SmartDCP User Guide (DOC-0073)

October 2022

Rev.3.0

www.vertekcpt.com

All rights reserved. No part of this manual may be reproduced, distributed, or transmitted in any form or by any means, including photocopying, recording, or other electronic or mechanical methods, without the prior written permission of the manufacturer:
Applied Research Associates
250 Beanville Rd
Randolph, VT 05060

The SmartDCP name, and all figures and information referencing the Smart DCP in this manual are copyright Applied Research Associates. Logos present on the DCP systems from Kessler and Salem Tool are copyright their respective owners. The use of Vertek, Kessler or Salem Tool DCP systems within this manual does not constitute a preference for these systems, the requirement to purchase these systems, or an implied increase of performance with these systems.

Document Revisions

Date	Version Number	Document Changes
10/2015	1.0	Initial Draft of DOC-0073
6/2019	2.0	Added assembly drawing & updated picture
4/2022	3.0	Updated assembly drawing & updated picture, update assembly instructions
10/2022	4.0	Updated assembly drawing & Bills of material

Table of Contents

1 Welcome! 1
2 First Time Users 2
2.1 ... Verify the Smart DCP Kit Contents *2*
2.2 ... Install the Smart Device Application *3*
2.3 ... Verify Range Finder Connectivity *4*
2.4 ... Assemble the Hardware *4*
3 Field Set-up and Data Collection 6
3.1 ... Data Acquisition *6*
3.2 ... Forcing Data Collection *9*
3.3 ... Pausing a Test and Rod Changes *9*
3.4 ... Deleting Data Point / Strike *11*
4 Data Transfer 12
4.1 ... Transfer via E-mail *12*
4.2 ... Transfer via USB *13*
5 Data Visualization 13
5.1 ... In-App Data Visualization *13*
5.2 ... Exported Data Visualization *14*
6 Troubleshooting 19
7 Assembly Drawing & Bill of Materials 21

1 Welcome!

Thank you for purchasing the new Vertek SmartDCP system! This innovative new product promises to reduce the training and manpower required to collect soil behavior data, while also improving accuracy and simplifying field logistics. The system achieves this by:

- Automatically counting blows
- Recording the change in depth with each blow
- Tracking the total depth of the probe
- Recording data on Apple iOS and Android smart devices via Bluetooth
    - Removing the need for a ruler, pencil, and paper
- Transferring data via e-mail or USB from the smart device

This user guide walks you through system operation. If you have any questions beyond what is covered in this material, please visit our website at www.vertekcpt.com, or call us at 1-800-639-6315.

2 First Time Users

This section provides the steps necessary to get the SmartDCP up and running. Be sure to complete these steps prior to entering the field.

2.1 Verify the Smart DCP Kit Contents

The SmartDCP is provided in a hard bottom toolbag with a shoulder strap so a single user can carry both the DCP itself, and our SmartDCP kit.

Caution: The SmartDCP kit contains a laser range finder labeled as a class 2 laser product. Do not stare into the laser.

Verify that the kit contains:

1. Carry Bag (DCP - 0457)
2. This Manual (DOC-0073)
3. Baseplate with magnetic laser mount (DCP-0586, DCP-0596, 71592)
4. Leica Disto E7100i Laser Range Finder with batteries (36753)
5. Laser target nut and jam nut (DCP-0588, DCP-0590, 91174, 91176)
6. ABS laser target (DCP-0589, 71199, LBL-0109)
7. 1” combination (71204)
8. 1-7/8” stamped wrench set (71192)

NOTE: The SmartDCP kit does not come with a smart device. The kit is intended to work with customers own devices with the free SmartDCP application.

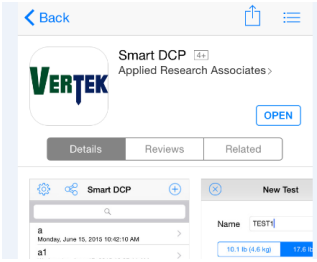
2.2 Install the Smart Device Application

The SmartDCP application is designed to work with iOS and Android devices. The application interfaces with the laser range finder via the new 'Bluetooth Smart' communication system. This technology is available on Apple iPhones beginning with the 4S, and all Samsung Galaxy phones, among many other devices. For a complete list of compatible devices please see http://www.bluetooth.com/Pages/Bluetooth-Smart-Devices-List.aspx.

The smart device application can be found on the iOS App Store or Google Play. To find it, search for "Vertek", "Smart DCP" or navigate to the instructions below to download the application. The application is free and can be installed on as many devices as the user desires.

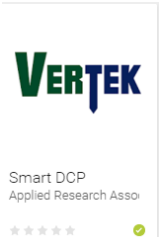
Apple iOS download Instructions: Select App Store Application

1. **Search *Vertek or Smart DCP***
2. **Select Smart DCP App and install**



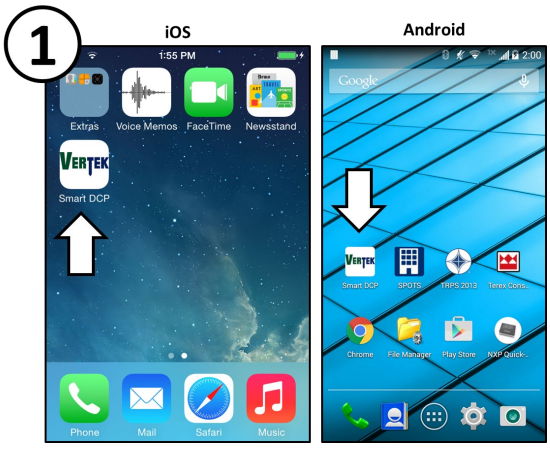
Android download link:
https://play.google.com/store/apps/details?id=com.ara.vertek.smartdcp&hl=en

1. **Select Google Play App on your Android smart device**
2. **Search *Smart DCP***
3. **Select App and install**

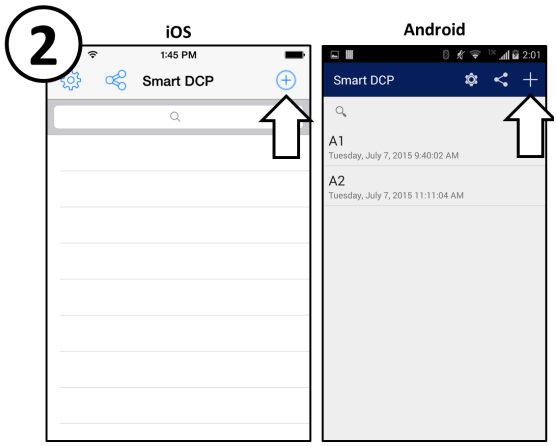


2.3 Verify Range Finder Connectivity

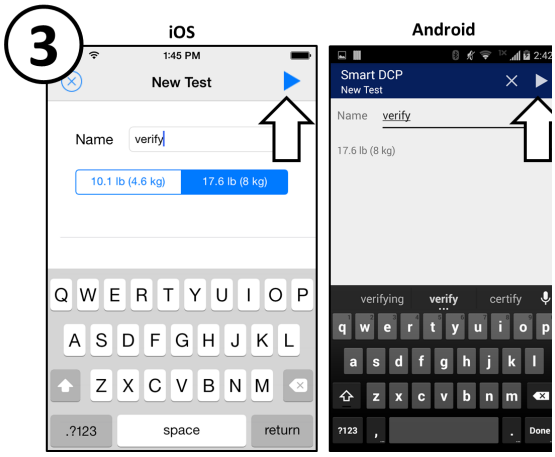
The steps shown graphically below will verify the user's smart device will interface with the laser range finder. Once verified, the system is ready for field use.



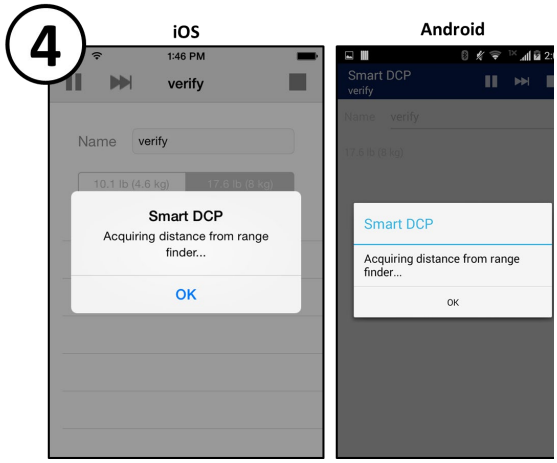
Select your newly installed SmartDCP application.



Begin a new test by selecting the '+' sign.



Give the test a name and select the 'Play' button then ensure range finder is on.



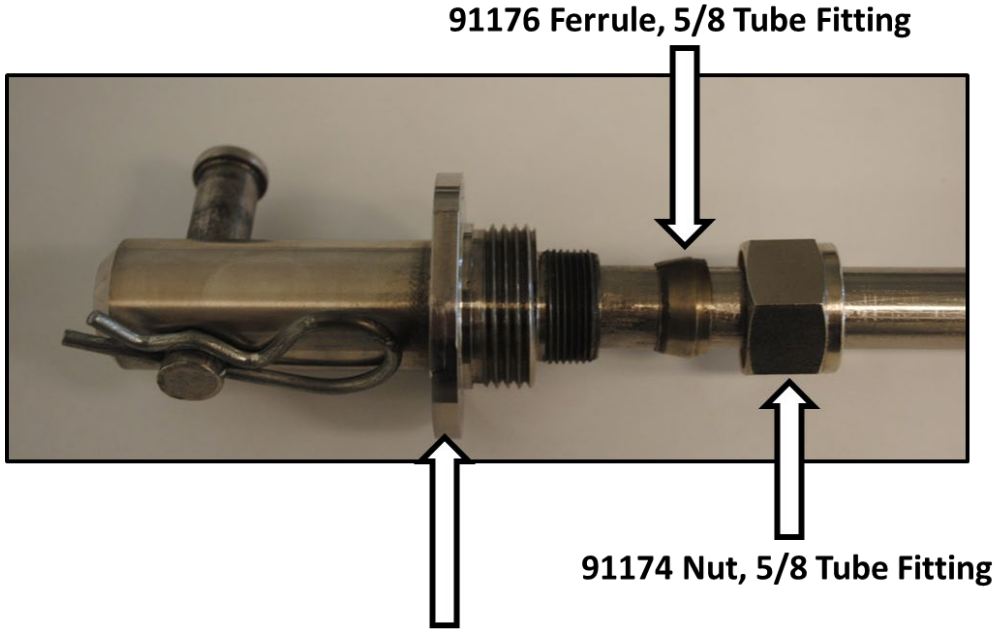
Wait for the 'Acquiring' message to disappear and verify the 3 vibrations/beeps indicating connection.

NOTE: The SmartDCP application uses vibrations and beeps to indicate various status conditions to the operator. These vibrations and beeps are tied to the volume control and vibration settings on the phone.

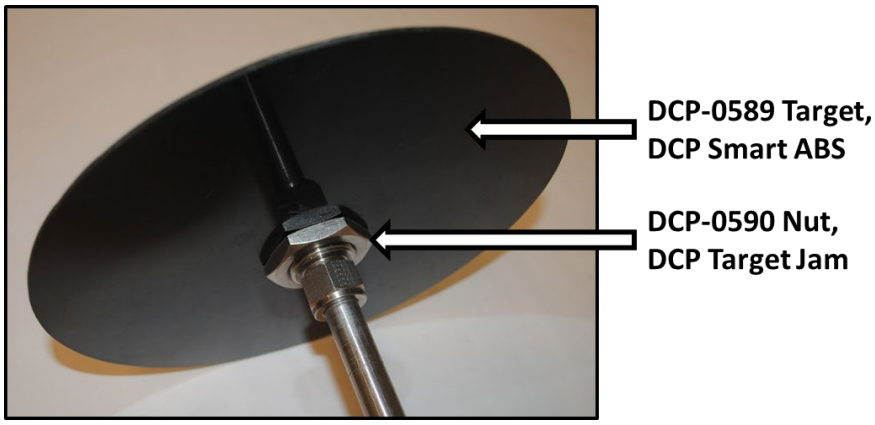
2.4 Assemble the Hardware

Assembly is minimal for the Smart DCP system. The DCP Smart Laser Base Plate (DCP-0586) and DCP Laser Mount Bracket with magnet come pre-assembled (DCP-0596, 71592)

The user must install the DCP Smart Target Bushing (DCP-0588) onto the lower shaft of the manual system by sliding the bushing; flange first, onto the shaft until the flange contacts the coupling. Then slide the 5/8in Tube Fitting Ferrule (91176) onto the shaft with the tapered end facing the bushing, followed by the 5/8in Tube Fitting Nut (91174). Using the 1.0in combination wrench provided (71204) tighten nut ensuring that bushing cannot slide on shaft. It is recommended that this bushing become a permanent attachment only to be removed when a different lower shaft is needed for testing.

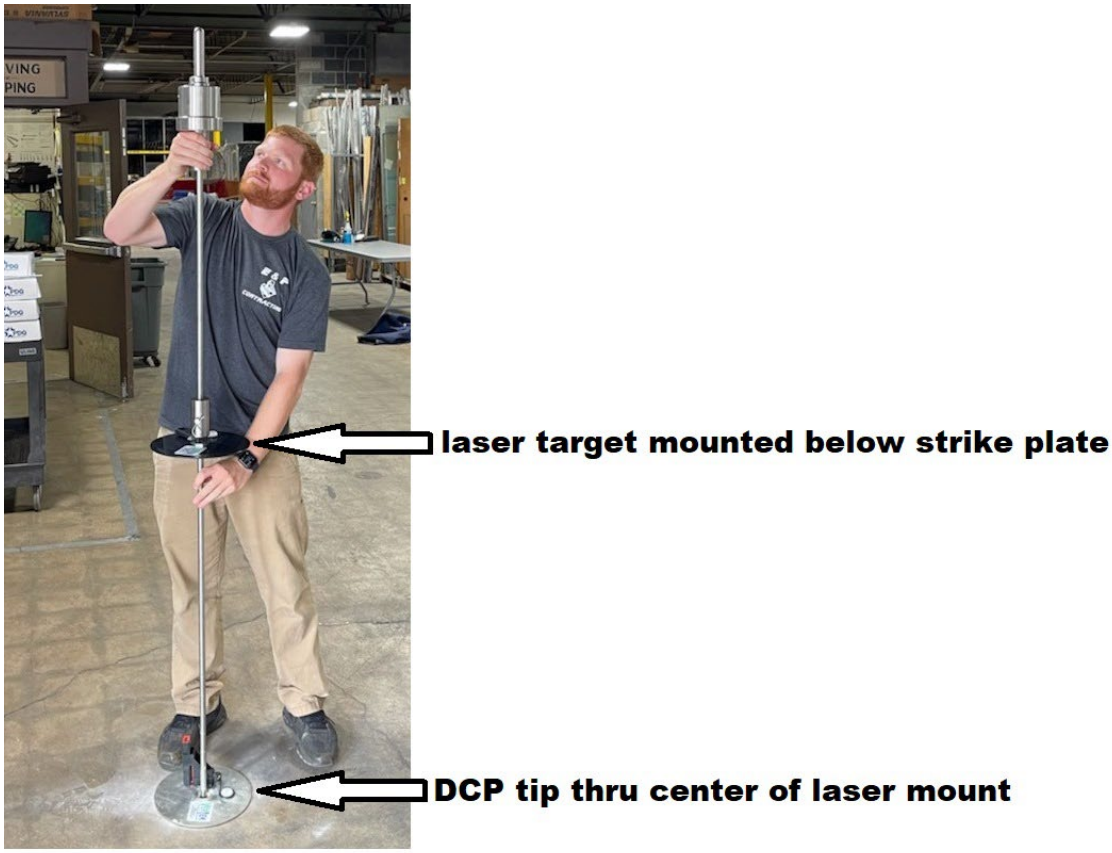


The installation of the DCP Smart ABS Target (DCP-0589) can be accomplished at the test site by sliding the target onto the bushing followed by the DCP Target Jam Nut (DCP-0590). The user can then use the two supplied 1-7/8in Stamped 7 Gauge Wrenches (71192) to ensure that the jam nut is tight enough to prevent the target from spinning on the bushing.



3 Field Set-up and Data Collection

Prior to entering the field, verify that all actions in Section 2 of this manual have been completed. The Smart DCP is designed for single operator use as indicated in the figure below:

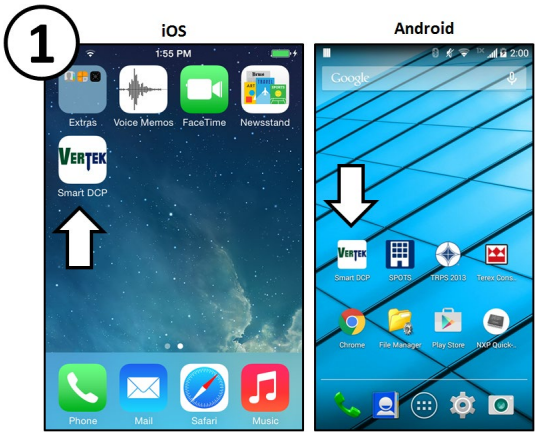


3.1 Data Acquisition

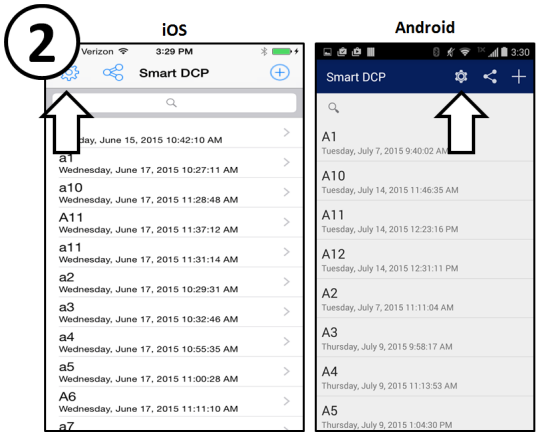
To begin data acquisition, follow these steps:

1. Install Target disc onto bushing and ensure that Tube Fitting Nut is tight. Check rod sections and cone to ensure that they are tight.
2. Place DCP Smart Laser Base Plate with DCP Laser Mount Bracket and range finder attached, on surface in desired test location.
3. Set cone on lower shaft into hole in DCP Smart Laser Base Plate, then drop weight until widest part of the cone is just below the test surface.
4. Turn range finding device on while ensuring shafts are perpendicular to test surface.
5. Begin a new test using the Smart DCP app and carry out test as described graphically below.

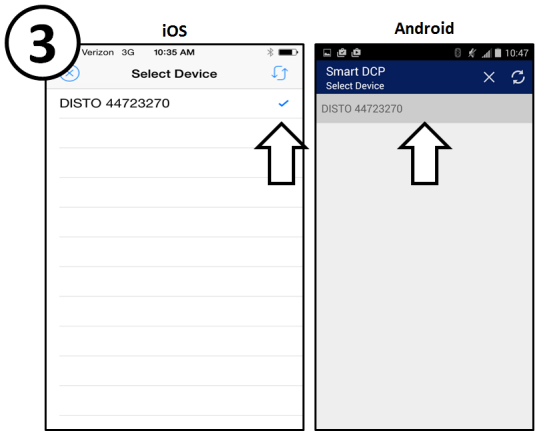
A graphical step by step set of instruction is located on the following page (6-7) for iOS and Android devices.



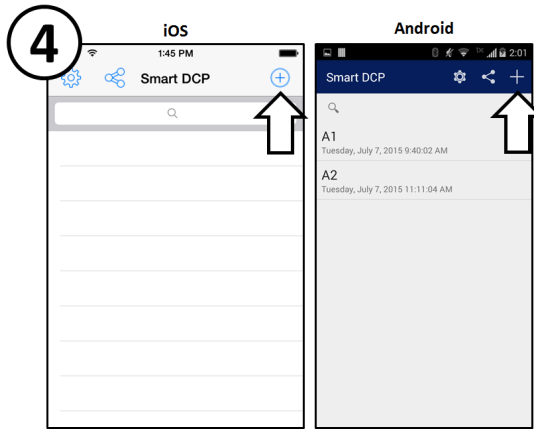
Select your newly installed SmartDCP application.



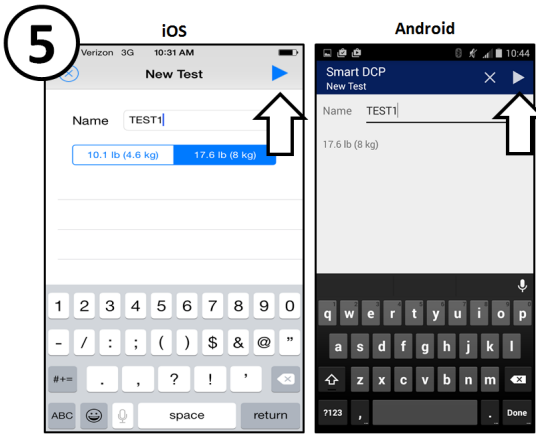
Turn on and Select the desired range finding device in the settings.



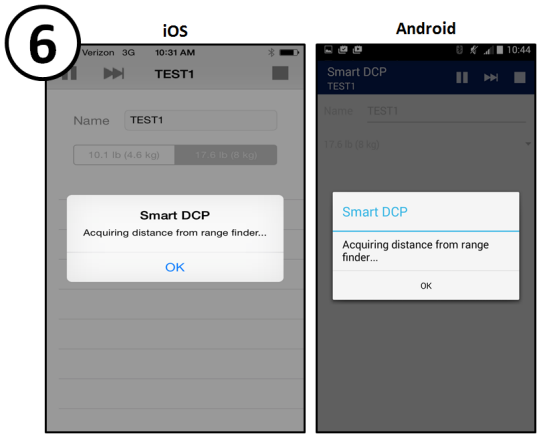
A check mark or gray highlight will appear next to or over the selected device.



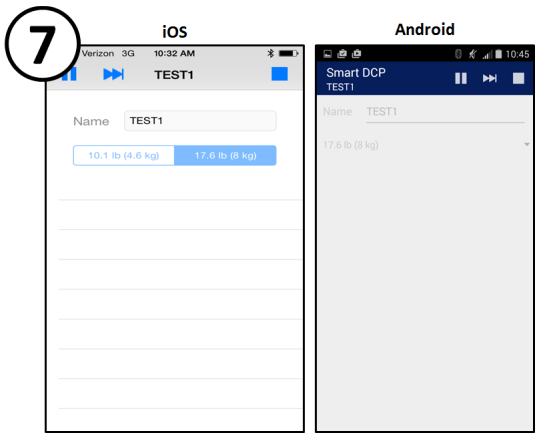
Begin a new test by selecting the '+' sign.



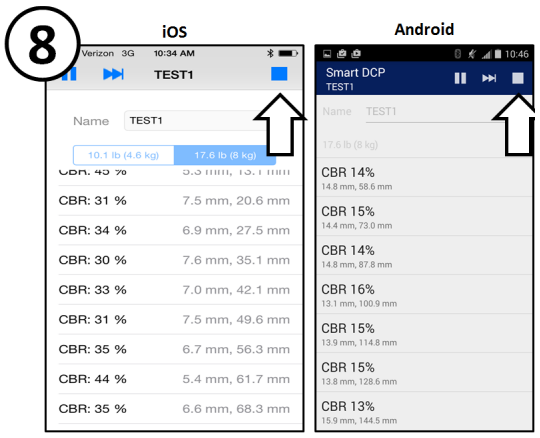
Name the test and select the 'Play' button.



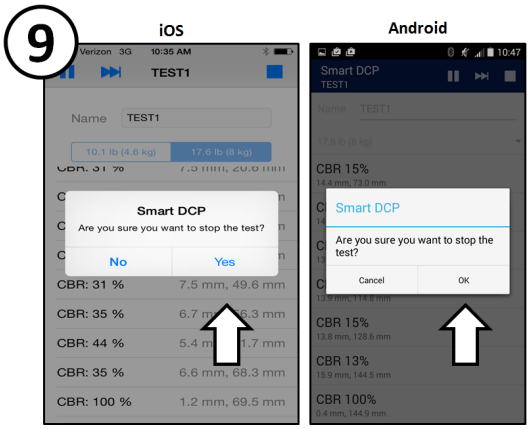
System will 'Acquire' measurement device.



When measurement device is acquired smart device will vibrate/beep 3 times and test screen will appear as shown above.



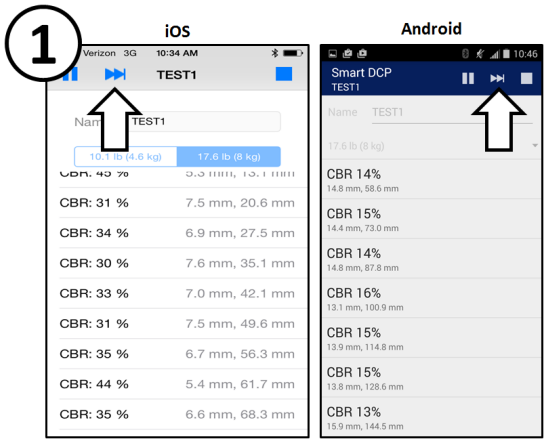
Collect data by lifting and dropping weight, smart device will vibrate/beep upon successful collection of each piece of data. The CBR percentage, penetration index and total depth will be displayed. User should wait for a successful data collection before proceeding with the next weight drop. When desired depth is met hit 'Stop' button to terminate test.



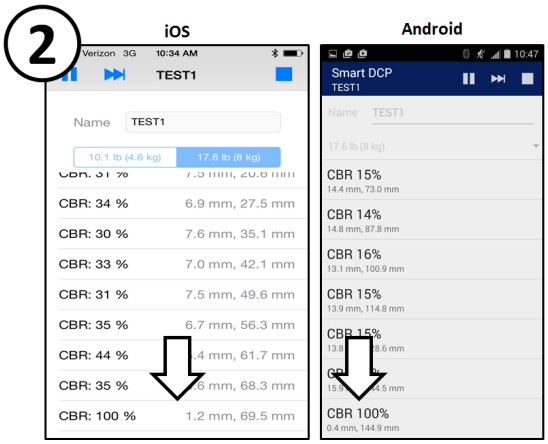
Confirm test termination by pressing the 'Yes/Ok' button. Once test is terminated the user may not return to test.

3.2 Forcing Data Collection

The SmartDCP system requires a minimum of 4mm of 'Penetration Index' or 'Delta' in order to successfully collect the data. When data is not successfully collected due to a refusal point the user is then able to 'Force' the SmartDCP system to collect a piece of data after a strike by pressing the 'Skip' button as shown graphically below.



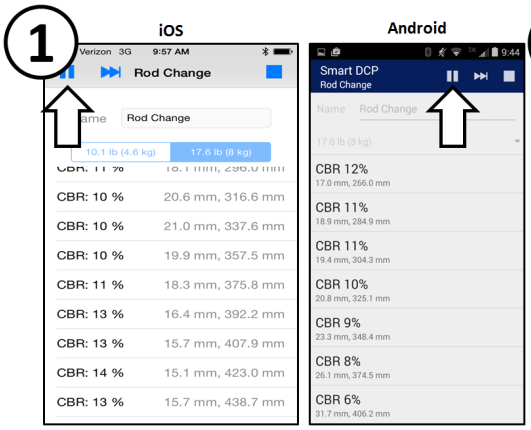
When a hammer strike results in no data collected the user can force the system to collect data by pressing the 'Skip' button.



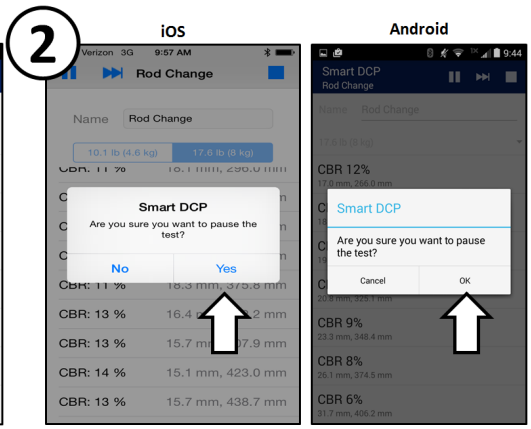
After the button is pressed the system will vibrate/beep 1 time and data will be collected that may be similar to that shown above. With a force the CBR% will range from 63% to 100% and the 'Penetration Index' or 'Delta' will range from 0 to 4mm.

3.3 Pausing a Test and Rod Changes

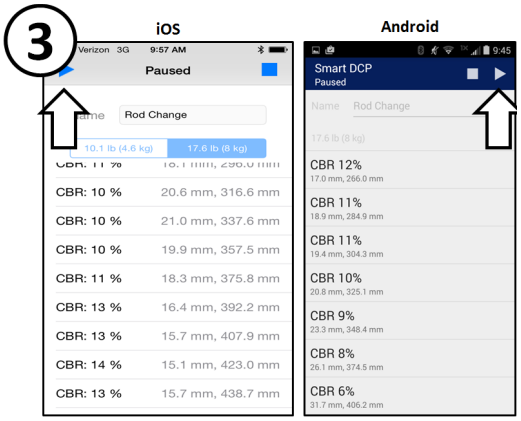
The SmartDCP system allows the user to easily pause a test to conduct other business; such as adding or removing a rod and this can be seen graphically below and page 9. When adding a rod its suggested to turn off the LRF, this action will not lose the test data.



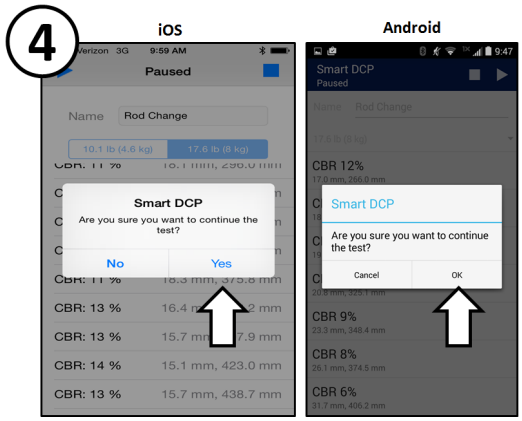
To pause the test, in this case to add a rod, press the 'Pause' button.



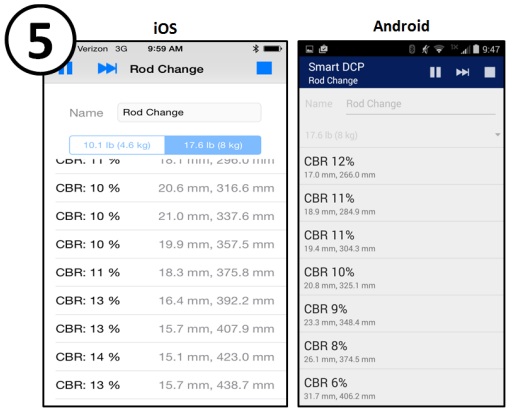
To confirm the pause press the 'Yes/Ok' button button.

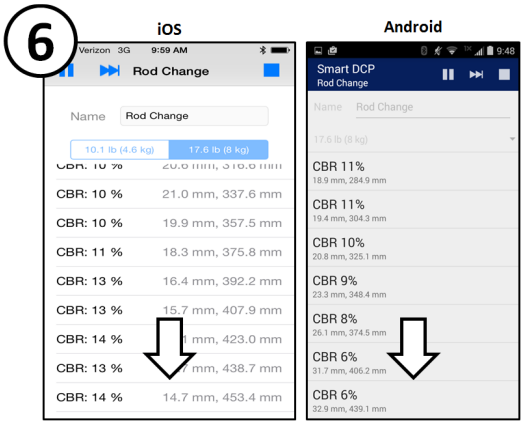


While the test is paused the user then changes the rod by removing the upper shaft with the striker. Then the user must remove the section of the lower shaft that contains the Target disc. The user then adds the rod extension, followed by re-attaching the lower shaft section with the Target disc, and finally the upper shaft with the striker. To continue the test, press the 'Play' button.



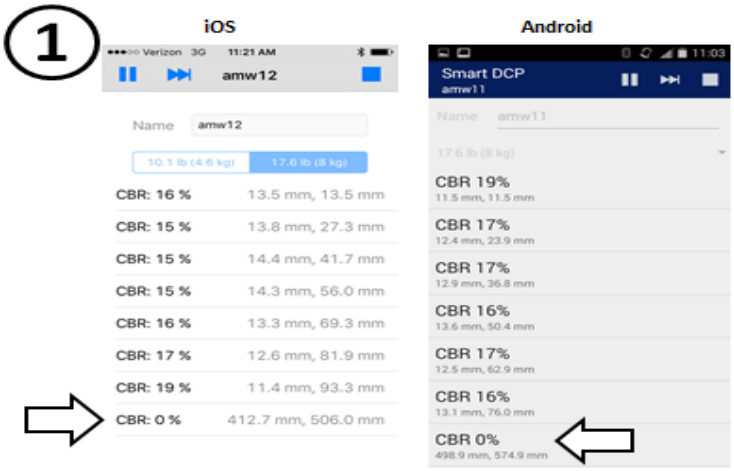
To confirm the continuation of the test press the 'Yes/Ok' button.

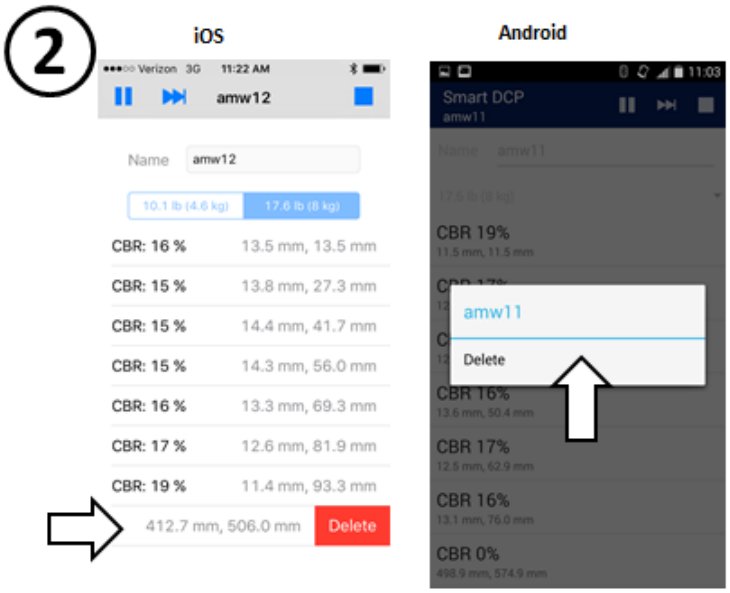


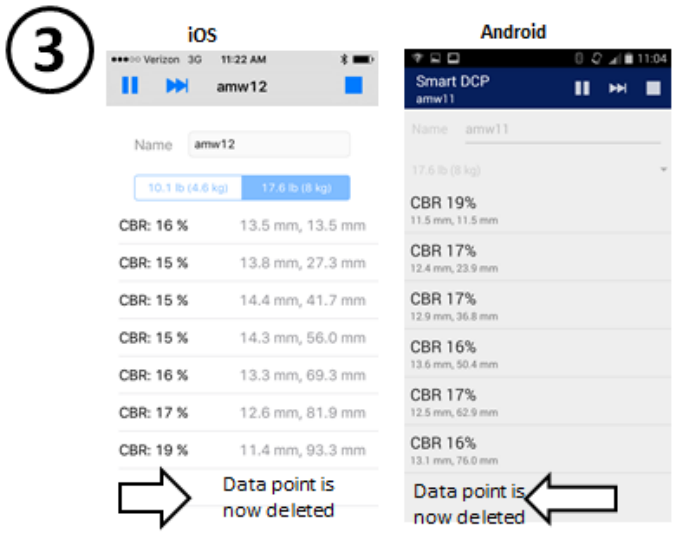


3.4 Deleting Data Point / Strike

If you accidently record a data point after an undesired strike or depth change, you can delete the data point from the test. See the figures below or conduct the following: Select pause on the App, select the data point by holding your finger (long pressing) on the last data point, a pop-up will appear asking if you want to delete. Confirm by sliding your finger across (iOS) or selecting yes (Android) and the last data point will be deleted. Deselect the pause button on the App and return to testing.



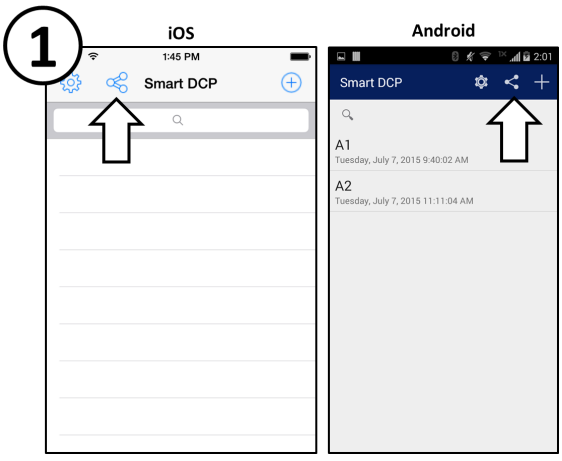




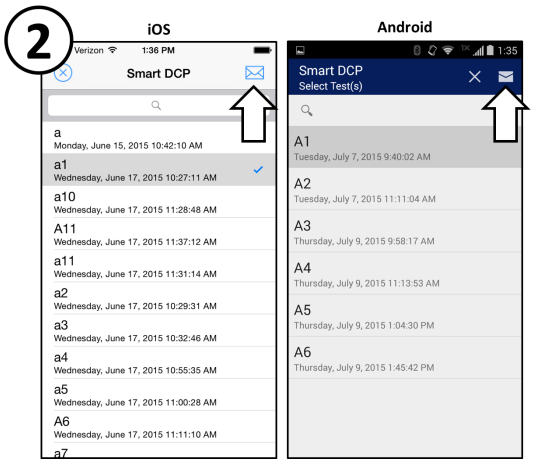
4 Data Transfer

The user has two options for transferring the data from the smart device to other devices; by e-mail or via USB cable connected between the devices.

4.1 Transfer via E-mail



While at main screen press the 'Share' button.



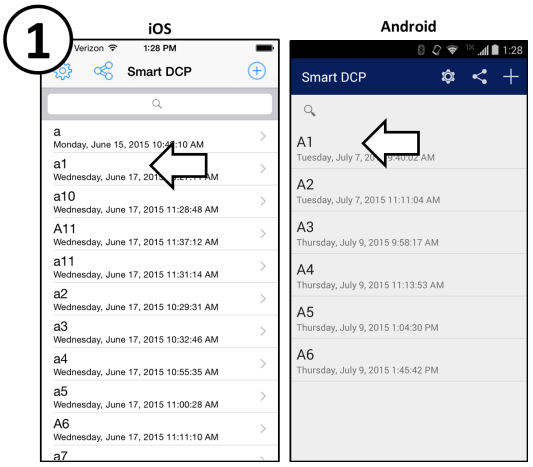
Select the desired test for transfer and press the 'Mail' button.

4.2 Transfer via USB

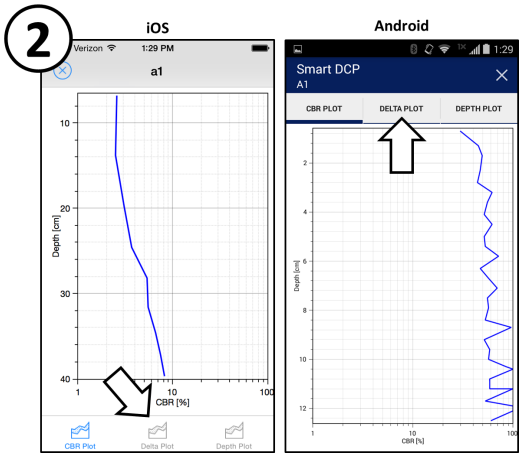
To transfer via USB, connect the smart device to a computer with the appropriate USB cable for the device. For Apple iOS users, the computer must have iTunes installed in order to transfer data with a USB.

5 Data Visualization

5.1 In-App Data Visualization

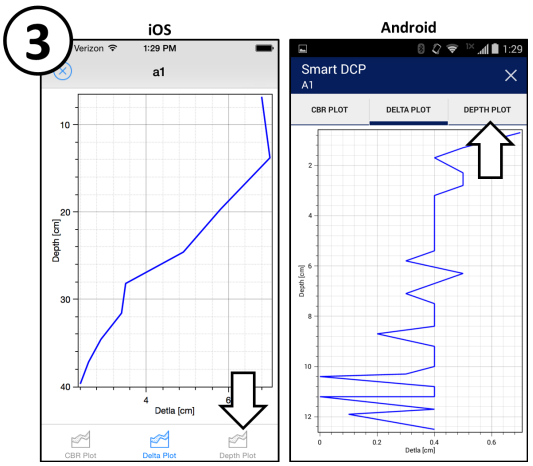


On the main screen, select any test by tapping it.

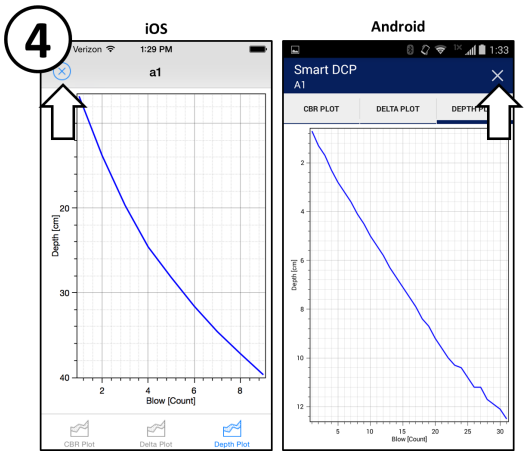


CBR%* vs depth is shown first. Use the navigation buttons to change the plot.

*CBR% calculated using ASTM Standard: ASTM-D6951



The second plot, Delta, shows the change in depth per blow. Use the navigation buttons to change the plot.



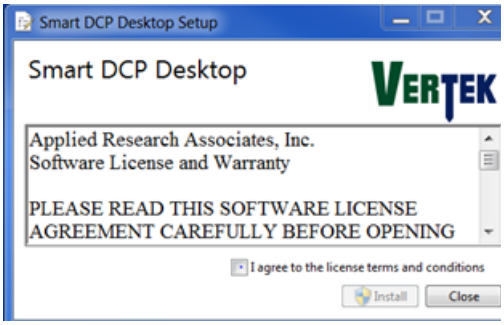
The last plot shows the total depth at each blow. Use the 'X' to go back to the main menu.

5.2 Exported Data Visualization

A complimentary desktop application to organize and graph the DCP data is available for Windows systems. The program can be downloaded from a link on our product webpage http://www.vertekcpt.com/dcp-handheld-and-adcp or via electronic transmittal. The desktop application can be used to quickly graph your field data and keep your data organized using the application and windows explorer.

How to install the Smart DCP desktop application

①

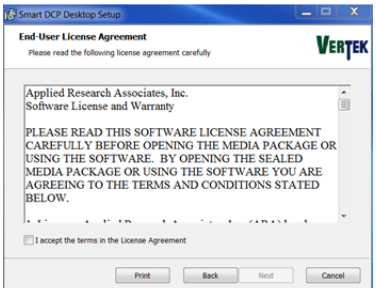


Select the executable file and terms and conditions will prompt you to agree.

②

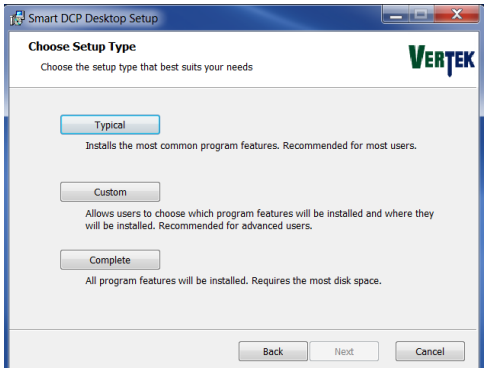
Select the Install button, enter you administrator password and a set up wizard will appear, select: Next to continue.

③



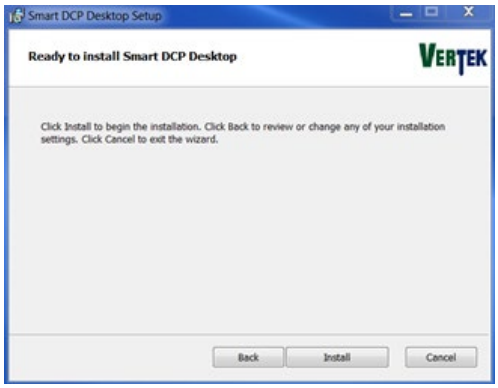
An End User License Agreement and Warranty will appear, Accept and Select: Next.

4



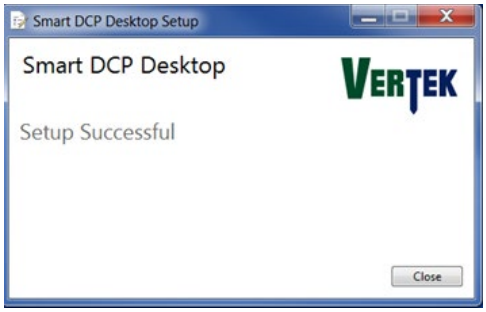
The installer will give you (3) options to install the application: Typical, Custom or Complete.

5



Select Install at the next prompt screen, after a few seconds, Select: Finish.

6



The Smart DCP Desktop application setup has been completed.

7

The Smart DCP Desktop application is stored in your user directory in the following breadcrumb trail with a desktop icon link:

(Example) C:\Users\John Doe\Documents\SmartDCP

How to install the Smart DCP desktop application

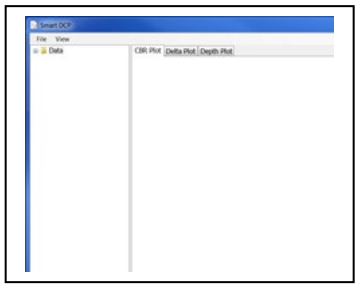
1. Select the executable file and terms and conditions will prompt you to agree
2. Select the Install button, enter you administrator password and a set up wizard will appear, select: Next to continue
3. An End User License Agreement and Warranty will appear, Accept and Select: Next
4. The installer will give you (3) options to install the application: Typical, Custom or Complete.
5. Select Install at the next prompt screen, after a few seconds, Select: Finish
6. The Smart DCP Desktop application setup has been completed

The Smart DCP Desktop application is stored in your user directory in the following breadcrumb trail with a desktop icon link:

(Example) C:\Users\John Doe\Documents\SmartDCP

How to use the Smart DCP Desktop application:

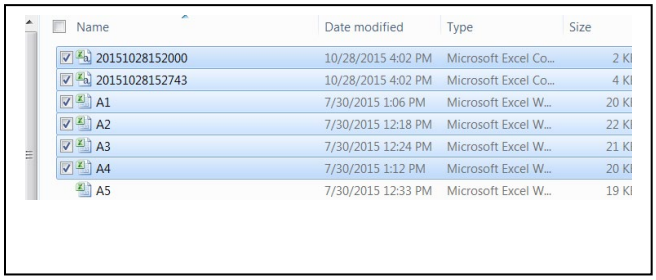
1



Double click the desktop application icon

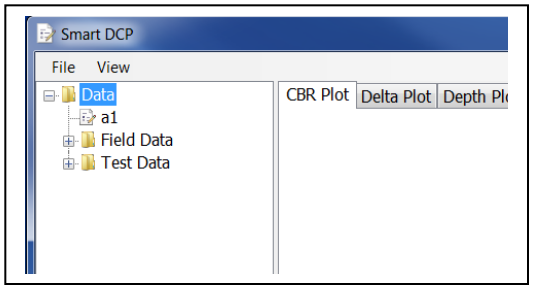
Once open, select: File> Open>Data Folder

2



Select your data files that you would graph and copy (Named by field user or date and time stamped).

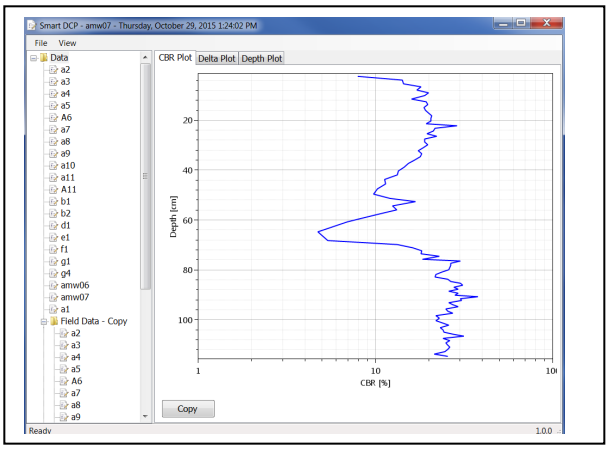
3



Return to Smart DCP Desktop and select: View>Refresh

The selected data will transfer and appear in a directory structure underneath the File and View Commands. Select the test file and CBR graph will appear to the right.

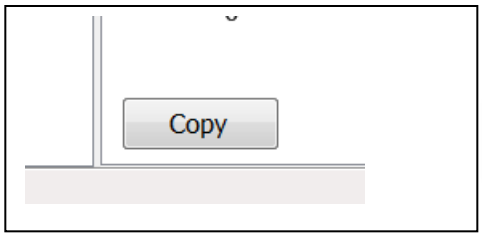
4



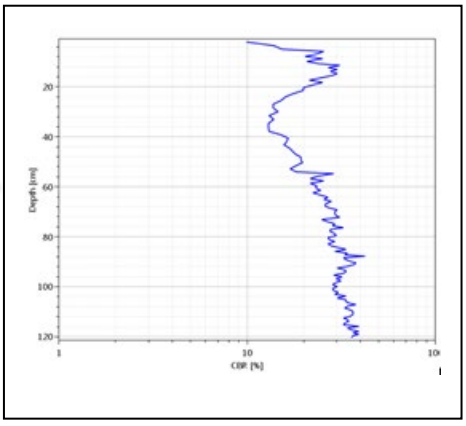
Three graphical tabs can be instantly viewed.

Application graphs are plotted as a function of depth: CBR %, Delta (depth change between strikes) and Depth (total blows).

5



PASTE



A Copy button is located in the bottom left corner.

Simply select the file and graph and select the copy button.

Open a Microsoft word document and paste and the graph will appear.

How to use the Smart DCP Desktop application

1. Double click the desktop application icon
2. Once open, select: File> Open>Data Folder
3. Windows explorer open the documents directory
4. Select your data files that you would graph and copy (Named by field user or date and time stamped)
5. Return to Smart DCP Desktop and select: View>Refresh
6. The selected data will transfer and appear in a directory structure underneath the File and View Commands
7. Select the test file and graph will appear
8. Three graphical tabs can be instantly viewed

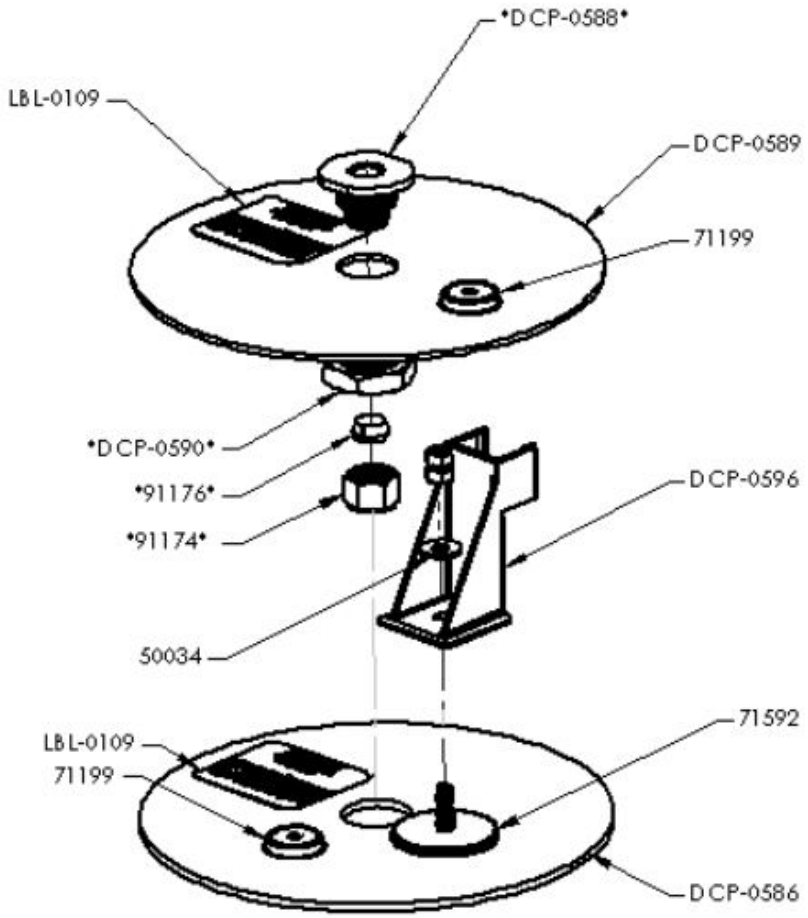
Application graphs are plotted as a function of depth: CBR %, Delta (depth change between strikes) and Depth (total blows).

9. A Copy button is located in the bottom left corner
10. Simply select the file and graph and select the copy button
11. Open a Microsoft word document and paste and the graph will appear
12. If you would like to remove the data set from the desktop application select: File> Open>Data Folder and delete
13. The deleted data set will automatically be removed from the Desktop Application directory structure once refreshed (View>Refresh)
14. After reviewing the data, simply select File>Exit and application will close

If you encounter issues not addressed by this user guide, please contact your account manager for additional support.

6 Troubleshooting

- *Trouble pairing your smart device to laser range finder (LRF).* It is not necessary to go into the smart device settings and search / pair the two Bluetooth devices. Simply, follow the steps on Page 2 of this manual, the smart device and LRF will automatically search for a connection when prompted. Smart Bluetooth doesn't require a manual pairing.
- *Initial setup, during operation or after adding a rod to extend the DCP test penetration the LRF doesn't connect with the smart device.* Make sure that when establishing the LRF to the target plate, the LRF base plate is as level as possible and the target is steady and in alignment with the LRF. Movement or misalignment can cause a LRF not to establish a reference distance.
- *The laser target slips down the DCP shaft.* Slide up the target and bushing to just below the hammer strike plate, verify the ferrule is seated and retighten with 1" combo wrench.
- *Measurement notifications (Beep or vibration) are slow to register. Keep the target as level as possible over the LRF and make sure that the LRF lens is clean.*

7 Assembly Drawing and Bill of Materials

PART NUMBER	DESCRIPTION	QTY
71592	MAGNET, 2.25 DIA W 5/16 STUD, NUT	1
71199	LEVEL, BULLSEYE PLASTIC	2
91174	NUT, 5/8 TUBE FITTING 316 SS-LIKE PARKER CPI	1
91176	FERRULE, 5/8 TUBE FITTING 316 SS-LIKE PARKER CPI	1
DCP-0596	BRACKET, DCP LASER MOUNT GEN III	1
DCP-0586	PLATE, DCP SMART LASER BASE	1
DCP-0588	BUSHING, DCP SMART TARGET	1
DCP-0589	TARGET, DCP SMART ABS	1
DCP-0590	NUT, 1 1/4-12 HEX (STEEL) (THIN HEX)(BLACK)	1
LBL-0109	DECAL, VTK ENV EQUIP & GEO 3 x 2.34	2
50034	WASHER, 5/16 FLAT (ST.STL.) 3/8 ID X 7/8 OD X 0.084 THK.	1