INNOVATIVE MONITORING EQUIPMENT FOR PROFESSIONALS

Manual PROFOUND PDA-USB Conditioner
Part II – Working with the PDA/DLT system

Version 2.20

March 2020

Profound BV
Mozartlaan 46-A
NL-2742 BN Waddinxveen
The Netherlands

ISO 9001:2015 certified
Tel. +31 (0)182 640 964
info@profound.nl
www.profound.nl

VAT number NL806166800B01
IBAN NL79 RABO 0116 9166 13
BIC RABONL2U
Chamber of Commerce Rotterdam 27242091

With the supplied Profound software and Manual Part I you have to install the necessary software and drivers before starting to work with the Profound PDA-USB conditioner.

The following steps are described in more detail below to get familiar with the Profound PDA/DLT software and the Profound PDA-USB conditioner system:

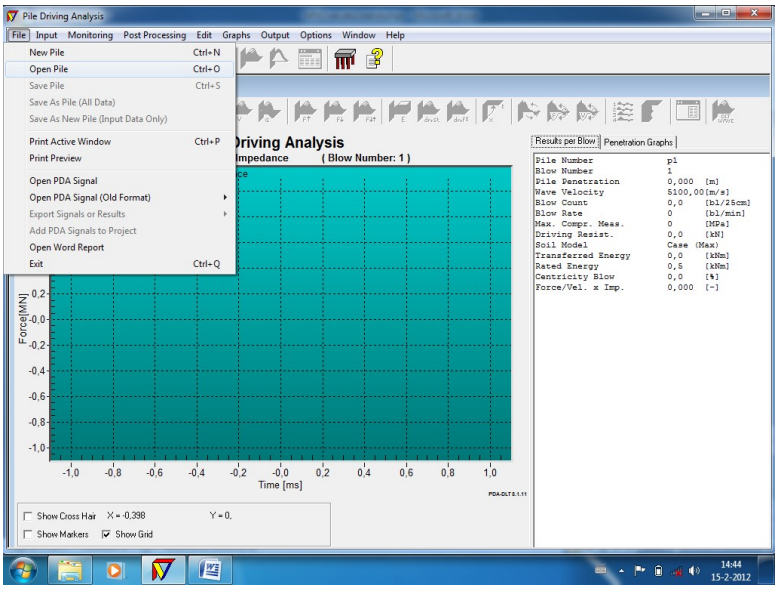
A) Viewing the Demo File
B) Accessing Help
C) Giving in the relevant parameters and starting a measurement

Minimal system requirements for the PC or laptop used to work with the PDA-USB conditioner:

1) Windows Operating System: WIN10/WIN8/WIN7
2) 3 available USB ports
3) Minimum vertical display resolution 768 pixels

A) Viewing the Demo File

Together with the PDA/DLT software, a PDA demo file has also been installed. You can open this demofile by choosing *Open Pile* in the *File* menu:



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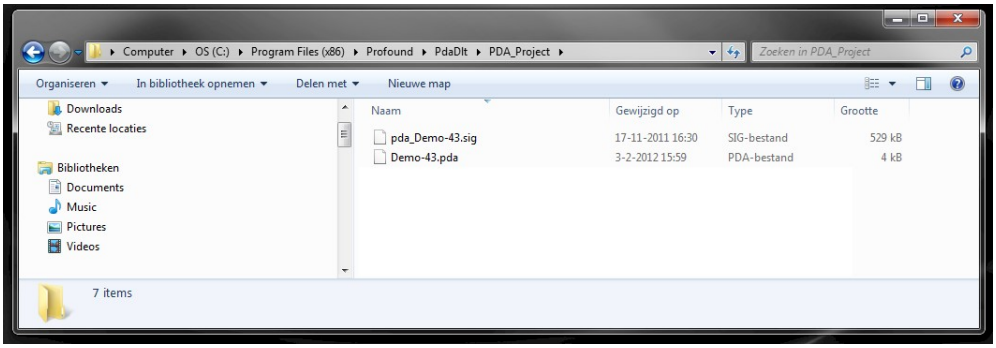
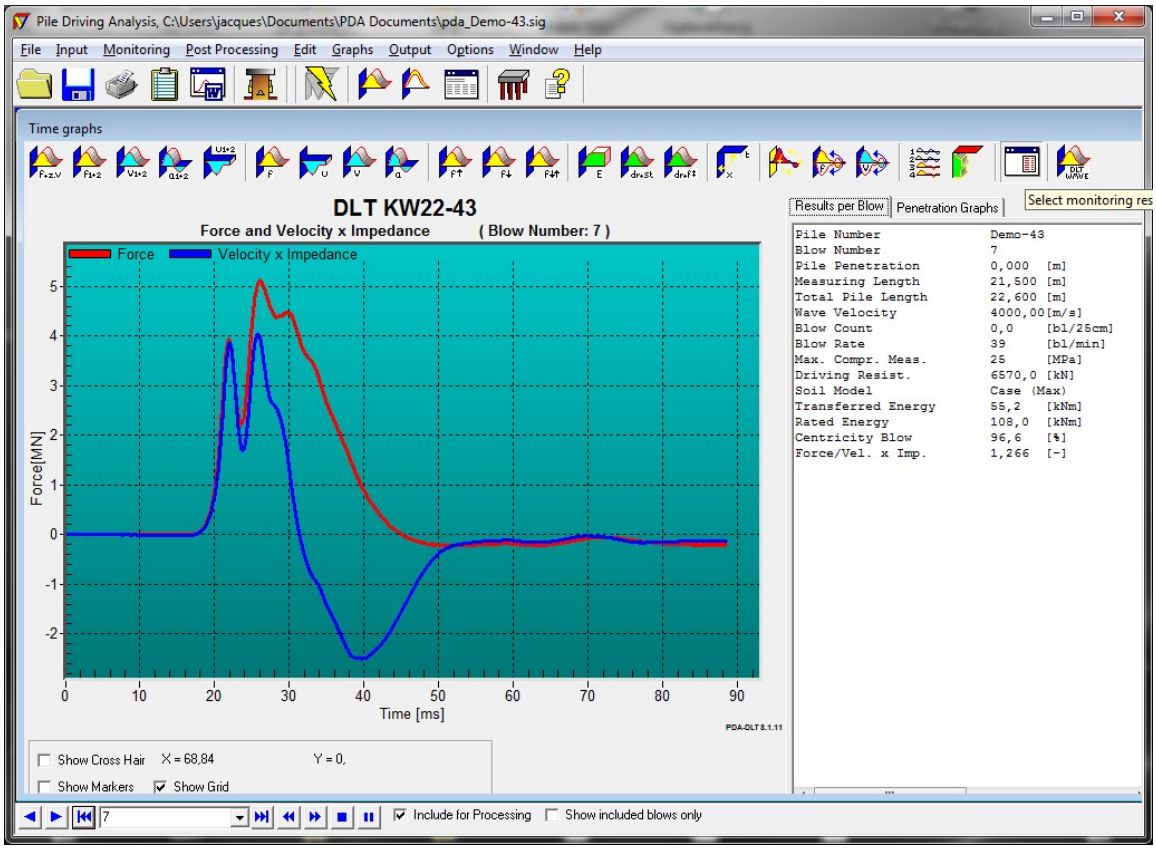
Followed by opening ➡ Program Files (x86) ➡ Profound ➡ PdaDlt ➡ PDA_Project ➡ Demo-43.pda:



The following demo file will open. Take your time to go through the different menu's and options.



B) Accessing Help

PDADLT has an extensive Help system. To view the Help system, select Help from the Help Menu or press F1

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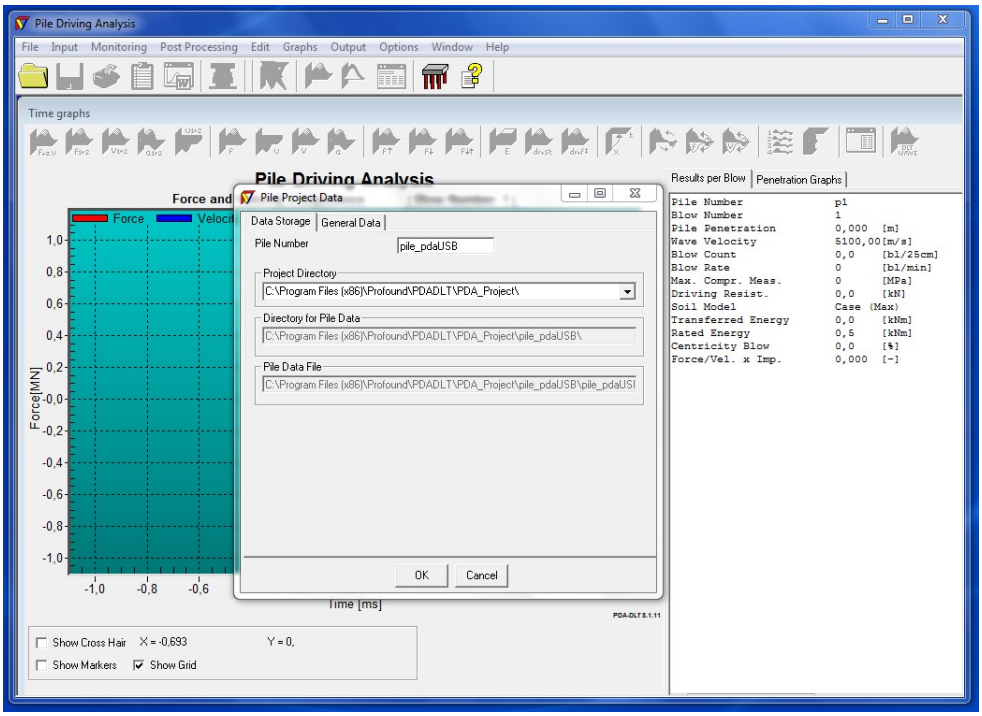
C) Starting a new PDA or DLT measurement with the Profound PDA-USB system and your PC

Before starting the measurement in the PC software, please perform the following actions:

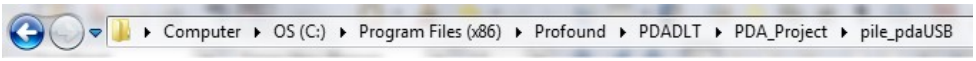
- Connect the PDA-USB conditioner with the PC (see also Manual Part I: step 10 and 11)
- Mount the sensors on the pile (see Part III - Mounting of PDA-transducers)
- Correctly connect the sensor cables to the PDA junction box
- Connect the cable reel to the conditioner

Then continue on your PC:

1. Run the Profound PDADLT Software with HASP key inserted.
2. Select *New pile* from the *File* menu. The *Pile Project Data* will be shown:



3. Insert the pile name in the tab *Data Storage* (for instance pile_pdaUSB). The program will create a directory and files for the measurement. The standard location will be: \Program Files (x86)\Profound\PDADLT\PDA_Project\



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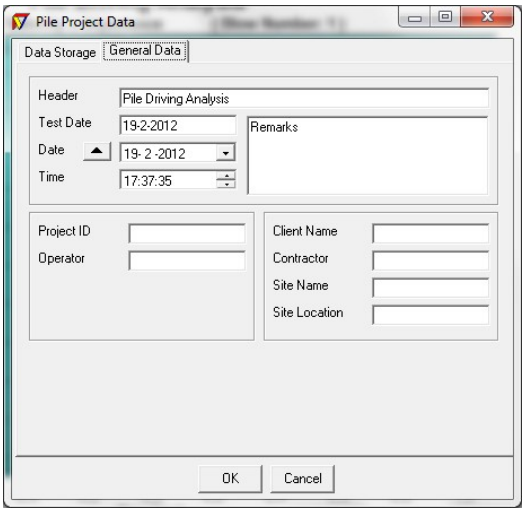
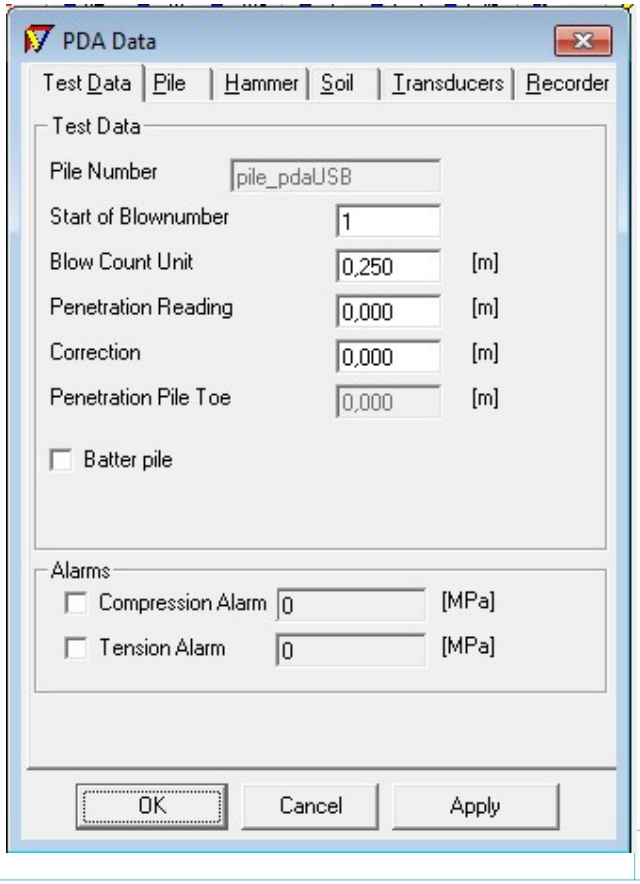
4. Select the tab *General Data* to give in additional measurement information:



Press *OK* to continue. The file name and location of the file will be shown in the caption of the window.

5. Select from the ***Input* menu** the option ***PDA Data***.
   Give in the relevant parameters below the tab***Test Data*** and choose *Apply:*
   - Start of Blow number: usually 1
   - Blow count unit: distance marking on the pile for penetration recording (only for PDA)
   - Penetration reading: Pile penetration at the first blow



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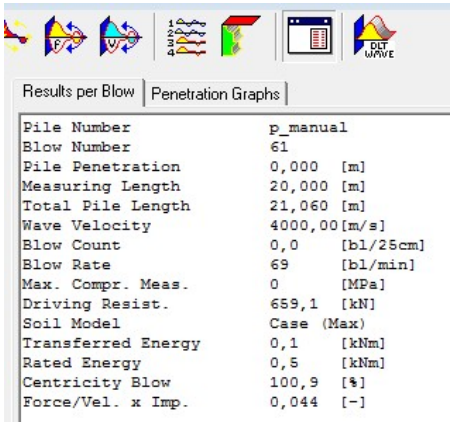
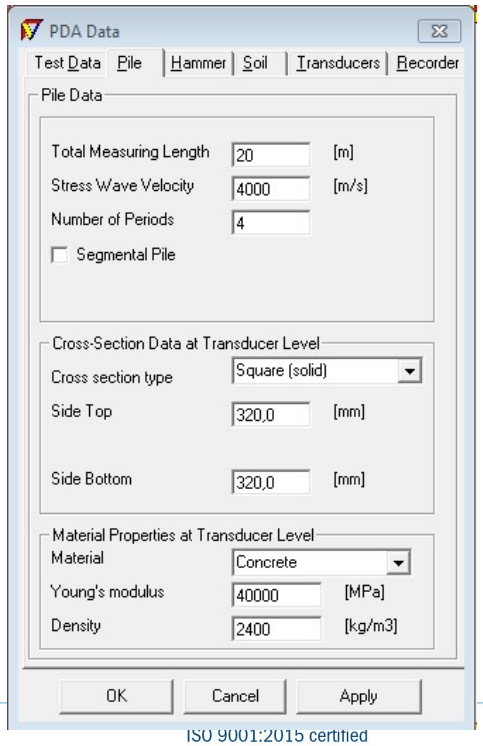
6. Give in the relevant parameters below the next tab ***Pile*** and choose *Apply:*
   - Total Measuring Length: the total measuring length in the menu "PDA data" is the total length from the position where the sensors are mounted up to the pile toe.
     Below the tab Transducers you need to enter the distance from the pile top up to the position where the sensors are mounted. The summation of these two parameters is the pile length. In short:
     Total pile length = measuring length + distance from top
     The total pile length can be made visible in the mrf-setting:



   - Stress wave velocity: see pile material parameters below
   - Number of periods: starting value is 4
   - Cross Section data: a calculation help for the cross section of the pile
   - Pile material parameters. With unknown parameters a guideline is:
     - for concrete is 39200 MPa. Density 2450 kg/m^3 (Stress wave velocity 4000 m/s)
     - for steel 206000 MPa. Density 7850 kg/m^3 and Stress wave velocity 5123 m/s (in accordance with ASTM D 4945 – 08)



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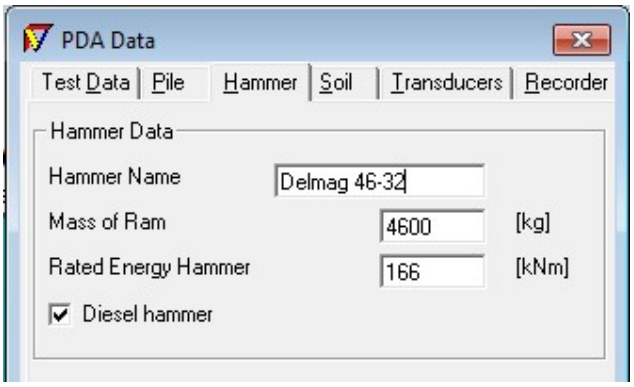
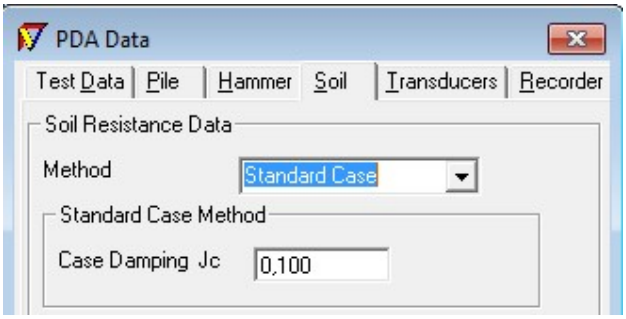
7. Give in the relevant parameters below the next tab ***Hammer*** and choose *Apply.* This tab is more relevant for PDA measurement, because the efficiency of the driving process can be analysed.

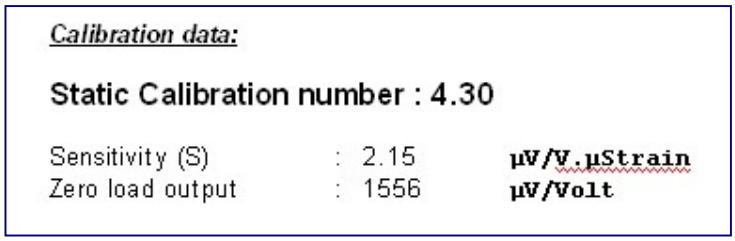


Please note: use the correct setting for the check box Diesel hammer, as the signal processing of the measurement is different for diesel hammers.

8. Give in the relevant parameters below the next tab ***Soil*** and choose *Apply.* Select the calculation method for the soil resistance. This gives a rough estimate for the static soil resistance. Common practice is to use the Standard Case method. Enter the Case Damping value for the toe soil type. In the online help you can find more information including case values.



9. Give in the relevant parameters below the next tab ***Transducers*** and choose *Apply.*
   - Enter all the sensitivities and serial numbers of all the sensors. The specific data is provided on the supplied calibration sheets.
     Please note: for the strain sensor the calibration factor is the Static Calibration Number from the calibration sheet!



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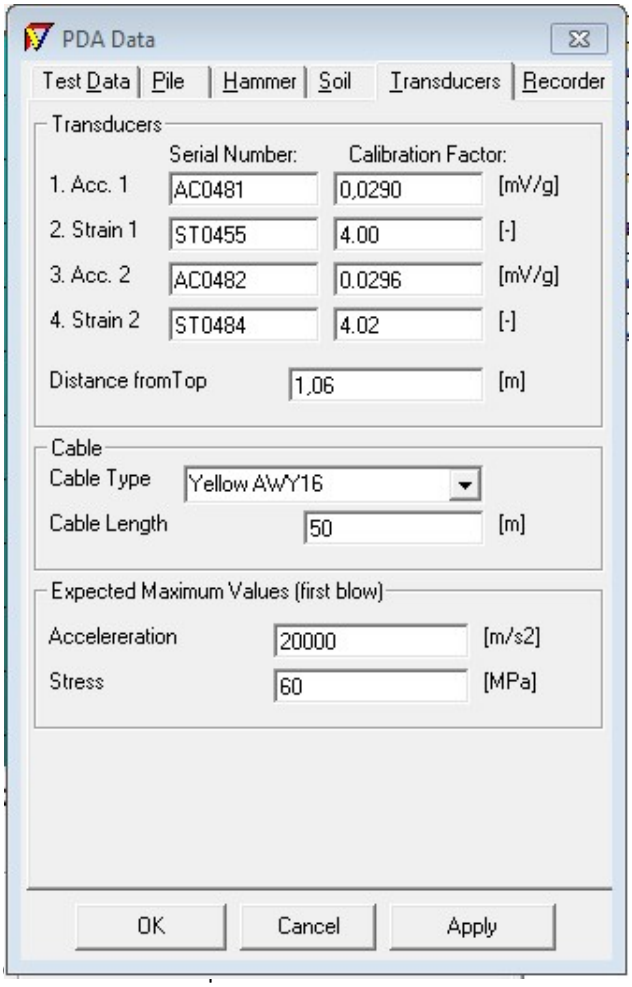
- Enter the measured distance from the pile top to the sensor location. A distance of 3 times the pile diameter from the top is a good mounting position for the sensors to equalize the stress distribution over the complete pile cross section. The minimum value defined in the ASTM D 4945 – 08, is at least 1.5 times the pile width.
- Enter the cable length of the cable reel. The standard cable is Yellow AWY16. These input values will be used to compensate for the influence on the sensitivity caused by the cable resistance.
- The data given in the *Expected Maximum Value (first blow)* are used to calculate the first gain settings. The acceleration and stress values depend on the material properties of the pile and are directly related to the data given under the tab *Pile* in this PDA Data menu. Make sure to give in the correct data.



You are now ready to start measuring with the Profound PDA/DLT-USB system

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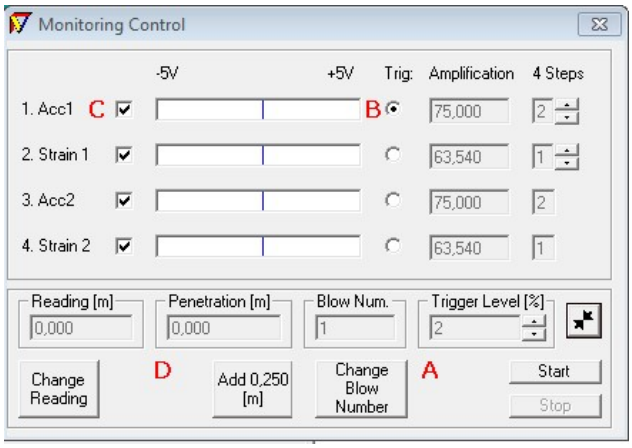
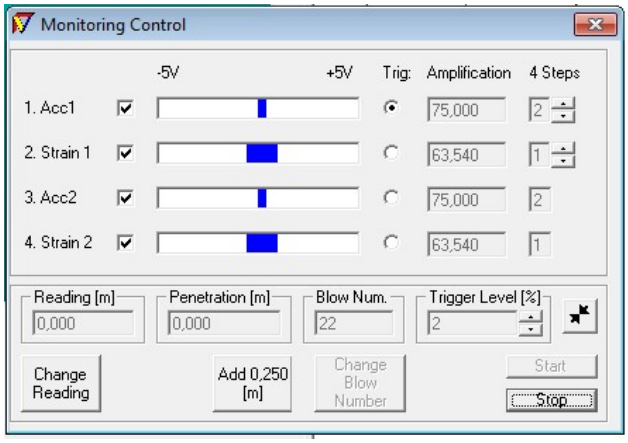
10. Go to the *Monitoring* menu and select *Start Monitoring.* The ***Monitoring Control*** dialog that appears, has to be used for:
    A. Adjusting the trigger level. Advised is to reduce the trigger level to 2% with the above advised gain settings and *4 Steps* setting 2 and 1 as shown below.
    B. Selecting the trigger channel. Default is acceleration channel 1. If a sensor fails, always change the trigger channel to a working sensor.
    C. Deactivating non-working sensors. If a sensor is not properly functioning, turn it off by deselecting the box. Thus this sensor will not further disturb the PDA signal processing during the measurement.
    D. Input of the pile penetration. The *Add 0.250 [m]* button (= blow count unit) must be pressed for each penetration interval (only relevant for PDA-testing).



Press <Start> in the dialog and the measurement will start. The PDA system is now waiting for a trigger.

11. After the first trigger the monitoring control dialog will display the signal amplitude for the sensors connected. The dialog below shows a good example of level control with no need to increase the amplification. The optimum signal amplitude is 20% of the total amplitude. During pile driving the magnitude for both acceleration and strain will usually further increase. The signal quality will not improve by increasing the gain.
    In addition, the value 2 and 1 below the *'4 steps'* are good starting values.



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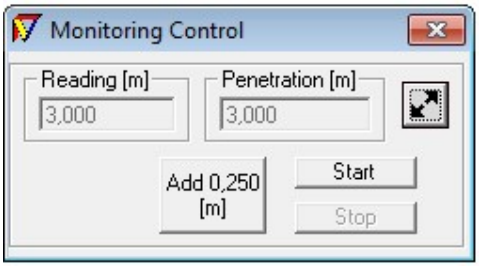
The PDA software will provide information dialogs to increase or decrease the amplification settings. The amplification settings can be changed with the spin buttons. Gain switching should be kept to a minimum except when an overload occurs.

Please note: In case you would like to check the functioning of the system, use a small hammer to give a soft blow on one of the acceleration sensors.

The monitoring dialog can be decreased in size for convenience:



Congratulations, you have successfully started a PDA/DLT.
Consult for additional info the Online Help

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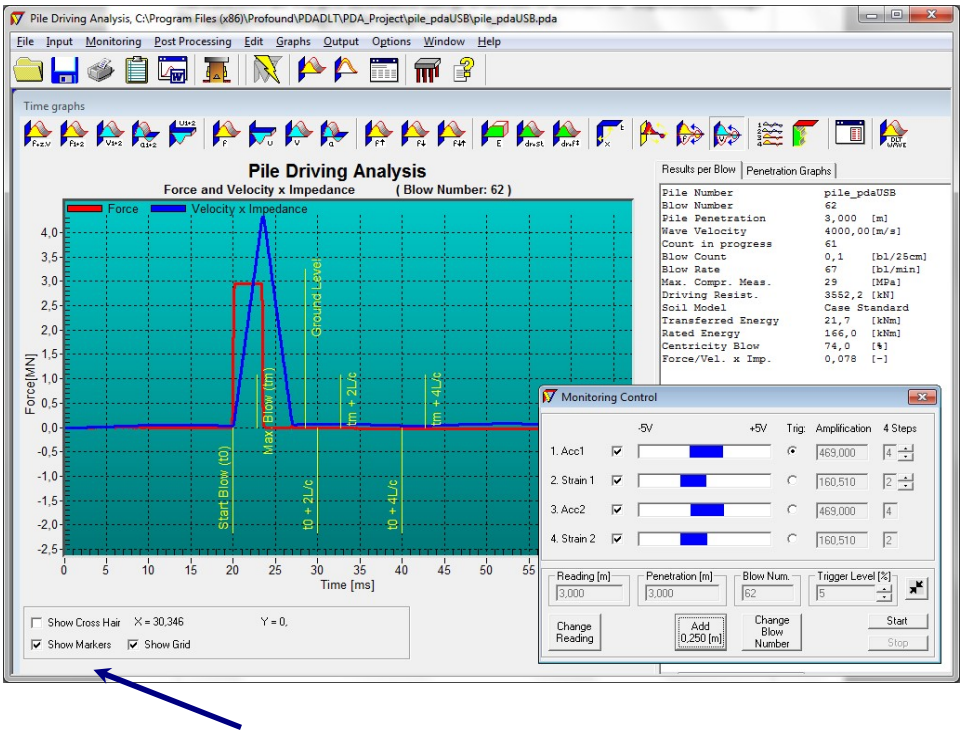
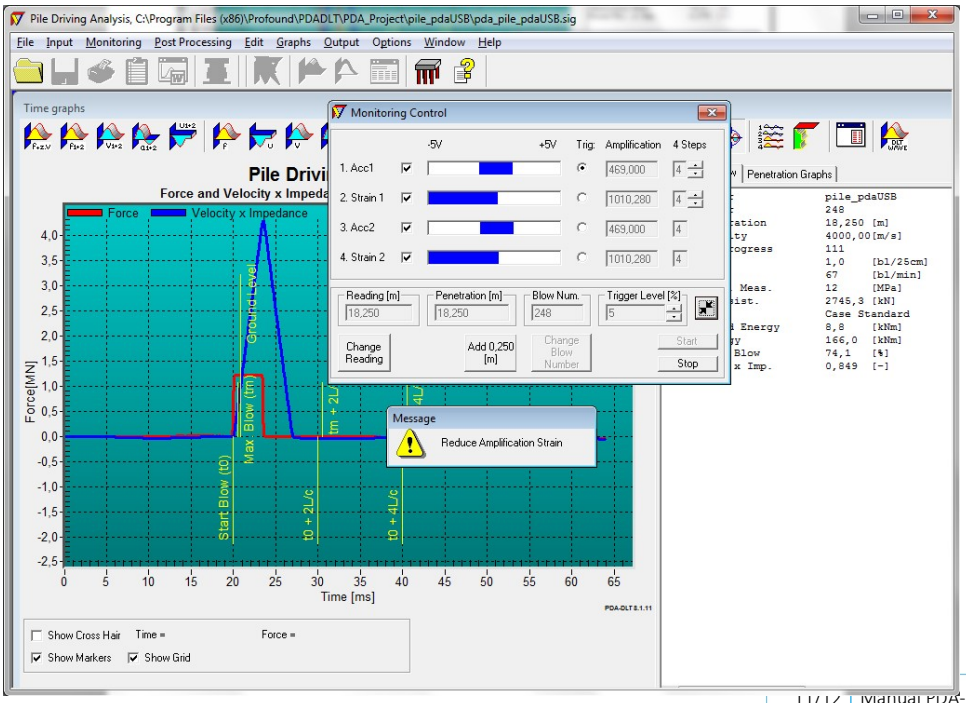
PDA example

An example with a simulated PDA signal is displayed below.



The check box *Show Markers* show additional information in the graph

Shown below is also the dialog message box notifying to reduce the gain of the strain amplifiers. The blue bars show the overload at -5 Volt:



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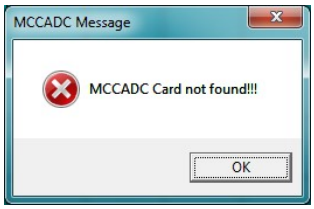
Appendix 1: Trouble shooting

Error message 'MCCADC Card not found'

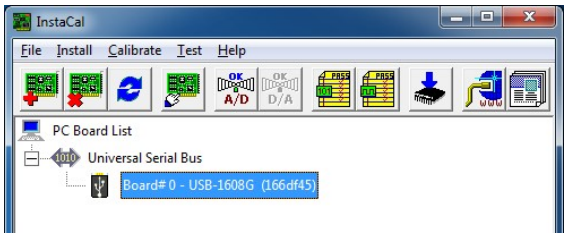
If you start measuring with the PDA/DLT PC software and the PDA-USB conditioner connected and this message pops up, the specific PDA-USB conditioner is not found.



Please do the following:

1. Close the PDA/DLT PC software
2. Run the InstaCal™ program. Click on Start ➢ All programs ➢ Measurement Computing ➢ InstaCal.
3. The detection window below always needs to appear. Click 'OK'.

4. In the window 'Board Selection List' select USB. Verify that the field 'Board Number' states value 0. In case the PDA-USB conditioner is not detected, press the refresh button.



5. Close the InstaCal software.
6. Run the PDA/DLT software and try again.

PDA-DLT License error

If your program does not run because of license errors, please check the following:

- Has the HASP driver been properly installed (without the HASP key inserted)?
- Insert the HASP key in an USB port before running the PDA/DLT program

PDA/DLT software does not respond to the instrumentation anymore

- Check the lights on the box
- Check the connection of the two USB cables between conditioner and PC
- Check the power down features of your laptop. All power save options should be switched off for PDA/DLT measurements, in particular for the USB ports.

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