A short comparison of freely available point cloud viewers for Windows

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Introduction

This document is a short overview of several freely available viewers for 3D point clouds for the Windows operating system. The goal is to provide the reader with a small document that enables him or her to choose the right viewer for a given application.

Viewer characteristics

For each viewer, a table contains the following characteristics:

- Tested version – version number of the software that was tested.
- Download size – smaller viewers are quicker downloads.
- Supported point cloud formats.
- Supported other formats – some viewers support other data types as well.
- Display options, such as
    - RBG per point
    - Intensity
    - Elevation
    - Classification
- Additional display functionality, like cross sections.
- Other functions.

A short comparison of freely available point cloud viewers for Windows

Bentley Pointools View

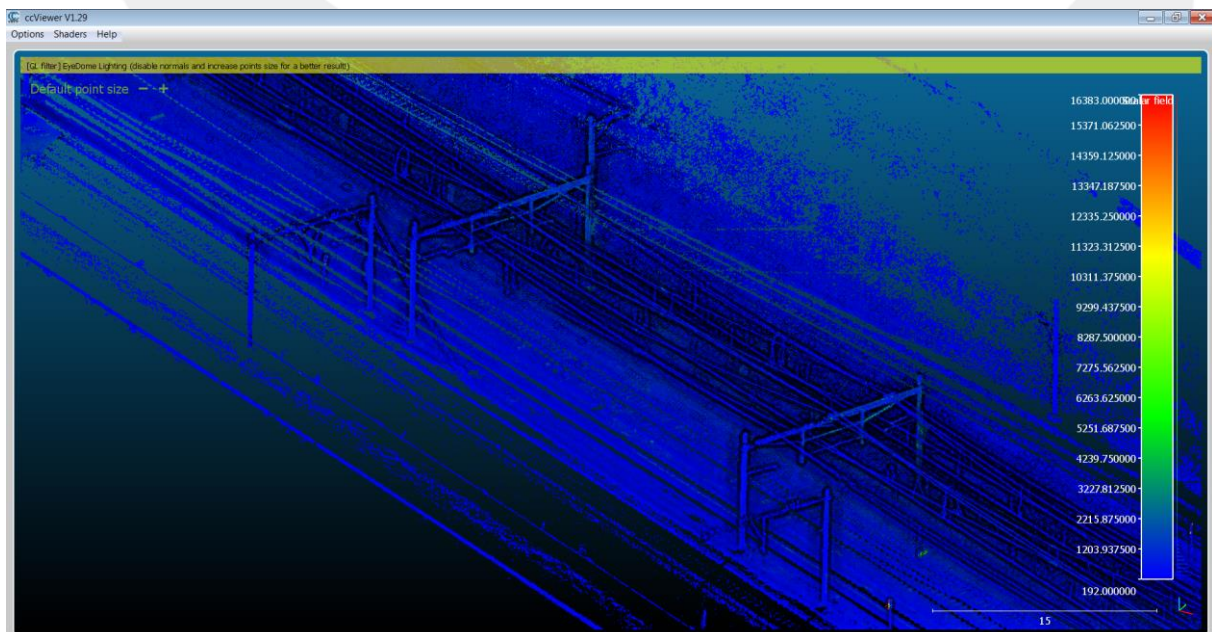| Tested version	2.00.01.00
Download size	58 MB
Supported point cloud formats	.POD - can be created with free Bentley Pointools PODCreator (36 MB), which supports Riegl formats TerraScan .BIN Topcon .CL3 .E57 Faro .FLS and .FWS Optech .IXF .LAS .LAZ Leica .PTG, .PTS, .PTX Z+F .ZFS ASCII formats
Supported other formats	.SHP (did not display in test) .DWG .DXF .OBJ .LWO .3DS
Display options	RGB Intensity Elevation (or value along other axis or vector)
Additional display functionality	Adjustable point size Stereographic mode Lighting (did not work in test)
Other functions	Clipping Measuring Sketching Annotations

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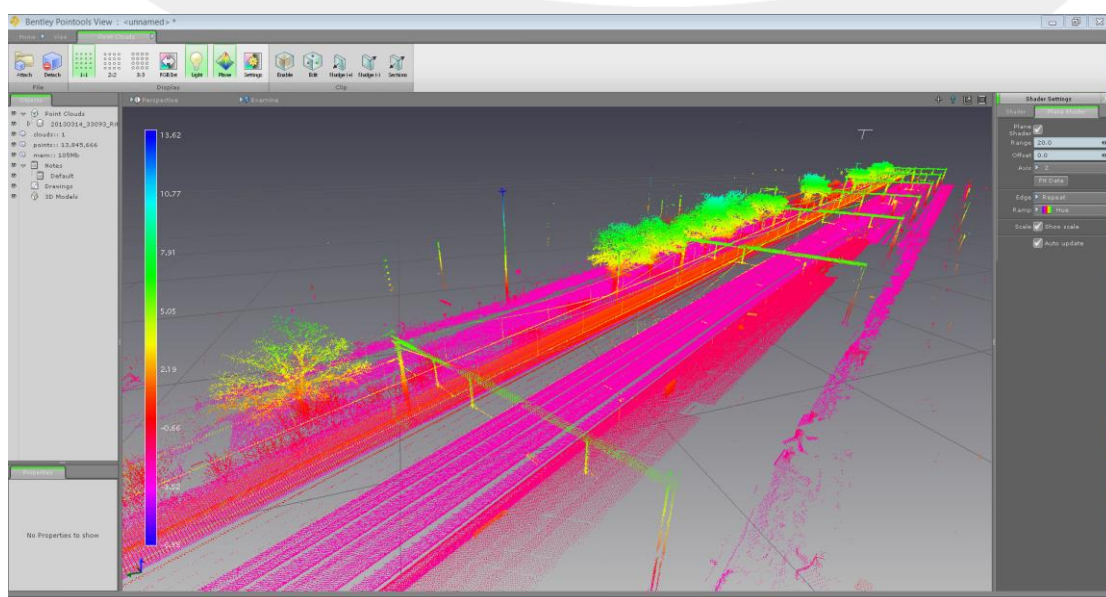
FugroViewer

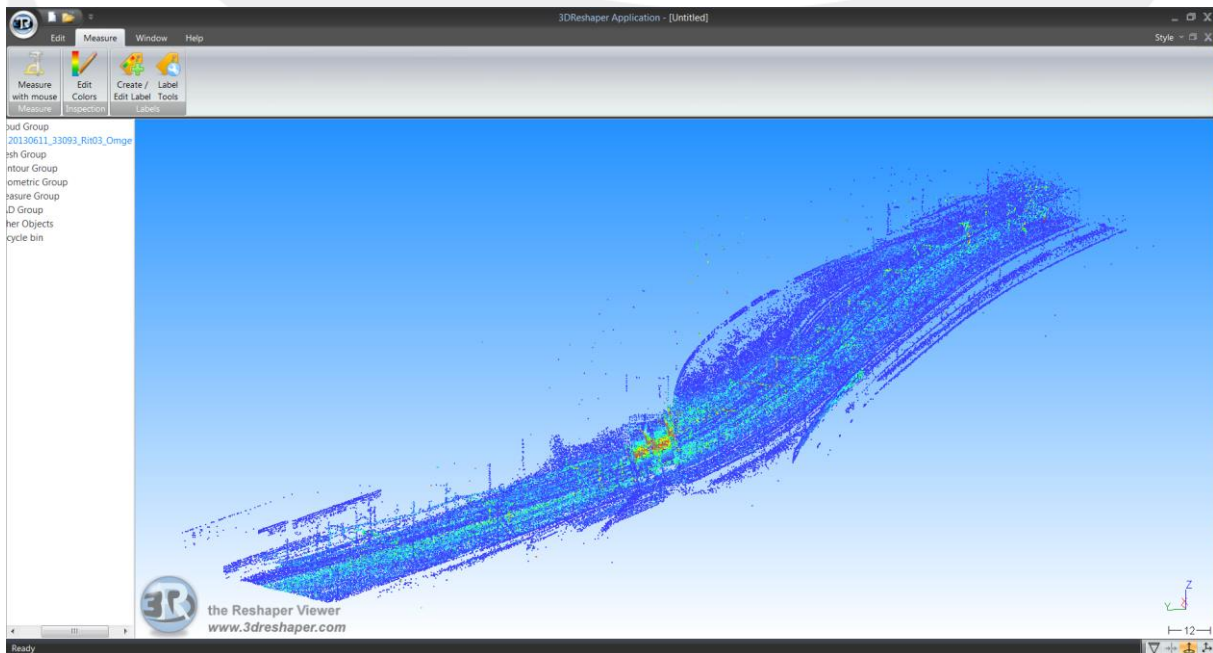| Tested version	2.0
Download size	2.9 MB
Supported point cloud formats	.LAS .LAZ ASCII formats
Supported other formats	.TIF (GeoTIFF) .HDR (Radar) .IMG (HFA) .SHP
Display options	Elevation Intensity Classification Source Id File Return RGB
Additional display functionality	Adjustable point size Contours TIN Cross sections Adjustable height exaggeration
Other functions	Display of points of interest and areas of interest

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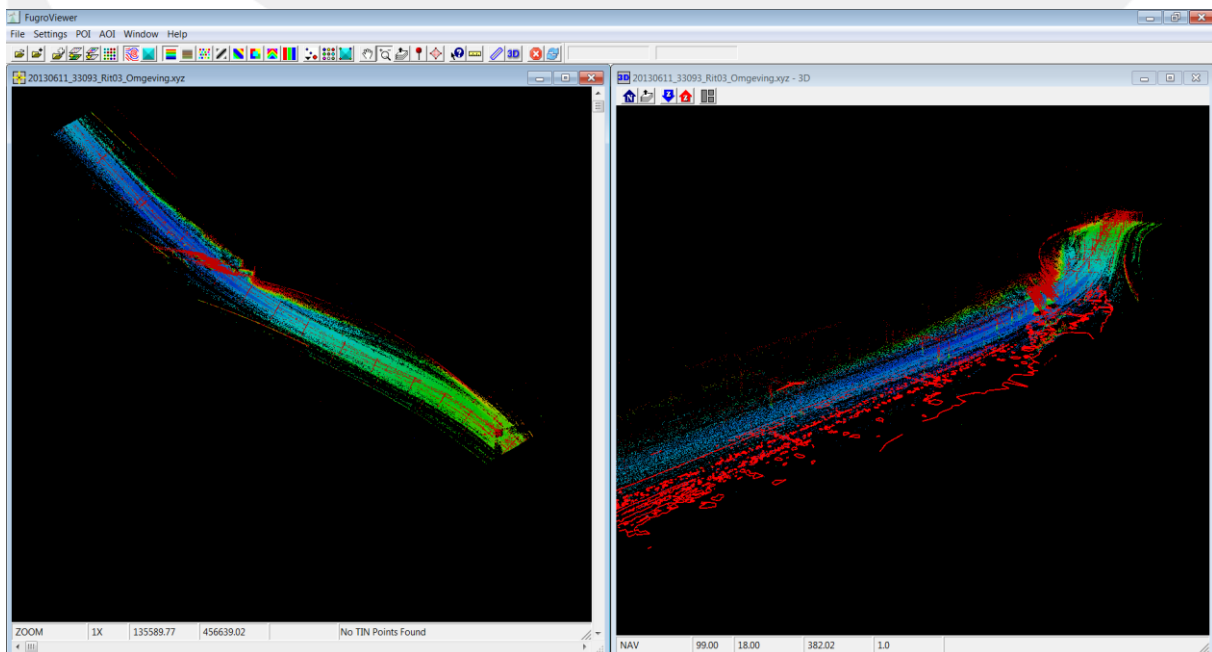
ccViewer

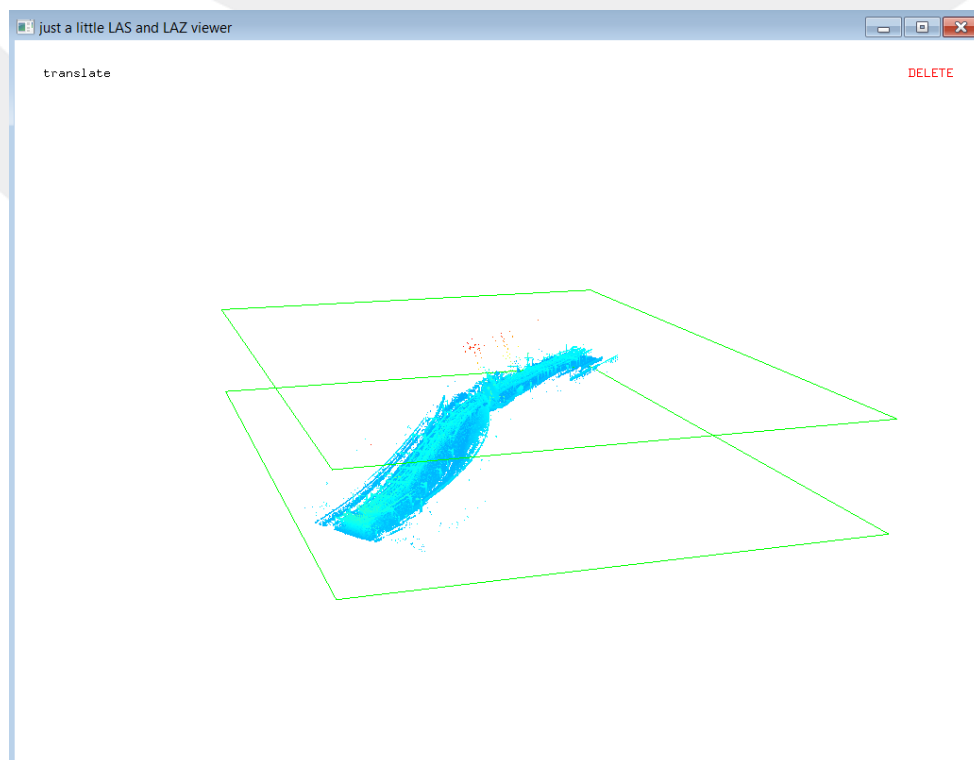| Tested version	1.29
Download size	32 MB
Supported point cloud formats	ASCII formats Point Cloud Library .PCD .LAS .LAZ .E57 Bundler .OUT
Supported other formats	.OBJ .VTK .STL .DXF Various other formats
Display options	Intensity RGB
Additional display functionality	Adjustable point size Shading
Other functions	Also available for Linux and Mac OS X Full version of CloudCompare is also available for free

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3DReshaper Viewer

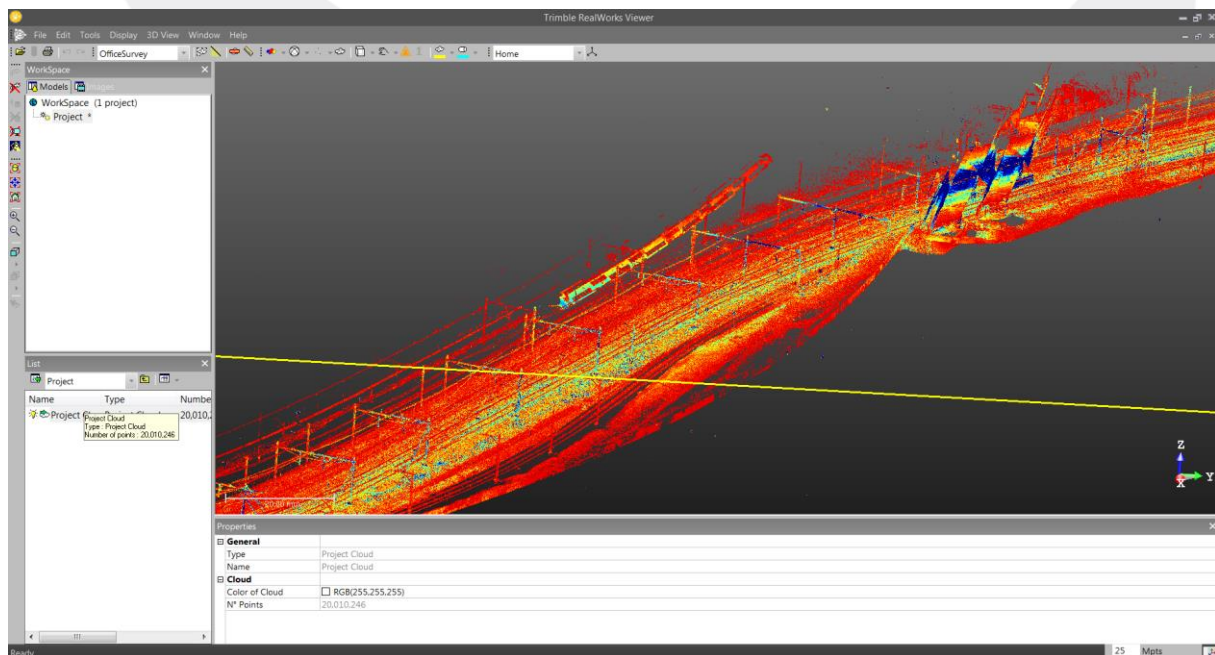| Tested version	8.0.7.13005
Download size	64 MB
Supported point cloud formats	ASCII formats .LAS Faro .FLS and .FWS Polyworks .PSL Leica .PCS and .PCV Z+F .ZFS Various other formats
Supported other formats	.STL .OBJ .DXF ESRI .ASC Various other formats
Display options	RGB Intensity
Additional display functionality	Lighting (view mode "smooth") Different colors assignable to different point clouds Adjustable point size
Other functions	Automatic point cloud reduction Measuring Labelling (point clouds with intensity only)

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LAStools lasview

| Tested version	22 March 2014
Download size	21 MB (full LAStools set)
Supported point cloud formats	.LAS .LAZ TerraSolid .BIN ASCII formats
Supported other formats	.SHP ESRI .ASC .BIL FUSION .DTM
Display options	Classification RGB Intensity Elevation Return number Flightline User data
Additional display functionality	Adjustable point size Adjustable XY and Z scaling TIN Cross sections
Other functions	Deleting and classifying of points Display of Full Waveform LAS FWF Display of spatial indexing LAX

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Trimble RealWorks Viewer

Tested version	8.1.1.219
Download size	174 MB
Supported point cloud formats	Trimble formats .LAS .LAZ ASCII formats
Supported other formats	.DXF .DWG Various other Trimble formats
Display options	Intensity RGB Scan number
Additional display functionality	Adjustable point size Isometric and perspective mode Various display rotation modes Clipping Cross sections
Other functions	Measuring Downsampling

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Applied Imagery Quick Terrain Reader

Tested version	8.0.3
Download size	117 MB
Supported point cloud formats	.LAS .LAZ
Supported other formats	.TIF (GeoTIFF) Quick Terrain Modeler formats
Display options	RGB Intensity Elevation
Additional display functionality	Adjustable point size Height exaggeration
Other functions	Histogram Marking Measuring

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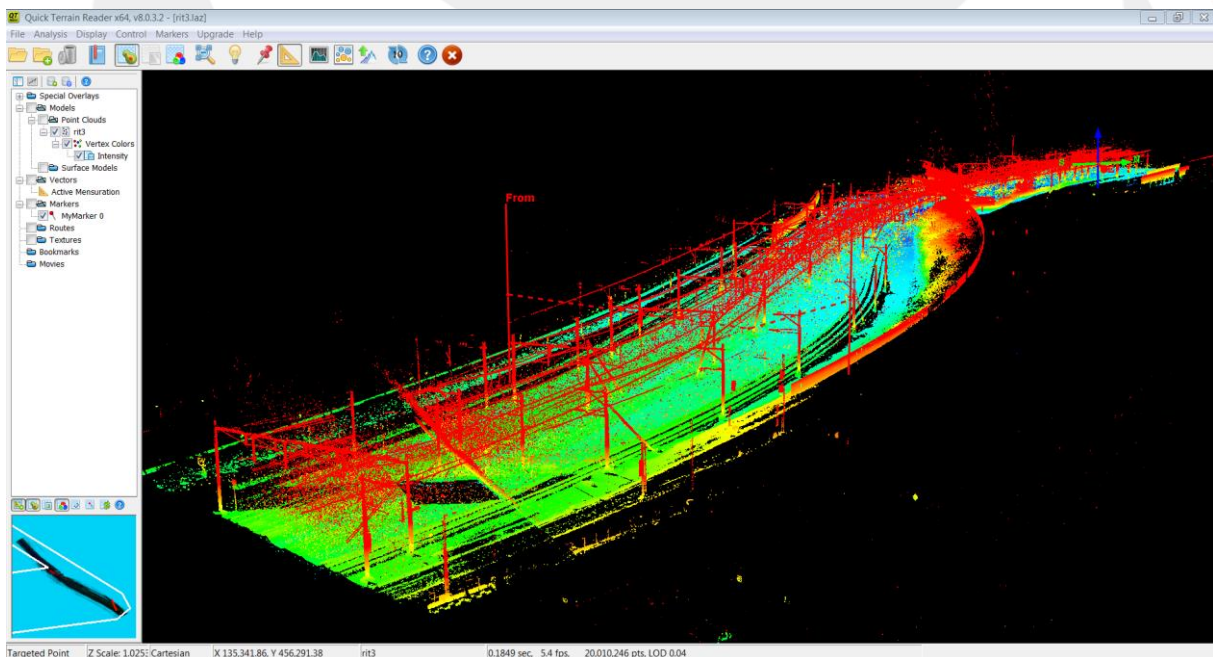
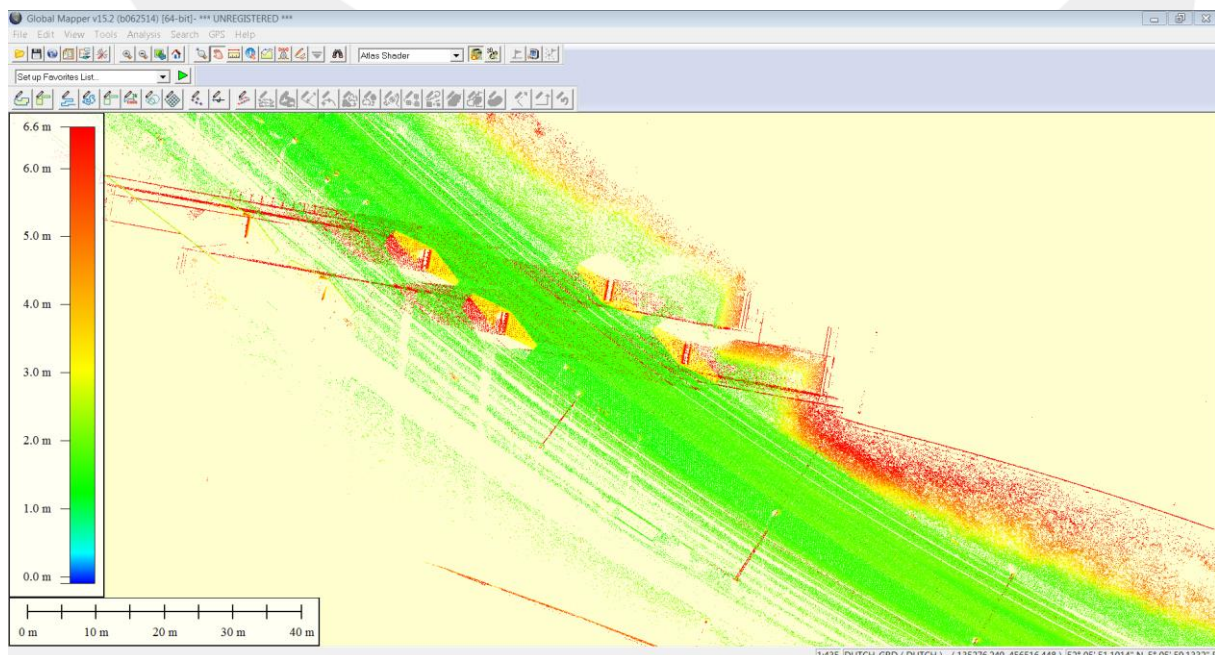A short comparison of freely available point cloud viewers for Windows

Merrick MARS FreeView

Tested version	7.1
Download size	325 MB
Supported point cloud formats	.LAS
Supported other formats	Various image formats .SHP
Display options	RGB Intensity Elevation Flight line Classification Return
Additional display functionality	Adjustable point size
Other functions	Measuring

A short comparison of freely available point cloud viewers for Windows
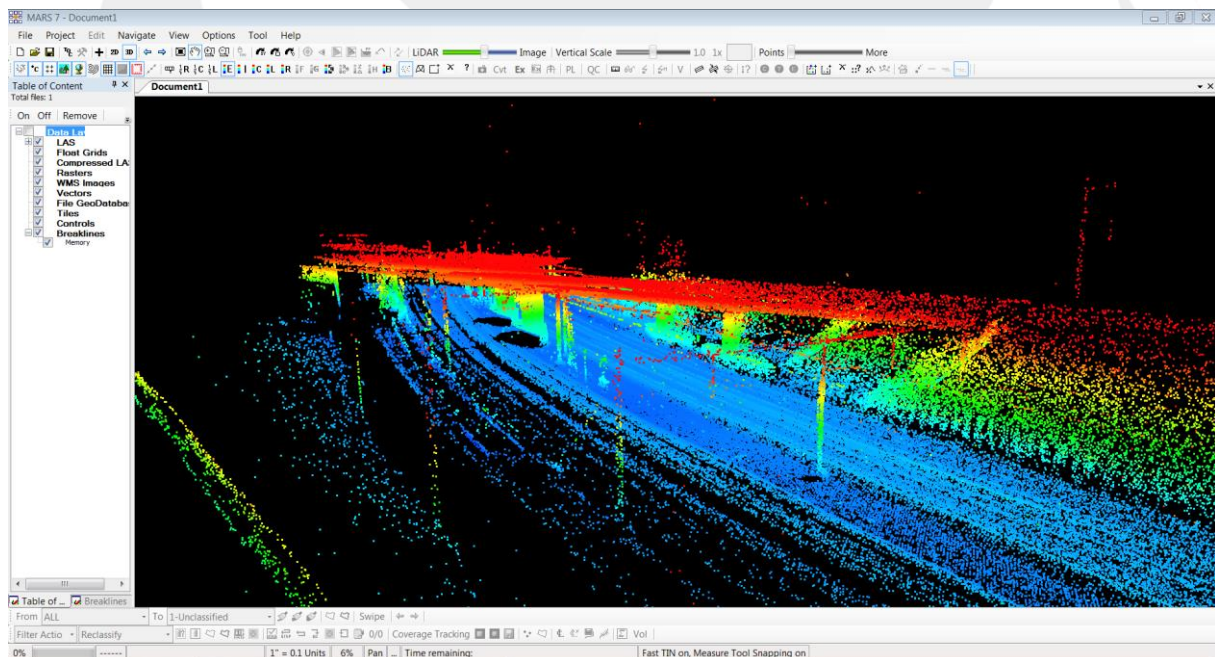
Global Mapper

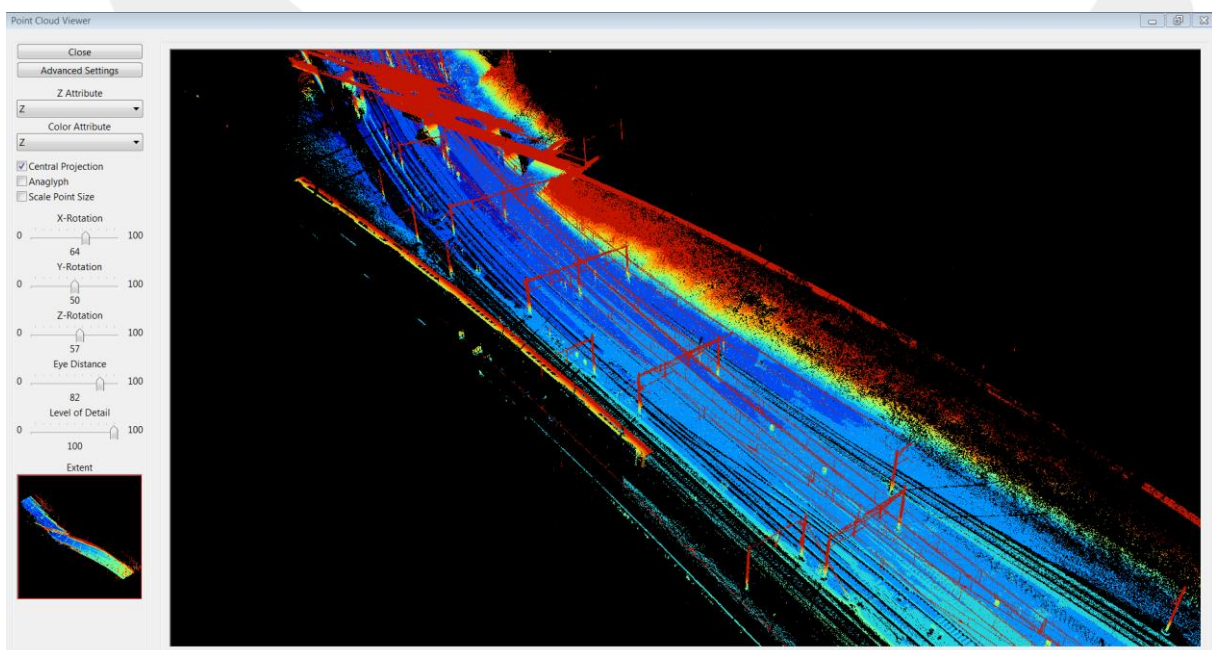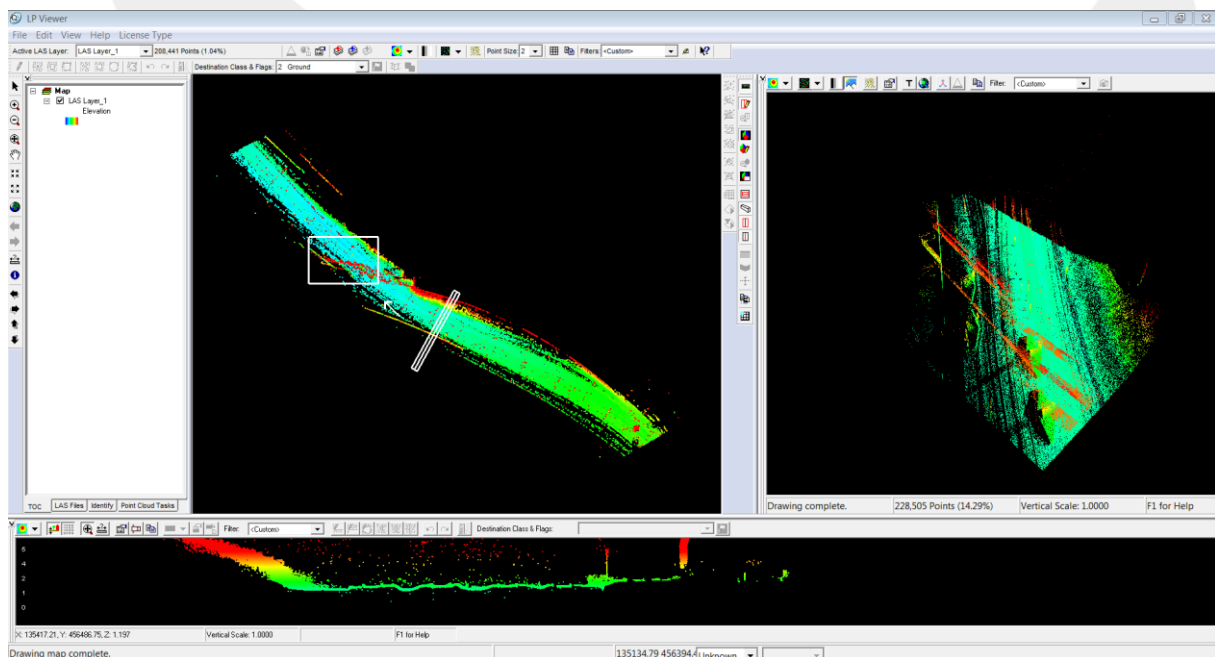| Tested version	15.2
Download size	90 MB
Supported point cloud formats	.LAS .LAZ .E57 .PTS TerraScan .BIN ASCII formats
Supported other formats	Too much to list (vector and raster)
Display options	RGB Intensity Elevation Flight line Classification Return
Additional display functionality	Adjustable point size Automatic increase in point size when zooming in
Other functions	Measuring

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SAGA GIS

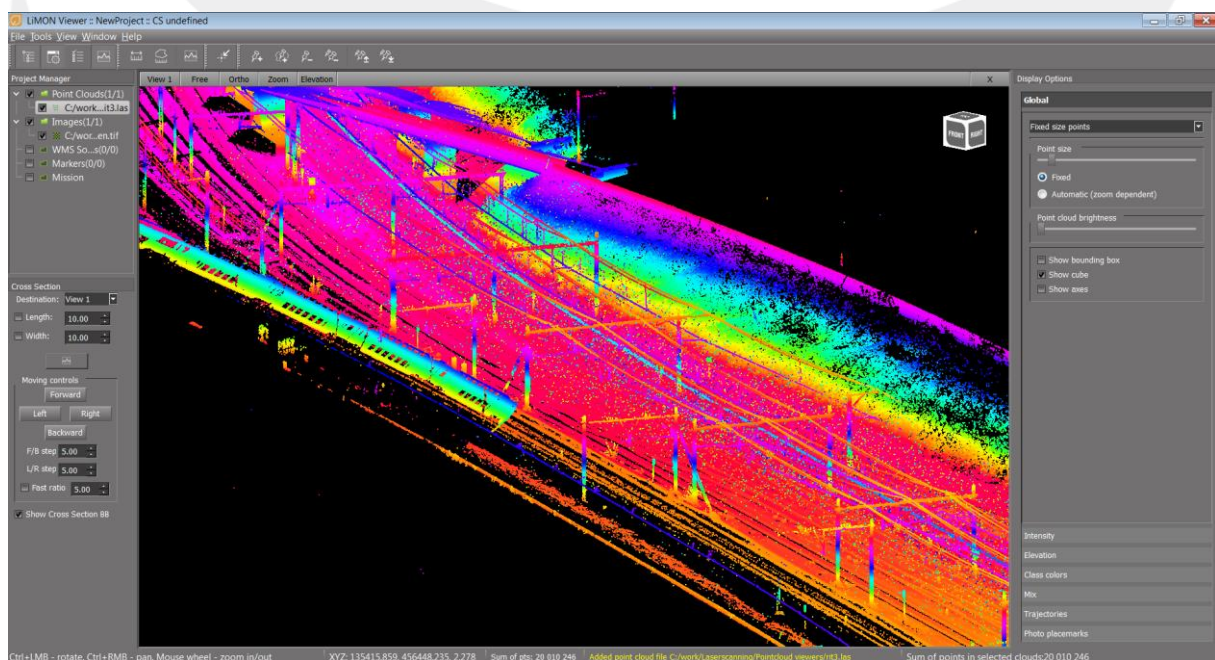| Tested version	2.1.2
Download size	35 MB
Supported point cloud formats	.LAS ASCII formats
Supported other formats	Shapefiles Various raster formats
Display options	RGB Intensity X Y Elevation Other LAS parameters such as point source Id and classification
Additional display functionality	Adjustable point size Transparency in 2D mode Anaglyph mode
Other functions	Measuring

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LP360 Viewer

Tested version	20132.2.49.1
Download size	63 MB
Supported point cloud formats	.LAS ASCII formats
Supported other formats	Shapefiles Various raster formats
Display options	RGB Intensity Elevation Other LAS parameters such as point source Id and classification
Additional display functionality	Adjustable point size Contours Cross Sections TIN Filtering of points by LAS attributes
Other functions	Measuring

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LiMON Viewer

Tested version	2.0.483
Download size	40 MB
Supported point cloud formats	.LAS .LAZ Leica .PTS Riegl formats Z+F formats ASCII formats
Supported other formats	Various raster formats WMS
Display options	RGB Intensity Elevation Classification
Additional display functionality	Adjustable point size Automatic point size Cross Sections Stereo mode
Other functions	Measuring Marking

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Pointfuse Free

| Tested version	1.0.0.4080
Download size	81 MB
Supported point cloud formats	.LAS .LAZ Leica .PTS and .PTX Faro formats ASCII formats
Supported other formats	Pointfuse vector formats
Display options	RGB Intensity Elevation
Additional display functionality	Automatic point size Surface generation
Other functions	

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A short comparison of freely available point cloud viewers for Windows
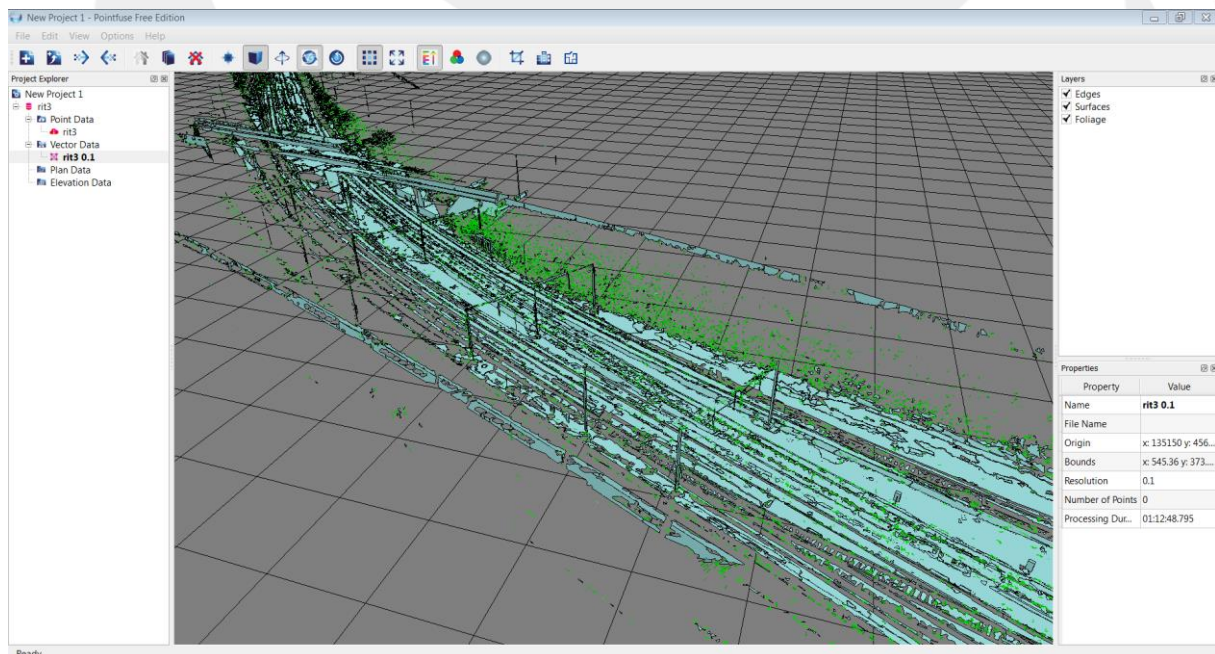
M LiDAR Viewer

Tested version	1.2.0.36
Download size	4 MB
Supported point cloud formats	.LAS TerraScan .BIN ASCII formats
Supported other formats	.TIFF images
Display options	Intensity Elevation Distance File Class RGB Return User Data Point Source ID GPS Time
Additional display functionality	Adjustable point size Selection of visible classes Downsampling for visualization Stereo mode Height exaggeration Cross sections
Other functions	Measuring Export of points selected by various criteria TIN creation Color extraction from images

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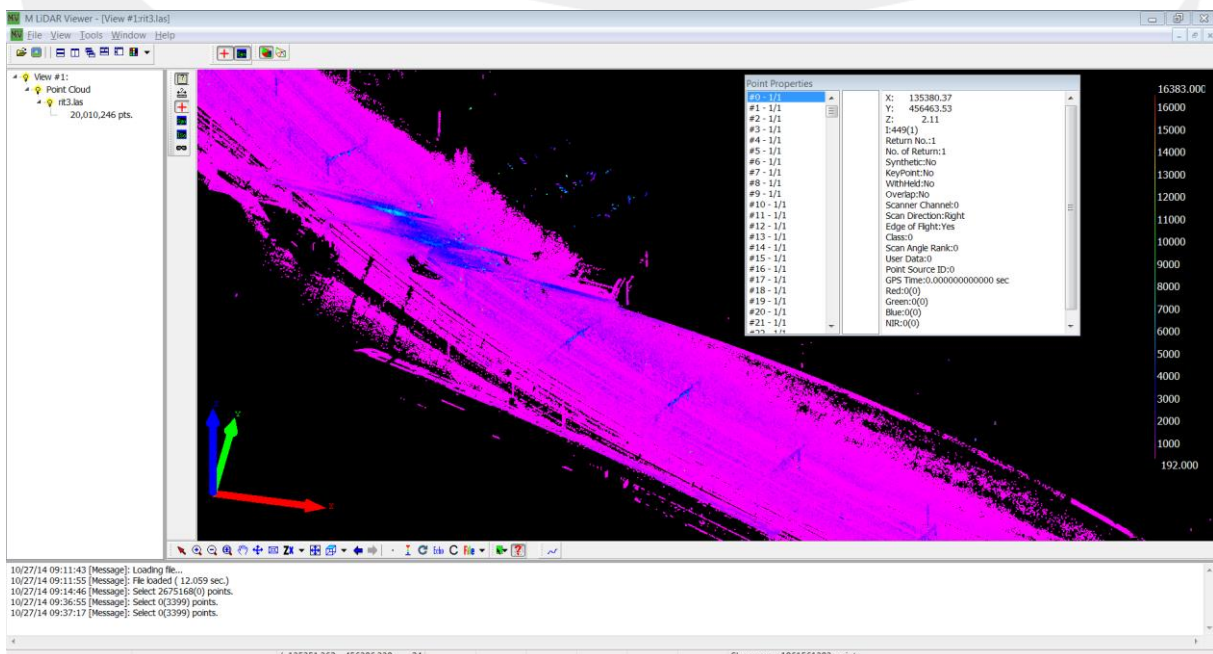
Displaz

Tested version	0.3.1
Download size	5 MB
Supported point cloud formats	.LAS .LAZ ASCII formats
Supported other formats	.PLY meshes
Display options	Intensity File Class RGB Return Number of returns Point Source ID
Additional display functionality	Adjustable point size Editable shader
Other functions	Saving of screenshots Remote interface for plotting from Matlab, Python, and C++

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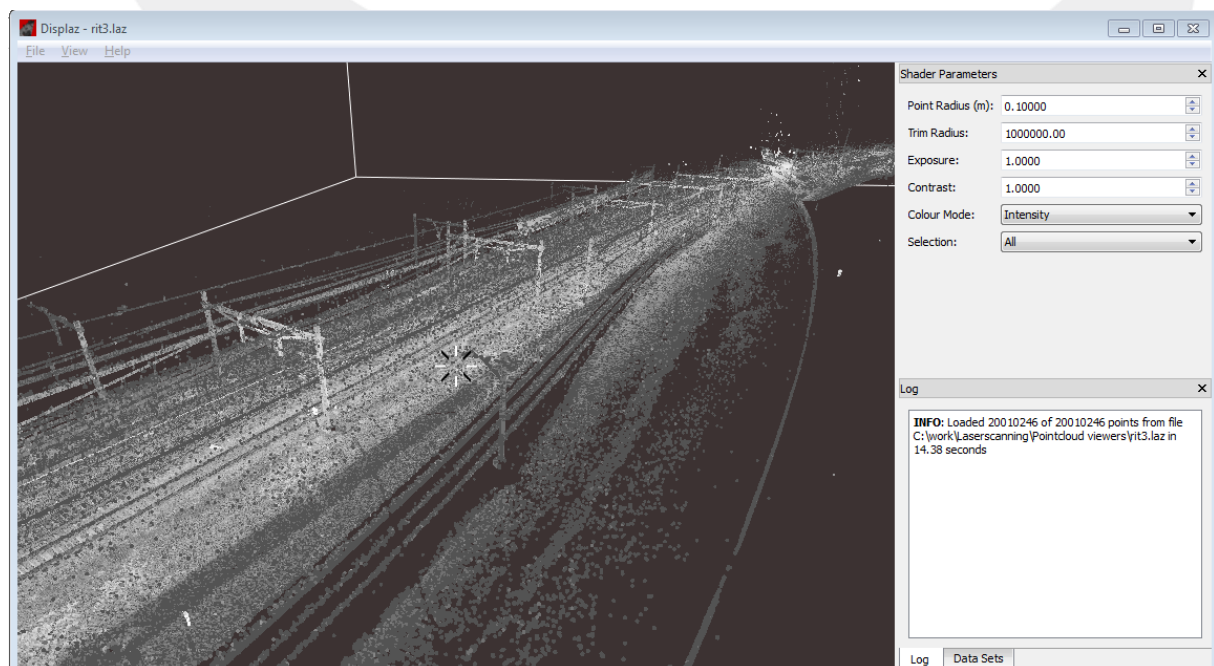
Summary

Viewer	Advantages	Disadvantages
Bentley Pointools View	Support of CAD and 3D model formats Many point cloud formats supported via Pointools POD Creator	Native support for .POD only Installation issues encountered in test on some systems
FugroViewer	Supports raster formats Display possible based on all LAS attributes Contour and TIN display Small file size	Supports only .LAS/.LAZ and ASCII formats
ccViewer	Shading No installation required	User interface not intuitive
3DReshaper Viewer	Native support for most common point cloud formats Support of DXF and 3D model formats	Limited display options (e.g. not elevation-based)
LAStools lasview	Display possible based on all LAS attributes Editing of points possible	Limited functionality User interface not intuitive (keyboard shortcuts)
Trimble RealWorks Viewer	Support of DXF and DWG formats Support of various Trimble formats	File formats Trimble-centric No elevation-based rendering
Applied Imagery Quick Terrain Reader	Supports GeoTIFF DEMs Marking and measuring	Support only .LAS and .LAZ
Merrick MARS FreeView	Supports imagery	Supports only .LAS 3D mode very limited Mediocre performance Large download size
Global Mapper	Supports a huge amount of (non-pointcloud) file formats	Annoying registration screen No 3D mode in unregistered version
SAGA GIS	Support of various vector and raster formats (being a GIS package)	User interface not intuitive Poor performance
LP360 Viewer	Supports raster formats Display possible based on all LAS attributes Contour and TIN display	Support only .LAS and ASCII formats
LiMON Viewer	Good interface Supports raster formats	File dialogs freeze for some time when network drives are inaccessible
Pointfuse Free	Surface generation shows edges	Slow file import File dialogs freeze for some time when network drives are inaccessible

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M LiDAR Viewer	No installation required Many display options Color extraction from images (though scaling not correct in test)	Supports only .LAS, ASCII and TerraScan formats Performance not great Experienced access violations on TIN computation
Displaz	Direct shader editing Can be used from other programs	Supports only .LAS, .LAZ and ASCII formats Limited display options and functionality
Faro Scene LT (not tested)		Opens only Faro formats
Leica Cyclone Viewer (not tested)		Opens only Cyclone format
Z+F Laser Control Elements (not tested)		Free version opens only Z+F format

Recommendations

Bentley Pointools View and Trimble RealWorks Viewer are the most capable viewers. Both support DXF and DWG CAD files as well (though strangely no DGN support in Pointools View) While Pointools View only reads .POD files, the free POD Creator reads practically all common point cloud formats. POD is used by Bentley Microstation, so Pointools View is a logical choice for those already working with Microstation. The RealWorks Viewer is more Trimble-centric and as such a natural choice for Trimble users.

The FugroViewer is geared more towards laser altimetry with its full support of the LAS/LAZ format and raster formats (e.g. aerial photography). It is compact and can compute contours and TINs as well. The LP360 Viewer is similar in functionality.

The ccViewer is exceptional by being open source and providing shading for point cloud display, which makes it much easier to see structures in dense point clouds. This alone is enough for a recommendation. If you want to do more than just view clouds, the full version of CloudCompare is definitely worth a try.

The LiMON Viewer, tested in a beta version, is an interesting new viewer with a clean and modern interface. Make sure to enable hardware shading.

M LiDAR Viewer offers many display options for LAS files. A unique feature is the possibility to extract point colors from ortho image. However, in our tests, there were issues with the georeferencing of TIFF images. Drawbacks are the mediocre performance and the limited file type support, and we experienced error messages when trying to compute TINs.

Displaz is great for experimenting with shader programming, but limited in other respects.

The other packages often have a single stand-out feature (such as the large amount of raster file types supported by Global Mapper, or the GIS functionality of SAGA GIS), but offer less as dedicated point cloud viewer than above recommendations.

Three scanner manufacturers are notably absent from the comparison: Leica, Faro, and Z+F offer free software versions that are essentially viewer-only versions of their full packages (respectively

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Cyclone, Scene, and Laser Control). Since they only read the manufacturer's specific proprietary format, they are of little use as generic viewers.

About GeoNext BV

GeoNext BV is a small, independent Dutch engineering company. Our expertise is in the field of geodesy and surveying with a focus on laser scanning and 3D modelling.

We acquire and process 3D data using various techniques and generate client-specific products, by making use of both off-the-shelf and custom-built software tools. We advise customers with regard to data acquisition, data processing, and process optimization. By being independent, we are not limited to hardware or software from a certain vendor and can chose the tools best suited for a given job.

Our capabilities include:

- Survey data acquisition with GPS, total stations and laser scanners, both static and mobile.
- Point cloud registration.
- Feature modelling from point clouds.
- 3D city models
- Profile generation and clearance checks for rail and road applications.
- Visualizations and simulations.
- Monitoring measurements.
- Large-scale data analysis.
- Custom software development.

Interested? Do not hesitate to contact us at info@geonext.nl or visit our website at http://www.geonext.nl for more information.