

# CONSTRUCTION europa

THE MAGAZINE FOR EUROPE'S CONSTRUCTION INDUSTRY

A KHL Group publication

[www.construction-europe.com](http://www.construction-europe.com)

September 2014  
Volume 25 Number 7

**Spanish auctions**  
p45

**Compact  
loaders**  
p37

**Nordic  
region**  
p23

**Foundations**

p30



# Solid start

Foundation technology is advancing, as buildings get bigger. From 3D piling technology to next-generation foamed concrete, Sarah McCay takes a closer look at the latest developments

**A** strong base will give a solid start to any type of construction, and choosing the right foundation method depends on the type and size of the building, the nature of the soil and the environmental conditions.

In addition, soil analysis can often prove vital, and soil reinforcement is sometimes essential.

Strip foundation is a common method, especially for smaller buildings such as houses and bungalows. This is especially suited to areas with a strong soil base that are not prone to flooding.

Pad foundations use concrete pillars cast from the foundation to carry a slab at the top of the ground. This is often used when the space under the building is to be used, for example for parking.



Raft foundations are used in areas where the soil is sandy and loose. More expensive than the first two, it involves concrete spread around the building from the base of the foundation to the ground floor slab.

Pile foundations are the most expensive and strongest type of foundation, and are favoured for large-scale and high-rise development. The soil is bored deep and filled with concrete to be able to support multi-storey loads.

Groundwork is essential for good, strong foundations. Italian manufacturer DAT Instruments specialises in instruments and software for such jobs as piling, jet grouting, CFA (continuous flight auger), diaphragm walls, grout injection and soil mixing.

The company's dataloggers are used for real time measurement of foundation parameters with the purpose of understanding what lies beneath. The dataloggers can track foundation penetration rate and alert contractors to cavities, the depth of rocks and different soil substrates.

DAT Instruments' JET 4000 AME/J can track the drill depth, feed force, rod speed translation, boring rod rotation torque and

**Propump Engineering's foamed concrete was used to create a thermally efficient foundation and ground slab to the UK's first 'off-grid' building**



speed, the mast bi-axial inclination, fluid pressure, fluid flow and volume, ending with the soil relative energy.

## MACHINE CONTROL

Trimble Navigation's Heavy Civil Construction Division has introduced a new 3D machine control system for a variety of piling machine makes and models.

Now available in Europe, the DPS900 Piling System can be used on building structural foundations, retaining walls, coffer dams, and solar or wind farm installations.

Alan Sharp, business area director for Trimble Heavy Civil Construction, said, "The DPS900 Piling System can transform the way piling contractors work. Without DPS900, the process is manual and often error prone. With the system, contractors can take advantage of accurate positioning and automated reporting to ensure machines are being utilised efficiently."

According to Trimble, the DPS900 Piling System reduces surveying costs associated with staking and as built checks. In addition, the system can increase on-site safety by reducing the number of people around machines, pilings and foundations. The DPS900's accurate positioning can reduce the navigation time between piles, speeding up construction.

The IT system captures start and end drill positions, time and elevation as well as actual embedment depth, blow count reporting, and inclination and orientation control.

Trimble offers a total solution alongside the DPS900. The firm's HCE office software can be used to create pile plans in the office, and can work with data preparation, estimating and reporting functions. Piling machines can be connected to the office using Trimble Connected Site solutions for wireless data transfer and GNSS corrections.

In addition, machines can be tracked and monitored using VisionLink for location, hours and usage information.

UK site preparation specialist Groundforce has been working with the Nuclear Advanced Manufacturing Research Centre (NAMRC) in the north of England, on a special foundations project.

Suttle Projects' new Klemm KR709-2 gets to work on Bournemouth Beach





**Tensar International provided its TriAx multi-directional geogrid product for the construction of 24km of access road for the Keadby wind farm site**

Equipment from two specialist Groundforce divisions was brought in to help with the installation of a new horizontal boring machine within NAMRC's existing facility at Waverley Technology Park in Sheffield. The new machine is believed to be the largest of its kind in a research facility in Europe, and is capable of manoeuvring work-pieces of up to 100 tonnes in the chuck.

The bases required to support this massive machine were constructed in a large excavation using more than 1,200m<sup>3</sup> of concrete and 100 tonnes of steel reinforcement.

The concrete foundations are supported by 78 auger-bored concrete piles, each 600mm in diameter and spaced at 2m centres. These were drilled from the underside of the existing floor slab level before work started to excavate the surrounding material.

Groundforce Shorco supplied the support system, which comprised the company's Mega



## FOUNDATIONS

**The Groundforce teams working on the Nuclear Advanced Manufacturing Research Centre foundations have created a concrete foundation supported by 78 auger-bored concrete piles**



and Maxi braces with 900 Series braces of varying lengths. Groundforce's HY6 trench sheets were used to line the excavation while Piletec supplied a MS4 EMV piling hammer to install them along with a Taets pile breaker to cut down the concrete piles to the required length.

### ROTARY DRILL

In Germany, Liebherr has seen its new LB 44-510 rotary drilling rig used on the construction of a particle accelerator in Darmstadt.

Two LB 44-510 rotary drilling rigs are being used on the construction of the international particle accelerator FAIR (Facility for Antiproton & Ion Research). The drilling rigs are there to stabilise the subsurface with cast-in-place drilled piles. The job will see 1,400 piles, measuring between 40m and 62m, set in the ground. FAIR will begin operating in 2018.

The latest development in Liebherr's range of deep foundation products, the LB 44-510 rotary drilling rig offers a torque of 510kNm. In kelly drilling applications, it is configured for drilling diameters of up to 3m and depths of up to 92m. The drilling rig weighs some 170 tonnes and is powered by a V8 diesel engine offering 505kW and complying with the Stage IIIB emissions standard.

Italian manufacturer Soilmec launched three new drilling rigs earlier this year, all designed to meet new emission standards.

The SR-45 and SR-75 hydraulic drilling rigs are designed for large diameter drilling of cased or uncased bore piles, CFA piles, cased augered piles, displacement piles and Turbojet piles. The two rig types feature a re-design of the mast, rotary, kelly and parallelogram. This helps with the forward weight balance of the machine, providing enhanced stability, greater crowd and extraction force, and increased depth capability.

The largest of the new Soilmec rigs, the new

**Soilmec's new SR75 hydraulic drilling rig working on a job site in Turkey**



**Save money – register online**

**bauma  
China 2014**

**November 25 – 28**

SHANGHAI  
NEW INTERNATIONAL  
EXPO CENTRE

**BUILDING  
SUSTAINABLE SUCCESS**

**7TH INTERNATIONAL TRADE FAIR FOR  
CONSTRUCTION MACHINERY,  
BUILDING MATERIAL MACHINES,  
CONSTRUCTION VEHICLES  
AND EQUIPMENT**

**[www.bauma-china.com](http://www.bauma-china.com)**



**Two Liebherr LB 44-510 rotary drilling rigs are creating the foundations for the international particle accelerator in Germany**

a double rotary, which allows casing and the drill string to be advanced independently.

### PILE DRIVING RIGS

Meanwhile, Finnish piling specialist Junttan has added three new units to its X-Series pile driving rig family. The new models, carrying the nickname J-reX, are the PMx26, PMx27 and PMx28. They have maximum leader capacities of 20, 23 and 25 tonnes and maximum pile lengths of 24m, 25m and 28m.

Junttan has redeveloped the whole basic structure and component layout of its X-Series for the PMx26-28 machines, including overhauling the hydraulic system, to make the machines more economical. The pile drivers also claim to have reduced emissions.

UK piling contractor Suttle Projects has increased its drilling capabilities with the purchase of a new Klemm KR709-2.

Suttle Projects had been using a second-hand Klemm KR708-2, which it had purchased to enable it to expand into augured piling as an alternative to driven piling. However, increased demand for its services – partly due to its rail infrastructure work for the UK's Network Rail – meant that a solid investment was required. The new Klemm KR709-2 will enable Suttle to drill to greater depths in a single stroke, speeding up the piling process.

The Klemm KR709-2 is suitable for medium weight drilling requirements and is capable of 450mm to 600mm holes. Suttle has already had the new unit out at work, using the drill rig during pre-auguring for sheet piling in a

SR-75 is a 70-tonne class rig mounted on a variable gauge undercarriage with telescopic side frames complete with predisposition for a casing oscillator.

The electrical system has been simplified and located into a single panel and all the electrical connections are provided with harness cable and LED signal. Its simplified structure is said to allow a fast transformation between CCS (continuous circulation drilling system) and WCS (winch crowd system) versions.

The SR-75 offers a 293kNm max rotary torque value and a pull-up force of up to 281kN for CCS and 408kN for WCS.

Third in the new Soilmecc line-up, the SM-17 multipurpose drilling rig is suitable for micro drilling and anchoring. The SM-17 is fitted with



project in Hampshire, UK.

Tensor International's TriAx soil reinforcement system has been brought in to overcome challenging ground conditions at England's largest wind farm site. It provided a multi-directional geogrid product for the construction of 24km of access road for the Keadby wind farm site, in North Lincolnshire.

**Junttan's new 'J-reX' pile driving machines offer a new hydraulic system and increased fuel efficiencies**



## Bilfinger's steel test

Bilfinger has been awarded a €20 million contract to test steel foundations for the Wiking offshore wind farm project in the Baltic Sea on behalf of Spanish energy supplier Iberdrola.

Work will begin this autumn when Bilfinger will drive steel piles up to 38m long into the seabed at the future location of the wind turbines. Tension and pressure tests will be conducted underwater following a static period of several weeks. The findings will assist in the development of a technically- and economically-optimised foundations solution for the wind turbine.

In addition, Bilfinger will test noise protection systems for the client, which will help reduce to a minimum the noise pollution that marine fauna is exposed to during the construction phase.

Work on the Wiking offshore wind farm will begin in 2016, and will see a total of 70 wind turbines installed in water depths of up to 42m north east of the German island of Rügen.

Joachim Enenkel, member of the executive board at Bilfinger SE, said, "The project is an important step forward for our offshore business – one that will further expand our leading technological position in the construction of foundations for wind turbines on the open seas."

In recent years, the group has delivered the foundations for a large proportion of the wind farms built in the North Sea and Baltic Sea. The foundation work for Dan Tysk in the German North Sea was completed in 2013, and in 2012 the company also concluded work in the UK for London Array in the Thames Estuary.

**Bilfinger completed an offshore foundations project at London Array last year**





**Soilmec's SR-45 drilling rig has bottom feed system technology for drilling in areas that are seismically active or have unstable ground conditions**

with Balfour Beatty in the past we were more than confident that the build would be efficient and environmentally sound."

**PASSIVHAUS**

In Scotland, Propump Engineering has been busy laying the foundations for the Passivhaus Macro Micro studio at Dundee University.

Using foamed concrete, Propump provided a thermally-efficient foundation and ground slab to the UK's first off-grid building powered entirely by renewable energy, designed by the University of Dundee's Macro Micro Studio.

For the building's raft foundation, Propump designed a foamed concrete to have a balance of both structural strength and thermal insulation qualities – reducing material usage and groundwork costs. Construction time was also reduced, as the complete foundation and ground slab was placed in two four-hour shifts.

Self-compacting, foamed concrete also seals around the building services, preventing heat escape and rodent entry.

"We are delighted to be involved in what, for many, is the future of construction," said Trevor Ansell, director of Propump Engineering. "We supplied a 600kg/m<sup>3</sup> wet density foamed concrete, which was pumped into a 1m deep slab to insulate the dwelling and help maintain

a constant temperature all year round."

The foamed concrete technology also allowed for the foundations to incorporate a void for a battery box to store electricity from the roof top photovoltaic system. The foamed concrete was then topped with thin self-levelling cement screed, to give the final exposed floor finish.

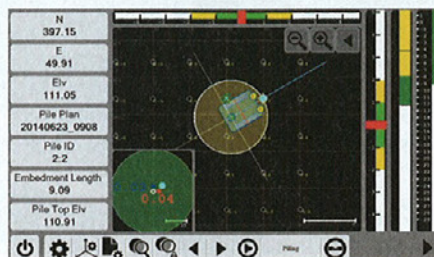
Once the foamed concrete foundation was in place, a soleplate was fixed to provide a level base onto which the timber wall panels could be installed. The foamed concrete's highly liquid nature meant the soleplate could be accurately fixed directly to the formwork and the slab then cast around it.

The next generation of foundations technology looks set to offer strength combined with insulation and energy efficiency. Likewise, fuel economy and emission reductions will continue to play a central role in equipment development. **ce**

Contractor Balfour Beatty selected the TriAx products for the 34-turbine site, for a safe, mechanically-stabilised access road solution.

The TriAx system provides a geogrid that sits directly on to the subgrade to interlock with and confine the granular fill material, allowing the use of a much thinner section of aggregate for access road construction.

Colin Thompson, wind farm manager (UK) at Tensar International, said, "Working on a project of this scale wasn't without its challenges, but Tensar's two decades of providing ground stabilisation for wind farm sites proved to be invaluable. Having worked



**Trimble's 3D control system ensures accurate positioning and automated reporting**

**BSP**

INTERNATIONAL FOUNDATIONS

**Making a Global Impact**



**Hydraulic Piling Hammers, Excavator/Rig Mounted or Crane Suspended**

An economical and versatile solution for installing all types of Steel or Concrete piles either for Civils or the Rail environment. Impact energy maximums from 20 KNm. Ram weights from 1.5 tons.



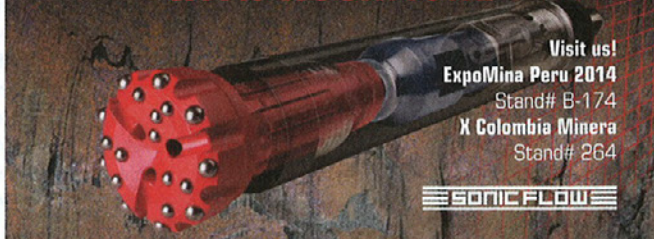
**RIC (Rapid Impact Compaction)**

BSP RIC is a dynamic compaction technique that impacts the ground at a rate of 40 to 60 times per minute using 5, 7, 9, 12 or 16t dropweights. Ideal for low cost foundations in granular soils.

**BSP INTERNATIONAL FOUNDATIONS LTD**  
Claydon Business Park,  
Gt Blakenham, Ipswich  
Suffolk, UK, IP6 0NL

Tel: +44 (0) 1473 830431  
Fax: +44 (0) 1473 832019  
email: sales@bspif.co.uk  
www.bsp-if.com

**DRILL MORE WITH ROCKMORE**



Visit us!  
ExpoMina Peru 2014  
Stand# B-174  
X Colombia Minera  
Stand# 264



BITS  
RODS  
COUPLINGS  
SHANKS  
DTH



MINING  
CONSTRUCTION  
QUARRYING  
TUNNELING  
WATER-WELL

**ROCKMORE**  
INTERNATIONAL

Rock Drilling Tools

Wilsonville, Oregon USA  
Tel +1 (503) 682-1001  
info@rockmore-intl.com

Judenburg, Austria  
Tel +43 3572-86300  
austria@rockmore-intl.com

[www.rockmore-intl.com](http://www.rockmore-intl.com)