

Equipment and Components

Pushing the development

The new AUTO CDA is successfully working in Germany



SIP & T continues its work of strengthening the German market thanks to the valuable support of his agent BBD Spezialtiefbau und Baumaschinen Vertriebs GmbH providing automatic casing drive adaptor to make a major project of DEMLER Spezialtiefbau GmbH + Co. KG.

AUTO CDA: WHAT YOU NEED TO KNOW

The automatic casing drive adaptor (AUTO CDA) is an interesting coupling system of lining casings that can be applied on all drill rigs and is able to increase safety and productivity in the execution of lining piles, eliminating the danger and waste of time due to the manual casings coupling phase. The safety issue, which is an obsession for the association of the European Foundations Enterprises, has focused its attention on the consequences for the industry of foundations resulting from the implementation of European Directive 2001/45/EC regarding minimum standards for the safety of workers which operate at high altitudes. A

"careful" Safety Plan seemed necessary and, therefore, the priority of a number of appropriate solutions to prevent and reduce the risks of falls from heights by workers during the assembly of drills and manoeuvring inherent to them to put them into operation. When tubular drilling (casings) operations are carried out, it is often necessary that some operations are executed at high altitudes by workers on the site. Before starting to drill, the casings that support the walls of the hole should be inserted into the ground; for this reason, the various elements are connected together securely through threaded sealing bolts in order to form a column which, in turn, must be bolted to the rotation head by means of a driver (twister). Once the pile has been installed, the column casing must be extracted from the ground and then must be disassembled element by element. In general, to connect the column casings to the driver, the sealing bolts are set manually and, for this purpose, the worker is forced to use devices such as a ladder, a rubber loader - used as a "working platform" - or safety harness.

Why are such widespread solutions not safe? The ladder can slip or slide on the muddy ground (during drilling, one cannot expect to have a clean and tidy surface); the worker could slip from the rung of the ladder (dirty boots); from an unstable position on a ladder, the worker must carry out his work with great physical effort; the driver of the rubber loader could make a wrong move endangering the life of the worker; safety harnesses could fail and therefore because the operator to fall. The use of these devices, as well as being very risky for the safety of operators, is highly unproductive since the entire team of workers - and the drill itself - cannot work until the column casing is connected to the carrier (in turn connected to the rotation head) or vice versa until the column casing is completely removed. For a number of years, manufacturers of drills, and their users, have tried to develop alternatives and adequate solutions to make work much safer and more productive from an economical point of view. With the automatic Twister, SIP&T stands by the road of concreteness, which has given desired results over time. A technological innovation targeted where clients highlight difficulties, resulting in a real and evident evolution of the product. The great desire to preserve and enhance its competitiveness, combined with the intention to protect the right to exclusivity, has led the specialist from Baronissi to patent "his invention". With the assistance of Eng. Francesco Cantisani, International Sales Director at SIP&T, we shortly illustrate the original design and creation by the company from Campania in the field of ducted piles and related management systems of lining casings by explaining the technological principles and practical benefits derived from it. The pipe casings are made of high quality steels and their use is intended for piling in grounds that require excavation protection to avoid the drilling pile from collapsing.

Two male/female coupling halves, which are applied to the ends of the individual elements of the pipe column, facilitate their junction. In this context, we find the recent technical development of the twister (driver) by SIP&T, made with an entirely mechanical system of engagement/release to lining casings that can be used on all machines for large vertical drilling. The system is able to increase safety and productivity in the execution of lining piles, thus eliminating danger and time wasted due to the manual phase of coupling. Thanks to it, today, drilling operators can connect the column casing to the driver without the use of human resources, therefore, directly from the operating cabin where they sit. After long research and development, the system described has now reached the stage of serial production and is successfully used on many sites.

FASTER AND SMARTER FOUNDATION PILES

Construction of the foundation for the viaduct began in July 2016 and included 24 drilled shafts socketed into shale. Most notable were 1500 mm diameter, up to 25 m long shafts installed on a 5.71-degree batter, using double walled sectional casing oscillated down to bearing strata. Demler provided the technical engineering and support required to operate the specialized equipment at a 5.71-degree angle, they used a Bauer drill rig BG39 Premium Line with a Laffer casing oscillator that was mechanically and hydraulically attached to the base of the rig. In addition, a 5.71-degree engineered framework provided rigid support in order to keep the casing oscillator on the correct inclination while drilling took place. The oscillator, the segmental casing and SIP&T AUTO CDA allowed the shaft to be advanced through the overburden materials. Despite the equipment challenges faced, the BG39 production overall was excellent in achieving the completion of this project ahead of schedule. Subsurface conditions consisted of stiff fat clays underlain by layers of soft lean sandy clays, clayey sands, and sand with gravel. The sand with gravel layer typically



Francesco Cantisani, Sales Director SIP&T

was present above the shale. The shale is highly weathered near the top of the formation and becomes progressively stronger with depth. It contains weakly cemented sand layers within the shale. Hard limestone layers and concretions are present intermittently throughout the shale. Groundwater was typically encountered approximately 6.096 mm below the surface elevation. The use of the oscillator, segmental casings and AUTO CDA was necessary in order to meet the technical requirements of the contract. The specifications required that the shaft excavation could not be advanced beyond the limits of the casing supported overburden. Unsupported or unshored excavation of the drilled shaft overburdens could have severe repercussions on the foundation system.

The 5.71-degree slope frame was necessary to maintain the required batter. The specifications allowed only a one degree +/- deviation from 5.71-degrees. Demler pointed out that, installation of the drilled shafts on 5.71-degree batter required a more delicate touch than the traditional driller's mentality of the more power the better. Equipment, and tooling designed to function vertically do not necessary operate efficiently on a 5.71 degree batter. Equipment and tools were structurally fatigued requiring constant care and field modifications.

The segmental casings required a high level of maintenance and care in order to keep the casing installation running

smoothly. It is important to note that maintaining plumbness of the shafts at a 5.71-degree batter presented a significant challenge and were critical for the success of the installation. The challenge of Mr. Weigand Lutz, Civil Engineer and Site Manager at Demler, was to increase the production speed while maintaining a high level of operator safety. The challenge has been widely won by using the AUTO CDA which allowed to achieve inclined piles automatically by connecting the casings elements and contributing significantly to their extraction from the piles without dangerous and long operations. Calculations in hand, the use of the AUTO CDA has increased by 10 times the connection speeds and disconnection of casing than the classic method heavily affecting the work completion date. Thanks to these results, the German company has decided to replace all conventional casing drive adapters with automatic ones of the SIP & T, believing to be able to achieve the same excellent results in its future projects. The cased drilled shaft installed on a 5.71-degree batter at the diameters and depths for this project may be a first of its kind, but not the first for Demler. They have been perfecting this construction method over time. Their work once again demonstrates the innovative abilities of drilled shafts foundation contractors who when presented with a daunting challenge find a way to rise (or drill down....) for the occasion.