

# Let's talk about safety

What are the guidelines and good practices when it comes to drillers' safety? We talked about it with Flavio Durigan, Sales Director of Comacchio S.p.A., a drill rig manufacturer that has been investing in research and development on this front for many years



Construction site safety poses many hazards and concerns and requires attention and commitment from all parties. "The handling of rods and casings involves a high risk of serious injury or even death through becoming entangled in the rotating drill-string. Moreover, on in the medium-long term, these operations can also be the cause of work-related diseases, causing the onset of musculoskeletal disorders, says Flavio Durigan, Sales Director of Comacchio, "automated and semi-automated equipment handling systems are breaking into

drilling projects across all application fields, from foundation construction to water well drilling, to geothermal. The advantages are multiple: safety, first of all. But in many cases the use of automated handling systems helps making the construction site management overall more efficient, by reducing the number of people employed on the construction site, shortening set-up time and cutting mobilization costs".

## LOADING SYSTEMS

The most effective equipment handling system is selected

dependant on the drilling task, the diameters and depths required by the project, the drilling methodology and tooling. All this taking into account the size of the drilling rig and its load capacity, as well as the available spaces on site. "We are observing a twofold development over the past years", says Durigan, "a greater offer of automated or semi-automated loading systems installed on the drilling rigs and a growing use of external manipulators, installed on small excavators. Especially for smaller drilling rigs, which are subject to greater weight limitations, the



most practical solution is that of an external system, such as our patented CPH manipulator. We know excellent cases where the CPH system was utilized for the installation of self-drilling hollow bars. On construction sites that have a large number of tiebacks or soil nails to install, being able to work with 6m bars considerably reduces the amount of joints required and speeds up production, thus reducing installation time and costs". Although increasingly widespread, excavator-mounted handling systems do not always meet the jobsite requirements. Medium to large drilling rigs allow the installation of an on-board loader which requires smaller manoeuvring spaces and does not involve the use of an excavator. Not to mention that an on-board rod loading systems integrated with high-capacity rod racks often allows for the drill rig to be transported in one load with the drilling equipment, reducing overall dimensions, mobilization costs and set-up times. The simplest

systems are based on the use of a loader arm installed on the side of the mast which can hold a maximum of two rods. These systems are often used on drill rigs with a long mast stroke. They allow to perform drillings at great depths (exceeding 30 m) without any manual handling of the equipment. The design of the so-called "revolver" systems is more complex. It incorporates a magazine holding a certain number of rods, which rotates to bring the rod in the required position under the rotary. The number of rods in the magazine can go from 5 to 10, depending on the type of machine. The diameters normally range from a minimum of 76 mm to a maximum of 140 mm. The length of the equipment usually does not exceed 3 m, but on some rigs, it can be extended to 6 m. "This type of loader", says Mr Durigan, "is usually installed starting from a certain size of rig: normally we start from an MC 12. But the same type of concept has been recently applied to smaller rigs, such as the MC 9,



**Flavio Durigan,**  
Sales Director of  
Comacchio

which can be supplied with a rotating on-board loader designed for the handling of self-drilling hollow bars as well as conventional rods."

### A SPECIAL MENTION

The Comacchio MC 20A, MC 22A and MC 28A are machines that were "built around" a semi-automatic loader, designed to handle rods and casings used in double-head drilling applications. The system consists of a rotating magazine and a gripper, installed on a guide parallel to the mast, which picks up the equipment from the magazine and positions the rods and casings along the drilling axis. Depending on the diameters (typically up to 114 mm for rods and 178 mm for casings, 3 m long), the magazine can handle up to 9 pairs of rods/casings. In addition, the starting rod can be put in a special slot on the side of the mast. The loader can also be used in single-head applications. "Many of these machines are intended for challenging shoring projects that require the installation of a large number of tie rods for the consolidation of deep excavations or other earth retention works", explains Mr. Durigan, "these retaining walls can reach great heights, so the manual handling of rods and casings on the drilling point is simply impossible. Not to mention that the very weight of this equipment makes the handling more difficult. The fully automated on-board rods-and-casing carousel helps to overcome all these problems, in combination with the Comacchio remote radio control, which controls all machine functions, including the loader. The trend is to use longer (and heavier) equipment to speed up

## → Comacchio at Geofluid

The Comacchio stand at Geofluid will be relocated to a larger area (External Area, G14) with a new layout to enhance the display of rigs and ensure a more comfortable experience for visitors. The extensive display at the exhibition aims to showcase Comacchio's commitment to providing a comprehensive range of high-quality drilling solutions, catering to various

needs, including geotechnical, foundation construction and water well/geothermal. The focus is on showcasing various piling machine of the Comacchio CH line, ranging from the compact CH 150 model to the versatile CH 320 and the powerful CH 450 in special CFA configuration. Additionally, the exhibition features the Comacchio MC line, which

includes machines designed for soil improvement and ground engineering works. Their display will range from limited access rigs such as the MC 4D, to the powerful MC 30 in jet grouting configuration. The geotechnical sector is represented by the GEO 305, GEO 602 (in Sonic drilling configuration) and the truck-mounted GEO-T 10. The display also emphasizes water

well and geothermal equipment, showcasing innovative solutions for safety and productivity, such as the GEO 600, GEO 900, GEO 700A, GEO 909 GT and MC 15P GT. As a complement to the rigs, Comacchio will display the new version of the CPH, an excavator-mounted rod and casing manipulator, and launch the new Comacchio radio control.

production. We recently upgraded the rod handling system that equips the MC 22A. The new version allows the use of 204 mm casings and 142 mm rods, up to 3.5 m long”

## WATER WELL DRILLING

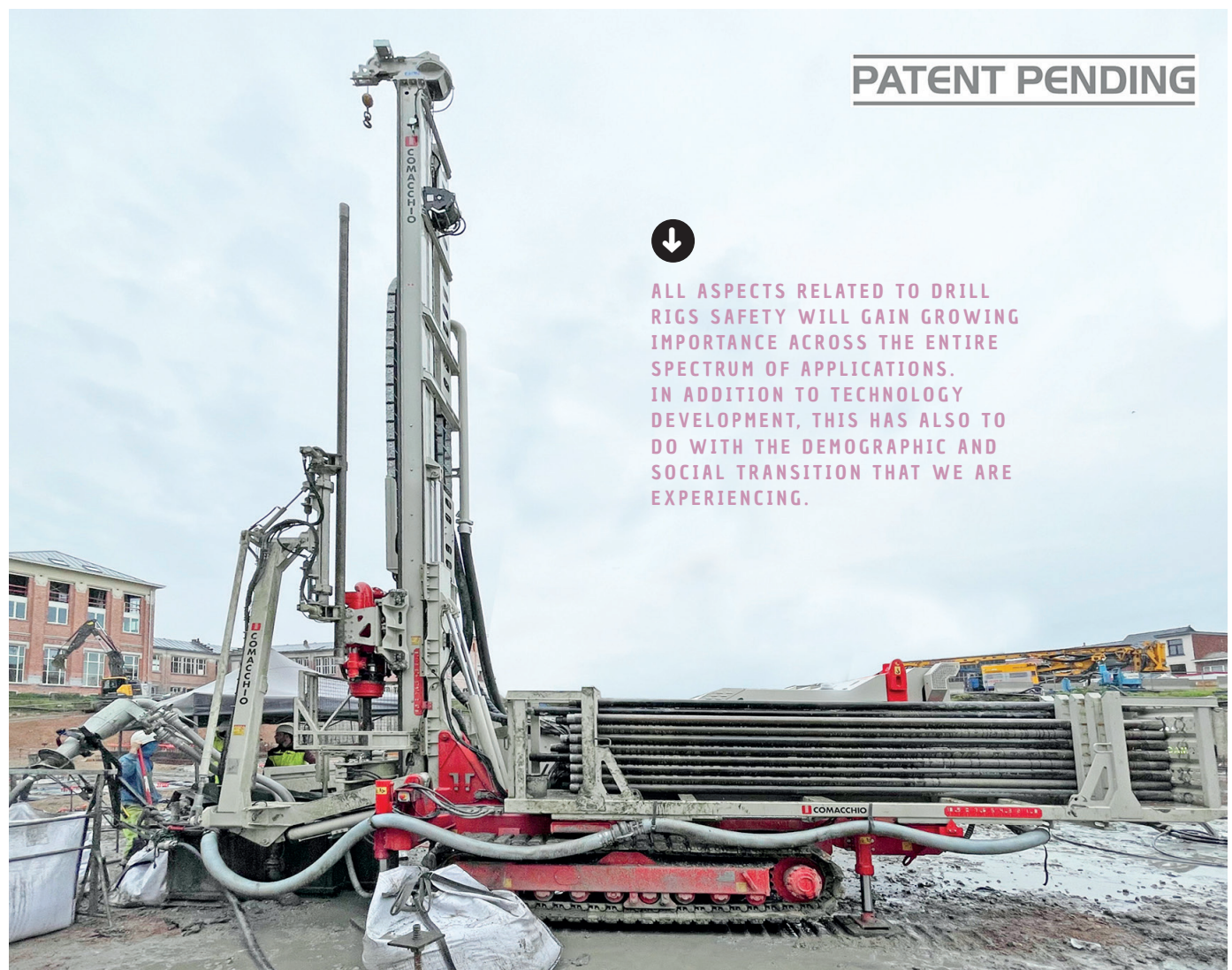
In addition to that of deep foundations and ground improvement, another industry where the demand for automated equipment handling solutions is constantly increasing is that of water well drilling. The machines used for this type of projects can reach drilling depths of 1,000-1,200 m, using drill strings that are longer and heavier than those used in foundation drilling. “All of this poses considerable challenges in the design of automated equipment handling systems”, clarifies Mr. Durigan, “but even in the water well industry we have noticed a clear evolution

towards more complex systems that involve a greater use of automated or semi-automated loaders”.

Partial automation occurs thanks to systems that incorporate a jib installed on the upper part of the mast. The jib is used to position the rods in the drilling axis, whereas the pick-up of the equipment is carried out manually by the operator with the aid of winches. A greater degree of automation can be achieved when a loader arm is installed on the rotary head: it picks up the rod from a trestle positioned in front of the mast and aligns it with the drilling axis (or vice versa, when the rods are recovered). These two systems are similar to external manipulators, as they do not include any magazine and can handle an unlimited number of rods. More complex systems use an on-board rod rack and a loader arm installed at the side of the mast that picks up the

rods from the rack to position them in the drilling axis. These are systems that totally eliminate the need for manual handling and are controlled by a PLC unit and a special panel integrated in the machine’s control panel. A water well/geothermal drilling rig such as the Comacchio GEO 900 equipped with such system can carry on board up to 240 m of rods. The latest evolution of this concept will be presented at Geofluid: the same loader arm is used not only for the handling of the equipment contained in the on-board rack, but it can also be used to pick up rods from a trestle on the side of the drill rig. “We introduces this type of system on our new GEO 700A”, says Mr Durigan, “the machine has recently been used in some residential geothermal

**The new GEO 700A has recently been used in some residential geothermal projects in Northern Europe**



**PATENT PENDING**



ALL ASPECTS RELATED TO DRILL RIGS SAFETY WILL GAIN GROWING IMPORTANCE ACROSS THE ENTIRE SPECTRUM OF APPLICATIONS. IN ADDITION TO TECHNOLOGY DEVELOPMENT, THIS HAS ALSO TO DO WITH THE DEMOGRAPHIC AND SOCIAL TRANSITION THAT WE ARE EXPERIENCING.



projects in Northern Europe. We have seen that when drilling through very soft sandy soils, the GEO 700A was able to drill 150 m deep boreholes in less than two hours, without any manual handling of the equipment. The same system can be replicated on other models in our range, including truck-mounted water well rigs". The flagship of the Comacchio range of geothermal drilling rigs remains the award-winning patented GEO 909 GT. Specifically designed for

geothermal applications that require simultaneous drilling and casing, the GEO 909 GT remains unique in its kind in the industry thanks to its rod-and-casings loading system. "Over the years the machine has undergone several upgrades", says Mr Durigan, "the last one, presented a few months ago, has added the possibility of working with 4 m rods when performing open hole drilling. Also in this case, the request that comes from the market is to increase

the reachable depths and the productivity".

### THE CX LINE

An industry that would deserve a special mention is that of mineral exploration drilling. To meet these needs, Comacchio launched a dedicated product line, the CX line, which incorporates the most advanced safety features that the Italian manufacturer can currently offer. In addition to automatic equipment handling systems, these machines use radio control technology to minimize the presence of the operators in the machine's work area and remote connectivity tools to collect data while drilling.

## A "universal" solution

**T**he CPH manipulator, which can be installed on any mini excavator, is a "universal" solution that can be used in combination with any type of drilling rig. Available in three sizes (CPH 1, CPH 2, CPH 3), it includes a hydraulically operated articulation system and a gripping unit incorporating two or three grippers. It adapts to both single-head and double-head applications. The clamping diameters vary from a minimum of 60 to a maximum of 305 mm, while the length of the equipment reaches a maximum of 6 m (which is reduced to 4.5 m when using casings). This type of manipulator can handle a virtually infinite number of rods/casings, without weighing on the drill rig structure. It facilitates the use of longer (and heavier) equipment thus resulting in higher production rates.

