

UltraPIP

User Manual V1.1 © 2019



What is the UltraPIP?

The UltraPIP is an electronic equipment for Pile Integrity Testing (PIT) using the Pulse Echo Testing method. It allows to analyze the speed response of a concrete pile, induced by a blow applied with an axial hammer *, to evaluate the physical dimensions, continuity of the pile and consistency of the materials used in its construction.

The UltraPIP has an acquisition software for the recording and visualization of the velocity response, which allows the user to detect potential defects such as fractures, widens or narrowing, and to estimate the unknown length ** of piles.

* The hammer should preferably be with a hard plastic tip so as not to cause damage to the pile head

** Depends on the condition of the pile and the surrounding soil



What is the UltraPIP?

Technical specifications:

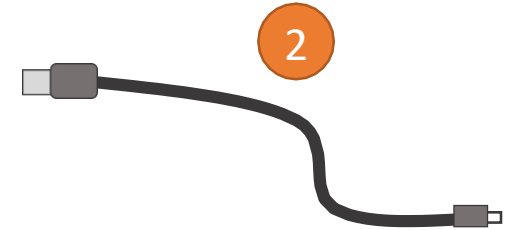
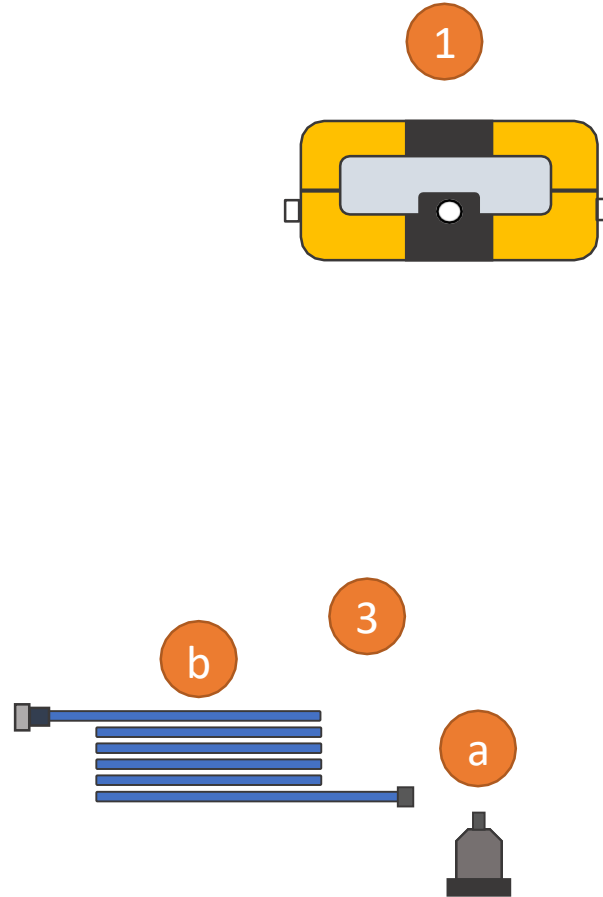
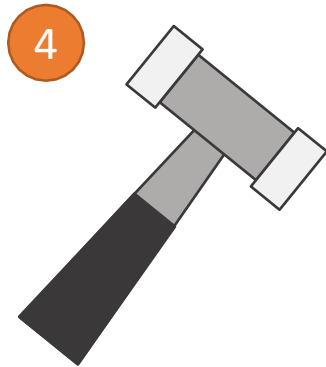
- Enclosure resistant to shocks, dust and splashes, with automatic pressure regulation valve.
- Dimensions: 16.3 x 12.2 x 5.3 cm (6.4 x 4.8 x 2.1 ")
- Weight: 350 g
- Operating temperature: -20 to 55 ° C
- Power and data transmission via USB port *
- Resolution and sampling frequency: 24 bit @ 52 kHz
- Transducer: IEPE type accelerometer with sensitivity of 100 mV / g, measuring range of ± 50 g, overload limit of 5000 g, frequency range of 0.3 to 15000 Hz and resonance frequency ≥ 50 kHz
- The UltraPIP can acquire signals of up to 100 ms in duration
- The equipment and its acquisition software are designed for compliance with ASTM D5882-07.

* Requires computer with Windows 7 or higher (64-bit) for data acquisition (Includes acquisition software. Computer not included).



Equipment components

1. Main console
2. USB 2.0 cable for connection with the computer
3. Transducer (a) with low noise coaxial cable (b)
4. 3 lb Hammer with 4.5 cm Nylon Head diameter



UltraPIP console connectors

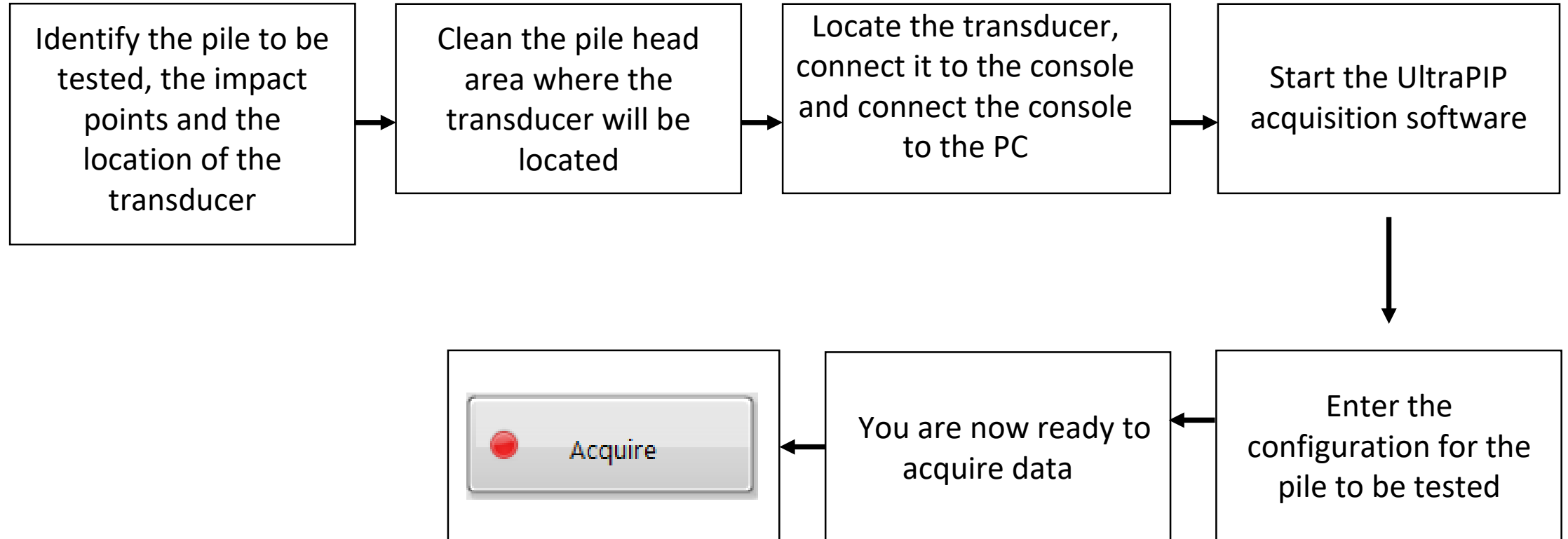
On the left side is the connector for the USB cable and a connector for Trigger signal *.

On the right side an insulated female coaxial connector, for the channel acquisition where the transducer (accelerometer) is connected.

** For future applications and updates of the console and its purchasing software.*

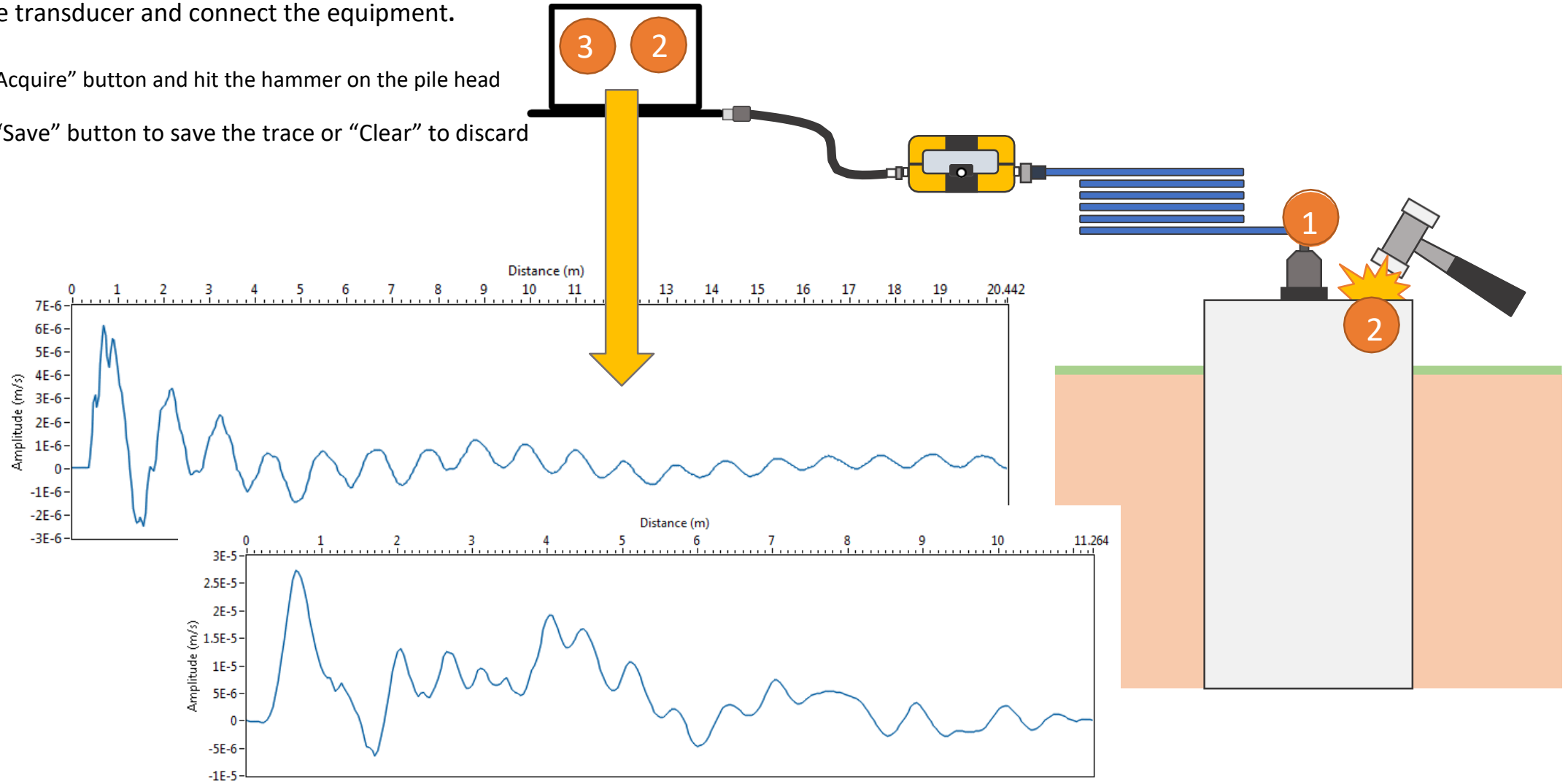


Procedure to initiate data acquisition on a pile



Data acquisition with the UltraPIP

1. Locate the transducer and connect the equipment.
2. Press the "Acquire" button and hit the hammer on the pile head
3. Press the "Save" button to save the trace or "Clear" to discard



Installing the UltraPIP Acquisition Software on Windows

- Navigate to the Setup \ Volume folder
- Double click on “setup.exe”
- Accept the terms when prompted
- The installation wizard will show you when the process is finished

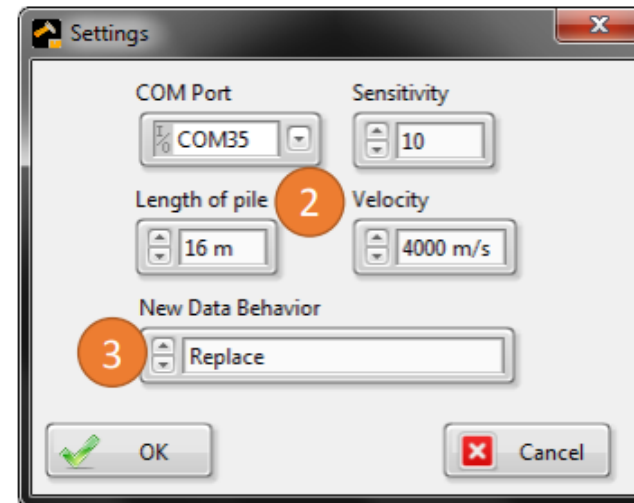
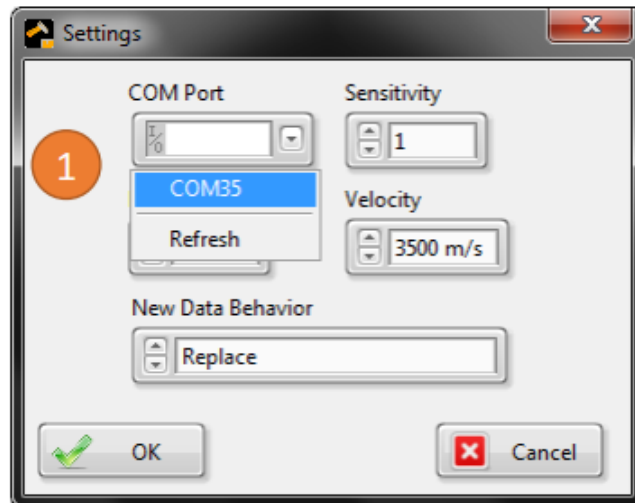


The acquisition software works only on computers with an Intel processor and a 64-bit Windows operating system. Windows 7 or higher operating system is recommended.

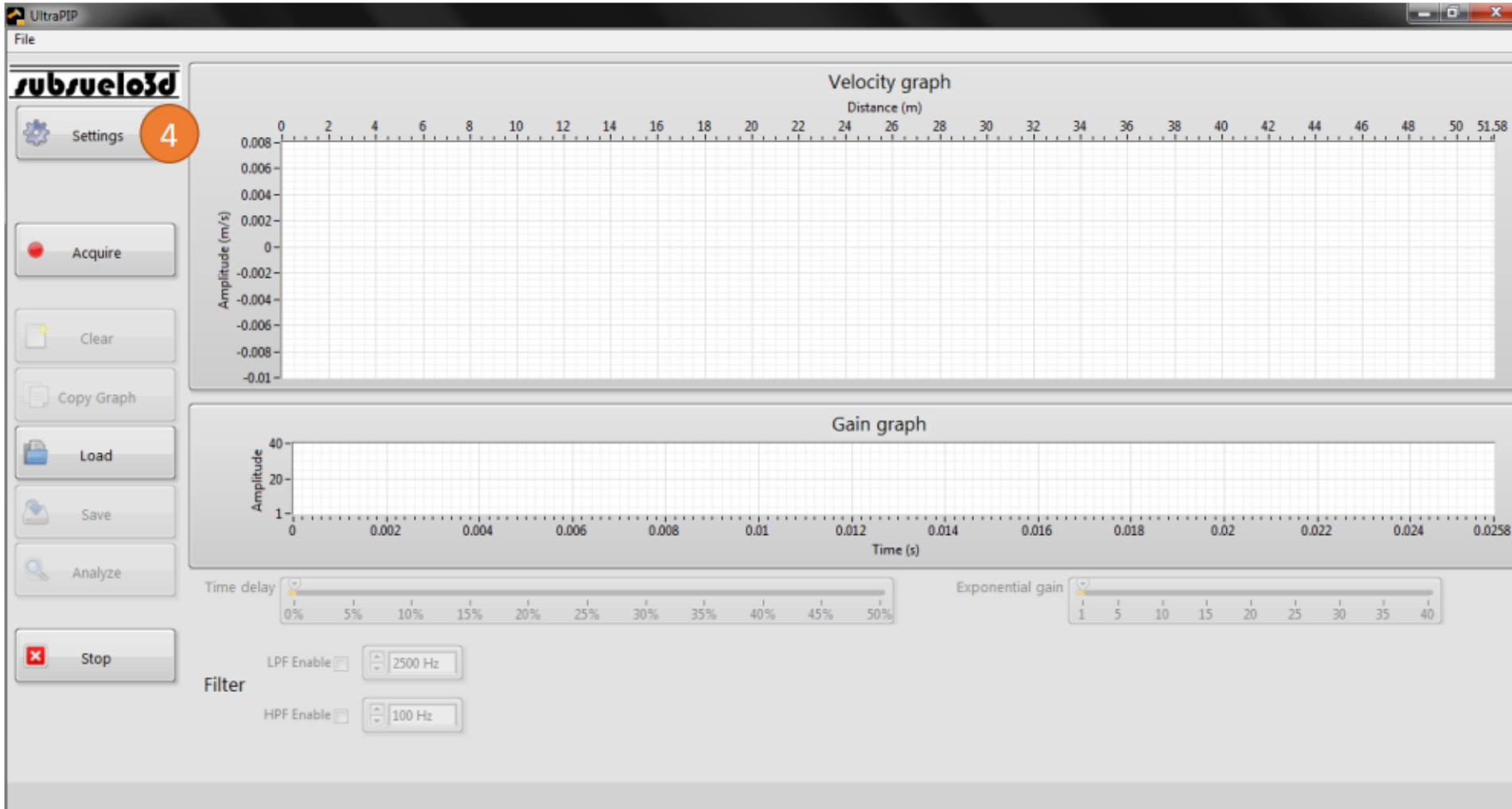
Using UltraPIP Acquisition Software for Pile Integrity Testing

(Once the equipment has been deployed and the console is connected to the PC through the USB cable)

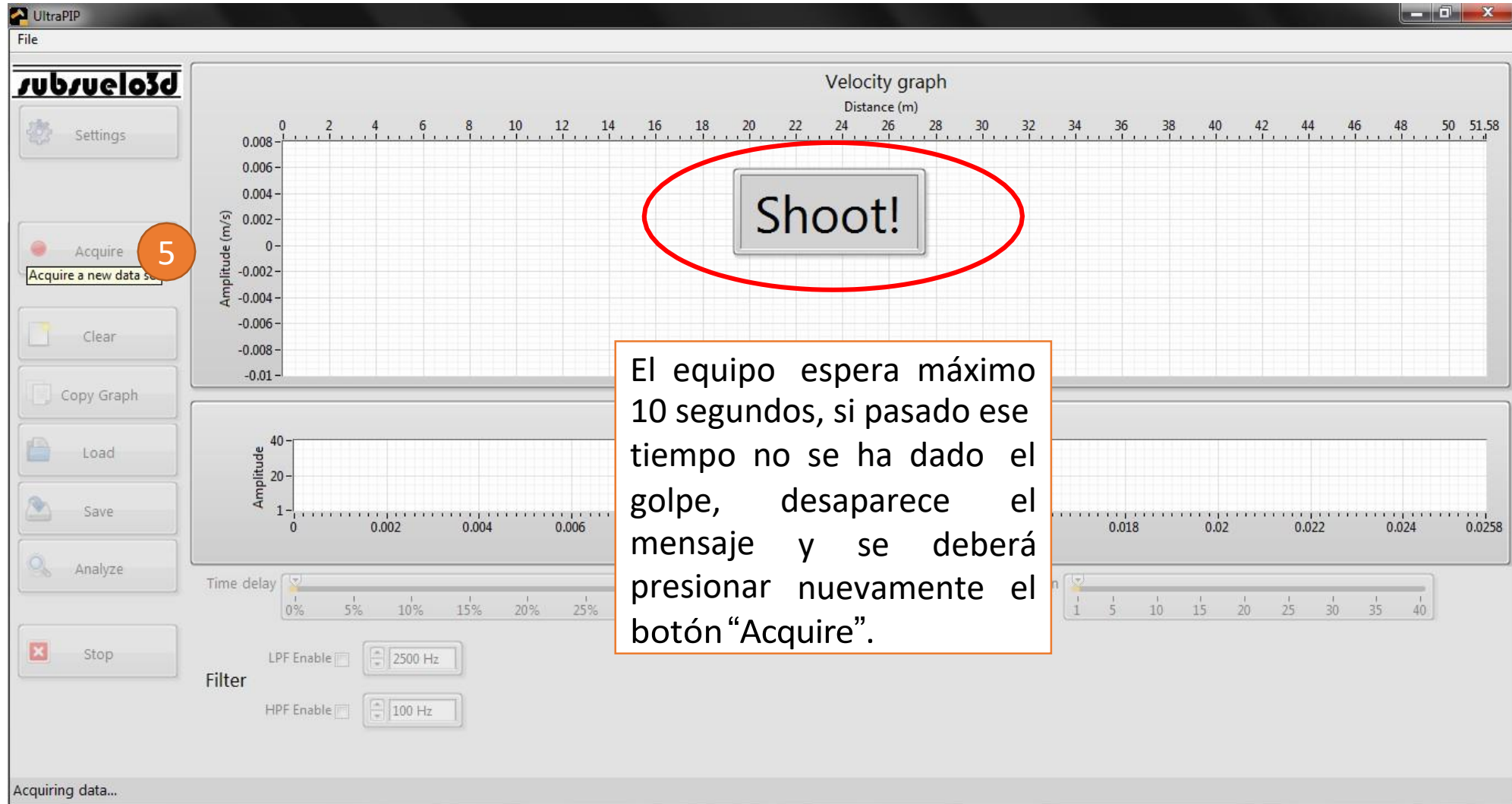
1. When you open the acquisition software, the configuration window is displayed. Select the communication port associated with the equipment (Press "Refresh" to update the list and select the correct port).
2. Enter the length of the pile to be tested (in meters), the speed of the acoustic waves in the pile concrete (in meters per second) and the desired sensitivity value for the blow (20 levels). The length is given in steps of 1 m, in a range from 1 m to 99 m, and the velocity in steps of 100 m / s in a range of 3000 m / s to 6000 m / s.
3. Select the behavior of the data, that is, each new hit replaces the previous one (Replace) or each new hit is averaged with the previous one (Average). This allows you to save individual records or save a stack of multiple shots, respectively. Press OK when setup is complete.



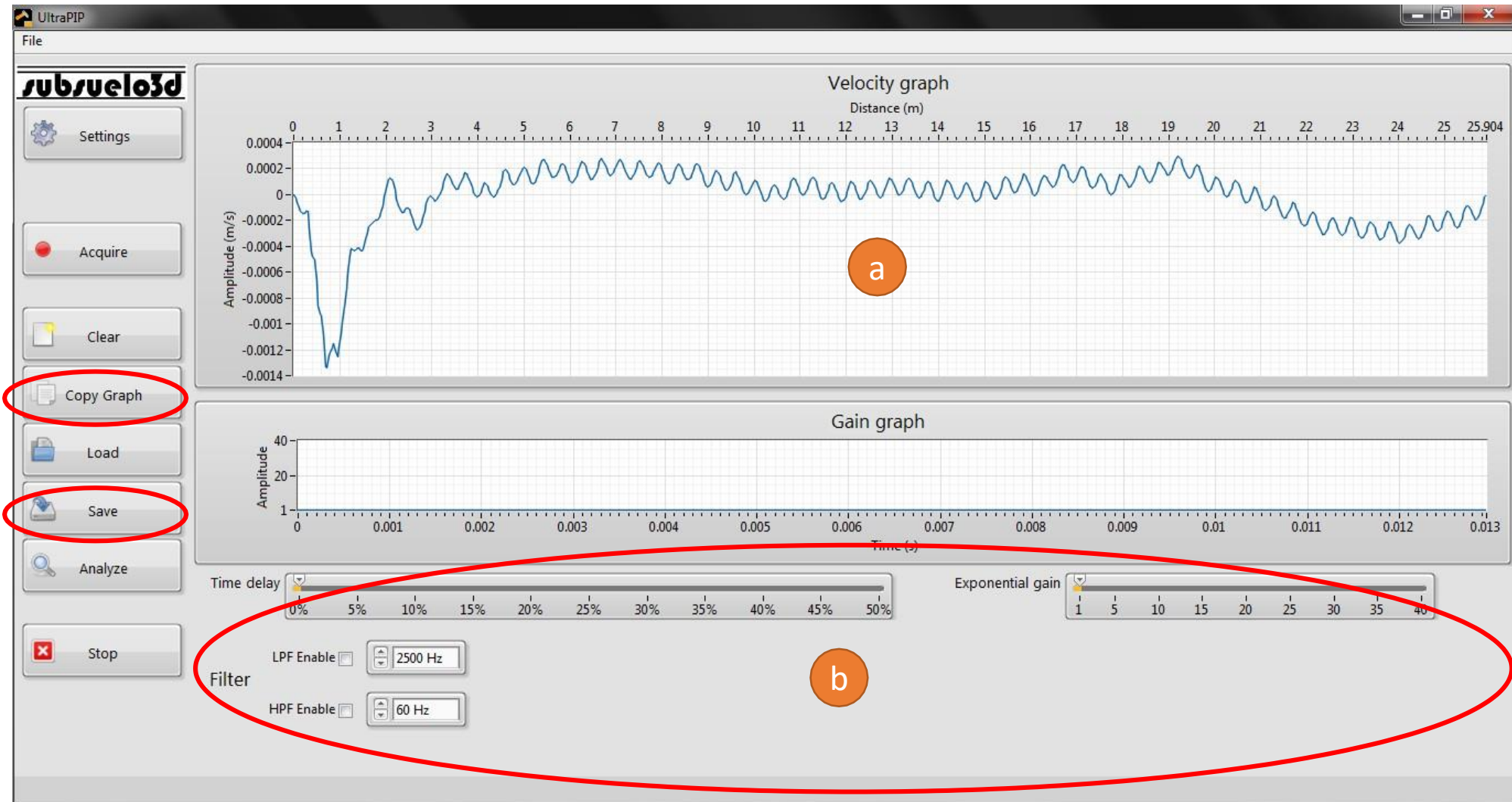
4. If you press “Cancel” in the previous step or want to change the settings, you can open the settings window again by pressing the “Settings” button.



- To acquire a trace (after locating the accelerometer and setting the firing point on the pile head), press the “Acquire” button. The message “Shoot” will appear and then you can hit the pile with the hammer.



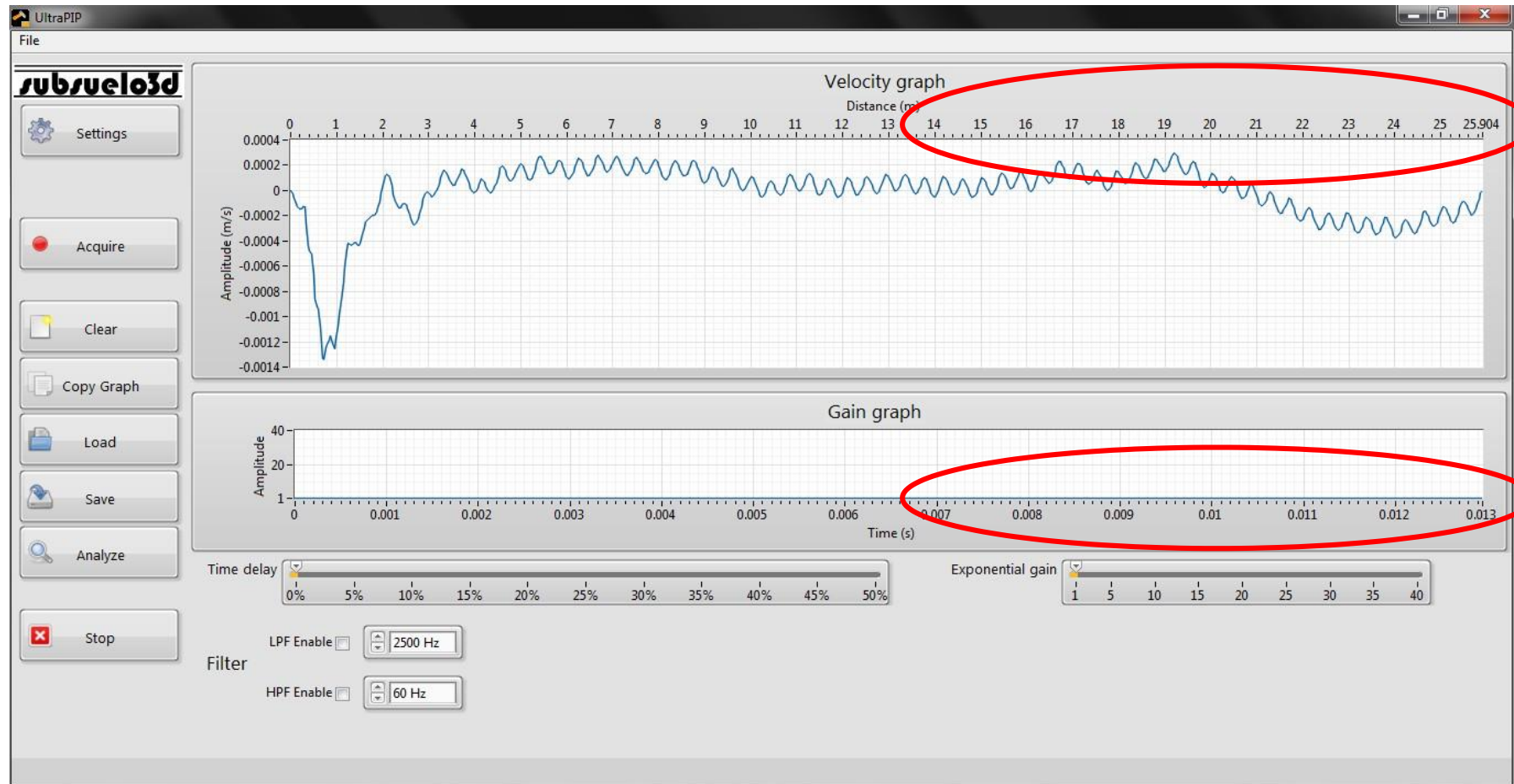
- The acquired trace will be displayed in the velocity graph (a) and the exponential gain and filtering controls (b) will be activated, as well as the buttons that were inactive in the left panel.



- Note that the velocity graph is in terms of distance or depth (c) and the gain graph is in terms of time (d), so that the results can be displayed on these two scales.



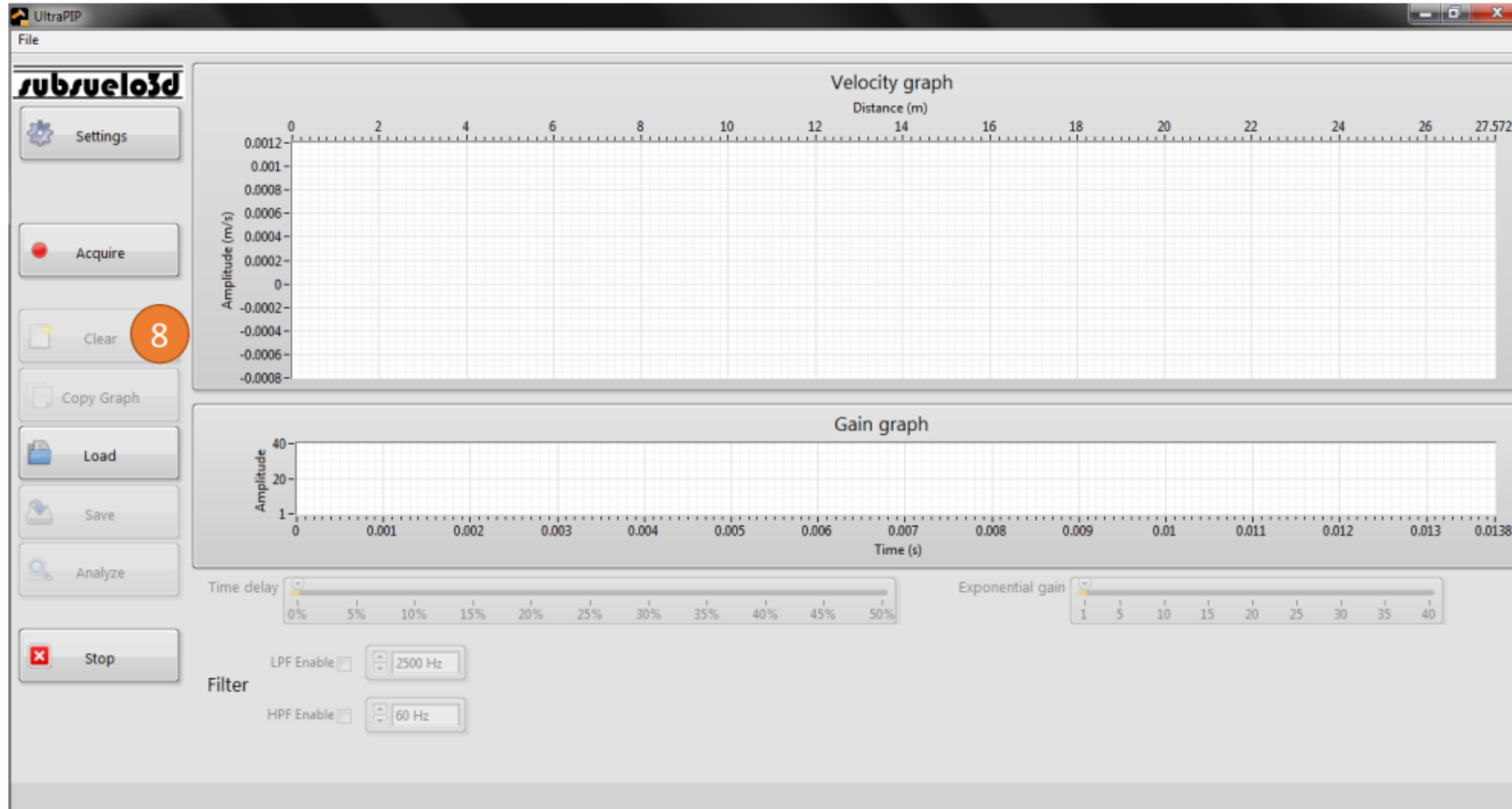
8. Adicionalmente Additionally, the scale extends beyond the configured length value. This is because, as a rule, the amount of data associated with the configured length and speed, plus five (5) milliseconds, is acquired.



9. You can use the Filtering (a) and Exponential Gain (b) controls to enhance the acquired signal, view possible anomalies and the pile foot. In the example, low-pass and high-pass were filtered, and gain 5 was applied with a 15% delay.



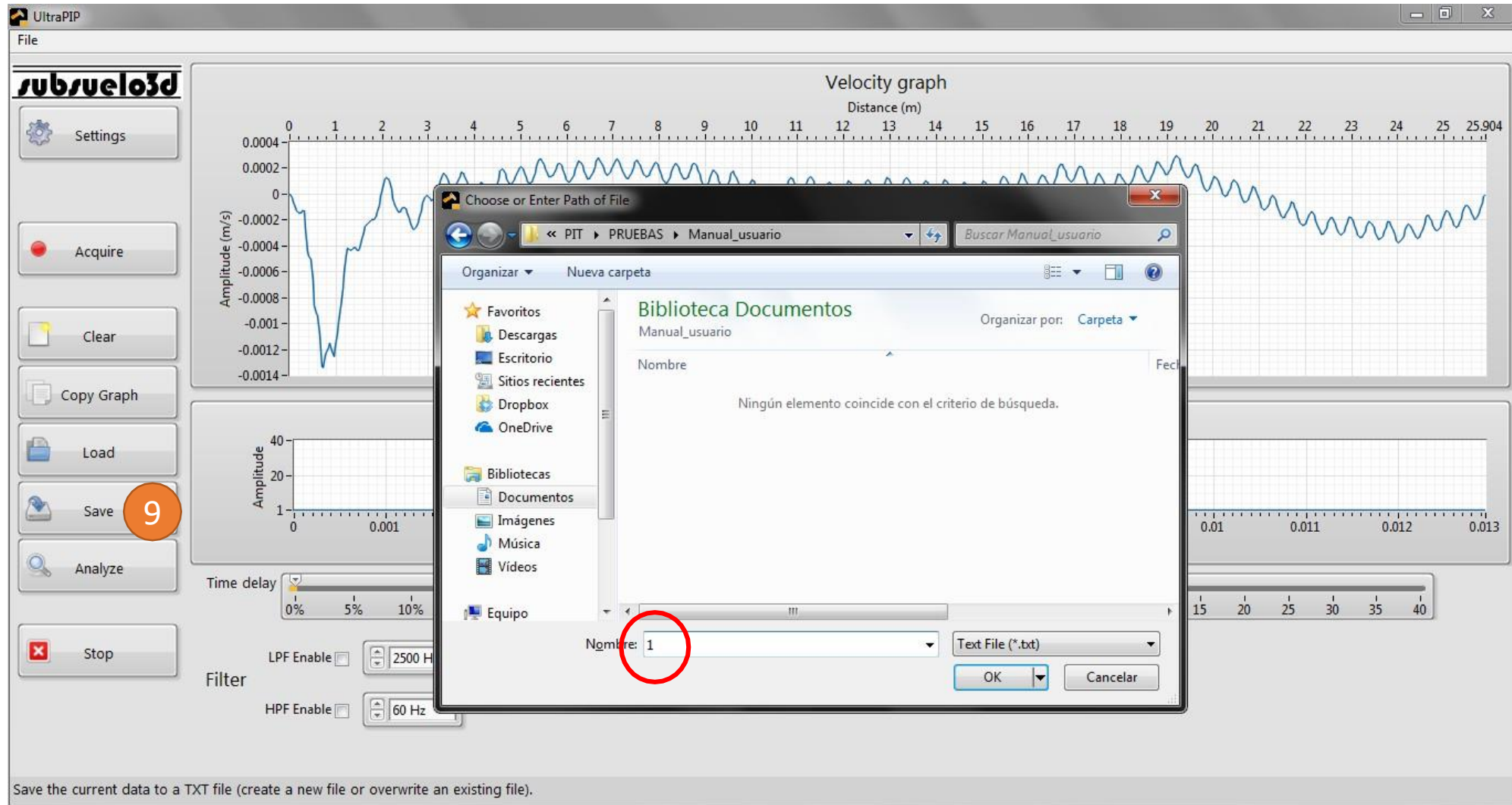
10. Si If you are not satisfied with the shape of the trace or you erroneously hit the pile, you can delete the trace with the button. "Clear", although if you selected the "Replace" option in the configuration, the next trace will replace the previous data.



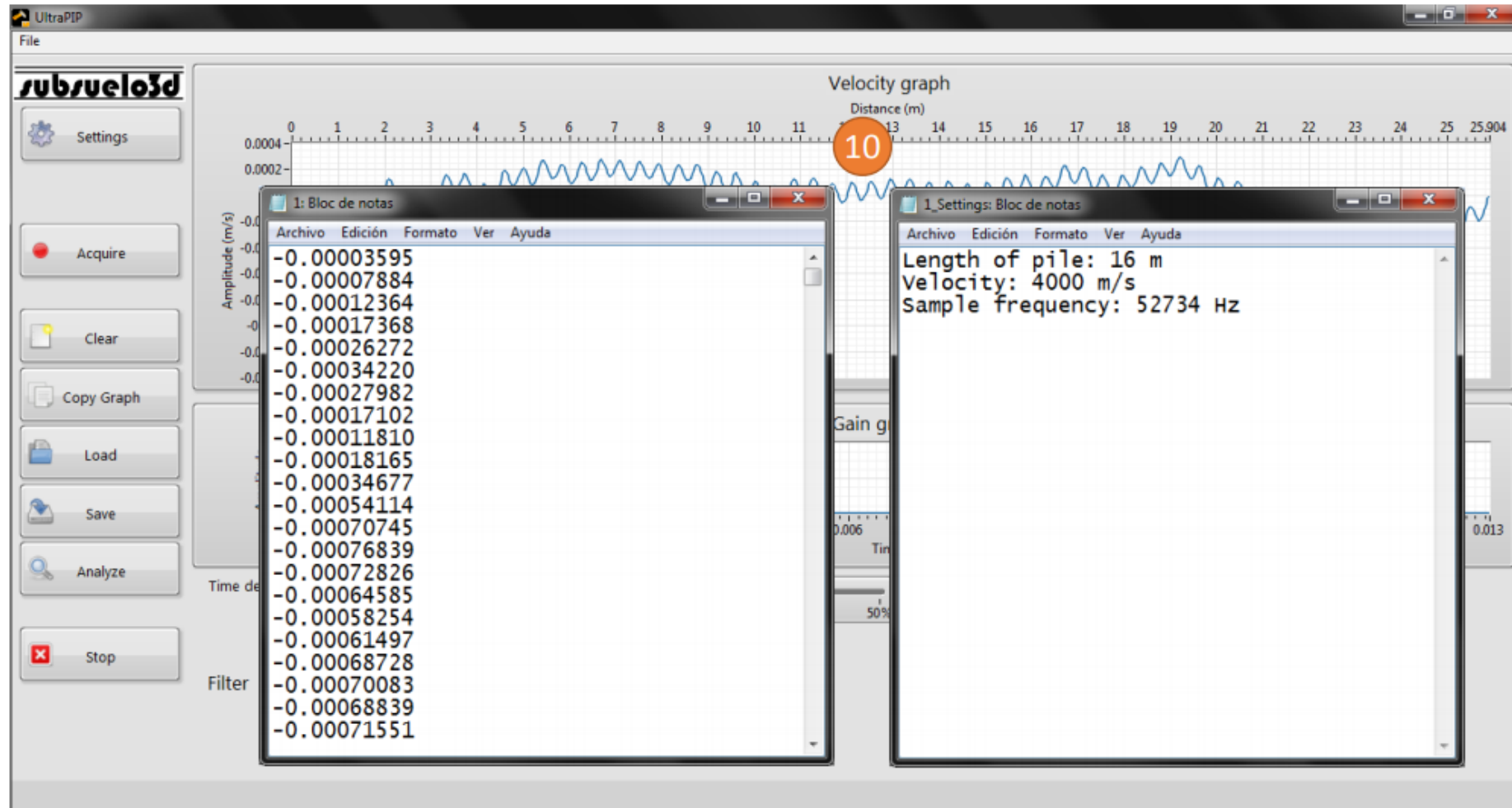
11. With the “Save” button you can save the displayed speed profile in a plain text file. It is recommended to disable filters and gain, in order to use the raw data in processing.



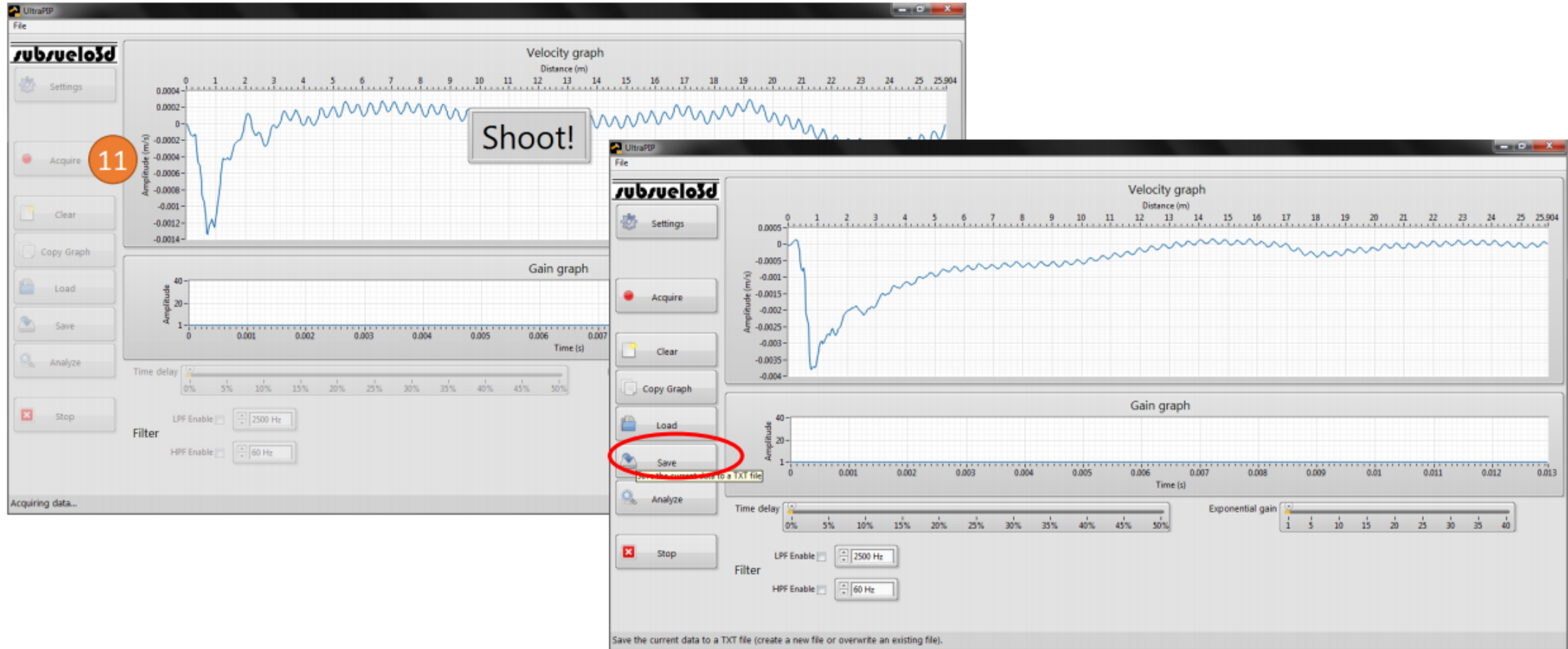
12. A window will appear in which you must select the destination folder and file name. It is suggested to name the folder with the pile number or code and assign the hit number to the file (1, 2, 3,...).



13. Two files will be saved: <name> .txt and <name> _Settings.txt. The first contains the data of the acquired trace and the second contains the used settings for length and speed (In the example <name> it is "1").



14. After saving the stroke trace, press “Acquire” again to acquire a new trace, store the data and continue until the end of the tests programmed in the project.



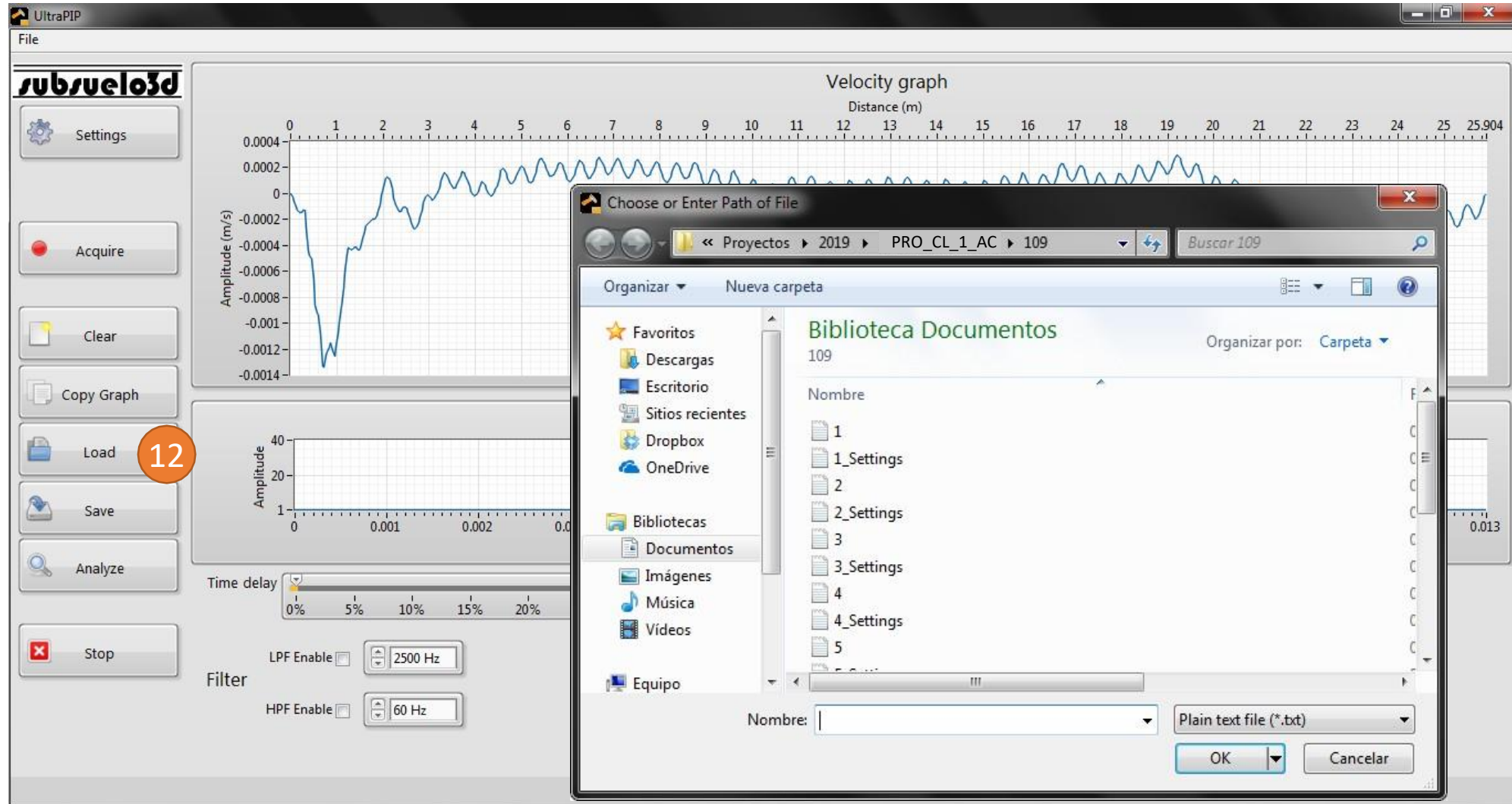
15. Remember that if you selected the “Average” option in the configuration, each new shot you acquire will be averaged with the previous ones. In this case, when you press “Save” the average will be saved.

The image displays two screenshots of the UltraPIP software interface. The left screenshot shows the 'Acquire' button circled in orange with the number '11'. The right screenshot shows the 'Save' button circled in red. Both screenshots display 'Velocity graph' and 'Gain graph' plots.

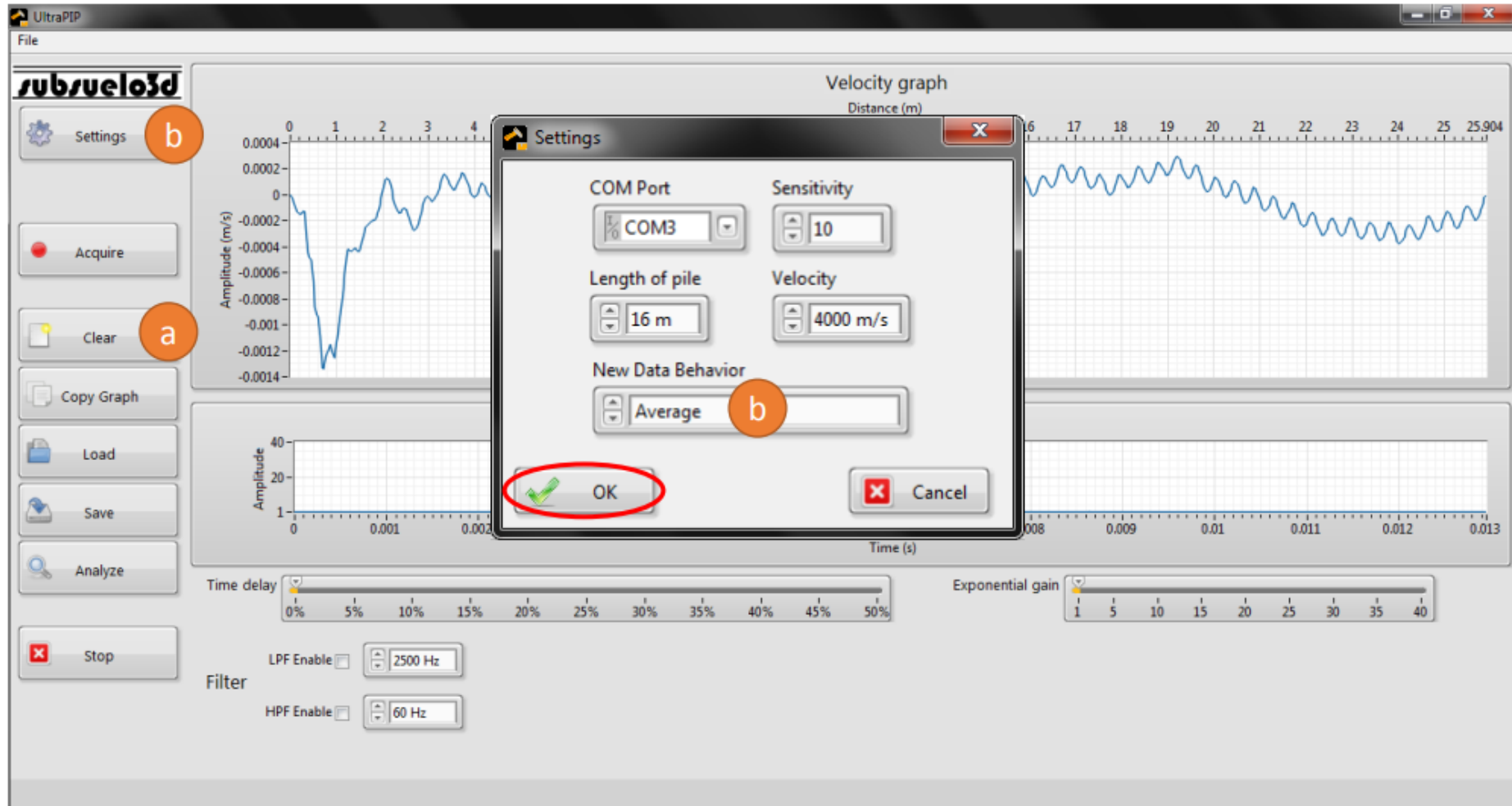
Left Screenshot: The 'Acquire' button is circled in orange with the number '11'. The 'Velocity graph' shows Amplitude (m/s) vs Distance (m) with a 'Shoot!' label. The 'Gain graph' shows Amplitude vs Time (s). The 'Save' button is not highlighted.

Right Screenshot: The 'Save' button is circled in red. The 'Velocity graph' shows Amplitude (m/s) vs Distance (m). The 'Gain graph' shows Amplitude vs Time (s). The 'Save' button is highlighted.

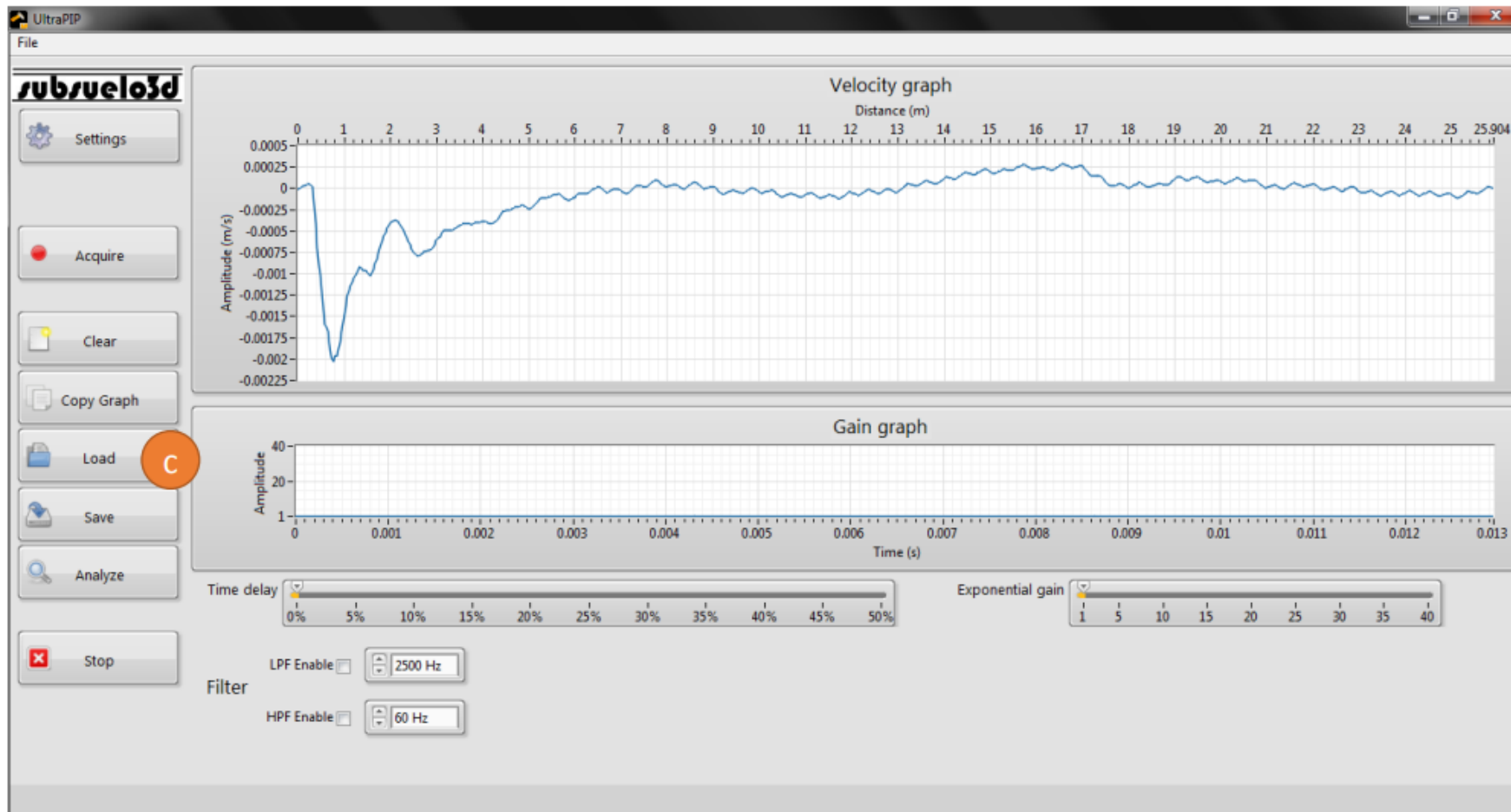
16. With the “Load” button a saved trace can be opened. In the configuration (“Settings” button), first select the length and speed with which the trace was acquired, to correctly adjust the time and distance scales.



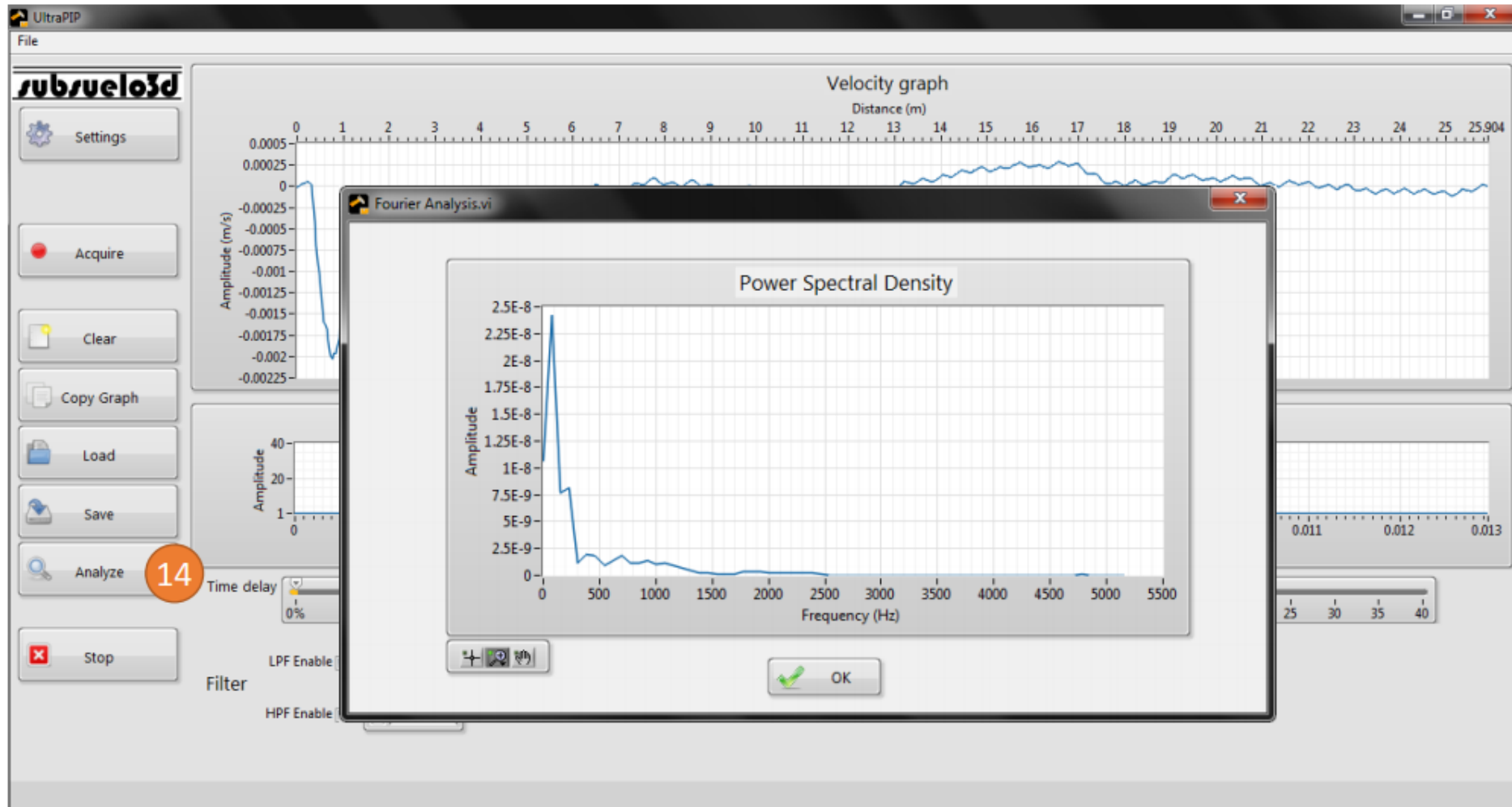
17.If you want to process the data using the UltraPIP software, you can start by pressing “Clear” (a) and then configure (b) the acquisition in “Average” mode to average all or some of the acquired traces for a pile.



18. Now load (c) the selected traces one by one, such that they are all averaged. Note that in the example the signal improves over that of a single hit.



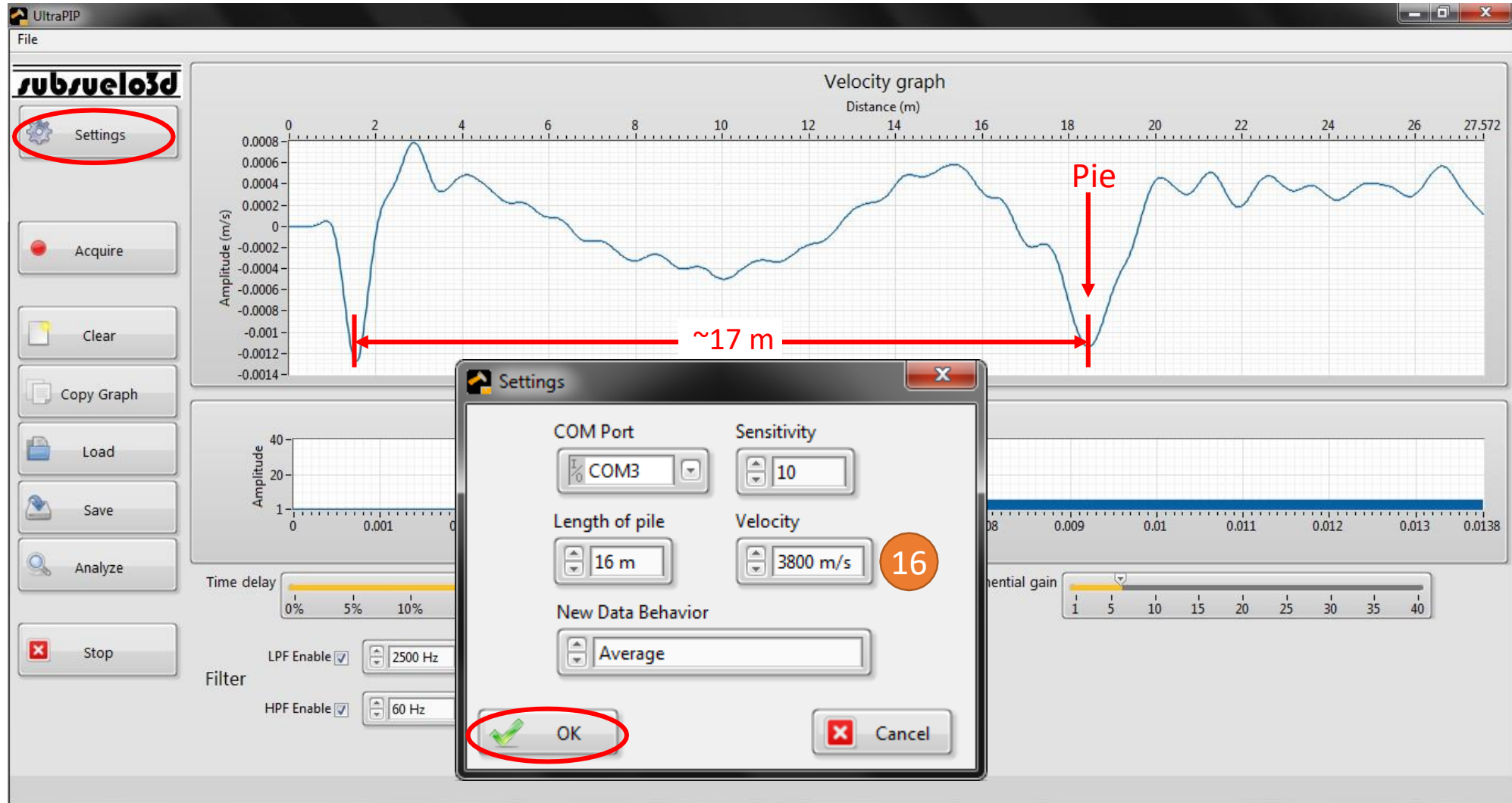
19. Use the “Analyze” button to view the spectrum of the signal. This can be useful for selecting filters (although there are more considerations for this task, according to the technical documentation regarding the method).



20. Apply the appropriate gains and filters for the pile and the signal, in order to observe the reflection of the foot and the possible anomalies. You can also save this processed data in a text file with the "Save" button.



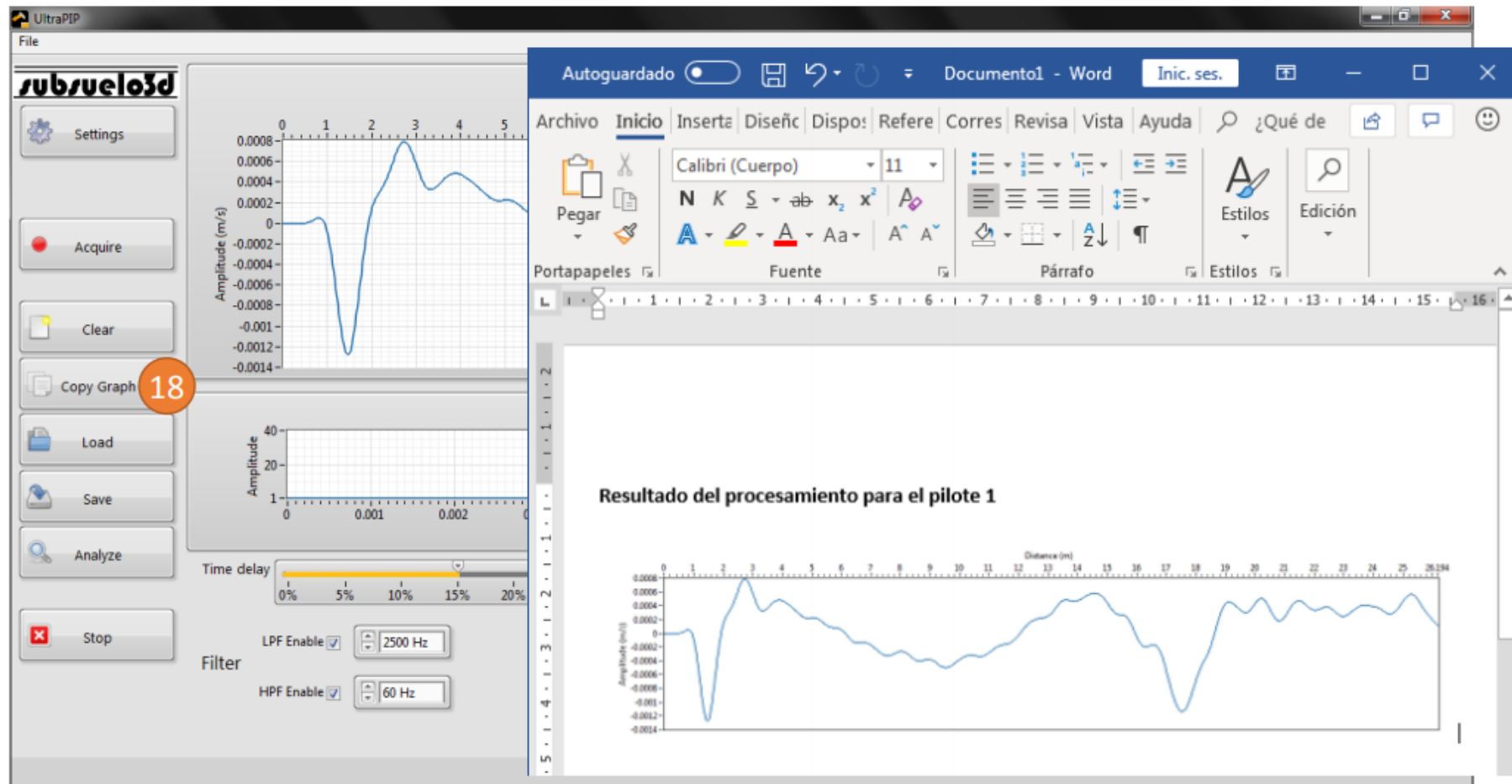
21.En The example estimates a distance of 17 m between the initial reflection and that of the foot, but the expected length of the pile is 16 m. The speed can then be reduced to adjust the scale and locate the foot at that length.



22. Now the reflection of the foot is in the correct position. This is used to determine if the pile has the planned length or not, in addition to corroborating the velocity corresponding to the concrete.

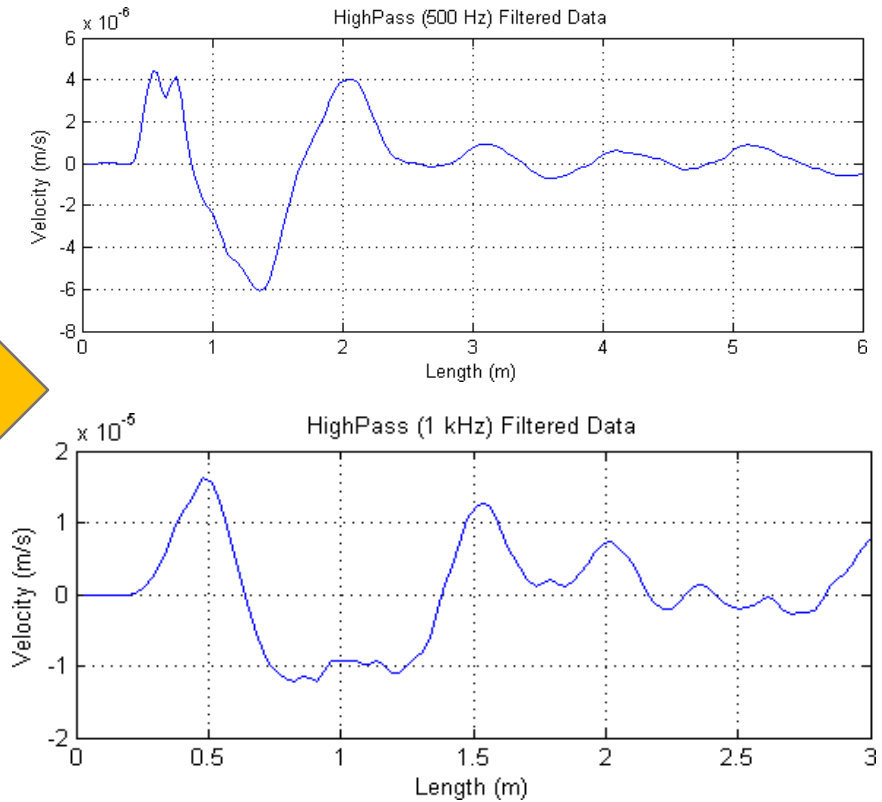
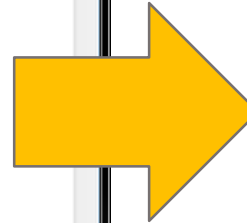
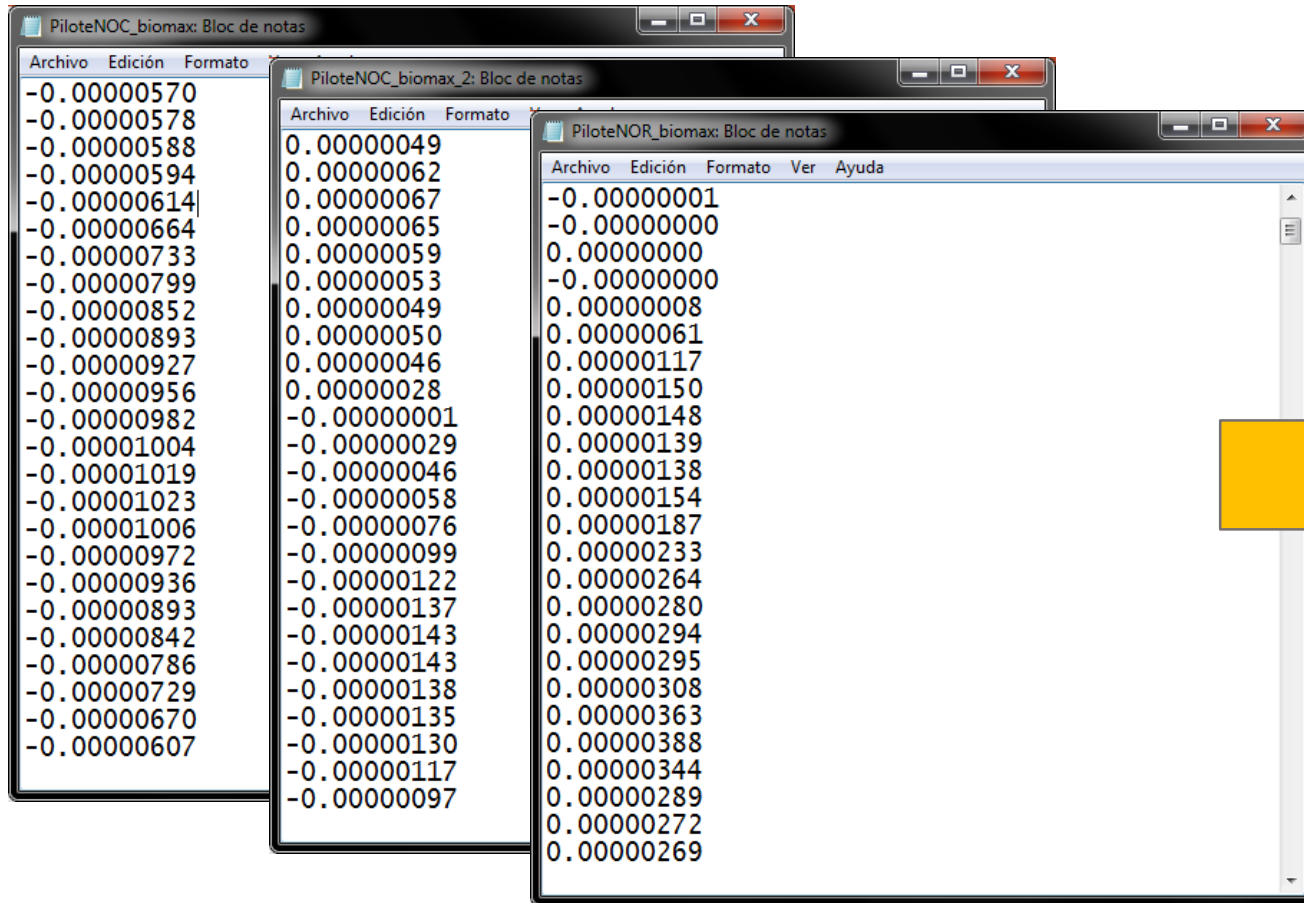


23. With the “Copy Graph” button you can copy the graph of the speed profile to the clipboard to paste it later in another application, such as a text editor.



Test file management

Once the pile integrity test is complete, the files stored in the selected folder can be verified. You can copy the data to Excel, Matlab or any program that allows you to apply gains, digital filters and other tools to analyze and interpret the results, in case the UltraPIP software tools were not sufficient to obtain conclusions in the field.



Equipment disconnection at the end of a test

1. Press the "Stop" button located at the bottom left of the graphical interface and close the program window.
2. Disconnect the USB cable from the computer and the console
3. Disconnect the coaxial cable and disconnect the accelerometer from the cable
4. Store all items properly to avoid damage

Warranty

The UltraPIP has a one (1) year warranty from the date of delivery. This warranty includes damage to the central unit or its accessories due to manufacturing or assembly defects in its internal or external components.

The warranty does not cover damage caused by prolonged exposure of the console to rain, nor damage caused to any of the components that make up the equipment due to improper operation, inexperience, accident, abuse, intentional acts of third parties, force majeure situations such as flood or fire and in general causes beyond the normal operation and use of the equipment. The warranty does not cover damage caused by the natural wear of the parts or by accelerated wear caused by the lack of cleaning and maintenance of the equipment.

Neither will the repair of damage caused when the equipment is intervened by personnel not authorized by the supplier, or in the event that parts are added or changes or alterations are made to the components that make up the equipment.

The warranty will be invalid if the central unit security seals are tampered with or destroyed.

UltraPIP

www.andesimaging.com

