In the arms of Aphrodite

A Massenza MI55 in Cyprus for drilling wells to depths of up to 800 m with particularly complex geological formations

Talk about the Mediterranean leads to talk about myths. And the foam of the Cyprus sea hides one of the most popular and charming myths: the birth of Aphrodite (Venus for the Romans), the most beautiful of the goddesses. An ancient land in which bringing groundwater to the surface, also as a result of the area's geological formation, is always very difficult. At Stavrovouni Monastery, located about 50 km from the capital Nicosia, this task has been performed by a Massenza MI55 drilling rig. The machine was sold through Massenza's sole distributor for Cyprus, CTC Automotive Ltd, and purchased by the Republic of Cyprus Geological Survey Department, Ministry of Agriculture, Rural Development and Environment.

The international tender

"Through our distributor CTC Automotive Ltd,", explains company Area Sales Manager, Silvia Azzoni, "Massenza was awarded the tender issued by the Cyprus Geological Survey Department for the purchase of a new drilling rig package to drill exploratory boreholes and wells for the national water grid. The machine, an MI55, was delivered at the end of 2020 and began site work between December and January 2021". In order to drill the first trial well, Massenza sent its own driller who also trained the local driller on how to operate the machine that is covered by a five-year maintenance package.

#Technical Specifications

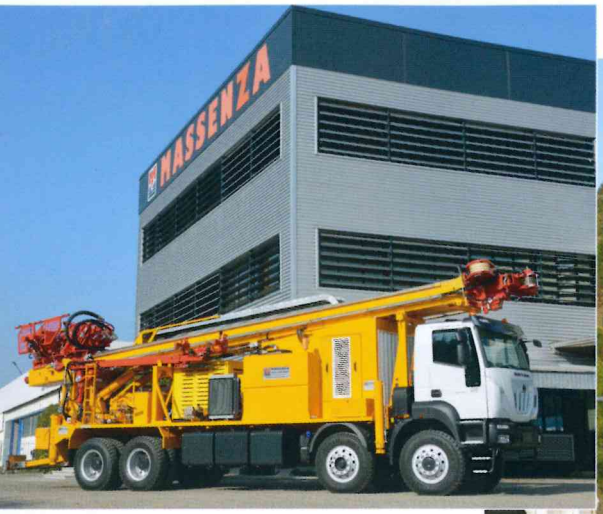
Model	Massenza hydraulic drilling rig model MI55
Truck	Astra truck heavy-duty 8x6 Euro 6
Engine	Caterpillar C18 ACERT, Stage V,
Max power	755 HP (563 kW) at 1800 rpm
Air compressor	Atlas Copco ORV 12,
Max pressure	24 bar
Max free air delivery	36 m^3/min
Mast Capacity	60 tons
Mast Height	13 m
Rotary head stroke	9.40 m
Max pull-up	55,650 kg
Max pull-down	29,970 kg, weight on bit regulation device
Rotary head:	Suitable for reverse circulation
Max torque	23,826 Nm
Max speed	124 rpm
Clamp	Double Hydraulic Clamp, max passage diameter 520 mm (20.5")
Max pull Main Winch	15,900 daN - 35,750 lbf
Max pull Service Winch	3,100 daN - 6,969 lbf
Other	Main winch, service winch and telescopic jib boom with dedicated handling winch
	Air lubricator
	Triplex water/mud pump
	Generator/welder set
	Washing system
	Anti-intrusion infrared barrier with side cage

The Massenza MI55

"In order to meet the contracting authority's specific requirements", Silvia Azzoni continues, "we recommended our MI55: a drilling rig with a pull-up capacity of 55 tons for deep water boreholes. The machine offers different drilling methods ranging from roller cone bit/drilling mud and down-the-hole/compressed air, hence the need for the on-board compressor. It is fitted with a powerful CAT C18 ACERT Stage V engine that drives both drilling rig and compressor".
We are certainly not talking about a standard machine and indeed Massenza, a veritable custom wizard, has once again demonstrated its ability to satisfy any need. "An important request", the Massenza Area Sales Manager resumes, "concerned the automatic rod racking system. In order to deal with the customer's specific requirements, we redesigned our automatic rod racking system in order to adapt it to the Cyprus-bound MI55 with the arm that picks up the rods from in front of the borehole. This is all achieved by wireless remote control". As there is a dedicated fact box for this system, it is worth emphasising that drilling is managed by a hydraulic control panel and the machine incorporates jib boom, triplex water pump (also used with the down-the-hole hammer to flush clean any cuttings the borehole) and the generator/welder set.

Trial drilling

The trial hole, constantly supervised on-site by Massenza's driller, Gianmaria Bertonazzi, who carried out training and commissioning, reached a depth of 560 m, although the MI55 is actually capable of going beyond 1300 m. This all depends on soil type and diameter. In Cyprus, the soil represents a serious obstacle due to the difficulties posed by its stratification that varies greatly from place to place and even in the very same area. This means that the drilling method needs to be constantly adapted.



When drilling the trial well at Stavrovouni Monastery, the work therefore required multiple techniques, due to the difficulties associated with the soil, the Cypriots' specific ways and also in order to test the rig thoroughly. Here is a summary of the various drilling steps performed.

1. 17½" roller cone bit/drilling mud for conductor pipes (15½" inside diameter) of up to 6 m
2. Placing and cementing of conductor pipe in wellbore
3. 85/8" DTH hammer down to 350 m
4. 77/8" roller cone bit down to 560 m
5. Widening with 12¼" hammer down to 360 m
6. 12" chisel down to 515 m

Extraction

Widening to 15" down to 310 m

7. Checking hole and removal of any detritus down to about 400 m
8. Stainless-steel threaded tubing with 8" casing down to 400 m

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A great job completed on schedule

"Manufacture of the MI55 sent to Cyprus", Silvia Azzoni concludes, "began early in 2020, so we had to deal with all the doubts and difficulties imposed by the first lockdown and the subsequent months of the pandemic. In any event, we managed to deliver the machine on schedule and also sent our representatives to the island, whilst our driller was on-site at all times for commissioning and to provide support whilst drilling the first well. As we have said, due to the customer's very specific requirements, this rig has some highly customised features, in particular the fully-automatic rod racking system for which we designed a highly-effective bespoke solution".

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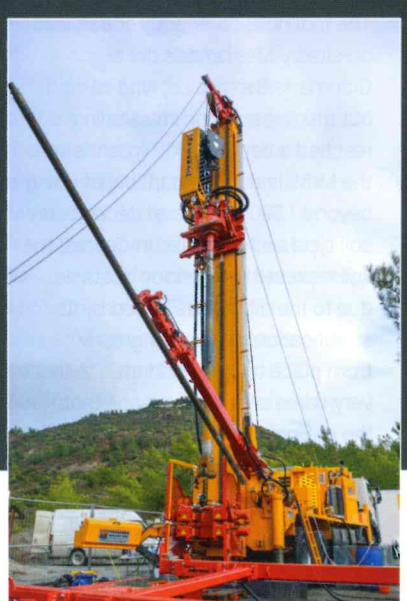
Automatic Rod handling system



Another feature of the Massenza machine is represented by the Automatic Rod handling system. Integrated with the rig and fully automatic, the charger arm on board of the rig that picks up the rods from in front of the borehole area. The rods are positioned on a hydraulically powered support system (allowing more than 200 m of rods) that allows to move the rod in position, thanks to inclination. Automatic Rod handling system is fully radio remote controlled.