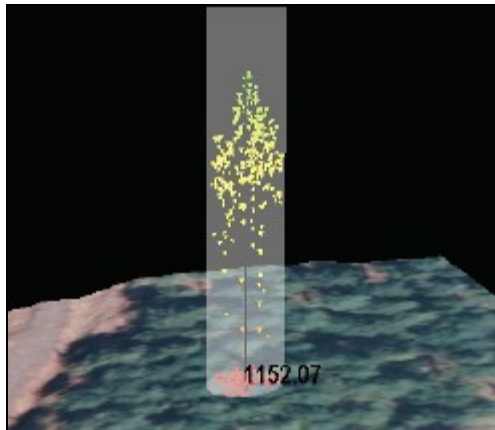




## EXERCISE 3: SIMPLE MEASUREMENTS IN LDV



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Fusion ver2.80



**FUSION Tip** -The order of display is important—you cannot display the draped orthophoto if you haven't already displayed the bare earth model.

### Introduction

In this exercise, you'll be using the fully-prepared example data to continue exploring Fusion and you'll learn the basics of making measurements in the LDV.

### Prerequisites

- Successful completion of Exercise 2 (Getting Started with Fusion)

### Overview of Major Steps

1. Make basic measurements in the LDV

### Procedure

#### Part 1: Make basic measurements in the LDV

1. Start Fusion if needed and *Load* the project **exer02.dvz** from the **C:\lidar\Fusion\_Projects** folder.
2. *Select* a **stroked box sample** that includes trees.
3. *Type*, **Alt+u** to display the bare earth model and *Type*, **Alt+i** to display the orthophoto (see side bar note) on the surface model or access these options from the right-click menu. You are now able to visualize Lidar points within the measurement cylinder and view the corresponding area of the orthophoto.
4. *Right Click* in the **LDV window** to activate the pop-up menu and *Select*, **Measurement marker**. This will change the display to an overhead view and show the measurement cylinder.
5. Move the cylinder by *holding down* the **Shift key** and typing with the arrow keys. Move the cylinder so that an individual tree is at its center.
6. Resize the measurement cylinder (Ctrl+Shift+Right mouse button + mouse drag up/down) to isolate the crown of a single tree.



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**FUSION Tip** -We're turning these options off because once we display the data that has the ground elevation subtracted from it, the bare earth surface will display above the lidar data in LDV.

### Measurement Marker — Quick Guide

*Shift + Arrow keys: moves the cylinder*

*Ctrl + Shift + RMB drag up: increases cylinder size*

*Ctrl + Shift + RMB drag down: decreases cylinder size*

*h : moves the measurement marker to the top return in the cylinder*

*g: move the measurement marker to the lowest return in the cylinder (disabled if Subtracting ground elevations automatically)*

*Enter: records (in memory) the current X,Y,Z of the measurement marker.*

7. *Click and drag* the data cloud with the **LMB** to view the cylinder from the side.
8. *Type h* to automatically move the cylinder to the highest lidar point. The value of the measurement marker location is displayed in the LDV's window.
9. To measure the ground elevation of this location, *Type g* to automatically move the cylinder to Lidar points corresponding to the ground surface.
10. You can now calculate this tree's height by simply subtracting the ground elevation from the tree-top elevation.

Another method to make similar measurements is to automatically subtract the ground elevations, let's do that now...

1. *Type Alt+i* to turn the display of the orthophoto off.
2. Likewise, *Type Alt+u* to turn the display of the bare earth model off (or turn these options off from the right-click menu).
3. Return to the Fusion window and *Click* the **Sample Options** button.
4. Enable the **Subtract ground elevations from each return** option and *Click, OK*.
5. *Click* the **Repeat last sample** button.
6. Notice that the sample area is "flat" in LDV and the elevation bar to the left is providing Height above ground.
7. *Right Click* in the **LDV window** to activate the pop-up menu and *Select, Image plate (Alt-p)* to turn the orthophoto on below the lidar data (you may have to zoom-out to see the image plate if you are zoomed-in).
8. *Right Click* in the LDV window to activate the pop-up menu and *Select, Measurement marker*.
9. *Move* and *resize* the cylinder as you did before to highlight a single tree (see side bar).
10. *Click and drag* the data cloud with the LMB to view the cylinder from the side.
11. Now, when you type **h**, the measurement marker moves to the tree top and gives you the height of the tree (there is no need to type **g** — in fact, that function is inactive). If the height numbers are black and are hard to see with the background, use the right-click



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menu and *Click* on the **Color..** option and change the **Axis color...** to a contrasting color (white works well).

If you wish to take multiple measurements, you can record them to a CSV file (readable in Excel) by following these steps:

1. Move the measurement cylinder around using Shift + arrow keys and navigate to another tree.
2. Resize the cylinder to properly isolate a tree within the measurement cylinder. At the next tree, measure the tree top (**type h** and then **Enter**).
3. If you have disabled the **Subtract ground elevations...** option then you should also measure the ground surface (**type g** and then **Enter**)—otherwise there is no need to measure the ground surface.
4. Repeat this for two-three more trees.
5. Now *Right Click* to activate the LDV popup menu and *Select, Save measurement line.* This will allow you to save the measurements you recorded in a XYZ comma separated (.csv) file.
6. Navigate to **C:\lidar\SampleData** , and name your file **treeheights.csv** and *Click, Save.*
7. Launch Excel and *Open treeheights.csv* to view the measurements you recorded.

*This concludes Exercise 3*