

# CONSTRUCTION europa

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**Surveying**  
p30

**Compact  
loaders**  
p23



**Foundations**  
p38



# CONSTRUCTION **europa**

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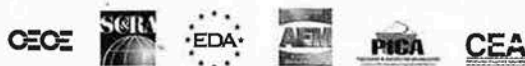
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# Facing the challenges

**With cities becoming even more densely populated, companies continue to innovate to make sure they can match and better any challenges they may face. Joe Malone reports**

Companies have faced many challenges when carrying out foundation works on construction sites – whether its tight spaces, difficult surfaces or tight time schedules, the need for efficient machines are vital to ensure the job is done properly.

While foundations may not be seen once a project is completed, they are perhaps the most important part of the building process, as the results of inaccurate engineering or construction can be catastrophic.

Close to the city centre of Paris, France, Liebherr's LB 24 rotary drilling rig is being used by construction company Bouygues for the erection of a new apartment building.

In the business district of La Défense, located west of the inner city, an 18-storey building comprising both apartments and a school is under construction.

A subway is also being built, as the complex is situated directly next to a track of the Parisian rapid transit system RER.

The Liebherr LB 24 rotary drilling rig was

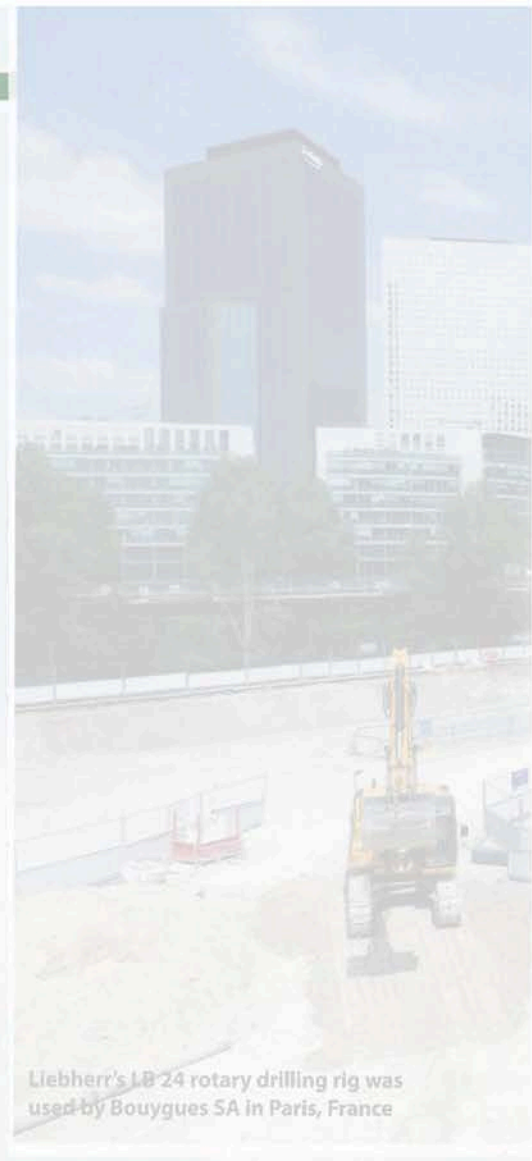
used for laying the foundation. The machine installed piles with a length of up to 30m and a diameter of approximately 1,500mm, using the Kelly drilling method.

Beams of 2m in width, 4m in height and 20m in length are now being placed on these piles, said Liebherr.

Liebherr also said that because of the compact space on the construction site, its LB 24 was the perfect tool.

The LB 24 belongs to the LB series of Liebherr rotary drilling rigs. The machine is equipped with a 270kW diesel engine and has a total weight of 76 tonnes. Another benefit of the LB 24 is its rope crowd system with a push and pull force of 20 tonnes.

In addition, the rotary drilling rig is equipped with the BAT rotary drive, manufactured by Liebherr, offering a torque of 270kNm. The company said the main advantages of the hydraulic drive were automated torque adjustment, continuous speed optimisation and four electronically adjustable speed



Liebherr's LB 24 rotary drilling rig was used by Bouygues SA in Paris, France

ranges. Further advantages of the rotary drive, said Liebherr, were its simple structure, its low maintenance requirements and its efficiency.

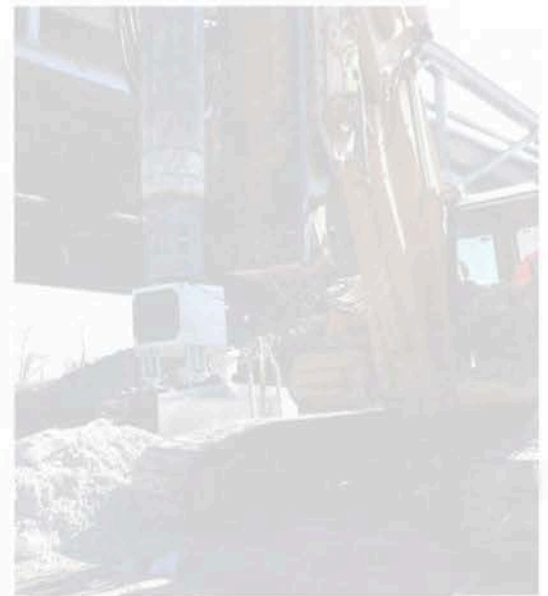
Meanwhile, in Finland, Skanska Infrastructure has been using Junttan machinery to carry out piling work at the Prisma retail chain extension site in Järvenpää.

Junttan's PMx22 drill rig, which uses its SHK5



Treviso is carrying out the foundation works for the Torrioni embankment, Florence, Italy, which suffered a structural collapse this year





Pile Dynamic's SQUID is an alternative to the camera-based visual inspection of the excavated shaft base

Trevi said that it had no time to lose in carrying out the consolidation works, structural restoration and hydraulic protection, as the winter weather could cause the river to flood.

The company believes its experience of working to tight deadlines, and delivering quality, aided its case in being awarded the contract.

Tommaso Gondolini, jobsite director at Trevi, said, "We are in the city centre and we want to minimise the impact of works on the citizenship. But, at the same time, we must be quick in order to ensure safety of the riverbank's protection wall by early November."

Ironically, November will mark the 50th anniversary of the Florence flood, which caused the Arno River to burst its banks on the Lungarno Torrigiani.

The company will use its PSM-20, SM-405/8 and SM-30 drilling rigs to help toughen the soil and create a stable workforce. It said a wall would be built adjacent to the Poggi Channel, which would protect and stabilise the tunnel, while supporting the excavation up to 3.5m to create a horizontal working platform.

The foundations will be treicon piles, with a 6m diameter, and will connect on the top with capping beams and cross beams, forming a rigid frame. Another wall will be built near the riverbank wall, and will consist of wooden piles.

Moving on to product launches, Movax has launched a range of new products this year, including the DH-20 and DH-30 piling hammers.

Movax DH-20 and DH-30 piling hammers are described as excavator-mounted, hydraulic impact-type hammers for driving load-bearing piles or assisting in sheet pile driving. The piling hammers can be flexibly mounted onto the excavator or when greater depths are required on an excavator mounted leader mast.

Movax has launched a range of new products this year, including the DH-20 and DH-30 piling hammers



hammer, has been used to carry out the laying of the precast concrete and steel pipe piles. The average pile length on the project is between 25 and 30m, which uses a two-pile element with one pile joint.

Jyrki Nikkinen, general superintendent of Skanska Infra, gave a number of reasons why the company adopted Junttan machinery. He said that, with telescopic leader, the setup of the piles was very fast, while the stability of the rig was crucial. It can lift 14.5 tonnes of material. He also noted that the SHK hammer was powerful, ensuring the work was carried out efficiently.

Another key feature, said Nikkinen, was the easy operation of the rig with its rear legs, which he said minimised track drive needs, which was important in tight spaces. Finally, he claimed the rigs gave total accuracy when placing the piles.

## STRUCTURAL COLLAPSE

In Florence, Italy, Trevi is being tasked with carrying out the first phases of foundation works for the Torrigiani embankment, which suffered a structural collapse earlier this year, causing a 3m displacement, with a depth of 3.5m.

The key features include its suitability for different site conditions, its availability in different models to meet a wide range of piling needs and its suitability for a wide range of piles including sheet piles, H-piles, tubular steel piles and more.

The piling hammers are also excavator mounted or excavator leader mast-mounted, which are designed to work on a standard excavator with normal auxiliary hydraulics. They are also equipped with Movax Control System (MCS), which the company said gave accurate control, safe, flexible and easy operation.

The company has also launched its new Movax EML-12, which is said to be a leader mast for piling applications with 12.3m of effective leader length. Movax said the EML-12 was ideally suited for different types of driven piles, preaugering or different techniques of cast in situ piles.

The EML-12 can be mounted onto multiple different crawler excavator bases, as piling specific hydraulics and winches are integrated to the Movax leader mast itself. The company also supplies a full featured controlling and monitoring system. The mast is easily transported from site to site, as it can be folded down to size.

Another new launch from Movax is the M-logbook which is a documentation and reporting tool, providing essential data related to piling works.

The piling information collected by the Movax Control System (MCS Pro) is stored in the system's excavator module.

The information is then copied onto a USB-memory drive and transferred to a PC equipped with the M-logbook software for further analysis.

Data concerning site and pile information can easily be added and ready-

**Soilmec's new Blue generation includes the SR-75**



Bauer constructed an underwater concrete base with 585 GEWI piles in Leiden, Holland

## Bauer busy in UK and Netherlands

Bauer Technologies, a subsidiary of Bauer Spezialtiefbau, was awarded the contract to execute specialist foundation engineering works around the Battersea Power Station, in London, UK. The site, which Bauer said comprised hundreds of thousands of square metres, will see residential, commercial and office space built.

In February, site mobilisation began and test drilling operations were carried out and, in June, the main works began. Approximately 600 foundation piles with a diameter of up to 2m and a depth of 60m will be laid, before the buildings begin to rise.

In addition, said Bauer, another 900 piles were required for a secant pile wall.

The company said that, with the work being carried out around an existing building, the heavy-duty rotary drilling rigs must operate in extremely tight spaces with limited access routes. The company also faced challenges before carrying out the piling work, as significant concrete obstructions had to be removed, while the clay subsoil – which is prone to drying out and shrinking – also caused difficulties.

Martin Blower, managing director of Bauer Technologies, said, "It is both an extremely interesting and challenging project, which we are pleased to be a part of."

Meanwhile, Bauer Funderingstechniek, the Dutch subsidiary of Bauer Spezialtiefbau, has constructed an underwater concrete base with 585 GEWI piles for an underground parking garage in Lammermarkt, in the centre of Leiden, the Netherlands.

The depth of the car park is 22m, which will be the deepest underground parking garage in Europe, claimed Bauer. Drilling was carried out to a depth of 55m.

In addition, Bauer pumped away and de-sanded the drilling fluid under water.

The work was completed by Bauer in November 2015 and the underground parking garage, with 525 parking spaces, is expected to be finished by 2017.

made reports – including both measured and calculated data – provide essential information about the piling work, says Movax.

### CLEANING AND INSPECTION

Pile Dynamics, meanwhile, said an important part of bored pile/drilled shaft construction is the cleaning and inspection of the bottom of the hole for cleanliness, prior to the placement of reinforcement and concrete.

It said that once drilling was complete, any material unsuitable for end bearing support was removed. Bottom inspection is then performed, often by lowering a

camera down the bore hole, a procedure that it said gave a rough idea of the thickness of any debris left at the bottom.

The company's new launch – SQUID (Shaft Quantitative Inspection Device) – is said to be an alternative to the camera-based visual inspection of the excavated shaft base. The device assesses cleanliness by measuring the thickness of the debris or non-competent material remaining at the shaft base, and can also provide a quantitative evaluation of the strength of the bearing layer.

The company claimed that a drill stub column adaptor allowed for a quick pinned connection to the Kelly bar of any drill rig.



The SQUID body includes three retractable contact plates attached to displacement transducers, and one instrumented cone penetrometer for each contact plate. The penetrometer cones move through the debris layer and into the bearing material under the weight of the Kelly bar and measure pressure, while the transducers measure displacement.

The device's body connects by cable to a wireless transmitter at the edge of the borehole, where the transmitter then sends pressure and displacement data to the SQUID tablet.

The wireless data transmission to the tablet – where data is visualised – then allows for the person holding it to be positioned at a safe distance from the borehole.

The SQUID Tablet displays, among other information, the depth of the non-competent layer and the maximum penetrometer cone tip pressure, said Pile Dynamics.

Soilmec, meanwhile, has introduced several key innovations and range updates, including the new Blue generation SR-45, SR-75, SR-95, SR-125 and SR-145 hydraulic drilling rigs for large diameter piles.

Soilmec said that, based on the experience and success of the first generation, the new SR rigs had been designed to improve productivity and operating flexibility, in addition to operator comfort and safety.

The new rigs are installed with new Tier 4 diesel engines and are fitted with more powerful and lightweight rotaries, with a claimed torque increase of more than 20% and pull up of more than 30%.

## Atlas Copco's 'versatile' drill rig

Atlas Copco has launched its new FlexiROC T20 R drill rig, which can be used for foundation drilling, and it claimed it was the most versatile version on the market in the 38 to 64mm hole range.

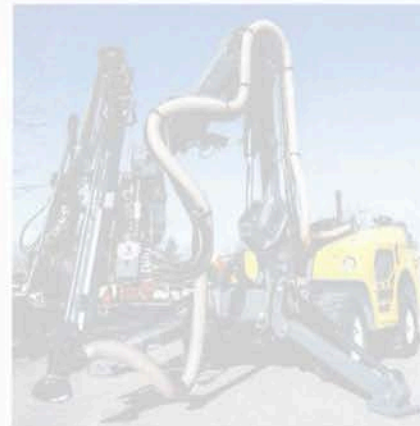
The company said the rig could drill underground and on the surface, as well as at any angle, and said it featured a high-powered rock drill.

It has a completely new rig control system as well as Radio Remote Control (RRC), and its compact design was said to assist transportation between locations and set-up in confined spaces.

The FlexiROC T20 R has a boom reach of 4,250mm through a 90° radius which claims to give more holes from fewer set-ups in tasks such as foundation drilling, trenching and various tunnelling operations.

Other upgrades include a new cylinder feed (BMH 2000) in three lengths, a new reinforced drill steel support, a front-facing feed holder and an easily accessible service access point.

Atlas Copco said the rig's 14kW COP 1435 rock drill, combined with a smooth cylinder feed action, provided almost 30% more impact energy and torque, boosting drilling performance by up to 40%.



Atlas Copco says its FlexiROC T20 R is the most versatile of its type on the market

The new SR line generation also claims a reduction in weight but an improvement in performance, thanks to the use of high-strength steels and a new antenna design.

The new Blue SR rigs come with new larger cabs, providing improved comfort and visibility and, equipped with a new DMS system (Drilling Mate System) to allow control of all the operating parameters.

Soilmec said that an innovative kinematic mechanism meant the machines could operate parallel to the tracks.

### FREE-FALL HAMMER

Liebherr has brought out a new hydraulic free-fall H 10 L hammer, which is said to be suitable for tough piling operations with a large radius.

The H 10 L is the first hydraulic free-fall hammer developed and manufactured in-house by Liebherr, and is currently the largest model of three in the new series and has a maximum impact energy of 225kJm.

Key advantages of the attachment include the modular weights, where the hammer can be perfectly adapted to the respective piling requirements, said Liebherr. It is also said to be extremely efficient as well as user-friendly in terms of transportation and maintenance. At the same time, the pile helmet is soundproof in the standard version.

The control is integrated in the system of the Liebherr basic machines, which Liebherr said allowed for better adjustment in

accordance with the respective conditions which therefore ensures more efficient operation. In addition to the LR 1300 piling rig, the duty cycle crawler crane HS 895 HD can also be used as a basic machine. Only a slight modification is required with both machines. The hammer can be operated directly from the on-board hydraulic system, meaning no additional power pack is required.

The leader elements of Liebherr's LRH 600 piling rig include easy and quick assembly of pin connections. A high degree of stability is ensured through the lattice boom design with the kicker also being secured via supporting tubes at the boom head. Two compensating cylinders ensure that the leader always remains parallel to the uppercarriage, which the company said provided maximum transmission of the torque. Inclination and radius can be adjusted using another pair of cylinders.

The LRH 600 achieves an effective working length of 51m and a maximum radius of 15m. Inclinations of up to 14° backwards and 9.5° forwards are also possible. The pull force extends to roughly 120 tonnes.

The leader elements of Liebherr's LRH 600 piling rig include easy and quick assembly of pin connections



Bauer will lay 600 foundation piles with a diameter of up to 2m and a depth of 60m around the Battersea Power Station in London, UK