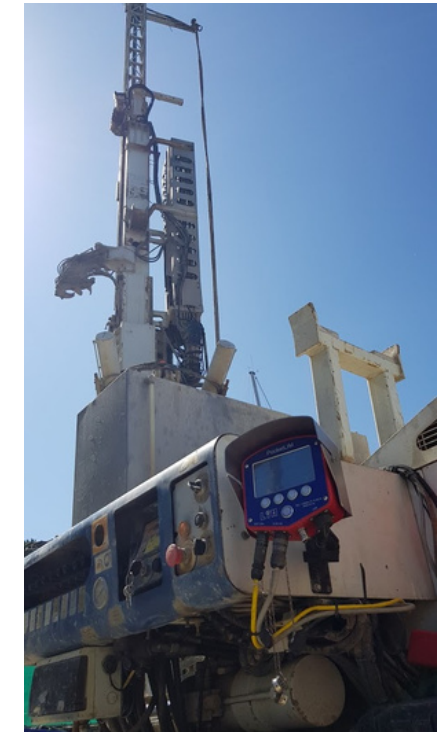


### Table of contents :

- ✓ Specifications
- ✓ Sensors installation
  - ✓ Results
  - ✓ Outcomes



In this case, the **PocketLIM 5G** records and displays drilling and grouting parameters for Single Jet Grouting method. It offers the option to automatically control the grouting phase. The installation took place in South of France.

Jet Grouting was used here because we were about 100 yards from the seafront. The soil was mainly composed of pebbles and sand (see picture). The Jet Grouting method is perfect for these conditions.



### Parameters recorded during the drilling:

Penetration rate / RPM / Pressures (Torque, Air and Pulldown) vs Depth.



### Parameters recorded during the grouting:

Lifting Speed rate / RPM / Grout Volume, Pressure and flow vs Depth



# Case study Jet Grouting

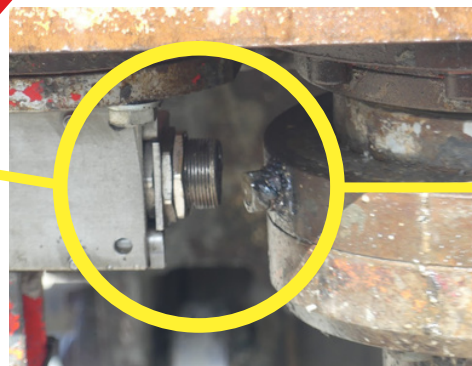
## Sensors installation



Depth sensor: optical encoder measuring depth, penetration rate and lifting rate.  
The sensor is installed on the sprocket of the chain; however we also offer an alternative solution for hydraulic drill rig.



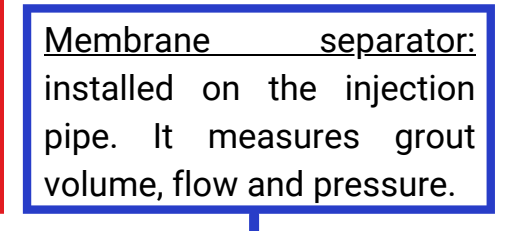
PocketLIM: Central unit recording and displaying drilling parameters, pre-jet and grouting parameters: values and graphs vs depth.  
The system offers the option to control automatically the grouting phase.



RPM sensor: Magnetic sensor installed by the drill head to measure the rotation speed. It gives information about the regularity of the drilling, but also helps to control the grout injection (automatic or manual).



Pressure sensors: installed on the gauges.




Membrane separator: installed on the injection pipe. It measures grout volume, flow and pressure.

## Results

Here is a Geotechnical report automatically generated after the grouting phase by our software, **GeoLog 4**. You can find the header on the top with the information relative to the borehole, but also the results as graphs vs depth.

\*(IAS: Penetration rate; TQ: Torque pressure; TP: Pulldown pressure; RSP: Rotation speed; IF: Flow and IV: Volume)

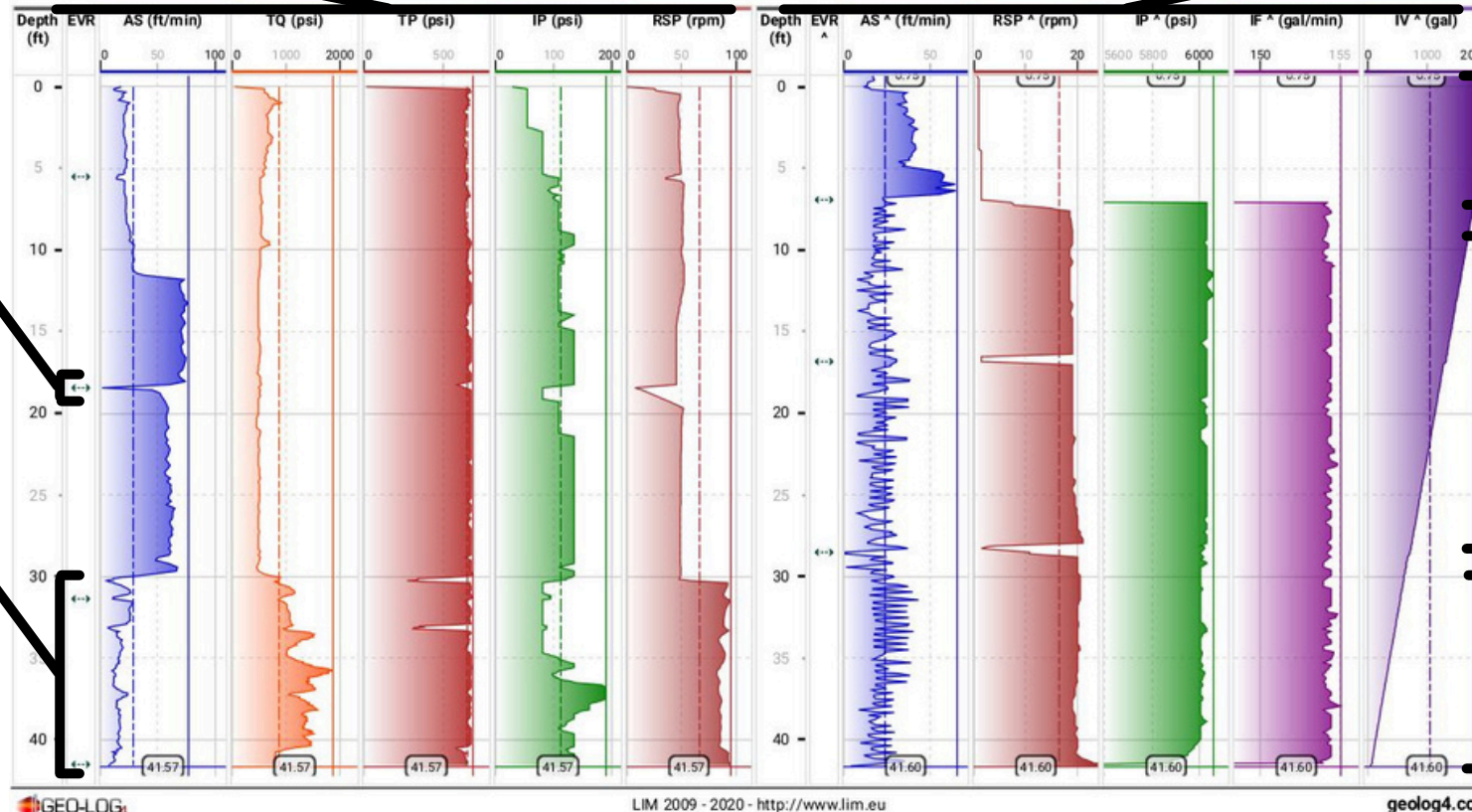
Drilling phase

 Project VILLENEUVE LOUBET	Borehole <b>C0005</b>	Ending Position 12.68 m, 12.67 m	Jet grouting parameters Creation date 04/10/2018 3:58:09 PM
	Machine MC 1200	Drilling Bit Diameter 4.5 in	Ending date 04/09/2018 4:40:07 PM
	Drilling Bit Tricone bit	Total injected volume 1797.9 l, 0 l	Drilling Duration 42 min
	Inclination X/Y /	55007121002093054J, 55007121002092725J	

Grouting phase

The different drops seen on the curves are due to a rod change. They are also represented in the column EVR by arrows.

We note a variation in the penetration rate, torque pressure and rpm from 30 to 40ft. We just reach the soil's hardest area. (pebbles probably). This is good because we can get a strong grout column with a good impermeability.



End of grouting (at about 7ft). We know this because of the injection parameters (Pressure, Flow and Volume).

We can see consistency in the various parameters (Lifting rate, Pressure, Flow and Volume). However, we can see a change of lifting rate above 30ft. This has been adjusted by the operator but it could be set up automatically.

Thanks to the LIM solution, we could verify the regularity of the “jetting”, meaning the strongness of the grout column.

➔ Monitoring the drilling allow us to identify the hardest part of the ground (at the bottom of the borehole) to build a strong and impermeable column.

➔ Critical parameters during jetting are the consistency in the RPM and no cut-off in the grout pressure and flow; meaning no leak or clog in the injection line.

➔ The PocketLIM offers the possibility to change the rate of grouting according to the depth. This can be set up automatically before the injection. Here, the driller did it manually.

➔ The data can be reviewed in real time by the driller and also at the office (with internet connection). The report is available when the grouting is complete.

➔ Total time of work for one borehole (42ft / 13m): 45 min. The system is easy to set up and ensures efficient completion of the project.

