

# Tools, Tips, and Workflows

## Whatever Happened to Data Fusion

### (Part 1 of 2)

Terrasolid



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July 2014  
Revision 1.0

A few years ago the big buzzword in the industry was data fusion. And most times people were referring to the merging of image and LIDAR technologies to provide a more comprehensive dataset. This buzz led to many vendors purchasing systems that contain not only a LIDAR system, but also a camera of some sort. Typically the camera is strapped to the LIDAR unit such that there is a known relationship between the two systems. This fusion of data would then lead to gains in the processing and extraction techniques being used. However, time and time again we hear how many data providers are acquiring LIDAR data and imagery simultaneously, but not doing anything with the imagery data in the case of mobile systems, or only generating orthophotos in the case of airborne. In the meantime, software has evolved over the years to incorporate tools for fusing these datasets. In this first article of the two part series we will look at the tools more applicable to the airborne side of the industry.

A number of years ago Terrasolid implemented a fairly simple, yet robust methodology for associating the RGB values from the co-acquired imagery to the corresponding laser point. The result was the not only a nice visualization of the acquired dataset (see Figure 1), but when coupled with the **Classify By Color** routine, provide an additional means of distinguishing the classification assignments for individual LIDAR points. Note that the assignment of RGB values to the laser points does not necessitate generating an orthophoto. The big plus to this is that one may fuse the two datasets together very early on in the process to assist in not only automated classification, but probably more importantly, in manual classification review work that can be difficult and very laborious without an orthophoto.

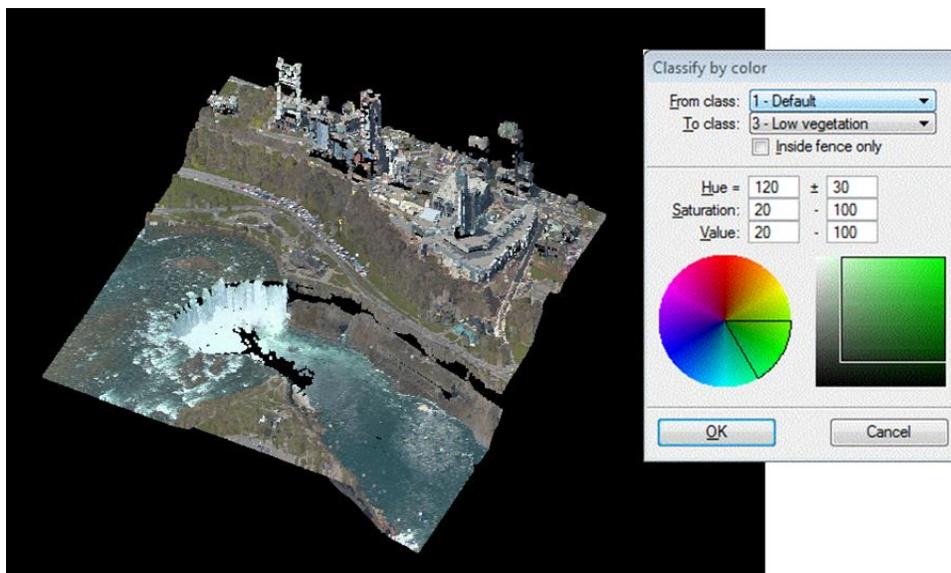
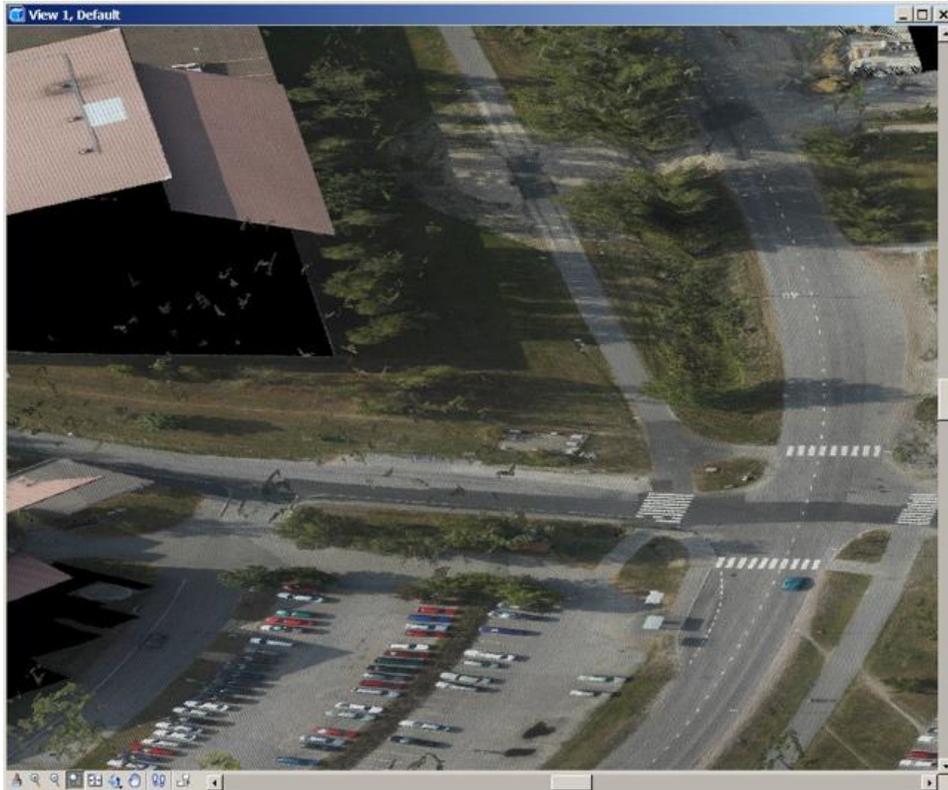


Figure 1: Niagara Falls, Canada

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For more information on how to use TerraScan and TerraPhoto to extract RGB values from imagery and assign it to the laser data check out the video on our [YouTube](#) page.



*Figure 2: 3D Ortho*

In more recent years, the camera systems being strapped to airborne laser systems are carrying multiple cameras, such as with the MIDAS system. These additional cameras provide oblique images that now allow one to not only rectify the nadir image to the LIDAR ground surface to produce an orthophoto, but one may also rectify the oblique imagery to wall surfaces. The wall surfaces are generated through the building vectorization process in TerraScan which uses both the LIDAR and imagery to determine the valid 3D vectorization of the buildings within a project.

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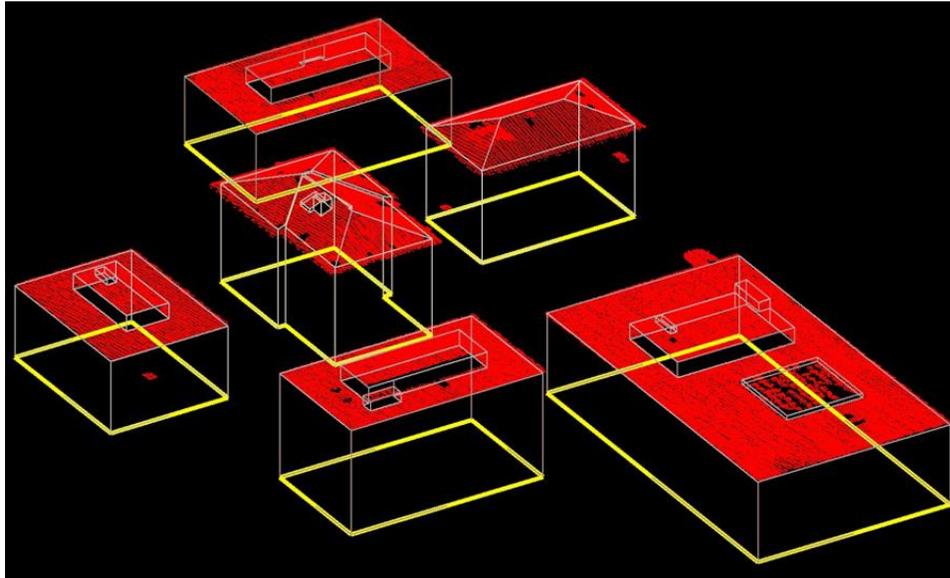


Figure 3: 3D Building vectors extracted from LIDAR and Imagery



Figure 4: Oblique imagery rectified on building wall vectors

The results of the building vectorization process and creating the wall rasters is that one may then create a [full 3D fly-thru of the project area](#) using the tools built into TerraPhoto. This becomes a very powerful visualization tool which with additional effort can become more lifelike, such as [this one of Bergen, Norway](#), and can be used to convey ideas and concepts to the general population or stake holders. We will be covering this process in detail as part of our fall Terrasolid training event taking place Oct 21-24, 2014 in Huntsville, AL. [Click here for more information, and to register before the class fills up.](#)

It is difficult to convey in words, and a couple of screen captures, the power of fusing imagery and LIDAR data so I hope that you follow some of the links to view the visualizations available on our YouTube channels. The visualization, classification by color, and building vectorization are a few of the tools already in the Terrasolid suite of tools which are readily available to take advantage of data fusion. In the next article we will look at these tools from a mobile LIDAR data perspective, along with the new calibration techniques that become available only when you have these two different data sets available for use.