ROBOTIC DRILLING FOR THE CONSTRUCTION SECTOR

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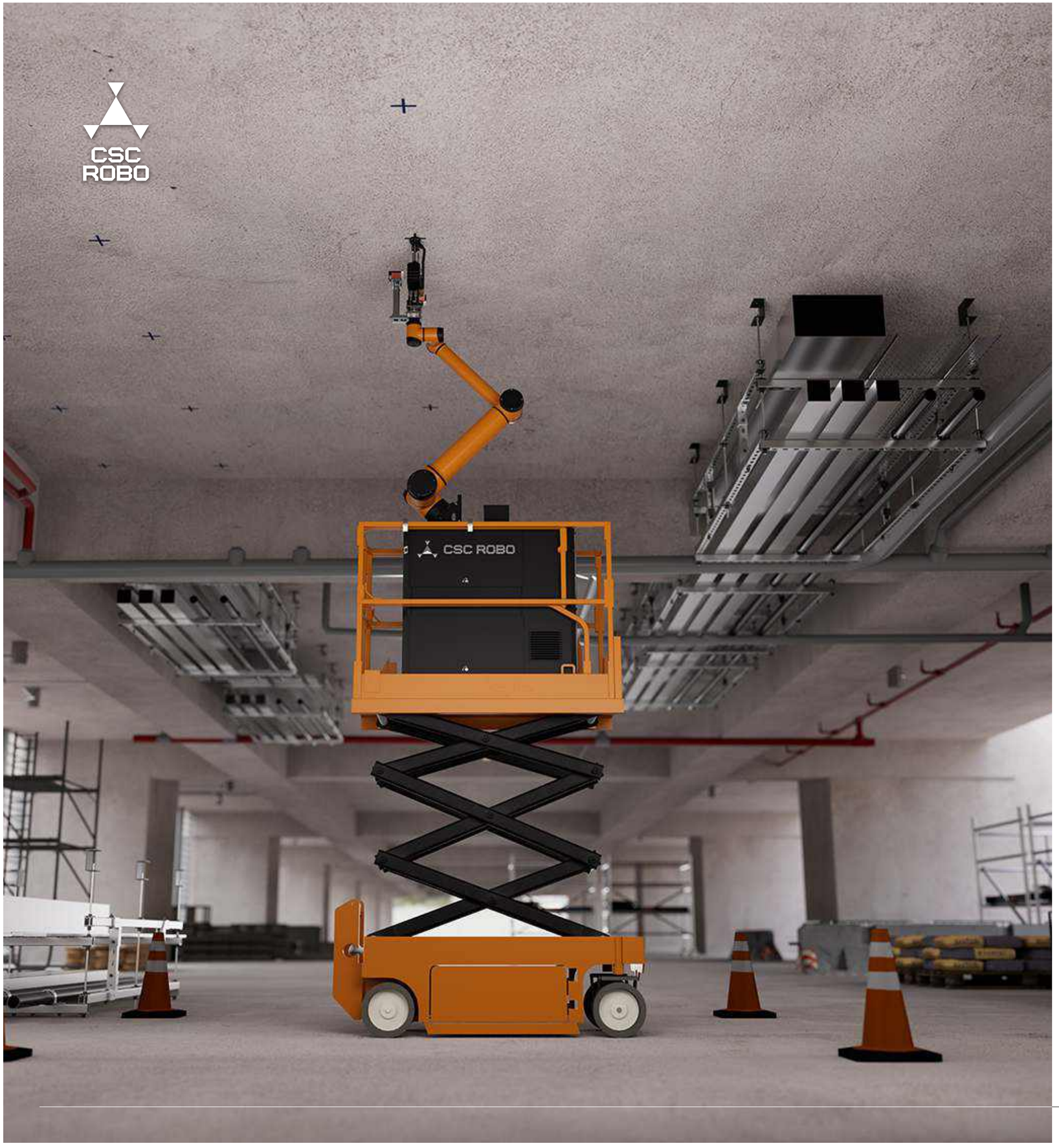
Beton Bauen
SPECIALIST CONTRACTING

20 YEARS

A BETON BAUEN SERVICE BROCHURE THAT FOLLOWS THE ADOPTION OF SMART TECHNOLOGY WITHIN THE CONCRETE CONSTRUCTION INDUSTRY



BETON BAUEN RENEW THEIR COMMITMENT TO SMART TECH

Beton Bauen has partnered with CSC Robotic Engineering for implementation of the Drillcorpio Model Df and Model D3 robotic drilling machines in the United Kingdom. Our business aims to be at the forefront of Smart Technology adoption within the construction sector, working to meet directives set out by the UK Government *Smart Machines Strategy 2035*.

Robotic drilling machines are set to transform the construction industry by enhancing precision, safety, and efficiency in tasks that are otherwise repetitive, dangerous, or physically demanding. Robotic drilling offers a perfect solution for large-scale commercial projects to speed up installation and improve accuracy, especially in new builds such as hospitals, offices, shopping centres, warehousing, factories, and data centres.

The high-precision drilling of the Drillcorpio Model Df and Model D3 are ideal where repetitive drilling to concrete structures is required, and especially when dense Mechanical, Electrical & Plumbing (MEP) installations are necessary. Beton Bauen currently operate both machines and are ideally placed to deploy robot drilling technology to live construction/refurbishment projects in the UK today.

Drillcorpio (Model Df) is a self-navigating drilling robot built for heavy-duty drilling in civil and infrastructure environments, designed primarily for floors and walls, with ceiling capability where required. It executes high-precision drilling with consistency and efficiency, enabling faster delivery across large-scale projects. With integrated safety features, intelligent navigation, and a dust extraction system, the Model Df ensures safe, reliable operation in complex, high-demand construction conditions.

Drillcorpio (Model D3) is an automatic drilling and anchor installation robot for both walls and ceilings. Equipped with dust extraction, it can simultaneously drill holes and collect dust, minimising the need for post-work cleanup and improving efficiency. This model is compatible with various construction projects, including Mechanical & Electrical (M&E) installation and civil works. It also eliminates the need for platform modifications and is ideal for tunnel installations.

Our Autonomous (Robotic) Drilling technology is ideally suited (but not limited to) the following tasks:

- FLOOR-PLAN LAYOUT & MARKING
- ANCHOR FIXINGS & WALL TIES
- RESIN INJECTION (WATER STOPPING)
- EPOXY APPLICATION (STRUCTURAL)
- CATHODIC PROTECTION
- DRILLED PENETRATIONS (CABLING, UTILITIES)
- CARBONATION TESTING

Autonomous (Robotic) Drilling technology is ideally suited to work in the following areas:

- HIGHWAY INFRASTRUCTURE
- BRIDGES, OVERPASS & TUNNELS
- WAREHOUSING AND STORAGE FACILITIES
- DATA CENTRE CONSTRUCTION
- MANUFACTURER, INDUSTRIAL & RETAIL FLOOR LAYOUT
- CEILING INSTALLATION

Beton Bauen is able to deliver semi-autonomous robotic drilling and anchor point installation in the UK from August 2026.

ROBOTICS & AUTOMATION

OUTLINING HOW AND WHY THE CONCRETE DRILLING SECTOR IS SET TO ADOPT SMART TECHNOLOGY

Written by Dan Brennan. Originally written for Concrete Magazine, Sept 2026 issue.

Following presentation of an overview of the UK Government's Smart Machine Strategy 2035 at the Evolving Concrete technical conference in June of 2026, Steve Davies of Beton Bauen examines the strategy in greater detail, outlining its ambition to modernise construction through automation and advanced technologies. This article goes on to cover issues facing the construction industry and how robotics might reshape the jobsite, as well as considering the topic of automation when concrete drilling, in particular.

If you stand on a construction site today, it probably looks and feels much like it did 40 or 50 years ago. Despite advances in design and digital coordination, on-site delivery remains heavily manual, high-risk, and unpredictable.

Over the next ten years, the United Kingdom's construction sector faces a defining technological transformation. Traditional methods of building infrastructure - heavily reliant on manual labour, time-consuming manual measurements, and repetitive physical tasks are increasingly unsustainable in an era defined by skilled labour shortages, tightening commercial margins, and rising expectations for sustainable project delivery. The introduction of new technologies by concrete specialists looks set to accelerate a transition toward smart, semi-autonomous robotics, specifically engineered to perform highly repetitive, physically taxing, and hazardous tasks on active job sites.

ISSUES FACING OUR INDUSTRY

Low Productivity

Global and UK construction productivity is low, driven by slow technology adoption, industry fragmentation, and labour shortages. Research shows global construction productivity grew by just 0.4% annually from 2000 to 2022, while UK output per worker hour sits roughly 13.5% behind the national economic average. [1]

Core processes like concrete drilling still rely on manual techniques similar to those used decades ago. The global construction sector also struggles with poor performance because it relies heavily on traditional methods and manual labour rather than automation. In the UK, the industry faces similar barriers, including a high reliance on subcontractors, increasing costs, decreasing profits, difficulties in measuring efficiency metrics, and persistent skills gaps. These issues can lead to frequent project delays and higher costs.

Labour Crisis

A skilled labour shortage is predicted to affect the UK construction sector, driven by an aging workforce, post-Brexit immigration changes, and high apprenticeship dropout rates. This gap delays infrastructure projects and increases building costs. Construction Industry Training Board (CITB) estimates the industry needs an extra 41,200 workers each year through to 2030, just to keep pace with demand. Meanwhile, 35% of the current workforce is over the age of 50, while fewer than 19% are under 25. Approximately 750,000 workers are expected to retire by 2036, taking vital knowledge with them. Post-Brexit losses have further reduced the pool of available EU tradespeople in core areas like bricklaying and carpentry. [2, 3]

Compounding these demographic challenges, training initiatives struggle to retain new talent. Industry figures show that construction apprenticeships suffer from a high dropout rate of nearly 47%.

With demand growing for housing and green energy infrastructure, finding qualified carpenters, electricians, and bricklayers remains a critical hurdle for the UK construction industry. A critical shortage of skilled labour to operate modern machinery is also required. Age, availability and fundamental skill-sets are all expected to continually decline.

Health, Safety & Environment

Construction remains one of the most dangerous industries globally. Every construction project introduces a certain level of physical risk to onsite workers. Protecting our workforce is not optional, it's a legal responsibility.

The industry faces specific critical health and safety challenges when it comes to concrete drilling from chronic occupational illnesses, specifically respirable crystalline silica (RCS) dust, Hand-Arm Vibration Syndrome (HAVS), working at height, and noise. In the UK, the Health and Safety Executive (HSE) enforces strict limits under the Control of Vibration and Noise at Work Regulations, targeting high-risk activities like concrete drilling and breaking.

A MOVE TOWARD AUTONOMOUS ROBOTIC CONCRETE DRILLING

Why is Concrete Drilling an Entry Point?

Historically, marking and drilling thousands of overhead or floor-level holes for mechanical, electrical, and plumbing (MEP) supports required workers to interpret 2D paper or digital drawings, climb ladders or scaffolding, mark coordinates manually, and operate heavy rotary hammers for hours at a time. It is the same process for concrete repair and refurbishment projects, rebar and anchor installation, cathodic protection, and chemical injection.

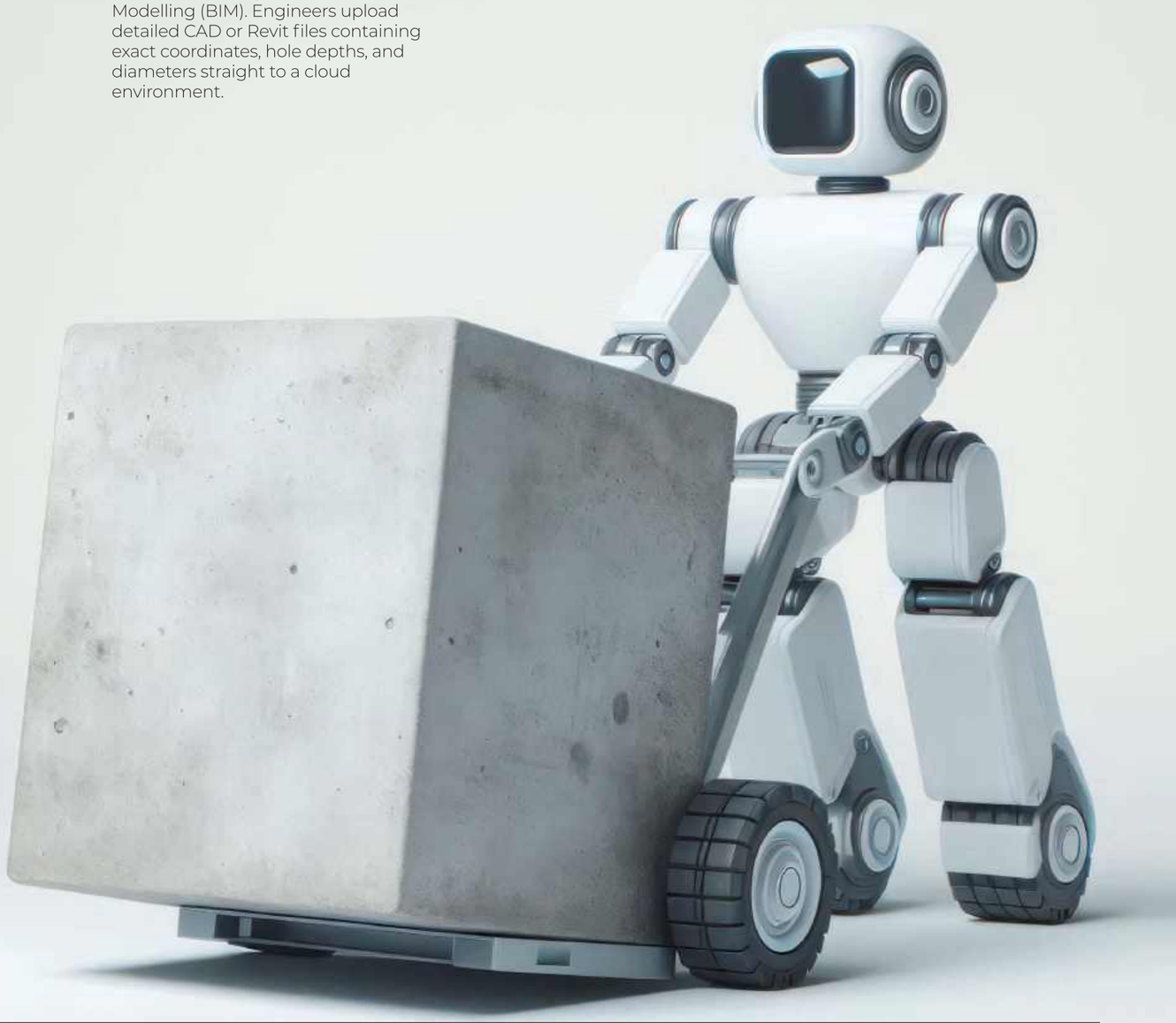
The workflow of modern robotic drilling begins firmly in the digital space via Building Information Modelling (BIM). Engineers upload detailed CAD or Revit files containing exact coordinates, hole depths, and diameters straight to a cloud environment.

Semi-autonomous robots drill directly to concrete material, using onboard lidar, cameras, collision-avoidance sensors, and local positioning systems to navigate the terrain and orient themselves against the digital blueprint. Once aligned, a stabilised robotic arm or drilling mast executes the task with pinpoint accuracy, repeating the drilling process across massive commercial, residential, and infrastructure projects. Drilling robotics have the potential to transform the concrete industry by increasing drilling speeds up to 10 times, eliminating physical strain and hazardous silica dust, multiplying labour output, and delivering 99.97% positional accuracy to eliminate performance variance.

Productivity Benefits of Semi-Autonomous Robotics

The accelerated shift toward semi-autonomous concrete drilling is underpinned by several compelling operational and economic benefits:

- **Enhanced Productivity & Speed:** Robotic systems operate at speeds significantly faster than manual counterparts, consistently executing serial drilling patterns without fatigue-induced slowdowns. Fleet-based deployment allows multiple units to work in parallel, drastically shortening structural fit-out timelines.



- **Precision and Quality Control:** Human error in layout and measurement can lead to costly rework or structural misalignments. Autonomous drilling units reduce rework due to precision layout and QA automation. The robotics reference direct BIM data to ensure absolute dimensional consistency, eliminating deviations in hole depth, angle, and placement. Built-in Smart Technology means every action produces data, and that data feeds improvement, enabling improved QA/QC traceability.
- **Resource Optimisation:** With no fatigue, minimal downtime, almost no variability in output, and predictable execution rates, contractors can align schedules, material deliveries, and subsequent trade works with high reliability. Enabling extended operating hours and a more predictable delivery can help minimise idle time on site, in turn offering an immediate ROI on deployment. In theory, multiple robotic units can operate simultaneously under a single guidance station, significantly compressing massive project schedules.

Solving the Construction Labour Shortage: How Robotics Could Reshape the Jobsite

The construction industry's contribution to the UK GDP is significant, but declining productivity linked to labour shortages threatens this. A primary cause is the aging workforce, with large numbers of experienced and skilled professionals heading into retirement. At the same time, attracting younger generations to the trade seems a constant battle.

> "Drilling robotics have the potential to transform the concrete industry by increasing drilling speeds up to 10 times, eliminating physical strain and hazardous silica dust, multiplying labour output, and delivering 99.97% positional accuracy to eliminate performance variance."

This gap puts a strain on every project, impacting timelines, increasing labour costs, and challenging construction management to do more with less.

Autonomous and semi-autonomous machines offer a solution, transferring operator skill to technology. From enhancing safety and productivity to reducing rework, autonomy is reshaping job sites and enabling contractors to do more with fewer resources. [4] The robotic technologies we see today are not about replacement; they are about collaboration.

These machines are made to handle the most repetitive, physically demanding, and often dangerous construction tasks. Onboard sensors and self-positioning arms handle complex operations, allowing general workers to manage tasks requiring years of specialised training. By taking over strenuous, repetitive drilling, these robots prevent physical fatigue and reduce injuries. This allows a single operator to manage output equivalent to a multi-person crew, helping contractors maintain project timelines despite an aging workforce and shrinking skilled labour pools, mitigating critical worker deficits across major infrastructure and housing targets.

Manual Labour vs Semi-Autonomous Drilling Robot Comparison [5]

Metric	Manual Labour	Semi-Autonomous Overhead Drilling Robot
Speed	30-60 holes per day.	Up to 300 holes per day.
Worker Strain	High risk of neck, shoulder, and back injuries.	Minimal physical strain; operator supervises.
Dust Exposure	Significant airborne dust created.	Integrated dust removal system captures debris at the source.
Precision	Reliant on human measurement; potential for error.	Digitally mapped for precise, repeatable accuracy.

FAR LEFT & LEFT:
Hilti Jaibot robotic drill. Images courtesy of Hilti Canada.

RIGHT:
The Drillcorpio D3 model offers automated drilling and anchor installation. Image courtesy of CSC Robotic Engineering Ltd.

Health, Safety, and Environment (HSE) and Injury Reduction

Health and safety considerations provide perhaps the most urgent moral and practical catalyst for adopting robotic concrete drilling in the UK.

Heavy plant equipment and manual overhead concrete drilling exposes workers to severe occupational hazards on a daily basis. Removing operatives from hazardous environments reduces the risk and liability.

- **Ergonomic Strain and Working at Height:** Operating heavy tools in confined spaces, overhead or from elevated platforms and ladders places extreme stress on the shoulders, neck, and spine, while introducing persistent fall risks.

  Robots absorb this physical burden entirely eliminating strenuous overhead ceiling drilling and awkward floor kneeling, cutting up to 98% of muscle strain.
- **Hand-Arm Vibration Syndrome (HAVS):** Prolonged use of heavy percussion drills transmits damaging vibrations to the operator's hands and arms, frequently resulting in irreversible vascular and neurological damage.

  Semi-autonomous units completely remove the human body from direct vibration contact during the drilling action.
- **Respirable Crystalline Silica (RCS) Dust:** Drilling into concrete generates fine silica dust, the inhalation of which causes chronic obstructive pulmonary disease and silicosis.

  Leading robotic systems integrate automated dust-removal attachments and some vacuum systems can capture up to 99% of toxic crystalline silica dust at the point of origin, protecting the wider site environment.

"As the demand for construction efficiency and safety continues to grow, automation and digitisation have become essential for enhancing productivity."

Michael Ren, Founder/Chairman/CEO
CSC Robotic Engineering

ADOPTING SMART TECHNOLOGY AND UK GOVERNMENT SMART MACHINES STRATEGY 2035

The UK Smart Machines Strategy 2035 is effectively a roadmap designed to bridge the gap between academic research in robotics and commercial industrial adoption. By boosting both supply and demand, it aims to scale the smart machine sector and increase UK Gross Value Added (GVA) from £6.4 billion to as much as £150 billion by 2035, driven by lowered operational costs, heightened productivity, and the cultivation of advanced technical employment roles.

The wider adoption of smart technology within the UK construction sector aligns directly with macroeconomic national objectives. For the UK construction sector, meeting the directives of the Smart Machines Strategy means moving past fragmented pilot projects into standardised, demand-led robotics solutions.

The UK Smart Machines Strategy 2035 aims to position the UK as a global leader in robotics and AI by driving technology adoption, boosting economic value, and transforming labour-intensive sectors like construction through automated precision and safety.

Deployment of Smart Technology to Concrete Drilling Projects [6]

Autonomy in construction is ultimately about finding the right use cases. For example, solar farm construction would be ideal as the sites require numerous post placements at precise intervals.

ABOVE:
The KUKA Baubot GmbH has been trialled and deployed onsite in the UK by Taylor Woodrow. Image courtesy of Fischer Group.

RIGHT (TOP to BOTTOM):
Common features of semi-autonomous robitic drilling machines, in this case the Drillcorpio Model D3. Images courtesy of CSC Robotic Engineering Ltd.

Semi-Autonomous Robotic Drilling: Concrete Solutions	Semi-Autonomous Robotic Drilling: Project Scenarios
Floor-plan layout and marking	Highways and Transport infrastructure (inc. bridges, overpass and tunnels)
Anchor fixings and wall ties	Warehousing and storage facilities
Resin injection (water stopping)	Data centre construction
Epoxy application (structural)	Manufacturing, industrial and retail floor layout
Cathodic protection	Utilities infrastructure (inc. solar farms, wind turbine fixings, conduit/utilidor, etc.)
Drilled penetrations (cabling, utilities, etc.)	Ceiling installation

ROBOTIC SOLUTIONS FOR CONCRETE DRILLING: AVAILABLE PRODUCTS AND FUNDING

Drilling Robotics Available in the UK

In today's market, semi-autonomous drilling robotics may seem a distant proposition. In reality there are a small number of international manufacturers pioneering specialised robotic drilling machines that are currently available in the UK, either for outright purchase or for hire (listed alphabetically):

Kuka Baubot GmbH: Owned today by the Fisher Group (Austria), the Baubot utilises robust industrial mechanics such as articulated robotic arms mounted on versatile tracked mobile robotic systems to perform multifaceted, heavy-duty on-site tasks, including autonomous drilling, milling, and fastening across civil engineering and infrastructure markets. General availability in the UK is reported as being imminent, although the Baubot has been trialled and deployed for onsite civil engineering work in Newcastle by Taylor Woodrow.

www.fischer-international.com/en/

Drillcorpio (Model Df & D3):
Operating from the Hong Kong with UK sales representatives and partnerships for route to market, CSC Robotic Engineering has made substantial impacts on international public and private sector works. Machines are available to purchase or hire in the UK. Their self-navigating systems, such as the Drillcorpio series, integrate smoothly with BIM files and advanced alignment technologies to execute semi-automated drilling and anchoring, with significant dust control systems.

www.cscrobotic.com

Hilti Jaibot: A global heavyweight in construction technology, Hilti has introduced the Hilti Jaibot, a pioneering semi-autonomous, cordless mobile ceiling-drilling robot designed specifically for MEP serial overhead applications, complete with integrated dust control and total station navigation. Hilti does not offer the Jaibot drilling robot through standard short-term tool hire depots at this time. Instead, the Hilti Jaibot can be acquired via enterprise consultation, project-based specialist robotics channels, or long-term fleet management agreements.

www.hilti.co.uk

Key Funding Channels

There are already financial support for the UK construction industry to adopt smart tech and autonomous robotic drilling is available.

Robotics Adoption Programme [7]
A £52 million initiative running from April 2026 to March 2030, backed by Innovate UK and the Department for Science, Innovation and Technology, providing regional hubs to help businesses trial and integrate automation.

Innovate UK Competitions [8]
Targeted grants for late-stage R&D and industry-ready automation, supporting deployment of intelligent machinery like autonomous drilling rigs.

R&D and Business Growth Support [9]
Expanded British Business Bank investment supporting growth and digital transformation across industrial strategy sectors.

> "The Robotics Adoption Programme is a £52 million initiative running from April 2026 to March 2030, backed by Innovate UK and the Department for Science, Innovation and Technology, providing regional hubs to help businesses trial and integrate automation."

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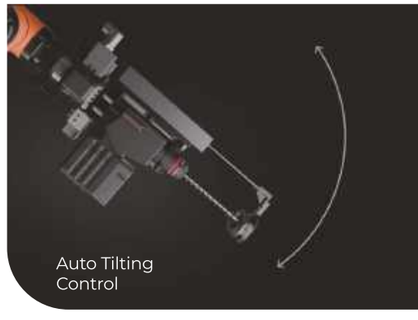
Curved Surface Drilling

Rebar Collision Sensing

Integrated Dust Vacuuming System

Flush/Wedge Anchor Capability


Auto Tilting Control

BETON BAUEN: 20-YEARS OF SPECIALIST CONTRACTING

Beton Bauen is an independent, family business, led by Managing Director, Steve Davies. Founded in 2006, the company has grown considerably and is now regarded as a leading specialist in Concrete Repair & Protection, Site Surveys & Concrete Testing, and Structural Waterproofing within the United Kingdom and overseas.

Beton Bauen work extensively in the field of highways and road infrastructure, the utilities sector, as well as specialist works including sea and flood defences.

Our head office in South Wales benefits from convenient transport links to the M4 'corridor', with the bulk of our contract work located within the South West of England and South Wales areas.

Clients consist of large organisations from both the private and public sectors, across a wide-range of industries.

We have built a network of manufacturing and service delivery partners across the globe, including North America, South East Asia, and continental Europe.

Beton Bauen Limited is certified to ISO 9001:2015, ISO 14001:2015 and ISO 45001:2018, to ensure the highest of standards in our commitment to delivering quality, safety, and management of our environmental responsibilities.

Beton Bauen provide an efficient and reliable service, combined with exceptional customer care. We plan and manage operations professionally, whether it be a long-term construction project or an emergency repair.

The business continues to enjoy steady growth, due largely to repeat business and regular contracts from a large number of loyal and satisfied commercial clients.

BETON BAUEN CORE SERVICES INCLUDE:

- CONCRETE REPAIR & PROTECTION
- SPECIALIST AUTOMATED (ROBOTIC) DRILLING
- STRUCTURAL WATERPROOFING
- SITE SURVEYS & CONCRETE TESTING
- INTRUSIVE / NON-INTRUSIVE SITE INVESTIGATIONS
- GROUND GAS PROTECTION
- RESIN INJECTION: LEAK SEALING / WATER STOPPING
- STRUCTURAL STRENGTHENING
- CONFINED SPACE WORKS
- HYDRODEMOLITION
- WATERPROOFING TANKING SYSTEMS
- SPRAY APPLIED MEMBRANE WATERPROOFING
- SPECIALIST GROUTING & SPRAYED CONCRETE
- INDUSTRIAL FLOORING REFURBISHMENT
- FACADE CLEANING & PROTECTION
- AERIAL SURVEYS

Beton Bauen

SPECIALIST CONTRACTING

20 YEARS

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