

Combined Pile Driver

Dual function machine

THE APPLICATION OF A DRILL TO A PILE DRIVER MACHINE SO AS TO GUARANTEE THE CONTINUOUS SEQUENCE OF DRILLING AND DRIVING OF PILES WITHOUT REMOVING THE DOWN-THE-HOLE HAMMER, BUT SIMPLY, PUTTING IT ON STAND-BY WAS THE TECHNICAL "BRANCHILD" OF ORTECO. IT ENDED UP BEING ONE OF THE MOST RECENT AND SUCCESSFUL OUTCOMES OF THE COMBINED MACHINES PRESENTED AT INTERTRAFFIC AND DELIVERED TO THE SWISS COMPANY SAGERIME, IN BULLE, LAST APRIL. LESTRADE WAS ABLE TO ATTEND THE ON THE FIELD DELIVERY, START UP AND TESTING OF THE MACHINE, AS WELL AS THE TRAINING FOR THE OPERATORS AND A NUMBER OF "TECHNICAL TESTS" OF AN UPGRADE TO BE RELEASED IN THE VERY NEAR FUTURE:

THE INTEGRATION OF A SATELLITE GUIDING SYSTEM WITH THE PILE DRIVER.

Stefano Chiara

From the Netherlands to the Swiss Confederation, Bulle in French Switzerland to be precise, I followed a special machine that is an example of that Italian technology still rated at the highest levels at home and especially abroad. The machine in question is a classic pile-driver on which a hydraulic rotor and a down-the-hole hammer were added to the pile driver hammer unit to allow the execution of drilling operations.

- We already saw it at the last edition of Intertraffic Amsterdam in March. On that occasion, **LeStrade** was invited by the manufacturer Orteco, in Anzola Emilia (Bologna), to attend the delivery, start up and preliminary field testing of the machine, scheduled for early April in Bulle, Switzerland, at the headquarters of Sagérime, the Swiss company specializing, among other things, in the installation of road safety devices. Thus the delivery of the combined pile driver was conducted with a one day training workshop during which Mr. Sergio Tassinari, Orteco's owner, had the opportunity to explain to the Sagérime operators the main characteristics of the machine, its safety features and how to guarantee its maximum efficiency. **LeStrade** attended the aforementioned training and a demonstration of a new technology applicable, thanks to the collaboration between Orteco and Geotop (exclusive distributor in Italy of Topcon products), to pile drivers, that is, a satellite monitoring system which allows the machine and the vehicle transporting it to follow a pre-established track guided by satellite. We will return to this subject. The reader can also find further information in the article "Pile driver equipped with a navigator", *LeStrade* 3/2010, pp. 124-126, at the end of this presentation. That is, after taking a detailed photograph of this "added value" dual function machine, in general and, as we will see, in the particular applications scattered along the Confederation's roads.

COMBINED MACHINE

It combines drilling and post driving capabilities into a single unit with a clear advantage: to use the pile driver hammer it is not necessary to remove the down-the-hole hammer which remains in a "stand-by" position. Here is a first definition of the role of this dual function machine developed by Orteco integrating a drilling unit with a traditional pile driver of the HD series. This is a 4,500 Kg crawler machine equipped with a 49 HP 3-cylinder diesel engine able to execute, in the event the post must be driven in particularly difficult surfaces (rock, unreinforced concrete or highly compact conglomerates), with a special hammer, a preliminary hole with a maximum depth of 1.20 m, which is actually the typical depth needed for guard rail installations. In the case of the machine delivered in Switzerland, one peculiarity to be considered is that in the Swiss Confederation many segments of traffic islands foresee the preparation of 80 cm deep holes which are partially done with a drill (60 cm) and the rest (20 cm) by hammering the bottoms to drive metal "containers" shaped to host the posts manually inserted at a later stage. The goal: to guarantee the possibility of easily opening an access between the roadways in case of emergency. The company Segérime, for its part, is specialized in mobile and technically innovative safety solutions, as can be appreciated from its role as the distributor and installer in French Switzerland and other markets of the Miniguard and Varioguard devices developed by Volkmann&Roszbach for the temporary protection of road worksites. The company Sagérime, established by Pierre Rime in 1975 and well known in the area as a result of its technological "insight", besides installing all kinds of safety guards (the company has another pile driver from Orteco, as well as a core borer from the same company in Emilia - Italy), it manufactures and installs gates and fences, even for roads or motorways. Bernard Baehler with his group of operators did the honours during our visit.

SAFETY AND EFFICIENCY

So let's see the characteristics of the machine. A typical approach of Orteco is the use of bent and not welded sheet metal for the realization of the guides which, as Mr. Sergio Tassinari explains, "are lighter, more flexible and durable than the welded solution". The only price to pay, albeit minimal, compared with the many advantages, is the imperfect fit of the sheets in some cases: the structure of the pile driver, however, foresees the use of parts subject to wear that may be, if necessary, replaced. Thus the Orteco training in Switzerland focused on the critical issue, safety. Mr. Tassinari adds that "The machine was designed to guarantee maximum safety for the operator, whose position is located at a safe distance from all hydraulic hoses even if they are adequately protected". The operation of the commands is simplified by an adhesive diagram that through an intuitive association of colours allows even a non-expert operator, to operate the machine correctly, and this is particularly useful in dangerous situations. Particular attention was paid by the manufacturer to the connection between the lifting chain, the hammer and the column, with a coupling featuring a double pin: the first is the one which actually works, while the second, duly bolted, operates as a safety measure in the event of the failure of the first one thereby preventing the hammer from falling. The chain, for its part, has a lifting

capacity far larger than the requirement, but Orteco does not stop stressing the importance of proper maintenance (of this and other parts of the machine, especially the pile driver hammer), for example through proper lubrication. The aforementioned command diagram includes "instructions for use" particularly appreciated in multi-lingual contexts where the symbols become critical and which show the attention to detail paid by the manufacturer. A similar adhesive diagram provides indications on the timing for maintenance operations on the engine (oil change, filters, etc.). Everything is always characterized by extreme simplicity.

TIGHT SEQUENCE

The "dual function" is the main characteristic of the Orteco machine, properly translated (with fluid movements and wide manoeuvres to avoid wear on the tracks and damage to pavement) in a Sagérime test area. The pile driver is equipped with a drilling system based on a down-the-hole hammer and a hydraulic rotor that, like the air intake filter, "exploits" the hydraulic system of the machine upon which the pile driver function also depends. Thus the only device working with air is the down-the-hole hammer, which makes the use of a compressor necessary, even if with a limited capacity (7,000 litres approximately). The operation of the pile driver and the rotor alternate given that the "driving source" of either is the same (oil). It is, however, a quite easy operation and as noted, it does not involve the removal of the drill: it is enough to move the machine back about 20 cm and unhook a pin to disengage the hammer from the drill, which remains in "resting" mode, and then drive the pile. Reinserting the pin, the set up changes again and the drill can be used to execute another hole. As regards drilling, the machine can drill holes with diameters ranging from 90 to 254 mm using different down-the-hole hammers from 3 to 6 inches. The drilling depth, however, is limited to 1.20 m, sufficient for driving piles for guard rails. In the Swiss test area the machine drilled several types of paving, from bituminous to porphyry conglomerate, and drove several piles.

AN AID FROM THE SATELLITE

A further demonstration LeStrade attended in the Swiss test field involved a satellite system for the monitoring of the position and movement of the pile driver. This feature is the result of the partnership between Orteco and Geotop aimed at perfecting the "machine control" applied to this kind of machine. An early presentation of the system occurred during the American Traffic Safety Association Expo in San Antonio, Texas, last February. The European debut followed at Intertraffic Amsterdam. Finally, operational demonstrations like those in Bulle, with the collaboration of David Bartolucci of Geotop. The system's name is "Topcon pile driver GPS system" and consists of a handheld Topcon GRS-1, a PGA-1 antenna, a radio communication device RH-1 radio modem and a second GPS receiver placed on a tripod (HiPer Base Receiver). The antenna, installed in line with the hammer, receives the location signal and forwards it to the handheld computer, while the second receiver corrects the metric error, which a GPS has when used alone, and communicates it by radio to the system installed on the machine, which

adjusts its position instantaneously. It is once again the handheld computer which is responsible for the "recording" of the post driving sequence. Once the data is "loaded", the instrument returns on board the pile driver and the work is started. The monitor displays the directions to guide the machine and where to operate. The display also allows an increase of the scale when approaching the point where a pile must be driven, facilitating the achievement of the highest accuracy: the error is about 1 cm.

**1. Mr. Sergio Tassinari of Orteco (second from right)
with the Sagérime operators next to the
machine in Bulle, Switzerland**

**2. Dual function,
drilling and driving, in a single
unit**

**3. Perforation tip
(properly covered)
and driving the pile: In this
stage the in-the-hole hammer
is "at rest"**

**4. Specialization
in innovative safety devices
for Sagérime in Bulle, Switzerland**

**5. The control panel
Immediate "reading" of
machine**

6. Protected hydraulic hoses

**7.- Safety pin bolted to
prevent the hammer from falling**

**8. Pile driver and compressor
during translation**