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# ELECTRIFICATION... ARE WE IN FOR A SHOCK?

The move away from fossil fuels to battery powered equipment - from cars and vans to work platforms, telehandlers and cranes - means additional demand and strain is being put onto the electricity power supply infrastructure across Europe. Is there enough capacity, is it in the right place and how much will it cost? Mark Darwin talks to Brian Stead, legal compliance and property director of Nationwide Platforms in the UK, about the power issues it is facing and how the UK's largest access fleet is preparing for the inevitable increase in electricity demand.



Brian Stead

**Nationwide Platforms - part of France's Loxam group since 2017 - has nearly 15,000 aerial work platforms, of which around 10,000 are battery electric or hybrid. Since 2015 Loxam's Corporate Social Responsibility (CSR) policy requires group companies to purchase environmentally sustainable products wherever possible. Until recently small electric slab scissors have satisfied this requirement as there have been few larger electric machines available. This is starting to change with the introduction of larger electric booms and scissors as well as vans and small trucks - and with it comes power supply issues.**

"Electrification is not about a product, it is about transitioning a business to reflect evolving market demands bearing in mind you cannot run faster than the customer, otherwise you cannot deliver your return on investment, and you cannot be slower than your supplier otherwise you will lose market share... and you have to do that in the environment of a long life cycle product," says Stead. "That is the way I realistically look at the problem. It is not about how many amps this machine needs."

"Equipment suppliers were initially slow to offer larger electric powered products and whilst lithium was available on spider lifts it wasn't on the core machines such as the 15 to 16 metre Rough Terrain booms or the 15 to 18 metre scissor lifts. Every year we submit our investment plans - and

this year there was a big investment - and we had to justify every single machine that was not electric. As part of this policy, we also started looking at vehicles such as cars, vans and Light Commercial Goods Vehicles (LGVs) up to 7.5 tonnes, however that raised the issue of is there enough power going into each depot?"

"Accepting that the rental machines pay our wages and not company cars, there had to be some prioritisation, and this was the real start of our electrification project," he says.

## POWER TRIP-OUTS

The increasing numbers of battery powered platforms meant that by 2019 the company was already experiencing frequent power trip-outs at one of its depots.

"At that stage I had initiated a power upgrade for the depot. However, it has taken three years and a significant six figure sum for the Distribution Network Operator to provide the upgrade. The cost did reflect problems in carrying out the upgrade being routed a distance of 7km over land owned by five different owners and two public highways. The cost depends on where the local substation is positioned relative to the depot and the size of upgrade you need."

"The main point here is the amount of time and cost it has taken just to upgrade one depot. It is not a five minute fix - you have to plan ahead as it could take years and be very expensive," he said.



## REVIEW INITIATED

Because of the power problems, Nationwide initiated an infrastructure review of its 31 depots. However, with the recent rises in the cost of electricity - which for some businesses have reportedly been in the order of 400 - 500 percent - the changes that have been implemented are



now saving a significant amount of energy and therefore money.

Stead's initial task was to deal with nine depots - roughly a third of the total - including three types: a large location most likely to have the greatest demand, the 'non-standard' depot which runs dual shifts, and the baseline 'average' depot used to compare against the others.

He then teamed up with an energy management company which installed software allowing them to see the power consumption of each of the nine locations in real-time - where the power was being used, whether the power is clean or dirty and if there were any other issues.

"Out of the nine depots I have had to upgrade the power supply of a further two this year making a total of three. One went very smoothly as the substation was almost adjacent to the yard boundary, one was reasonable and of course we had the three year challenge depot - but there will be many others."

The software allows Stead to carry out sensitivity tests purely on the number of machines in each branch that can predict power capacity problems if requirements increase by 10, 20 or 30 percent etc. "Using this data we can get ahead of the curve in applying for upgrades to the Distribution Network Operator or in the worst case deciding whether we need to relocate a depot if upgrades are not available in a timely manner."

"A full audit of each location has been carried out and we are finding that years and years of adding additional electrical charging points etc... was really not working," he says. "Some machines were being daisy-chained from transformers meaning as little as a one amp single phase supply to the machine. But the overnight charging mind-set - an eight metre electric scissor charges in six to eight hours - meant we would plug them

in at 5pm, and mistakenly expect them to be fully charged by the morning. This carried the risk of supplying machines to customers which were not fully charged. We have now addressed this from the audit."

### WHAT IS TYPICAL USAGE?

For most depots the power supply would be between 100 and 200Amps three phase - compare that to an average household which would be 60 to 100Amp, two phase depending on its age. The largest supply for a Nationwide depot is 800Amps however that was inherited when it took over the facility of an old steel fabricator which obviously needed a huge amount of power. This however is not currently cost effective because of the high standing charges and will be scaled back shortly.

"What should also be remembered is that almost all of our 10,000 electric machines are electric slab scissor lifts or small machines charging at a 16A rate on single phase connections," he says. A 100A supply can support between 400 and 500 of these machines relatively easily. When dealing with larger scissors, booms and trucks vastly more power is required."

"Dingli's new 34 metre boom lift for example will take much more power to charge than the standard slab electric scissor lift. Using a single phase 16A circuit you would be lucky to charge the big boom in a week! The manufacturer says it can be charged in 1.5 hours - perhaps with a Tesla type fast charger - but certainly not on the

Dingli's new 34m boom



typical customers' worksite. It probably needs a 32A three phase supply, so the average depot with 100A can charge three big booms before it is overloaded."

However, the challenge does not stop at the rental company in that once the machine has left the depot and is delivered on site, it is the customer and the construction site's electricity capacity that has now to be able to charge possibly hundreds of electric machines with peak power needed for a few hours after the site closes in the evening. Pushing the problem up the chain has resulted in several customers now asking Nationwide to provide machines with five times the operating cycle so instead of the machine being operated for a day and charged every evening, they want one charge to last a week because of the lack of charging facilities.

"In simple terms five times the operating cycle means five times the battery size or using a different type of battery which means a redesigned machine due to weight dynamics/battery size etc," he says. "Battery technology has improved and will continue to improve but the more it is pushed back to the rental company the bigger its power supply challenge."

"Our most challenging depot in London has 1,100 machines and a 100A supply. What blows the circuit is peak demand and one solution is moving that demand. The obvious has been done - changing all lights to LEDs and installing PIRs etc which can deliver 75 percent power savings across the lighting network. Lighting makes up around 20 percent of the depot's demand so worth saving. What was last year a four year payback decision is now a sub one year decision making the financial justification easier and instantly aligns the need for available capacity with the desire for cost savings."

In a standard depot the bulk demand is between 4.30 and 7.30pm daily with the peak day being Friday. On Friday many machines were plugged in and left for the weekend.

"If people leave the depot late Friday and then the circuit trips they arrive on Monday morning and the machines aren't charged. The solution requires the charging to be staggered, say putting a second batch on at 8pm Friday or on Saturday morning but it then starts to affect the efficiency of the depot. With the analytical software we can predict the direction of travel and even check that the power has not tripped."

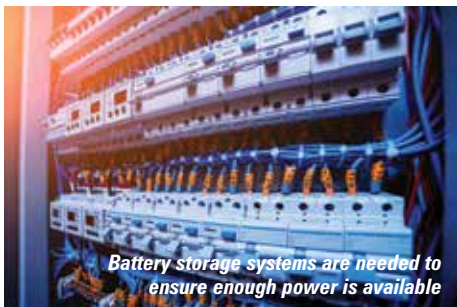
### ALWAYS ON THE GRID?

"Company CSR policy negates the use of a diesel generator to provide power - although we did use one for a short period at a depot, but it was using £1,000 of diesel a month. The solution in some depots is now battery storage. Demand during the night - particularly at the weekend - is virtually zero so you can feed the storage batteries using differential charging rates - taking cheaper overnight electricity of course, but importantly you can smooth the demand from the grid by using the batteries to feed in capacity at peak times. This will reduce and possibly eliminate some upgrades."

### BIG POWER CONSUMERS

The major gamechanger to having enough power is the introduction of the larger electric booms and scissors, electric vans and LGVs which have enormous power demands.

Nationwide is just about to take delivery of its first two 40 tonne trucks and each one takes about seven times the energy of the average electric car to charge - so the equivalent of charging 14



Battery storage systems are needed to ensure enough power is available



electric cars, which would be too much for most depots power supply.

"To keep the delivery trucks charged Nationwide uses the off peak storage batteries - one battery pack for two trucks. The trucks have to be charged overnight so a fast charger - similar to a 150kW Tesla super charger - is needed. You cannot draw that sort of power from the grid in our depots."

"Some people say use solar power then its more sustainable than drawing from the grid. To charge the two delivery trucks via the batteries we would require over 500 square metres of solar panels making the charging cost of two trucks more than £1 million to purchase and install. That is a lot of money and an awful lot of yard space which is at a premium in the first place. We are of course looking at solar in the depots but not for delivery trucks."

### GRID INFRASTRUCTURE

"The main problem is the power grid supply infrastructure is not in place to cope with the rise in power demand the country is now seeing. One network provider told me that the electricity supply will max out by 2026 because of growing

demand particularly from electric cars, vans and trucks. If the substation hasn't the capability you cannot plug in, if the power to the substation has reached its capacity you then need massive infrastructure upgrades and that means digging up roads - or going over ground although that has its own problems. In certain areas we could reach the capacity of the infrastructure in three to four years and alternative solutions such as hydrogen will not be advanced enough in that time."

### SOLUTIONS COST

As already mentioned, there is no average cost for energy upgrades it is purely down to how far the substation is from the depot, and the pricing strategy of the network provider. Its depot in Birmingham had a substation next to the depot and cost less than £10k to upgrade.

"In London East - where there has been a lot of warehousing built including the 190,000 square metre facility for Amazon which draws an enormous amount of power - they are running out of power, so supply and demand applies, and rates go up if you want more. Each depot has to be looked at individually and then money allocated - perhaps £100k perhaps £1 million - for each project, unfortunately it takes time to work out and there is an awful lot of detail to be considered before you can be sure."

"When I started this project, I thought most of the spend would be on the analytics but that is less than 10 percent of the cost. The initial project needs to be completed by March 2023 as this is when our fixed price electricity contract ends. Current projections for savings for initiatives already taken or to be completed over the coming months suggest 900,000 kWh will be saved each year. At current market rates of around 75p per unit that is £675,000. A very positive result for both sustainability and the cost line."

### DECISION TIME

"The whole industry is facing a very significant decision and as the market leader we need to play a part in this," he says. "Before April 2022 we were all using Red diesel with 46p duty relief - costing about £1 per litre. Then industry took the hit on 1st April when the relief was ended, and we had to move to White diesel. Many rental





Red diesel

companies took the hit to their margins. At the time it was perhaps easier to pass on the direct increases because of the volatility in the energy market."

"Currently if you hire an electric machine, it goes out fully charged and you can return it with any amount of charge so long as there is enough power to get it onto the back of the truck. If you calculate the cost of charge by machine type which is easy to do at the industry rate of 75p per unit then you will realise you are making less money on an electric machine, even though the average rental price is slightly higher than diesel because you are giving the electricity away for free."

"An eight metre electric scissor costs about £5 to £6 to charge each time, which if the customer takes it for a long rental is not relevant. However, on a short term rental it starts to add up, particularly with a fleet of more than 10,000 machines! Of course the bigger the machine the bigger the cost to charge and with the larger booms and scissors this is becoming significant. If we look at the car rental market as a parallel market, they too have faced very large upgrade costs to be able to offer electric vehicles as part of their hire fleet. They now charge a fee for the electrical recharge and I believe the plant rental industry will have to follow this path. The challenge for the access industry is working out a fair and accurate price. "Nationwide will have telematics on all of its 15,000 machines by the end of this year and this will include a method of charging in a fair way. No decision has been made by ourselves but I don't think the industry can continue to just absorb the electricity price increase - and that is a problem for both large and small companies."

## IS BATTERY ELECTRIC THE FUTURE?

"I see battery electric power playing a major part in the future, certainly over the next five to 10 years and diesel will disappear, although bear in mind the companies which run truck mounted machines will have a long tail before they reach 100% sustainable. We are about 66 percent electric and hybrid today - by machine count not power demand - of which only five percent is hybrid and the remaining 34 percent diesel."

"I think hydrogen will play a part initially on the smaller machines before moving to the larger machines. Hydrogen may initially find its way on to work sites as a fuel source for generators to provide electrical charging capacity. Having hydrogen available at the point of use today will provide many work sites with challenges."



"There is not one solution and there isn't a switch over point from going from electric to hydrogen. As with fossil fuel to electric so with electric to hydrogen or other solutions it's a transition. For Nationwide with the fleet we have and a replacement value measured in the hundreds of millions of pounds, the cost of getting it wrong or miss judging the timing will be enormous."

Stead is initially carrying out the project for Nationwide in the UK but also sharing the information with the rest of the Loxam group.

"In my experience the ability to work with the energy suppliers varies country by country. France is more enlightened in terms of its energy infrastructure and has more government influence over its energy policies. The tendency in much of continental Europe is to lay the infrastructure earlier. In the UK they typically put the tarmac down and then build everything around it. The USA is still very closely wedded to diesel - that will change but American suppliers are currently slower out of the blocks."

## HVO FOR LARGER VEHICLES?

"We have offered HVO in at least 26 of our 31 depots but there is little demand from customers so far. Some do not see HVO as a more sustainable solution when you consider the whole life cycle whilst others reflect the site demands of the prime contractor. Nationwide's role is a solution provider, we have spent over £300,000 this year to give the customer that choice."

## INCREASED COSTS

"One of the problems of being a market leader is that the companies that lag behind are able to use a lower cost base and wait," he says. "Rental rates have gone up but not sufficiently to maintain margins for all these extra infrastructure costs and that is a real challenge for everyone. Of course, our competitors will make their own decisions regarding the road ahead, but I would recommend everyone reviews their infrastructure and they do not underestimate the time and cost of transition. It is going to be tough but exciting over the next five to 10 years." ■





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The flywheel energy storage system



# FLYWHEEL TECHNOLOGY IS A GAME CHANGER

New game changing flywheel technology developed by UK company PUNCH Flybrid is helping some pioneering contractors drastically reduce carbon emissions and costs when running big electric powered equipment such as tower cranes, hoists and mastclimbers.



Tobias Knichel

**Construction and development group Bowmer + Kirkland was the first construction company to recognise the potential of the new technology - which has its roots in Formula 1 - and the first to install two PUNCH Power 200 machines on site resulting in massive cost and emission savings with its tower cranes and then mastclimbers. Bowmer + Kirkland now has more than 10 Power 200s and is at the forefront of reducing carbon emissions from the equipment it uses. Going forward it plans to use them on all its sites with tower cranes, hoists and mastclimbers, an approach that is helping to save the environment and support new technology which will benefit the entire construction and perhaps other industries.**

## WHAT IS FLYBRID TECHNOLOGY?

Tobias Knichel, managing director of Silverstone based PUNCH Flybrid explains: "Dynamic duty cycles waste a great deal of energy because they require a lot of power for short periods of time, as a result this type of application has traditionally required oversized powertrains purely to cope with the peak demand."

"But what if the power source - a generator, battery or mains electric power for example - could draw on an external power source to deliver that peak dynamic load, injecting energy only when the large power demand is required e.g. when a crane lifts a heavy load at maximum speed or when a Formula 1 car needs full power when accelerating? A short surge of power from an

outside source when needed would allow the size of the generator powering the equipment to be matched to the average load - when slewing or lifting lighter loads - thus saving fuel and reducing emissions. This is exactly what the PUNCH Flybrid Power 200 does."

As we have already mentioned the system was originally developed for motor sport because a race car is constantly switching between full acceleration or hard braking and so has a very dynamic duty cycle. There are however many other types of equipment with similar dynamic duty cycles such as excavators and wind turbines but also compressors as well as tower cranes and mastclimbers. In trials carried out by Bowmer + Kirkland over the past year or so, it has found that it was able to cut the size of generator used to run a tower crane by more than half, from a typical 300kVA to 100kVA, reducing the rental cost of the generator as well as saving massive amounts of fuel because the fuel efficiency of a smaller generator running at a more constant load - thanks to the Flybrid flywheel technology - is drastically more efficient than a big generator having to cope with the fluctuating demand from the duty cycle work of a busy crane.

## HOW DOES IT WORK?

PUNCH Flybrid uses a flywheel energy storage system - essentially a highly engineered flywheel which can spin at high speeds - connected to a combined electric motor/generator which powers the flywheel during periods of lower demand and then converts to a generator driven by the



flywheel when the crane needs more power.

This running gear is then enclosed in a protective, ventilated, skid mounted generator like case measuring 1.2 x 1.6 x 1.5 metres and weighing about 500kg to create the PUNCH Power 200.

This is then simply plugged in between the power source - a diesel or hydrogen genset, battery or mains power - and the tower crane or mastclimber. Maintenance is minimal requiring just an annual oil and filter service plus bearing

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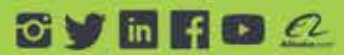


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Inside the Power 200 the energy is stored as kinetic energy in the spinning flywheel, and this is transferred by the motor/generator to the crane when it needs that short burst of power. When the tower crane is about to lift a load and spike the power requirement, the Power 200 reacts to the frequency and voltage changes between the power source and application and uses the energy stored in the flywheel to generate the extra power to cover the crane's surge requirement, eliminating the additional demand on the generator. This allows the generator to run at almost constant load, rather than forever changing to cope with the vastly differing power requirement of the tower crane. The Power 200 works whatever the power supply/source and is literally 'plug and play'.

There is only size of one Flybrid unit available - the Power 200 - but this can cope with generators from 100kVA to 1000kVA. If more power is involved then it is possible to connect the Power 200s together to deal with 2000, 3000, 4000kVA etc if required.

There are many examples which we will cover in detail later however here is just one simple example of the substantial savings on a typical tower crane application. The usual 300kVA generator supplying the crane was consuming about 8.3 litres of diesel an hour, largely because it had to deal with frequent changes in power requirements. After installing the Flybrid system and replacing the larger generator with a smaller one, fuel consumption was reduced to just 3.3 litres an hour for exactly the same work! On a tower crane that might be on site 75 weeks that is a huge saving in diesel, genset rental and CO<sub>2</sub> emissions. The financial saving was substantial a year ago, but with the current cost of diesel it is staggering.



PUNCH Power 200s are manufactured in the UK using conventional materials and processes resulting in fewer supply chain issues. They are easy to recycle and have very low full life-cycle emissions in the manufacture, usage and recycling phases.

*"It is becoming more and more unacceptable to waste energy"*

"With the global energy crisis, we are heading into a period where it will become more and more unacceptable to waste energy," says Knichel. "Bowmer + Kirkland was one of the first companies we worked within the construction sector that was prepared to try this new technology with its tower cranes."

"The starting power required is generally significantly higher than the running power. One of the first crane applications was on a luffing crane which would normally be powered by a 325kVA generator set - in this case it was an Atlas Copco QAS 325 with 325/260 kVA/kW power. After installing the PUNCH Power 200 the generator was reduced to a 100kVA HGI HRD 1000T with 100/80 kVA/kW reducing the genset by a factor of 3.25 saving more than 51 percent of the fuel which equates to saving more than 240 litres of fuel per week and more than 12,000 litres per year. The annual emissions saved is more than 32 tonnes of CO<sub>2</sub> which is the same level of emissions as 21 cars driving an average annual mileage of 7,400 miles."

Another example involved a 66 tonne Terex CTL 1600-66 luffing tower crane which had its 800kVA genset downsized by a factor of 2.5 to 320kVA after installing a PUNCH Power 200. Savings of more than 633 litres of fuel per week/31,000 litres per year and more than 83 tonnes of CO<sub>2</sub> per year - or the equivalent of 55 cars - were achieved.

### MEGA HOIST SAVINGS

"Hoists are typically powered by Direct on Line (DOL) motors which start at full load drawing a large amount of current and a significant challenge to genset frequency and voltage stability. Trials were carried out on a UK site with two Alimak Scando 650 hoists each normally powered by 200kVA genset. By adding a PUNCH Power 200 it was possible to downsize to just a single 100kVA genset for both hoists. Thus, a fourfold reduction resulted in a fuel saving of 71 percent!"

The use of the Flybrid technology in the Power 200s also allows more equipment to be powered by an existing AC mains connection, avoiding the use of additional diesel generators to help the site cope when the mains connection is not large enough to power the application. It also minimises the cost and time of upgrades for site power requirements and there is also a cable sizing and connection switchgear size/cost reduction. And on certain sites the diesel generators can be removed altogether after employing the flywheel power system.

At the moment the company is producing around 10 Power 200s a week and each is available for purchase at a fixed cost of £44,900. Many have been sold to rental companies - such as John F Hunt Power - which are now available to rent. Tower crane rental companies may also be able to supply one with the crane.

This really is a game changing product. PUNCH Flybrid's flywheel technology and Bowmer + Kirkland have recently been recognised in the British Construction Industry Awards winning the 'Carbon Net Zero Initiative of the Year' award as well as the overall 'Initiative of the Year' award - chosen from all the category winners. And it's easy to see why. It is a win, win, win product where everyone gains. ■



# BOWMER + KIRKLAND PIONEERING MAKES HUGE SAVINGS

One of the early adopters and hugely involved in the onsite trials of the PUNCH Flybrid flywheel technology was contractor Bowmer + Kirkland and its group crane manager Dave Shooter. Speaking of how he became involved with the product he said: "I was immediately interested in the product and keen to try out the new technology. The results were astounding. We could not believe the savings in carbon emissions and fuel consumption when the Flybrid was used in conjunction with either mains power or a genset."

**"Any reduction in generator size counts. Even before using the PUNCH Flybrid Power 200s we were making sizeable savings from using more efficient equipment. For example, the Terex CTLH 192-12 we hired from Select has a 25kVA smaller generator specification than its previous model. This may sound very small but if it saves four litres per hour, on a 50 hour week that is 200 litres, over a 45 week contract that is 9,000 litres saved, when fuel was 63p a litre that was £5,670 and 23 tonnes of carbon saved!"**

"The same is happening with the SAE P40 mastclimbers we have on the MediaCityUK contract in Salford which start up at about 40 amps and then run at 9.8 amps. Most mastclimbers start up at 55 to 60 amps and then run at 14 to 16 amps. The P40 - supplied by Lyndon SGB - wasn't designed as an 'eco model' but is just the next generation model with newer technology. Having just one machine on a job means there isn't a great benefit but when there are 23 on site as on the MediaCity contract, the benefits of a smaller generator and therefore less fuel usage is multiplied."

"The two 300kVA generators used for the 23 mastclimbers have now been downsized to 200kVA saving £75 per week rental over 120 weeks which is £9,000. The fuel saving on both generators is seven litres per hour over a 50 hour week that is 700 litres for both generators. With diesel at 55p a litre which is the price when we first started looking into this, the saving was

£46,200. With fuel rising to £1.50 per litre that is now a total saving of £126,000!"

"On our Friargate site in Coventry we had two luffing jib cranes - a Terex CTL 272 and a CTL 282 - from Select Plant, each with a Flybrid Power 200 installed between the generator and crane. Each crane would usually use a 300kVA generator however using the Power 200s reduced this to one 200kVA unit. Over the 78 week hire period we saved over 40,000 litres of fuel and over 106 tonnes of CO<sub>2</sub> - the equivalent of almost 18,500 car commutes into Coventry (based on a 40mpg car travelling 20 miles per day)."

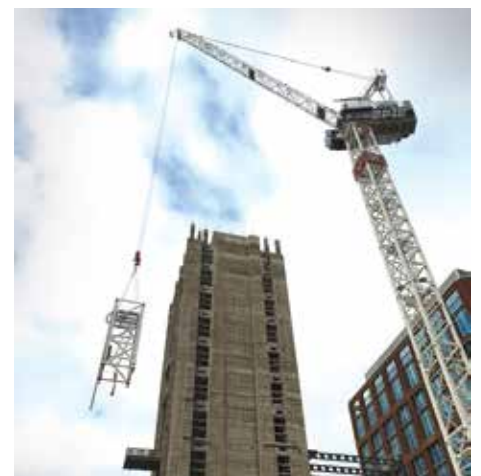
"The twin passenger hoist on the Vita student accommodation block in Coventry downsized its two generators from 200kVA to 100kVA using one Flybrid unit. Over 37 weeks it saved 64,509 litres of fuel and almost 170 tonnes of CO<sub>2</sub> - the equivalent of almost 30,000 commutes into Coventry."

"In total using the Flybrid Power 200s on the two sites in Coventry we have saved over 100,000 litres of fuel which at £1.55 a litre is more than £160,000 and the equivalent of almost 50,000 car commutes in CO<sub>2</sub>."

"Between June 2021 and June 2022 on seven pieces of kit - six tower cranes and one hoist - we have saved £129,466 in fuel and 407.13 tonnes of CO<sub>2</sub>," says Shooter. "And the frustrating thing at the moment is that we are one of only a few contractors that have adopted this technology. Imagine the total savings that could be made if every tower crane, hoist and mastclimber in the UK, Europe or world used this technology."



Dave Shooter



## IN CONCLUSION

It is very rare that we see a new product that has such profound potential to change without finding at least one or two downsides. From listening to those who have used the equipment and visited the Flybrid facilities, met the team and looked at the equipment, we can see no clear downside no matter how hard we try to introduce some balance. This is truly a win win product. ■

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# TAKING CONSTRUCTION TO THE NEXT LEVEL.

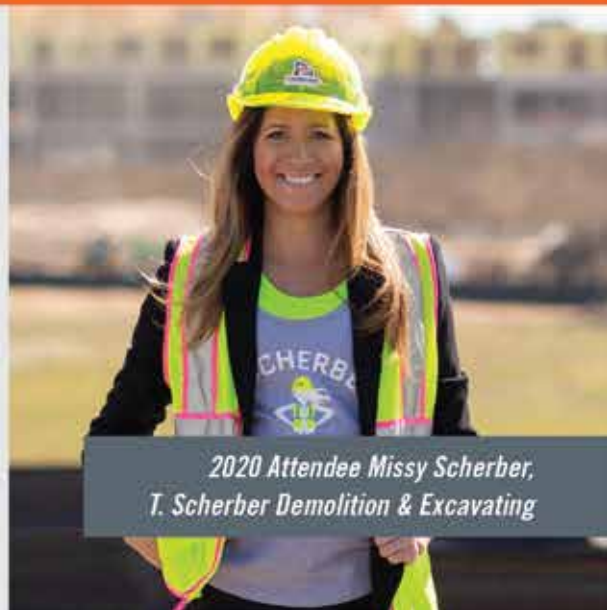
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2020 Attendee Missy Scherber,  
T. Scherber Demolition & Excavating

# IN THE NEXT ISSUE OF

# C&A

Place your products in front of more than 28,000 cranes, telehandler and access buyers & users who will be reading the November issue of **Cranes & Access...**



## THIS ISSUE WILL INCLUDE FEATURES ON:

### PICK & CARRY/INDUSTRIAL CRANES

We'll be reviewing the latest developments and products in this growing equipment sector. If you have news or information to add, we'd love to hear from you.



### TRUCK MOUNTED LIFTS

The truck mounted sector continues to grow and develop. We look at the latest trends as well as new product developments and launches. If you have any news please get in touch.



### OUTRIGGER MATS AND PADS

With the use of outrigger mats and pads now the norm, we will report on the latest guidance, recommendations and products. If you have any interesting applications or case studies, we'd like to hear about them.



### BAUMA 2022 REVIEW

Back after three and a half years, Bauma returns to Munich as the largest equipment exhibition in the world. There's lots to see and learn and we'll bring you an extensive review of the cranes, powered access and telehandler sectors.



Every issue of **C&A** is also packed with our **regular columns** and **news** plus **reader's letters, books, models** and **training**, along with the latest news from **CPA, ALLMI, IPAF** and **PASMA**.

Send any information, news, photographs or ideas on these subjects to [editor@vertikal.net](mailto:editor@vertikal.net)

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Liebherr LTM 1070-4



27x Saan FBN DAF XF



Heavy lifting CC8800

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*We work daily on assignments for leading manufacturers such as:*

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- Liebherr
- Manitowoc
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- Spierings

But of course we also work for importers, dealers and end users (both new and used equipment).

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Heavy lifting requires high quality lifting equipment. Our Konecranes overhead cranes are able to make a lift of 50 tons.

Lately we have been lifting a crawler of a CC8800. Our employees have been trained to work with the overheadcranes and therefore are able to lift our customers heavy equipment safe and sound!



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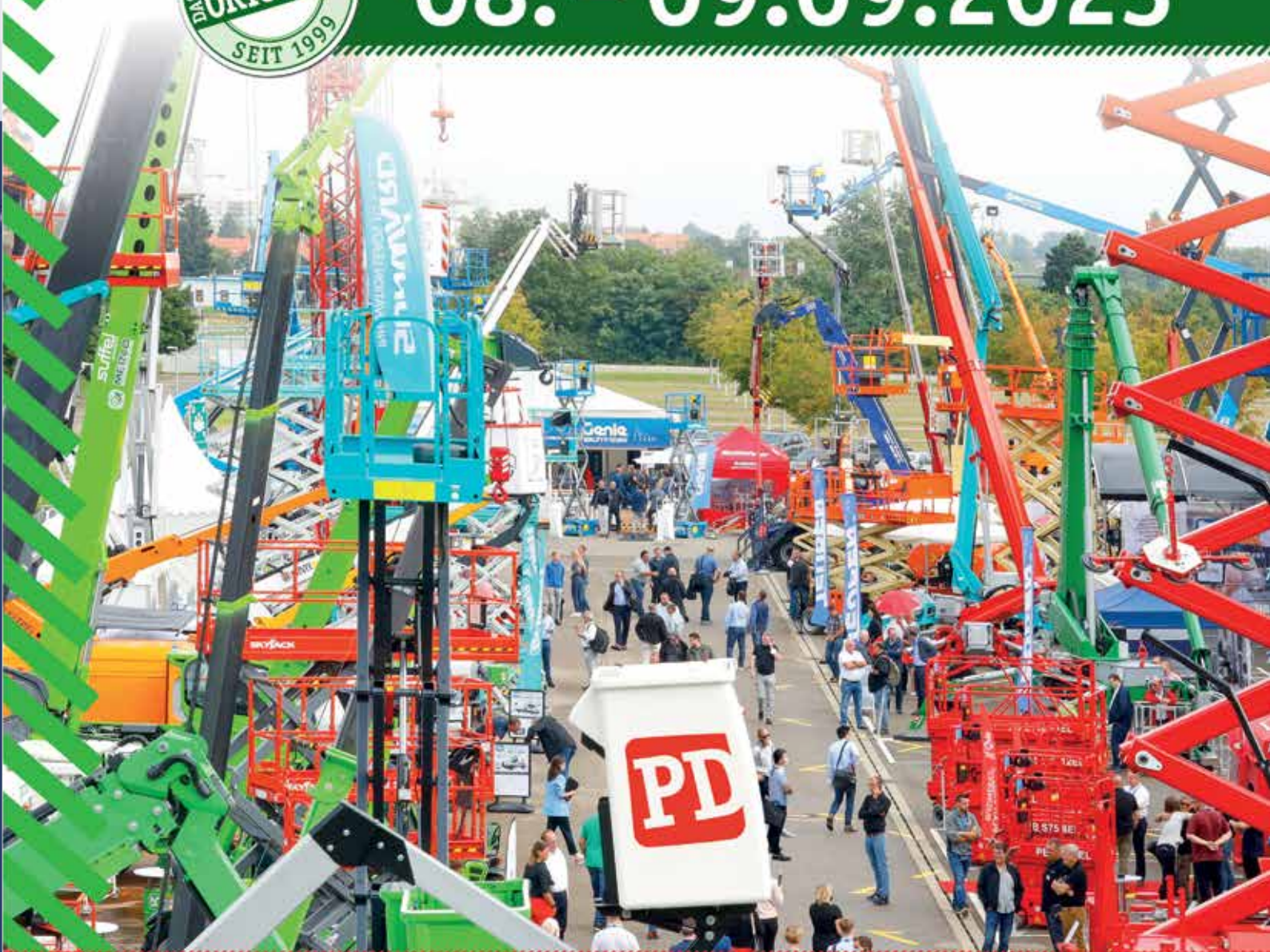
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