 - 40% less expensive and used during times when costs are high.

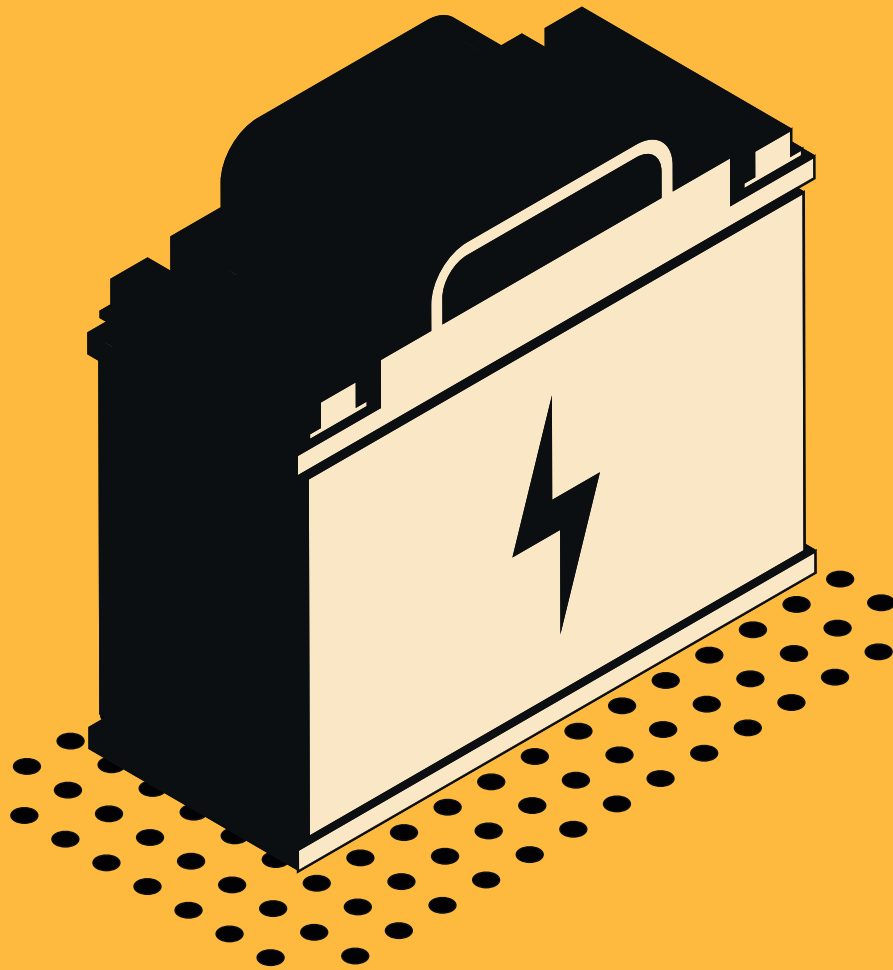
Building an integrated charging ecosystem

Investing in modern power infrastructure that is digitised and decentralised is vital to preparing for the electric vehicle revolution. Over the next few years our infrastructure must become more flexible and agile in order to cope with the significant energy demands and potential energy storing from electric vehicles.

Modern charging stations are part of that movement, acting as network connection points capable of accessing the cloud and supplying electrical power when needed. Within these technologies, leading companies in energy management and automation have designed in the ability to safely and securely connect and send data to the point operator and to the electric power consumer.

The opportunity presented by electric vehicles is fast making them the smart choice for both consumers and businesses. But they can only reach their full potential as part of the low carbon future once the potential hurdle of ‘dumb’ infrastructure is becoming a speck in the rear-view mirror. **ER**

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EV charging: The barriers

When it comes to testing the safety of roadside EV chargers, not all products are created equal. Here, Mark Johnson of Metrel UK Ltd compares test equipment from a selection of major manufacturers.

According to an article in *Autocar* published back in July, an unreliable charging infrastructure is preventing the electric vehicle (EV) roll out. This is hardly surprising given the ad hoc manner of the development of the infrastructure and the lack of strategic control in Britain.

Today, there are in the region of 28,000 charging stations in the UK, 10,000 of which are privately owned. To add an additional level of confusion, there are at least ten manufacturers of vehicle charging equipment approved by the Office for Low Emission Vehicles. Each manufacturer is required to train electrical engineers on the installation of their equipment, but this can be as cursory as working through a web-based programme and answering some questions.

Meanwhile the 18th Edition requires that each charging point 'shall be protected by either an RCD type B or an RCD type A and appropriate equipment that ensures disconnection of supply in case of a fault current above 6 mA DC'. That is how they should be installed, but there is no comment on how they should be tested on installation or, into the future, to ensure proper functioning and reliability.

From a survey run by one of the test instrument manufacturers, half of all installers have experienced out of the box failure of new RCDs, so for safety's sake it is valuable to test newly installed RCD protection.

Between charger and tester: The interface

Strangely, while the charging station product market is relatively well developed, the equipment market for testing them is not. At the last count only three manufacturers produced interfaces for testing roadside chargers without opening them up.

One marketed by a charger manufacturer was originally dedicated to testing their equipment, though this has changed recently to be more universal. Two test equipment manufacturers sell adapters that can interface between any charge point and any manufacturers' tester.

Of the adapters, the Roolec EVTU0018 can test single-phase installations, while the Metrel A1532 and Fluke/Beha EV-520-uk will allow testing of single and three-phase units. They simulate the charging state of the vehicle, disconnected, charge ready, active charging (with and without ventilation) and pilot error, and permit the system to be electrically tested as a whole, and not just discrete parts.

And because there is no need to open the box, testing is quick and there are no warranty implications. However, there is a problem with these adapters; they are only as good as the tester you connect them to.

Testers: The limitation

Returning to the 18th Edition stipulation, the electrical vehicle supply



A high speed EV charger being tested to 18th Edition

Testing a domestic car charging unit to 18th Edition with EVSE adapter and multifunction tester



equipment (EVSE) must be protected by type B RCD or a type A RCD and something to disconnect the supply when more than 6 mA of DC fault current are present.

Any all-in-one tester will test type A RCDs, premium testers such as the Fluke 1663 and 1664, and the Megger MFT1721 and MFT1741 will test type B RCDs. Until now, it was only the Metrel range of three multi-function testers that would test type B RCBs and that offer a standard 6 mA DC disconnection test, classed as type EV RCDs, to confirm all types of charger protection conform to the 18th Edition.

Recently the Fluke 1664 FC has been marketed as part of a kit to cope with EVSE testing and Megger has introduced a MFT1741+ so that they have an EVSE capable tester. However, this entails buying a new machine.

Test automation

Many years ago, Megger pioneered the Auto RCD test, and the contractors were slow to adopt it, possibly due a failure to explain just how useful a function it could be. It is now one of the most popular functions on their testers and they have extended it to do EVSE breaker testing. However, they have not moved on to adopt more automatic testing functions. It is known that they are working on their data/results storage capabilities, hoping to make it more usable.

At the premium end of their range, Fluke has incorporated automatic installation testing, allowing the scripting of up to seven installation tests, saving time by reducing the need to remake connections. But they, 'do not have a fixed 6 mA DC test for RCDs. The only technique that could be used is to run a ramp test using the 10mA RCD setting.'

Consequently, the Fluke 1664FC may not be used in any automatic mode to test vehicle chargers, but results, once obtained, can be saved to the cloud via a smartphone running IOS or Android and shared easily.

All three of Metrel's testers have automated testing for EVSE points using the Autosequence function. The operator opens the test, enters the parameters of the test such as earthing system type and starts the test,

changing the vehicle status button when prompted. Not only the functional tests and breaker tests but a full electrical test is completed.


The future

The future is always difficult to predict. One thing is certain - 28,000 charge points are not sufficient in a population of approximately thirty million vehicles. A recent estimate put the figure at 2.5 million high speed public charge points.

Strangely, while the charging station product market is relatively well developed, the equipment market for testing them is not

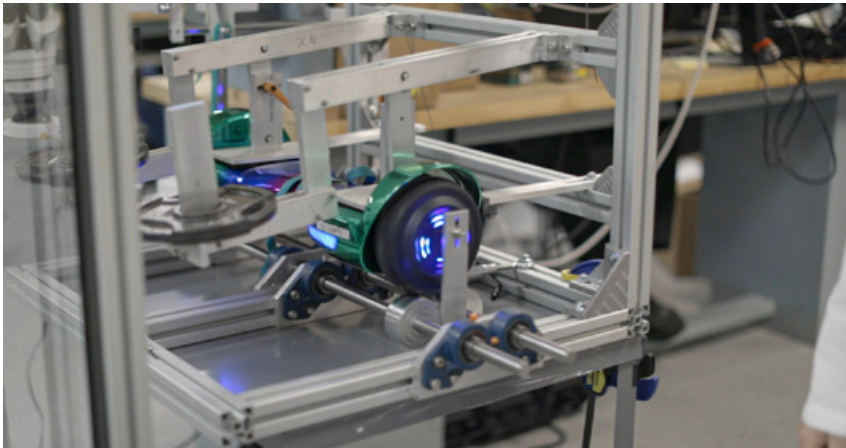
There will be a lot more installations to be tested both initially and on an ongoing basis. The electrical distribution companies are talking about using the population of electric vehicle storage systems to both store and manage supply from their renewable generation, charging in off peak and buying energy back in the peak. Although it sounds complicated and would require a much smarter grid.

It is known that some companies are working on a consumer device that they can plug in to check a charger's safety before they attach their valuable vehicle, to confirm it is not going to burst into flames.

At recent exhibitions, an e-mobility analyser was displayed – a much more sophisticated interface. It supports diagnostic testing and verification of electrical safety and function of type 1 and type 2 supply equipment, as well as testing mode 2 and 3 charging cables and their communications, monitoring between vehicle and charging station during operation, using either a multi-function tester or, using an Android app and mobile phone, to control testing, as well as monitor and store the results. 

The customer's always right

Negative reviews from customers online can have a catastrophic impact on sales. In this article **Jean-Pierre Rosserot**, technical director at SGS, explains how performance testing could help shield manufacturers from negative customer feedback.



Currently, 88% of consumers state website ratings and reviews as their primary source of information when considering buying a product. This puts retailers and manufacturers of electrical and electronic equipment under increasing pressure to ensure their products are safe and meet the demands of consumers who are increasingly tuned in to sustainability, energy efficiency and green issues.

To retain competitive advantage, it's important for manufacturers to consider their products from the perspective of how happy the consumer is, or will be, with their purchase. The key to having happy consumers is in understanding their expectations and then either matching or exceeding them. Taking the perspective of the user should be the starting point for any testing protocol in order to anticipate possible consumer feedback.

Performance and reliability tests

Performance and reliability tests verify the ability of a product to function at required parameters under various conditions throughout

its lifetime. Intensive testing of specific samples will ensure that failures only occur in the lab and not in your customers' hands. It's an ideal step to prepare goods for the rigorous marketplace testing and competitor comparisons often carried out by consumer groups.

Performance testing is not related to any directives and in most cases is carried out at the end of the product development stage, after all other tests have been completed successfully. Performance testing enables the functionality, usability, durability and electrical performance of products to be measured, compared and evaluated. A performance test plan, which entails verifying all relevant test protocols and certificates, can reduce product recall risks and cut your costs.

Performance certification can also be used by manufacturers and suppliers to help differentiate their products in the marketplace. Following testing, the certification can be displayed on packaging, thereby demonstrating to consumers that the declared characteristics have been thoroughly tested and validated, building brand recognition and

increased consumer trust in your product.

Reliability testing ensures a product works as expected in normal and unusual situations. Such tests enable producers and retailers to estimate a product's life span and identify the causes of failures.

Products must be 'fit-for-use'. A 'fitness-for-use' assessment identifies possible product weaknesses and allows manufacturers to compare their products with their competitors'. This allows a manufacturer or supplier to position their product in the right competitive environment. It will also mitigate some of the risk associated with negative feedback.

'Fitness-for-use' assessments match the prime areas of usage that are commented on by consumers. These include:

- Instructions to user
- Handling
- Performance
- Durability
- Usage.

Usability is a large part of those expectations and usage assessment has become one of the most important tools available to a manufacturer when helping them define and anticipate users' feedback.

Which protocols need to be applied to the product will, of course, rely on the type of product. With electrical and electronic equipment, a variety of testing protocols can help manufacturers and suppliers monitor and rate their products.

Energy Rating labels, which evolve from test results, enable consumers to compare the energy efficiency of E&E products on a fair and equitable basis. Energy efficiency is measured against specific standards which are periodically updated, prescribing higher levels of energy efficiency.

Tests can provide valuable data on the energy efficiency of consumer electronics including:

- Photometric tests for lamps and luminaires
- Standby current measurements of consumer electronics
- Energy consumption of refrigerators
- Efficiency of transformers.

To ensure the proper functioning of various components in a product, comprehensive tests can be undertaken to assess:

- Keypad/switch durability
- Bending and twisting on PC card and memory modules
- Insertion/extraction durability test for connectors
- Mating/unmating/normal force tests for connectors
- Terminal retention force testing
- Flexibility tests for cords
- Evaluation of solder joint reliability.

Manufacturers can also better prepare products for consumer use by submitting them to tests that mimic extreme scenarios that might happen during use:

- Hot/cold temperature step stress test
- Rapid thermal transitions stress test
- Combined environment stress test

- Vibration step stress test
- Highly accelerated stress screen.

Environmental conditions also impact on the function of consumer electronics and these can be tested through environmental simulations for temperature, humidity and weather:

- Cold/heat testing
- Temperature cycling testing
- Salt spray test
- Thermal shock test
- Ozone testing
- Altitude/low pressure testing
- Temperature/humidity cycling test
- Water/rain/dust proofing test
- High temperature gradient cycling testing
- Mixed flow gas corrosion test
- Steady state temperature/humidity testing
- Solar and UK irradiation testing
- PCT (pressure cooker testing).

Taking the perspective of the user should be the starting point for any testing protocol in order to anticipate possible consumer feedback

In addition, tests can be undertaken for environmental simulations for mechanical stress including:

- Sine wave/random vibration testing
- Bump testing
- Mechanical shock test
- Drop testing
- Bouncing and loose cargo/swinging testing
- Package and transportation testing.

Through testing, manufacturers can ensure their products go the extra mile. Ideally, it will lead to product improvements based on test result data and enable poorly performing products to be redesigned or removed from the market.

Online reviews are a phenomenon of today's consumer markets and negative feedback can directly lead to a drop in future sales. Employing performance and reliability testing services will help manufacturers reduce risk and ensure compliance of products across the EEE market.

In finding the right service partner, manufacturers will gain the confidence to navigate the processes from product design through to production. Priority should also be given to those organisations focused on the reparability and sustainability of products. In doing so, manufacturers will not only be gaining an advantageous position within the market, but they will be taking the right steps to address sustainability, energy efficiency and green issues. 



Electrical safety after Grenfell

ECA's director of technical **Mike Smith** and director of employment and skills **Andrew Eldred**, highlight the continued fire risk due to under-qualified installers, in response to this summer's 'Raising the Bar' consultation, which followed the tragic Grenfell Tower fire of 2017.

Close examination of the factors that contributed to the Grenfell Tower fire has reinforced the importance of competence as a key factor in the safety of electrical installations – and ultimately, the safety of those living in the buildings we help to create.

Everyone knows what happened at Grenfell Tower on the night of 14 June 2017, but the story is no less shocking when repeated. In the capital of modern, allegedly safety-conscious Britain, the deadliest residential fire since World War II claimed 72 lives and threw our country's reputation for public safety into serious question.

Could another fire happen?

What has emerged through the subsequent investigations and reports initiated by Dame Judith Hackitt is that a disturbingly complacent approach to competence has been allowed in some places to hold sway for too long.

Two years since the fire, there remains a danger that some of society's most vulnerable are being put in harm's way due to the work of under-qualified installers. The residential and care homes that hire them are especially in jeopardy, given the number of sick and elderly residents under their charge.



Mike Smith



Andrew Eldred

In our *'Raising the Bar'* submission to the Government, we have repeated our view that installers such as electricians, plumbers and builders who are hired to work in higher-risk buildings need to have undertaken an appropriate apprenticeship, or equivalent competence-based qualification. The work of under-qualified installers is more likely to be dangerous, leading to a higher risk of electrocution and fire.

Government statistics show that in 2018/19, 636 fires were attended by emergency services in hospital and healthcare buildings, and 1,168 fires were attended in communal buildings, which includes residential and care homes. Many of these fires are likely to be electrical in origin.

A warning to industry

ECA has warned both Government and industry against a counterproductive trend towards short, classroom-based courses, which claim to prepare budding tradespeople for electrical and other installation work. These courses do not provide the technical understanding, or the extended real-life, on-the-job experience needed to ensure safe electrical work.

However, within the electrotechnical industry, many individuals are claiming to be competent electricians despite having trained, in some cases, for only a matter of weeks.

The publication in August 2019 of the *'Raising the Bar'* recommendations, underline the urgency and importance of ensuring that everyone who works in and on buildings must be sufficiently competent.

We should all remember we are talking about protecting people's lives. To be blunt, it's time to stop messing around with low levels of electrical and fire safety competence, and in particular it's high time to say a final goodbye to the so-called 'five-week wonders' – wrongly deemed by some as competent to design and install electrical work.

Paths to competence

ECA has mapped a way forward in our response to *'Raising the Bar'*. We and the wider industry need to stop settling for low levels of competence, which put buildings, and hence lives, at risk.

We strongly support all five *'Raising the Bar'* recommendations concerning the competence of installers:


- There should be independent third-party certification of all enterprises undertaking installation work.
- All individual installers must hold a minimum Level 2 or 3 Ofqual-regulated, competence-based qualification (Level 3 being the minimum in the electrotechnical sector). ECA unequivocally advocates technical apprenticeships for new entrants.
- The electrotechnical sector as a whole should adopt the Electrotechnical Certification card Scheme (ECS) as proof of the qualifications an individual holds.
- An open-ended obligation to undertake CPD should ensure all installers remain up-to-date with the latest relevant regulations and other developments.
- All installers should have appropriate knowledge of fire safety in buildings, with standardised, mandatory training units.

Within the electrotechnical industry, many individuals are claiming to be competent electricians despite having trained, in some cases, for only a matter of weeks

In the months following the Grenfell fire, former chair of the Health and Safety Executive Dame Judith Hackitt was tasked with undertaking an *Independent Review of Building Regulations and Fire Safety*, to address the flaws in the system which allowed the disaster to happen.

ECA and the Fire and Security Association (FSA) made a number of influential representations to the review, having listened closely to industry concerns over competence and fire safety.

Earlier this year, we welcomed the Government's confirmation that a new regulatory system would come into place, supported by stronger sanctions and enforcement powers.

With phase two of the Grenfell inquiry report now underway, ECA and the FSA will continue to offer advice and informed opinion wherever possible, to ensure such a tragedy can never happen again. 

Southern Manufacturing & Electronics 2020

Southern Manufacturing & Electronics returns to Farnborough from 11 to 13 February 2020.

The Southern Manufacturing & Electronics show is undoubtedly one of the most important engineering exhibitions in the UK, offering an incredible diversity of exhibitors covering all aspects of engineering enterprise.

The 20,000m² Farnborough International Exhibition Centre will host firms from all over the UK, together with a significant number of offshore exhibitors from across Europe, Asia and the Far East, offering a huge range of products and services from components and production hardware to subcontract expertise.

Roughly half the show is dedicated to electrical components and electronics. Component vendors include **ESI Technology**, **Würth Electronics**, **TDK Lambda**, **Luso Electronics**, the **Rebound Group**, **Cosel Europe**, **Selwyn Electronics**, **Transfer Multisort Elektronik** and Austria's **CODICO GmbH** amongst many others.

Scolmore will showcase a raft of new additions to its IEC Lock range, designed to provide protection against accidental disconnection of computer equipment, servers and most network devices by way of a unique and patented locking mechanism.

Binder will be showing the latest examples from its comprehensive range of connectors including M5, M8 and M12 connectors, designed for the growing sensors and controls market, and systems specifically for the

medical and food and beverage sectors.

Easby Electronics will highlight a broad range of products, supporting amongst others, the industrial, mil-aero, medical and automotive markets. In the expanding EV market, Easby and its long-term manufacturing partner **Degson**, will offer several solutions, including 32Amp Type2 Sockets to IEC62196-2 and 32amp type 1 and 2 cables.

Production hardware is also well represented. Five new machines will be launched by **Automated Cable Solutions** this year, including the Carpenter cut and strip machine, PP3+ stripper crimper, a multi-core wire stripper and digital microscope. Visitors will be able to see hand tools, mini applicators, crimping presses, wire pull testers, cable feeders and a whole fleet of machines for cutting cable and tubing.

Hakko is set to launch its new thermal wire stripper at Southern Manufacturing 2020. The FT-802 satisfies the demands of the military, medical and aerospace industries. It ensures the precise, clean-cut removal of wire insulation, even through highly heat-resistant PTFE, says the company, and improved flexibility allows for tangle-free operation. It can also be used for the stripping of insulation from single core wires.

The show will also highlight an enormous range of industrial equipment and workshop essentials, such as automated retrieval solutions from **Kardex Remstar**, storage systems from **Bott** and modular worksta-





The 20,000m² Farnborough International Exhibition Centre will host firms from all over the UK, together with a significant number of offshore exhibitors from across Europe, Asia and the Far East

tions from **Kanya UK**. **Yaplex** will showcase its materials handling systems, and there will be a wide selection of consumables from well-known brands such as **Henkel Loctite**, **Ambersil** and **Lohmann Technologies**.

Alongside the hardware, Southern Manufacturing is also a vitally important marketplace for subcontract services, with every kind of expertise on offer, from design, to wiring and box build to EMC testing. Wiring specialists **IEW** will be showcasing its higher-level box builds, power boxes and PLC controllers. The firm has been developing relationships with software developers in the PLC industry to provide a total solution for PLC hardware and integration. **iDaC Solutions** provides high performance data and control cabling systems for industrial environments and enterprise networks. Its range includes screened structured cabling systems and fibre optics, industrial grade enclosures, modular power distribution systems, control and robotics cabling and modular containerised data centres.

A full list of the hundreds of exhibitors at this year's show is available at www.industrysouth.co.uk. Over 130 exhibitors are profiled in the show's official preview magazine, which is available to read online for free on the same site.


The show is partnered with the **Farnborough Aerospace Consortium**, alongside national bodies including **Composites UK**, **NetComposites**, the **Confederation of British Metalforming**, the **SMMT**, the **GTMA**, the **British Gear Association** and **Locate** in Kent.

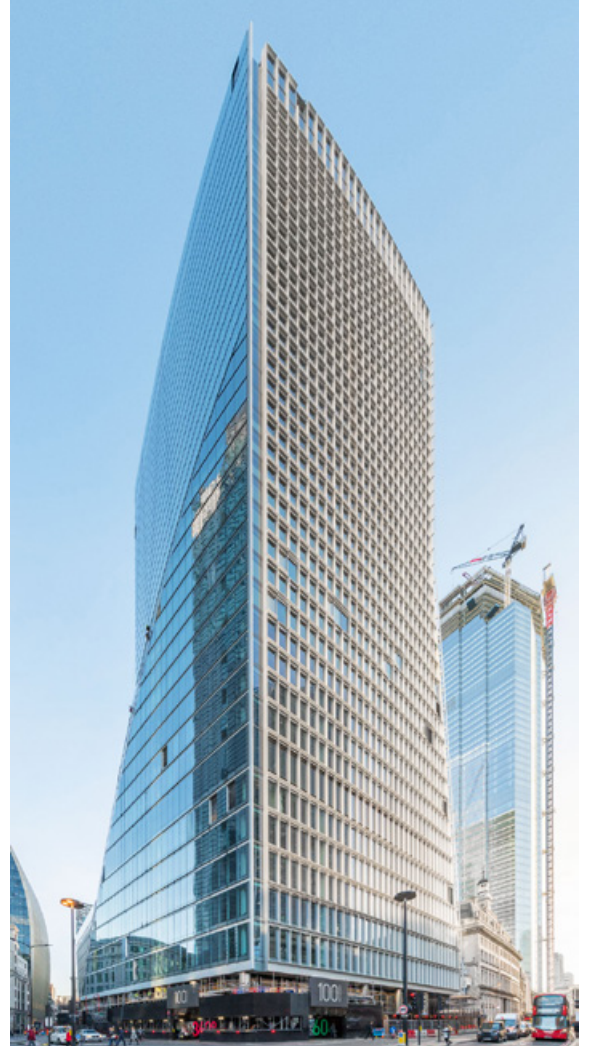
Much of the expertise encompassed within these organisations will be accessible to visitors via the show's ever-popular free seminar programme. Spread over the three days of the show and running in two dedicated theatres, the seminars deal with a wide variety of technical and business-oriented issues, and will appeal to anyone with an interest in engineering, technology or management.

The programme for 2020 provides its customary high standard of presenters drawn from both the business and academic worlds, including award-winning authors and recognised authorities in their respective fields.

At the time of writing, a total of 33 sessions have been announced, covering areas such as advanced materials, digital transformation in manufacturing and Industry 4.0, 3D printing, lean marketing and discussions on the future evolution of CE marking, post Brexit. All of the sessions are free of charge and open to all, although pre-booking is highly recommended. A complete listing of sessions as well as the online reservation form is available at www.industrysouth.co.uk.

Farnborough International Conference and Exhibition Centre offers complimentary car parking for 3,500 vehicles and is well-served by road and public transport links. A regular free shuttle bus service operates from both of Farnborough's mainline railway stations directly to the exhibition. The venue itself provides a high standard of facilities including a complimentary Wi-Fi service in the foyer area as well as high quality catering outlets.

Southern Manufacturing & Electronics 2020 opens from 11 to 13 February. Admission to the exhibition is free of charge. More information and tickets are available from www.industrysouth.co.uk 



Women wanted



Drawing on her own personal experience, **Jess Costanzo**, specification sales manager at Simmtronic, discusses the gender disparity within the industry, highlighting where the UK is falling short, the unsung opportunities available to young people, and what we can do to not only encourage more women to get involved, but how we can help create a more female-friendly sector.

The construction industry worldwide needs to constantly evolve in the face of adversity. A diverse workforce paves the way for originality, and questions conventional thinking, to find innovative solutions to tackle today's challenges head on. There are over 15.5 million women in work in the UK, and yet such a small number have found their way into the construction industry. We can do better than that.

I lead the Specification Engineering team at Simmtronic – an independent specialist, manufacturing fully intelligent lighting control systems for thousands of projects across the UK. I work extensively with electrical engineers at all levels (both within electrical contracting firms and building services engineering consultancies), specifiers, contractors and clients alike to deliver projects.

One in every 1,000 electrical contractors is female. Add into the mix that the UK has the lowest percentage of female engineering professionals in Europe – only 11% of the engineering workforce is female – and

it is unsurprising that such gender disparity has resulted in the significant gender pay and skills gaps. Construction is the worst offending sector, with women earning only 76p for each £1 earned by their male colleagues. Only 14.5% of construction workers are female according to the UK's Construction Industry Training Board (CITB).

Despite these startling figures, I myself have not experienced a stigma around women working within the electrical building sector. There is, however, definitely a lack of awareness, particularly regarding potential career opportunities for women and girls.

More needs to be done to encourage women to pursue a career in the construction industry. Starting at educational level, addressing the skills gap is key (the UK wide shortage of trained trade professionals in any and all trades), and helping all young people realise that having a trade, particularly being an electrician, plumber or carpenter is actually hugely advantageous. You can take home around £1,000 a week as a crane operator for example – if you are willing to put the hours and hard work in.

Simmtronic recently had a stand at a careers fair for Warrington and Vale College, where a number of young girls were coming over to ask me what I did as a job. Many of them hadn't given a thought to any potential careers in construction – one of them even remarked “isn't that just building things?” to which I replied, “Of course not! We need project managers, engineers, accountants, document controllers. The construction industry at large holds wonderful opportunities for everyone. We need as many team players as possible.”

I'm passionate about inspiring and encouraging others, hence me visiting career fairs, and I'm currently working on a programme in my own time, to encourage young people of all backgrounds to consider a career in building services engineering.

There are so many job roles involved in delivering electrical building services – most of which I interact with on a daily basis. How many of these people are women? Less than a third, and most of these are at junior levels within electrical engineering or working as lighting designers and architects.

The UK has the lowest percentage of female engineering professionals in Europe – only 11% of the engineering workforce is female

Many of the young women I've met as electrical engineers are not British, but Greek, Italian, Bulgarian, Finnish, or Indian. This speaks volumes about the culture within our current educational system, where we direct our young people to seek careers. I came into the sector through familial ties, having been exposed to the construction and electrical industries from a very young age, along with my dad's enthusiasm for, and awe of, the built environment. It was infectious, and I'm eternally grateful for that influence, but not everyone has had that opportunity. We need to create those experiences for our young people, and particularly, young women.

With this in mind, I was lucky enough to secure a work experience placement with my current employer at 15, which made me aware of the opportunities available within the industry. This snapshot whetted my appetite further and led me to go on and study a BA(Hons) in Business Management with Sustainable Business at the University of Winchester (2011-2014). The course content further opened my eyes to the opportunities to make a difference in the construction industry, particularly in improving sustainability in the built environment.

My day-to-day role involves consulting with a wide variety of talented professionals on finding the best solution for a given project, running CPD seminars for hundreds of engineers annually, and negotiating on projects. My main enjoyment, however, comes from the consultancy element – helping others to learn about lighting control. Liaising with different audiences across different ages and cultures provides us all with useful insights and a well-rounded understanding as to why the industry is as it is and what we as a company can do to help aid its development.

For me, one explanation for the gender skills and pay gaps in the UK electrical industry, could be the fact that we tend to see girls going towards careers in financial services, legal services, social work etc. Why



is this? Are they pushed in this direction, or just unaware that there are other avenues in other industries that their skills could be suited to as well? Whilst the aforementioned are all fantastic career options, the building services industry and the construction industry needs skilled workers and engineers too, and there are plenty of extremely intelligent and capable young women out there.

Many firms are yet to make inroads in addressing the balance. I believe it would help stereotypes if business got involved within education, prior to Key Stage 4 (GCSE level), and provided a diverse range of role models to young people to show that there's careers for all.


When it comes to recruitment agencies, hiring managers should also look at CVs and cover letters blind – meaning that recruiters/HR manager should remove defining characteristics (for example somebody's name) off of the CV, so that there isn't any prejudice when reviewing a candidate's suitability for a role.

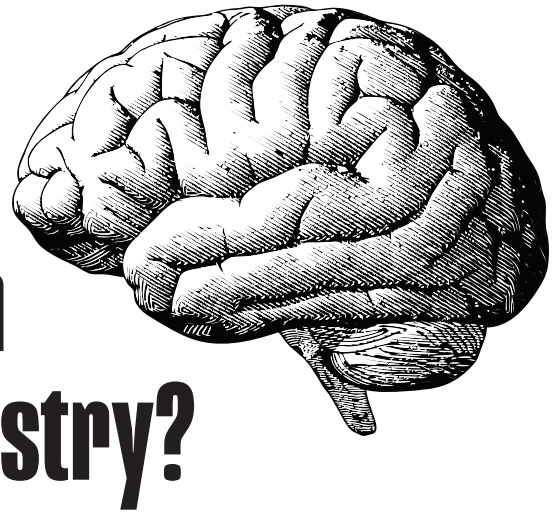
Certain firms we work with have begun to take positive steps by acknowledging the balance disparity – ARUP/ Skanska and Lendlease to name but a few. They have researched diversity extensively within their companies. I've been impressed with how Arup, for example, has managed to address that balance throughout the junior levels already. Representation on company boards and committees has also seen increased diversity in membership over recent years.

Construction is the worst offending sector, with women earning only 76p for each £1 earned by their male colleagues

I have very recently just recruited for a graduate specification engineer for our northern office, and only received three CVs from young women, despite over 30 applicants being sent through from the recruitment companies. Compare this to when I helped recruit our marketing manager; all the shortlisted candidates were women. This figure speaks volumes, even though they are small numbers.

It's 110 years since International Women's Day was first observed, and, yet, 2020 still finds every industry continues to pay men more on average than women. Thanks, however, to cultural and societal shifts prompted by the #MeToo movement, small changes are evidently afoot.

I want to help spread the message and encourage more women into this trade. If you have the passion, then go for it – the world of construction is rife with opportunity. 



Mental health: How can we do better as an industry?

Even though most of us will struggle with mental health issues at some point in our lives, when it comes to getting the help we need, it can be difficult to know where to start. For thousands of people, this disparity is the difference between life and death, with suicide rates among men in particular the highest they've ever been. Here, the Electrical Industries Charity gives us some invaluable tips on starting the conversation.

Let's face it, the start of the year is always a little depressing, the weather is miserable, Christmas is over, and normality has almost resumed, generally leaving in its wake heavier bodies and lighter wallets. January 20 has even been dubbed 'Blue Monday' making it officially the most depressing day of the year.

We all have mental health that, just like our physical health, needs taking care of. Unfortunately, in this country, mental health issues, particularly those relating to suicide, are still strongly (and wrongly) shrouded in secrecy and shame. This stigma is an enormous issue and one of the main reasons suicide rates, particularly among men, continue to rise with no sign of abating.

Why is suicide so common in the UK?

Many experts believe a number of things determine how vulnerable a person is to suicidal thinking and behaviour. These include:

- Life history: For example, having a traumatic experience during childhood, a history of sexual or physical abuse, or a history of parental neglect.
- Mental health: For example, developing a serious mental health condition, such as schizophrenia.
- Lifestyle: For example, misusing drugs or alcohol.
- Employment: Poor job security, low levels of job satisfaction or being unemployed.
- Relationships: Being socially isolated, being a victim of bullying or having few close relationships.
- Genetics and family history.

The facts

- Suicide is the greatest cause of death amongst young men (15–44) in the UK and of many young women.
- Every four minutes someone in the UK tries to kill themselves and every hour and a half someone succeeds.
- 1,419 people working in skilled construction building trades took their own lives between 2011 and 2015.
- 1,409 were men and just 10 were women.

- The statistics also show that the risk of suicide for those working in building and construction trades was 1.6 times higher than the national average.

How can we do better?

- Talk about mental health awareness, being more open and discussing challenges so that we take away the stigma.
- Acknowledge as an industry that there is an issue and start to measure it as we do with other health and safety statistics.
- Engage in dialogue with your colleagues by asking a simple question, such as 'are you okay?' – it can make all the difference.
- Try not to judge. You might feel shocked, upset or frightened, but it's important not to blame the person for how they are feeling. They may have taken a big step by telling you.
- Don't skirt around the topic. There is still a taboo around talking about suicide, which can make it even harder for people experiencing these feelings to open up and feel understood. Direct questions about suicide, such as 'are you having suicidal thoughts?' or 'have you felt like you want to end your life?', can help someone talk about how they are feeling. **ER**

Access Assistance

If you or someone you know is struggling with mental health and you're unsure what to do, the Electrical Industries Charity have some brilliant resources:

- Call 080 652 1618 or email support@electricalcharity.org – Available 7 days a week offering free and independent assistance for virtually any problem or issue you may encounter. EIC's trained advisors assist everyone with respect and empathy.
- Through Samaritans: Confidential emotional support is available 24/7 to anyone experiencing despair, distress or suicidal feelings by calling 08457 090090.
- The EIC also offers telephone counselling, careers advice and assistance, as well as financial assistance. For more information, please visit www.electricalcharity.org. Remember, you are not alone.

New media plate – half full or half empty

The latest product development from Scolmore sees the launch of a new range of half media plates which have been developed as the direct result of requests from contractors looking for a smaller version of the existing media plates.

The plates feature a decorative ingot switched double socket outlet, with a triple aperture that will allow the installation of any three new media modules to build a plate to suit a variety of installation requirements.

With flexibility and quick installation for the end-user in mind, the half media plates include a pre-manufactured insert onto the back of the plate to eliminate the need for a mounting yoke.

There are five new half media plates available - polar white, polished chrome (with a choice of black or white ingot) and satin chrome (with a choice of black or white ingot).

Scolmore • 01827 63454
www.scolmore.com



New Fluke thermal imaging camera

Fluke has introduced the new TiS20+ entry-level thermal imaging camera. The new Fluke TiS20+ features IR-Fusion technology, which blends visible and infrared images to help to exactly pinpoint the location of a problem.

A thermal image is overlaid on a visual light image to give the full picture of where the issue is before it becomes a problem. By simply sliding a finger across the screen, the level of infrared is adjusted.

The Fluke TiS20+ features a 3.5-inch touch-screen, offering 120 x 90 infrared resolution for use in a temperature range of -20°C to +150°C. It is designed to withstand a two metre drop and is water and dust resistant to IP54 with a battery life of over five hours' continuous use.

The TiS20+ is compatible with Fluke Connect, with Fluke Connect desktop software enabling the creation of professional reports in minutes, while efficiently capturing full radiometric data to support the maintenance program.

Fluke • 020 7942 0708
www.fluke.co.uk



Centiel to show industry leading agile UPS solutions at DCW 2020

Centiel UK Ltd has announced it will demonstrate its agility by showing its industry-leading, flexible UPS solutions at Data Centre World this year on booth D810.

Louis McGarry, sales and marketing director, Centiel confirmed, "We will be showcasing a 600 kW CumulusPower UPS frame populated with our 4th generation, high-availability, high-efficiency, hot swappable 60 kW modules offering 540 N+1 in a single footprint. We will also demonstrate one of our most popular frames, which maximises availability, achieving 75kW N+1 within a single footprint of just 0.59 m2. With up to 320 battery blocks internally, this solution offers a great option for facilities with limited space."

CumulusPower is known for its '9 nines' (99.9999999%) system availability and low total cost of ownership through its Maximum Efficiency Management (MEM) and low losses of energy. CumulusPower has now been installed in data centres and comms rooms in over 60 countries across five continents.

Centiel • 01420 82031
www.centiel.co.uk



ESP targets professional CCTV sector

ESP's new IP (Internet Protocol) CCTV range will satisfy growing demand from customers and contractors as well as meeting the needs of a changing marketplace which is moving from analogue to IP.

The IP POE CCTV range is designed to offer superior, reliable and straightforward installation solutions for a range of applications from domestic through to larger and more complex commercial projects. The range features PoE (Power-over-Ethernet) which enables the camera and power feed to be wired in Cat5e cable up to 100 metres without the need for additional power, which makes installation much more convenient.

There are two distinct IP ranges available – the REKOR IP 2 Megapixel range which has been tailored for the domestic market, and the HDView IP 5 Megapixel range which is aimed at larger applications with a wide choice of NVR and camera selection.

ESP • 01527 515150
www.espuk.com



New clampmeter for testing multi earth installations

Instruments specialist Chauvin Arnoux has launched its first earth clamp with oblong head for testing earth resistance in multi-earth installations. The new CA6418 earth clamp comes with a carry case and calibration shunt and is ideal for quick testing of 30 x 40mm or 20 x 55mm rectangular earth bars and cables up to 32mm diameter.

Ergonomically designed, with features such as an OLED display ensuring 180-degree visibility in all lighting conditions, the CA6418 clamp simultaneously displays the earth resistance and leakage current. An automatic "pre-hold" mode when the clamp is opened, and automatic compensation of the jaw gap when powering up, ensure optimised processing of the measurements provided by the CA6418.

The clampmeter provides earth resistance measurement from 0.01 to 1,200 Ω and current measurements from 0.5 mA to 20 A. The instrument boasts a large internal memory which allows it to time and date-stamp 300 measurements thanks to the real time clock.

Chauvin Arnoux • 01924 460494
www.chauvin-arnoux.co.uk/en



Realistic transformer protection testing

The latest version of RelaySimTest (V3.20) means that instead of adopting the usual approach of simply testing the reference values of characteristics, typical situations are all simulated in a realistic manner in order to assess the response of the transformer protection system. RelaySimTest thus ensures that transformer protection will function as required in real-world fault scenarios.

Testing with RelaySimTest means that manufacturer-specific test templates can be dispensed with, as each relay or IED is treated as a "blackbox" – hence placing the emphasis on the correct response in the event of a fault. The new transformer protection testing features cover:

- Internal transformer faults (winding to winding and winding to ground).
- Placing residual current transformers in the star point of the transformer.
- Simulating inrush currents for testing the stability of the protection system.
- Defining relative current transformer faults for testing the stability of the differential protection.
- An upgraded transformer widget for improved analysis of test cases.

Omicron • 01785 848 100
www.omicronenergy.com



Motor testing at its best



MTR105 Rotating Machine Tester

The new Megger Baker MTR105 hand-held static motor tester is designed for performing multifunctional tests on motors.

All in one device at an affordable price.

- Insulation Resistance tester
- DLRO (Digital Low Resistance Ohmmeter)
- Voltmeter
- Motor rotation tester
- LCR meter
- Temperature measurement
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