origin

DOORS AND WINDOWS

Disrupting the Construction Sector through Innovation

Foreword

Innovation is defined as ‘a new idea or method’, but it is so much more than that. It is progress, it is hard work, and it is driving us towards a better future.

Without innovation, the construction industry would not be where it is today. It is responsible for improved products, shorter timelines, streamlined processes, more effective costing, fewer delays, sustainable approaches, improved relationships, better understanding of end users, and so much more.

There are some people who follow suit, and then there are those that are pioneers; those who disrupt the status quo and challenge industry norms. It is these innovators that are shaping the way in which future generations act, think and work. By pushing boundaries, we are able to go to the edge of what we think is possible and then surpass it. Think 3D printing or robotics – transformative, creative and now an industry must-have. Innovators are to be encouraged, as they can pull the market along with them.

With this in mind, we searched the UK for some of those unique thinkers and looked for those who have changed the way in which we work today. We asked each industry leader to share their insights into one innovation that they feel has changed the face of the construction industry, and elaborate on how it has changed the industry for the better in the past 20 years.

We have curated their thoughts into this report which features a series of articles. The subjects include cloud connectivity, data analysis, connected thinking, sustainable practices and metaverse technologies. Thank you to all the contributors who have authored an article.

VICTORIA BROCKLESBY
COO AND CO-FOUNDER, ORIGIN
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About Origin

Origin is the UK's leading manufacturer of premium quality aluminium bi-folding, sliding, residential and internal doors and windows; complementary products that make up the Origin Home range.

The company was originally founded in 2001 when cousins, Neil Ginger and Victoria Brocklesby, found they could not get great aluminium folding sliding doors for their building projects. Their ambitious solution was to create a company capable of manufacturing the UK's best quality doors, backed by uncompromising levels of service. The result was the Origin Bi-fold Door, a cleverly designed sliding folding door system that features a unique free-glide running system.

Since then, Origin has worked relentlessly to perfect the design and functionality of bi-folding doors, and to create and maintain the highly respected reputation for quality and service that it has today while introducing windows, sliding, residential and internal doors to the range.

At Origin, personal service and attention to detail is everything. High standards of craftsmanship and uncompromising levels of service, together with industry leading initiatives, have positioned Origin as one of the UK's leading home brands. This was officially recognised in 2020 when Origin was awarded the Queen's Award for Enterprise: International Trade.

As a British manufacturer, Origin has complete control over its operations, from sourcing through to design, manufacture and delivery, and always strives for the highest standards. Rigorous quality testing at every stage of the manufacturing process means that everything that leaves the state-of-the-art UK factory is at a consistently high standard. This allows for an industry-leading guarantee of up to 20 years to be offered.

Origin is completely unique in its ability to be able to offer a 'Your Lead Time, Not Ours' zero lead time service on its bi-fold doors, sliding doors and windows. This means that if the product is ordered in one of the popular colours on offer, then Origin will change its manufacturing schedule to be able to deliver for the day it's been specified for – even if that's for the next day.

As the business has continued to grow and diversify, the foundations of family ethos, pride and ownership in all stages of production firmly remain.

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The Contributors

RAHUL KEJRIWAL

CEO, BRICSYS

Rahul Kejriwal is CEO at Bricsys, part of Hexagon. In this role, he is responsible for developing and executing strategic plans to advance the company's mission and objectives.

Previously, Kejriwal has worked both as a technology investor and investment banker, working with and investing in fast-growing technology companies globally. Rahul started his career as a cyber security management consultant.

TINA PRINGLE

DIRECTOR OF TECHNICAL INNOVATION, NBS

Tina joined NBS in 2014 and has global responsibility for the technical content and classification strategies, development and delivery.

Over the last 25 years, her experience has taken her from construction product manufacturing, built environment consultancy, and major capital project development through to asset management and master planning. She also has a focus on sustainable development and the heritage environment in construction.

Her work now covers the digital dimension of the built environment – working with platforms, products and customers to deliver the digital construction information and data requirements of the future.

KAREN FARDELL

FOUNDING DIRECTOR, FUTURE PROOF MY HOME

Karen came up with the concept for Future Proof My Home as part of a scholarship application to the Design Council. She won the scholarship in 2013 which fully funded a place to undertake a Masters in Innovation at Bayes Business School. Karen furthered the idea through the research project, graduated with distinction in 2016 and went on to raise £138,280 in funding from Innovate UK, Keep + to fund the R&D for the concept and development of the platform and sketch tool.

Karen's previous experience includes setting up the UK's first virtual PR agency in 1997 which boasts award-winning campaigns for clients in self-build and home interest including Kingspan, Potton and Keuco. She also developed the first online self-build series 'Building Dreams' in 2010 and set up the UK's first Self Build Academy in 2012.

The Contributors continued

VICTORIA BROCKLESBY

COO AND CO-FOUNDER, ORIGIN

Victoria co-founded Origin in 2002 alongside Neil Ginger and is a key driving force behind Origin's extensive growth and its deep investment in its people. Despite rapid expansion, the business has retained strong family values under her direction, particularly within its internal employee culture.

Victoria is responsible for the efficiency of the business and has a passion for how world class innovation in manufacturing can impact climate change. She believes investing in technology will be key to sustainable manufacturing and is leading the charge for a circular economy within Origin.

CAT SMITH

DIRECTOR AND CO-FOUNDER, PIXEL

After a career in housebuilding and developing and seeing a gap in the market, Cat Smith and business partner, Steve Smith, founded PropTech company, Pixel, in 1996. Since then, the award-winning company has grown from a two-person family business into an employer of 40 staff and more than £1.6bn worth of properties have been showcased through its cutting-edge platform, the Pixel HomeSelector.

The Pixel HomeSelector has been used by hundreds of developments to allow potential buyers to browse newbuild projects online. Buyers can walk virtually through each property with and without furnishings, walk around the streets of the development, see birds-eye perspectives of plots and floorplans, compare and shortlist multiple properties, and click to book a house without having to leave their kitchen table.

RICHARD BROOME

MD, LSBUD

Richard is Head of the Infrastructure Management and Maintenance Department at Fisher German, and Managing Director of LSBUD, the UK's leading online safe digging resource service. He is responsible for the portal's growth, management, and development.

Richard has been working in Infrastructure Services since 2010, with experience gained in matters ranging from pipeline management, major projects and contract management.

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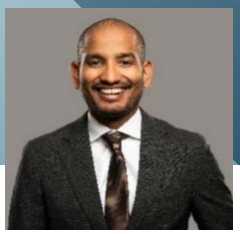

Industrialised Construction Powered by Game-Changing Design Technology

Rahul Kejriwal, CEO at Bricsys, takes a look at how automation, AI and Machine Learning are speeding up the design process without sacrificing on quality or customisation...

A revolutionary era is beginning across the construction sector. After years of stagnation, industrialised construction is completely reinventing the sector through processes from within manufacturing design and production. Architects and engineers have been deploying CAD innovations for decades and are now embracing cloud-connectivity.

For construction, the possibility of future has arrived with adoption of technology, processes and skills from Design for Manufacturing and Assembly (DfMA), and these developments will not wait for constructors not willing to invest in new capabilities and talent. These solutions are driven by innovative 2D and 3D modelling, integrated with Building Information Management (BIM) software. Today's solutions can be interoperable and open to allow architects, engineers, General Contractors (GCs), component manufacturers, and other trade partners to speak a shared language.

THE IMPACT OF CHANGE

Until recently, the construction industry has remained largely unchanged, with an abysmal record for adopting innovative technology. Global consultant McKinsey & Co. states that labour-productivity growth in construction trails other industries and has a "productivity gap", costing the global economy approximately $1.6 trillion each year.

Just think about the current, archaic practices to understand why. Tradespeople arrive on-site to perform discreet tasks, based on the architect's drawings, which are converted into a trade-specific format for a purchase order. Then this becomes a works order to install a component. Any changes in processes to eliminate problems between the different businesses, such as dealing with changes in design specifications, have had limited impact, tapped in yesterday's technology.

In this situation, the GC is typically isolated from the architect and owner. And his separation significantly impacts construction performance, leading to 'as-installed' not being 'as-designed'.

PREFABRICATION LAID THE GROUNDWORK FOR INDUSTRIALISATION

Until recently, highly customised, one-off buildings in construction have been limited to small-scale projects. However, manufacturing is now entering an age of hyper-personalisation that creates a pathway for the construction industry to transform its approach. But this

can only happen if the sector embraces technology, using a seamless flow of processes from design and engineering through to manufacture and construction.

‘new talent entering the construction sector will need to master computer-aided tools’

DfMA also addresses ongoing construction staff shortages. Contractors can more easily fill employment gaps by allowing room for a labour force who are not so highly specialised. Although the new talent entering the construction sector will need to master computer-aided tools, just as workshop engineers had to 40 years ago.

MAKING ROOM FOR CUSTOMISATION IN INDUSTRIALISED CONSTRUCTION

Today's open-source software for CAD will better support the hyper-customisation of modular solutions to build better custom solutions.

Certain systems won't need to change within a building: plumbing systems across a hotel or headwalls within hospital rooms, for example. Today's software allows designers to easily iterate rooms or change structures with shared fixtures in the design. And automating routine design workflows provides architects with the freedom to customise, and then apply a unique façade or finishing element into documents for the manufactures and installation teams to use.

So, automation, supported by AI and Machine Learning solutions, is speeding up the design process without sacrificing quality or customisation. The result is a more cost-effective, higher-performing building — and the most impactful innovation the construction industry has ever seen.

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It's All About the Data

Tina Pringle, Director of Technical Innovation at NBS, explores how the adoption of digital tools and improved use of data have underpinned a cultural and economic shift on site...

The most significant innovation since the millennium has been how we can make better decisions in construction. Data has been at the heart of these changes and because it's so central to our daily lives, it's easy to forget how far things have come in such a short time.

We've all seen how the pandemic forced the use of digital tools. What was optional has now become compulsory with huge leaps in productivity, profitability and building quality. A few years ago, it was common for senior leaders to head on site or wait for the weekly report to find out what was happening. The lockdown allowed for the rapid uptake of digital updates, delivering real-time information and vastly improved access to data. This has led to a focus on improving business choices, with accurate and up-to-date data allowing for better decision-making.

The construction sector is facing new building safety regulations and, as one of the most carbon-intensive industries, is also looking at ways to lighten its footprint on the planet. Data will be critical in building more safely and sustainably.

The ability to use data to make better choices starts with the specification. Specifiers can now call upon the latest construction product datasets and make comparisons about performance. Last year's announcement by a consortium of construction institutes covering the development of a standardised embodied carbon database is revolutionary. This will provide standardised data on the performance of product types and classes and create a foundation on which products and their substitutes can be assessed and improvements made.

'The construction industry accounts for over 40% of all carbon emissions'

When it comes to building safety, the new Office of Product Safety and Standards (OPSS) will regulate construction products that have a safety impact using data sheets and unique product IDs. The new Buildings Regulator will review building safety files to ensure compliance with the regulations and provide evidence of the digital 'golden thread of information'.

The construction industry accounts for over 40% of all carbon emissions, of which a quarter is due to ongoing construction activity. The energy performance of our buildings is also 30% lower than the performance we expect. It's clear that construction needs to do more to overcome these issues; fundamental to this will be improving how we access data and having robust

It's All About the Data continued

datasets available, to ensure correct decisions are made thought out the construction lifecycle from design to occupation, refurbishment and decommissioning.

Building information modelling (BIM) is becoming more embedded. Architects and construction engineers use BIM to create 3D models of a complete building using software. It's a process that enables the creation of a shared data model, which can be made available in real-time for all concerned, from the designers of the building to the construction company, and finally, the property owners and managers.

'construction moves from adversarial and cost-focused to quality-driven'

With tighter regulation, more rigorous record-keeping and sign-off procedures will be the order of the day, with digital fingerprints required on all major decisions to provide accountability at every stage of a build journey.

Data has underpinned significant cultural changes as construction moves from adversarial and cost-focused to quality-driven. The industry has evolved from a time when data was in short supply and hoarded for competitive advantage. Today, it's becoming a much more collaborative effort, providing greater levels of transparency by giving project participants access to the same information. Not only is this improving co-ordination amongst stakeholders, but ultimately, it's leading to better decision making. Those working in the sector, including materials suppliers, architects, specifiers, project managers and contractors, have and continue to see unprecedented changes in how they work and the tools required to meet this new agenda.

The future's bright and data-driven.

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Future Proofing Britain's Homes

Karen Fardell, Founding Director at Future Proof My Home, talks about the UK's 'agequake' and the need to future proof our homes rather than react to issues as they arise...

The effort to bring innovative, sustainable construction methods to the built environment has accelerated over the last few years as the industry has gradually joined forces to drive radical change to achieve our net zero targets. But when it comes to housing, the industry needs to take a more holistic approach that considers both energy efficiency and accessibility if we are to create sustainable homes and futures for us all.

It's no secret the construction sector is a major contributor to greenhouse gas emissions, with the built environment now considered directly responsible for at least 25% of total UK greenhouse gas emissions. Even before the current energy crisis, the mission to halve the energy use of buildings by 2030 was part of the Government's Clean Growth challenge, one of four Grand Challenges backed with a £400 million public and private sector investment into innovation in new construction products, technologies and techniques.

Right now, 80% of the buildings that will exist in 2050 have already been built. There are also 26 million homes in need of retrofitting if the UK is to meet its 2050 climate target – that's 1.6 homes every minute! This will require a fast-tracked holistic approach to the building process based on a new 'design imperative' that employs innovative products and processes.

The construction industry has adopted new ways of improving the thermal efficiency of the building's fabric and reducing energy use and waste. Innovative products including hardwood cross laminated timber introduced in early 2000 took the industry by storm thanks to its strength, flexibility and durability. Similarly, architect, Decker Yeadon's homeostatic facades hit the headlines in 2011, with his product inspired by the homeostasis in biological systems. These 'architectural skins' enable buildings to respond to environmental conditions preventing overheating from solar gain.

> 'The UK is currently facing an agequake, yet 91% of our homes are inaccessible'

However, innovations in sustainability and energy efficiency in the built environment should also be matched with innovative solutions to address another of the Government's four Grand Challenges: our 'Ageing Society'.

The UK is currently facing an agequake, yet 91% of our

Future Proofing Britain's Homes continued

homes are inaccessible as well as thermally inefficient. This causes accidents and ill health and costs the NHS £2.8bn per year.

It is only post-accident or at the point of crisis that homes are retrofitted to cater for our changing needs. This creates waste because products – old and new – are then ripped out and replaced, an approach which is both costly and unsustainable.

There is now a legal, environmental and moral imperative to create innovative adaptable homes that support the life cycle of the building.

Future Proof My Home focuses on a preventative approach to the problem. Our innovative home improvement Platform brings specialist expertise and approved products needed to create beautiful accessible, energy efficient homes and places it into the hands of the home improver and their key professionals. Meanwhile, we are busy working with forward thinking housing associations and developers to create innovative 'Design Codes' using innovative design and product specifications to create homes fit for all our futures.

The Platform, due to launch this Autumn, has been supported and recognised by Innovate UK, Futurebuild and shortlisted alongside Tesla in The Guardian's People and Environment Awards. It uses the power of 3D technology to inspire and enable anyone – regardless of experience or profession – to access information on approved products and key design features needed to 'future proof' a home and, using the magic of augmented reality, enables anyone in the process to try them out in the home environment.

The UK faces many challenging issues in addressing our current housing and energy crises. However, innovative solutions that combine the latest technological advances to facilitate and fast track the construction process, access innovative products and expertise that serve the needs and well-being of people and the planet will go a long way in creating homes fit for the future.

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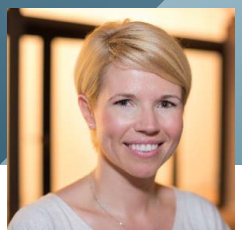

Disrupting the Industry Through Tech to Facilitate Growth

Victoria Brocklesby, COO at Origin, explores the increasingly important roles that technology and automation play within the construction sector...

When I founded the company with my cousin, Neil Ginger, back in 2002, the vision was to create the UK's best aluminium bi-folding door. Two decades later, we still offer the best bi-folding door system on the market, but we also have a full product line-up that feature innovative designs.

We didn't arrive where we are now overnight. Early on, we established a dedicated R&D team that not only designs market-leading products, but continues to improve them after launch. This mentality to constantly innovate has helped us transform from a small family business to a large manufacturing company that now employs over 350 people.

To maintain the upward trajectory of the business, we have implemented a highly advanced IT infrastructure – we call it our 'just one click' vision.

Through intelligent software systems and the continual use of data, we can automate all areas of the business, from sales and procurement to manufacturing, warehouse, and delivery, with just one click. This means when one of our Trade Partners confirms an order through our unique ordering and quoting system, Origin Sale Safe (OSS), a works order is triggered which kick starts a whole sequence of automated actions. Materials are automatically deducted from stock and reordered via a PO, replenishing what has been taken. Line supply and manufactured are triggered, and even delivery is scheduled. All of this happens without any human interaction.

If you had told me when I first started the business, or even 10 years ago, this is what modern manufacturing and construction would look like, I wouldn't have believed you. The advancements in technologies and innovative thinking have been incredible, and there are more coming. Over the next few years, the changes will be exponential.

All of this efficiency ensures that our Trade Partners are constantly supplied on time, in full, and our materials are being consistently replenished to eliminate stockouts. This allows us to offer the most competitive lead times in the industry - a bespoke manufactured aluminium product delivered in as little as 24 hours from the point of order. The technologically advanced way of operating not only helps our productivity and efficiency, but it means that our Trade Partners can better manage their cashflow by not having to pay for products that they normally would have had to wait weeks for. Plus, it means

Disrupting the Industry Through Tech to Facilitate Growth continued

they can take on more jobs because their supply chain is secure.

Implementing a technology overhaul project of this scale was ambitious. Full automation of our pre-existing processes was needed to make our 'just one click' dream a reality. Multiple systems had to be synchronised to feed into one seamless piece of software and it had to be stress tested to ensure it was robust enough to support Origin's workflow.

It wasn't just a technological undertaking either. To support such a switchover, we had to ensure that we had the fundamental infrastructure in place. So, despite challenges presented by Brexit, the pandemic, and the Russo-Ukraine war, including material shortages and a demand surge, we continued to undertake this project for the long-term efficiency, growth, and success of Origin.

The biggest addition to our infrastructure and an imperative part of our operations was the investment in The Ark, a new 55,000ft^2 warehouse facility. This allowed us to increase our storage capacity by 82 percent, giving us and our Trade Partners a huge advantage against the competition.

With this increased inventory, the Ark and our other storage and manufacturing facilities, comes the ability to use our automated system to move materials from the warehouse to the factory without additional human interaction. Line supply is called off from the Ark and then replenished automatically, meaning there is no disruption to our supply chain, and we can continue to manufacture and deliver as normal to our Trade Partners.

Our manufacturing facilities also work in a similar way. When a Partner uses OSS to submit an order, the system creates a works order based on the BOM, and then automatically sends the sizes and specifications to the machinery on the factory floor. All our factories are now set up for this system across our entire product range, from bi-folding and sliding doors to our window systems.

These processes are also all recorded in a data warehouse, meaning we can track trends which can inform our decision-making in the future. Getting real time data and feedback also allows us to identify areas that need focus. These feed into our continuous improvement department, so we can always continue making operations more efficient and building on the service levels provided to customers.

Using tech and data has completely revolutionised how those within the construction industry work, and it has to be the way of operating for all as we move forward. The combination of sophisticated IT software and a robust infrastructure is key to delivering efficiency and productivity. When I think about the past 20 years, the technology revolution has completely transformed the way we operate as a company. It has empowered our people to be able to fully focus on their job, instead of being swamped in admin and paperwork. Without this step towards technology, we could not have grown to the size we are today or be as efficient as we are.

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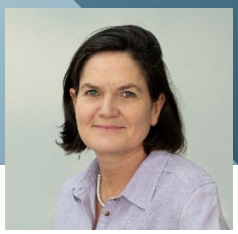

How Scottish Housebuilders are Mobilising to Weather Market Turbulence

Scottish housebuilders are ahead in their efforts to batten down the hatchets as the property market takes a downward turn. But how are they doing it? Cat Smith, Director at Pixel, an award-winning PropTech company, explains...

Housebuilders are facing rising materials costs and labour shortages. The cost of financing already-built developments has skyrocketed as interest rates climb, and unfavourable mortgage rates are putting potential buyers off. But something is different this time around.

In the face of these age-old issues that have dogged the sector in every economic downturn in history, Scottish housebuilders are turning to new technology and are rapidly innovating to mitigate their impact.

Over the last year, Scottish housebuilders have increased their use of cutting-edge metaverse enabled software by 6%, to 16% total. What this translates to in real terms is £1bn worth of new-build homes presently being marketed and even "sold" in fully virtual environments.

The benefits of this software are multifaceted. It allows potential buyers to browse entire new-build projects, compare and even reserve properties online – the closest the property market can come to an online sale – without ever visiting the site in-person. The software also allows for the entire options selection process to be completed by buyers on their own, in their own time.

For the cost of a single physical showhome, an entire development can be created in a virtual environment. That means housebuilders can plug gaps in staffing, reach buyers further afield and out of hours, and generate insightful and actionable data about buyer behaviour and preferences, all while cutting costs.

Digitisation is by no means a panacea, but it is an incredibly useful tool to improve profitability in times of economic slowdowns.

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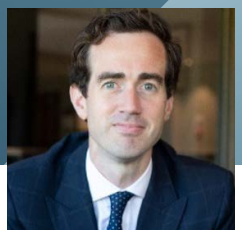

The Improved Use of Data

Richard Broome, MD at LSBUD, the UK's leading online safe digging resource, talks about the emergence of data over the past 20 years, the benefits of analysing it accurately, and the increasingly important role it will play amongst construction professionals in the future...

As we have continued to build homes and a better infrastructure over the past 20 years, innovation within construction has been vital. It is, however, hard to identify any one product or technology that has stood out amongst the rest, to improve 'how' construction is carried out.

Perhaps the exception to this rule, is 'data' and its use within construction. Whilst readily available in modern times, data collection was non-existent or at least primitive 20 years ago. It now has the power to fundamentally change how projects are carried out, making them more time-effective, cost-efficient and safer.

DATA ANALYTICS

As we all know, the moving parts on any construction project are many, from contractors and subcontractors, materials, and equipment, through to delays, changes to scope and contract adjustments. All of these different elements generate a mass of data, all of which needs to be correctly analysed, then utilised. Historically, this would have likely been entered or at least reviewed manually. However, through a greater understanding, improved technologies, and now machine learning and artificial intelligence, these processes can happen at the touch of a switch.

In fact, we have come such a long way that construction companies are utilising their data when leveraging new technologies, such as drones, 3D laser scanning, and virtual reality to increase productivity and deliver projects with fewer errors and with higher-quality results.

All of these approaches greatly increase the speed and accuracy of our analysis and filtering; organising data and identifying patterns with much greater efficiency than a human could achieve.

So, how does this translate to safe digging within the construction industry?

SAFER SEARCHING

Well, each year, we process over 3.5 million safe digging search enquiries through our portal. That is more than one every six seconds, and generates a phenomenal amount of data to analyse, and look for patterns.

With this data, we produce The Digging up Britain report, which is produced annually, alerting those with digging projects, from large-scale construction work through to homeowners putting in a shed, to the latest thinking, safety advice and trends.

To ensure we have as much information as possible, we also draw on research data from the Health and Safety

The Improved Use of Data continued

Executive (HSE) and Utility Strike Avoidance Group (USAG), to identify patterns and highlight any risks that may lead to future issues.

THE PATTERNS

The data tells us that the highest volume of accidents are recorded mid-week. However, the number of incidents classed as 'high' in severity rises as the week progresses, peaking on a Friday. This suggests week-long tiredness or a pressure to finish jobs ahead of the weekend. This is something on-site managers can watch out for, re-emphasising safe-digging measures to their teams.

In a similar vein, most strikes happen during the middle of the working day. This suggests workers may be losing concentration before their lunch breaks.

When taking a more macro-view, the monthly figures show that most asset strikes during the COVID pandemic were in September. According to our historical data, this is an outlier, with construction projects being shunted back towards the end of the year as things re-opened for business. July is usually the month when most strikes happen, due to the long working hours, good weather and temporary workers covering for holidays. Again, on-site managers need to be aware that warmer summer months and holiday times are when the most asset strikes take place, so being proactive about the data rather than reactive.

There has also been a change in the type of equipment causing underground strikes since the pandemic. Latest figures show hand tools are the most common piece of equipment that cause damage to underground pipes and cables. This is a change as it has previously 'excavators' and 'mini diggers', classed as mechanical excavation, that took the top spot.

Strike incidents involving 'saws' and 'jackhammers' have also been noted. This suggests that the pipes and cables being hit are likely to have been close to the surface and that the workers are operating close to them, increasing the chance of these incidents being more severe.

The clear recommendation here is that anyone performing any kind of digging work should start with a background understanding of strike data, and a clear idea of what is beneath the ground. Whilst it may be perceived as a lower risk digging activity, the consequences of striking an asset when doing so is much more severe.

IN SUMMARY

When you are operating in an industry where there are risks around every corner, you want to make sure you stay safe at all times. By analysing historical data, we are able to be preventative rather than reactive, which could just save your life, or that of one of your colleagues.

I am looking at 'data' from a purely safe digging perspective, ensuring we all stay safe on site, but the impact it has had across the construction industry is immeasurable.

Anyone not using data is already behind the curve, and runs the serious risk of becoming anonymous within their selected field.

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