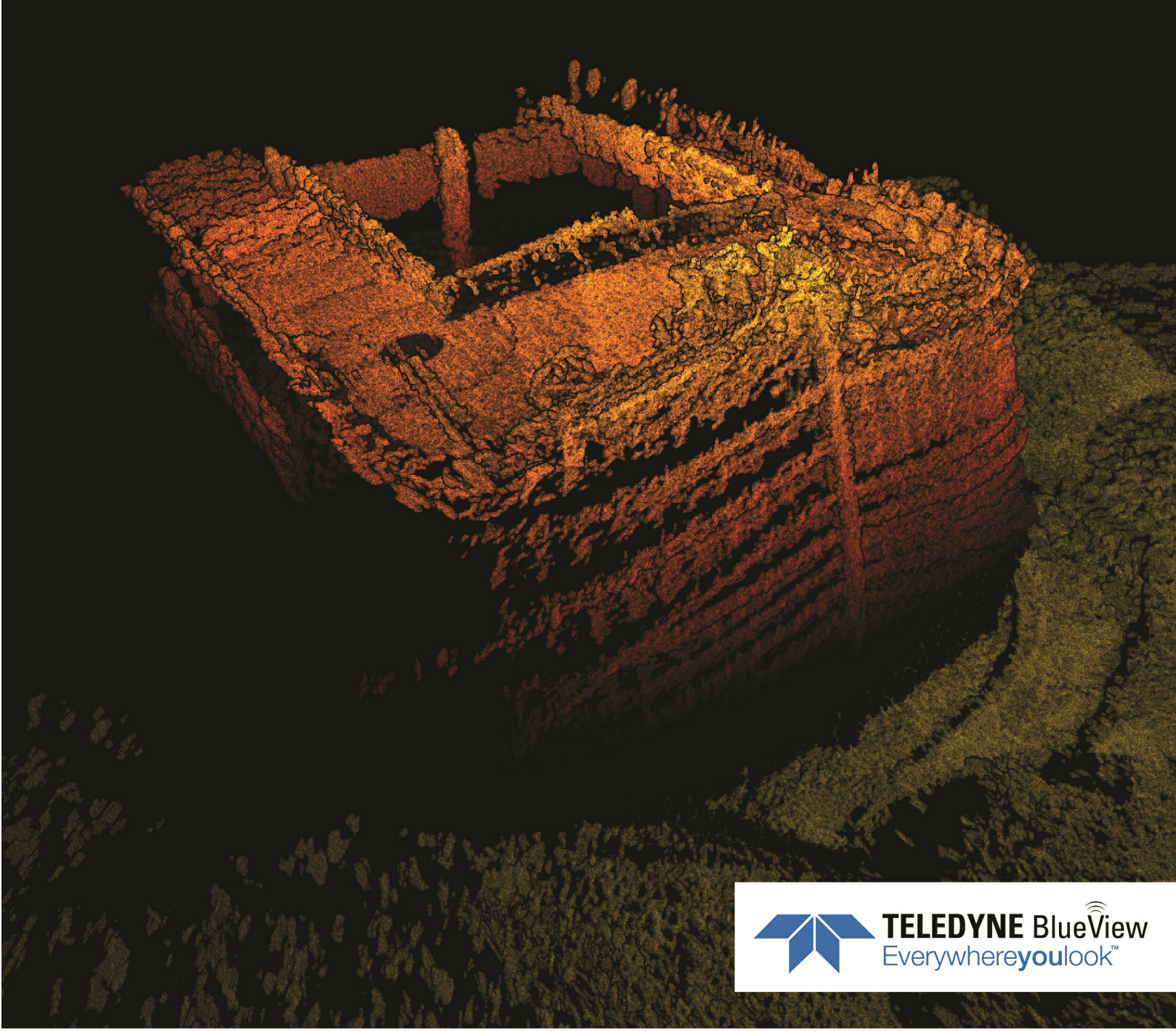


TELEDYNE BlueView
Everywhereyoulook™

QuickStitch

by EIVA

User manual

Version 4

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1 Introduction

QuickStitch developed as a customized solution for marrying two or more separate BlueView 3D scans of XYZi data into one coherent point cloud. The inherent difficulties of assembling multiple discrete 3D scans is solved by QuickStitch via the user's ability to recognize spacial similarities between the separate scan files. This is important based on the following list of possible dataset realities:

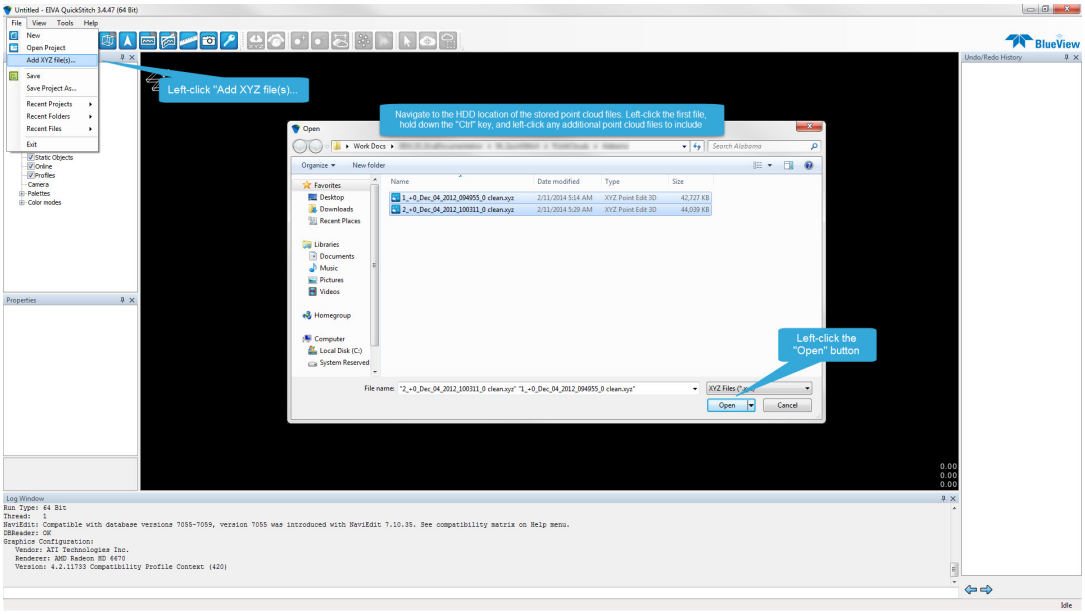
- The location of each dataset is known and the difference between the discrete sets can yield a rough resolution of the MBES sonar system
- The location of one dataset is known and the remaining datasets are referenced relative to the first set
- The location of each dataset is unknown and are completely relative only to each other

Manipulating each dataset as needed under recognized individual dataset constraints is the purpose of QuickStitch.

2 Quick Start

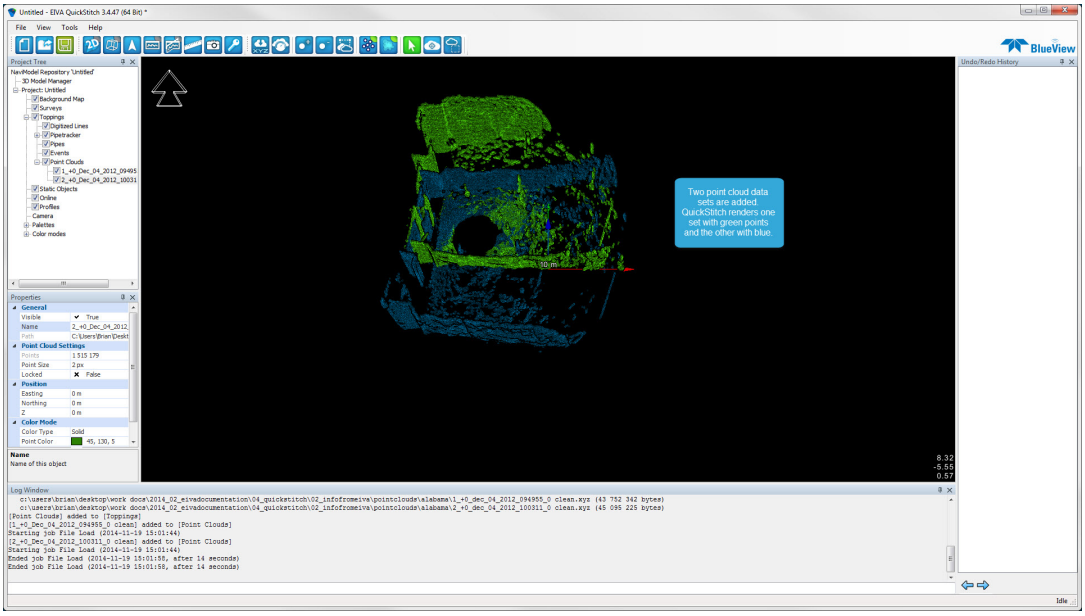
This sub-section is designed to quickly get the user up-and-running with the EIVA BlueView QuickStitch software. The basic functionality includes manipulating one or more MBES point clouds into a single, coherent, sufficiently-dense dataset.

- Left-click File > Add XYZ File(s)... from the main File menu above the toolbar
- In the Windows Explorer pop-up, navigate to the location of the stored *.xyz file(s)
- Left-click the first file to add, hold down the "Ctrl" key, and left-click any additional files to include in the file set
- Left-click the "OK" button



Adding xyz data to the Main window can also be accomplished via the "Drag and Drop" method

- Use the mouse scroll wheel to zoom into the loaded point cloud(s).

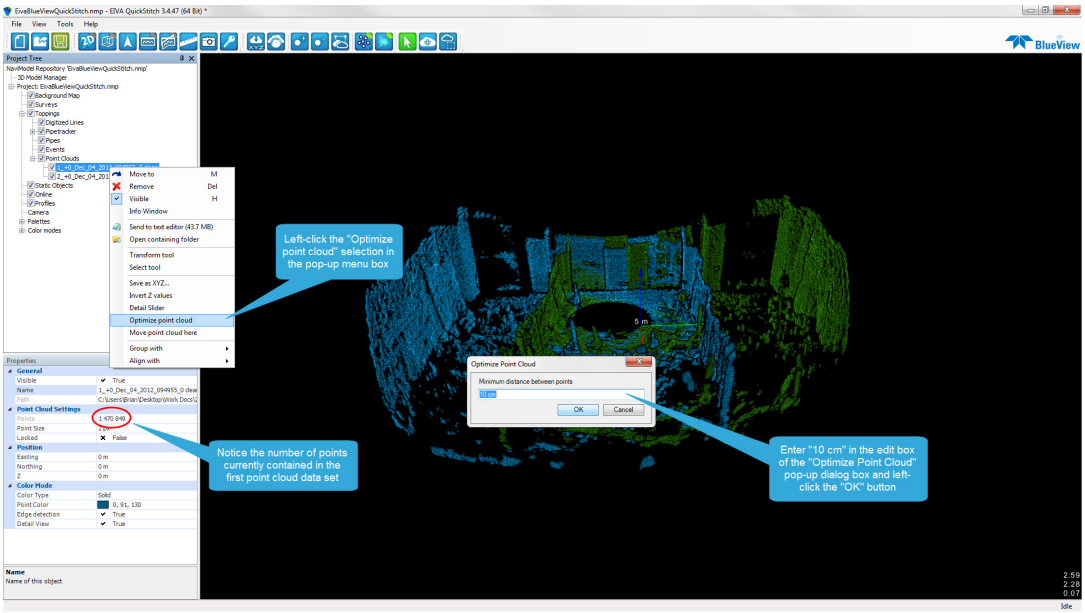


All model orientation is handled using the same Main window controls as NaviModel. 3D mouse support is included

- In the Property Tree window, right-click the first point cloud data set under the "Point Clouds" heading, and left-click the "Optimize point cloud" selection in the pop-up menu box.

The "Optimize Point Cloud" pop-up dialogue box opens.

- Type "10 cm" into the "Minimum distance between points" edit box.

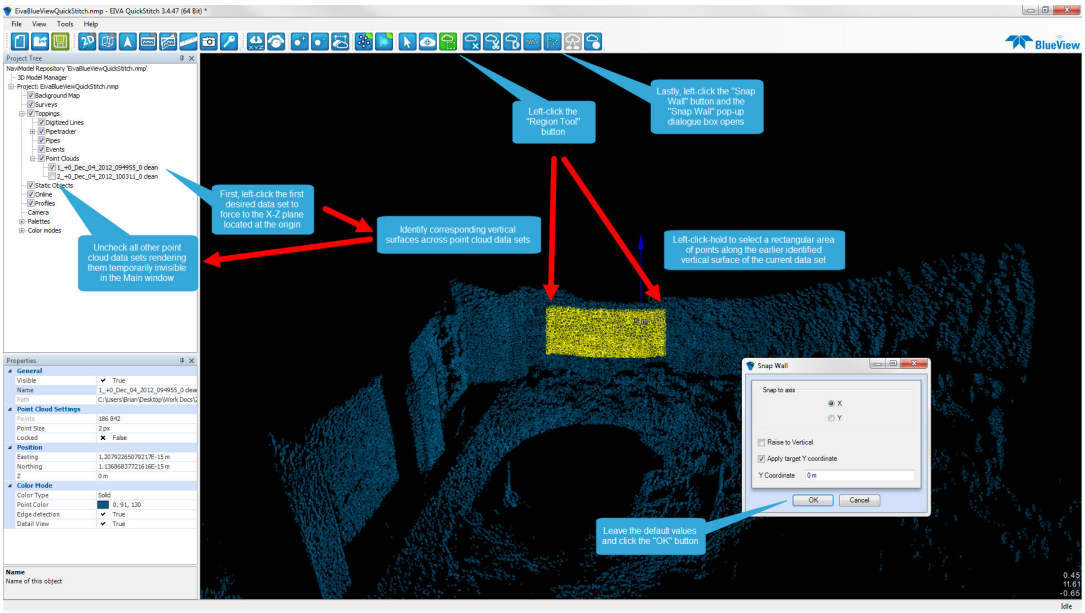


Thinning out superfluously dense data sets

- Left-click the "OK" button
- After the optimization process completes, left-click the "OK" button in the "Optimize" pop-up dialogue box.
- Run the optimize process for the second point cloud data set under the "Point Clouds" heading in the Project tree window. Use the same "10 cm" value in the "Optimize Point Cloud" pop-up dialogue box.

Note: The number of points in the Point Cloud settings > Points field of the Properties window of both data sets is reduced by nearly a factor of ten.

- Under the "Point Clouds" heading in the Project Tree window, left-click the first data set
- Uncheck the check-box next to any other point cloud data sets in the Project Tree window in order to effectively turn all other data sets "off"
- Left-click the "Region Tool" button in the main toolbar
- Left-click-hold to select a rectangular area of points along a "wall" of points that both data sets share even though the data sets might be offset from one another
- Left-click the "Snap Wall" button in the main toolbar
- Leave the default values in the opened "Snap Wall" pop-up dialogue box
- Left-click the "OK" button

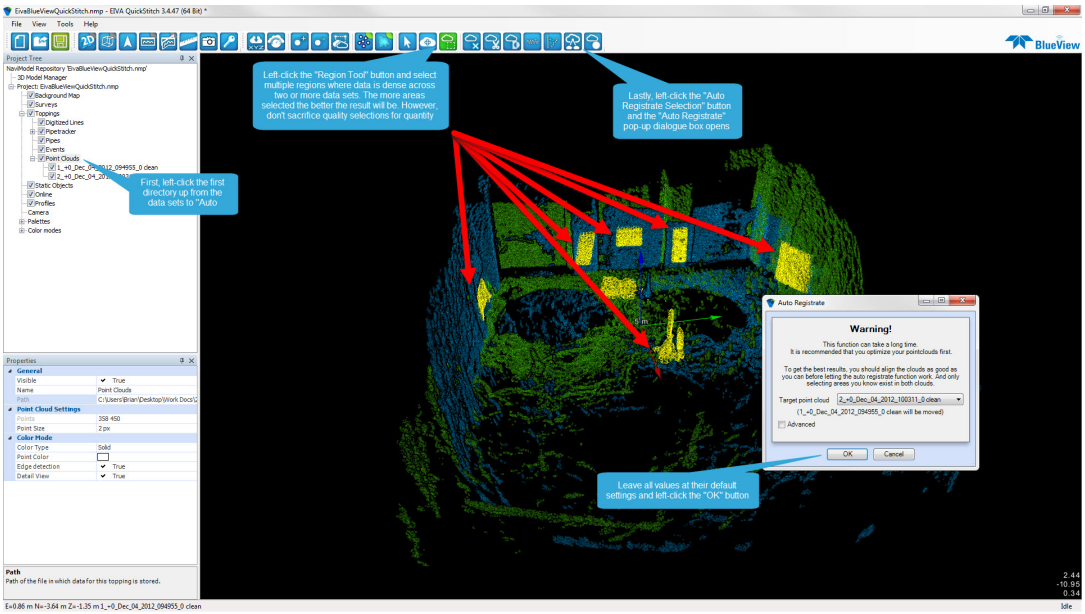


Using the "Snap Points to Wall" functionality

- Run the same process on another local data set. Be sure to select the same vertical surface in the second data set as was selected in the first.
- Turn "on" all point cloud data sets to view the results in the Main window

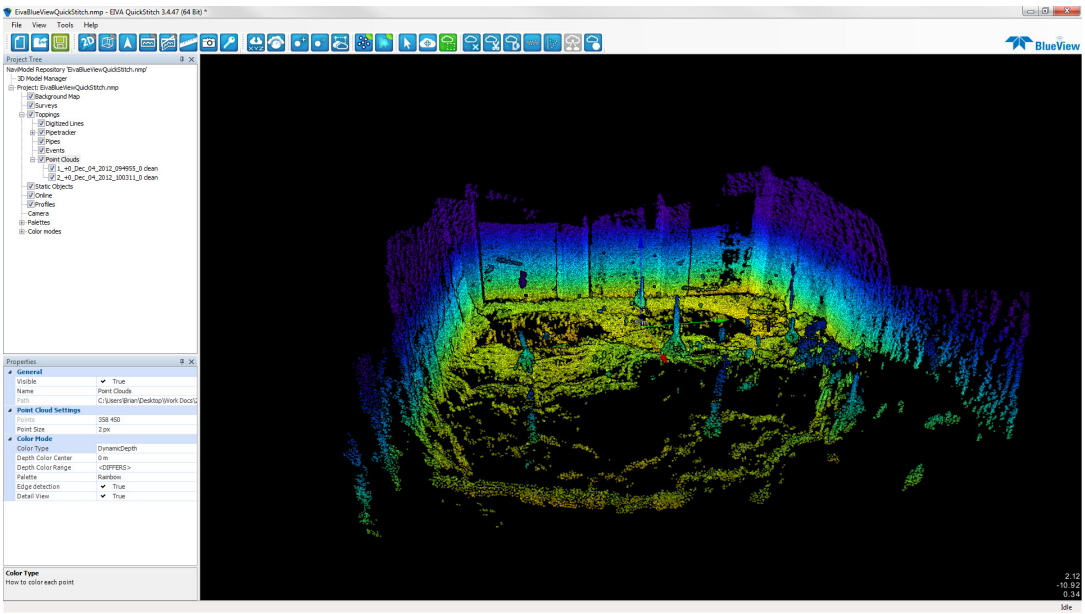
The last step is to use the Auto Stitch function to merge data sets across all three axes.

- Under the "Point Clouds" heading in the Project Tree window, left-click the first directory up from the data sets. Typically, this directory will be labeled "Point Clouds".
- Check the check-box next to all point cloud data sets in the Project Tree window in order to effectively turn all data sets "on"
- Left-click the "Region Tool" button in the main toolbar
- Left-click-hold to select a rectangular area of points along any surface that contains the two data sets with sufficiently dense sets of points in each. Holding the "Shift" key, repeat this selection process multiple times. As more areas are selected, the function returns better results. However, do not select insufficiently dense areas of points as the quality of the result will deteriorate rapidly.
- Left-click the "Auto Register Selection" button in the main toolbar
- Leave the default values in the opened "Auto Register" pop-up dialogue box
- Left-click the "OK" button



Utilizing the Auto Stitch functionality

The result of the Auto Stitch function is displayed in the following image:



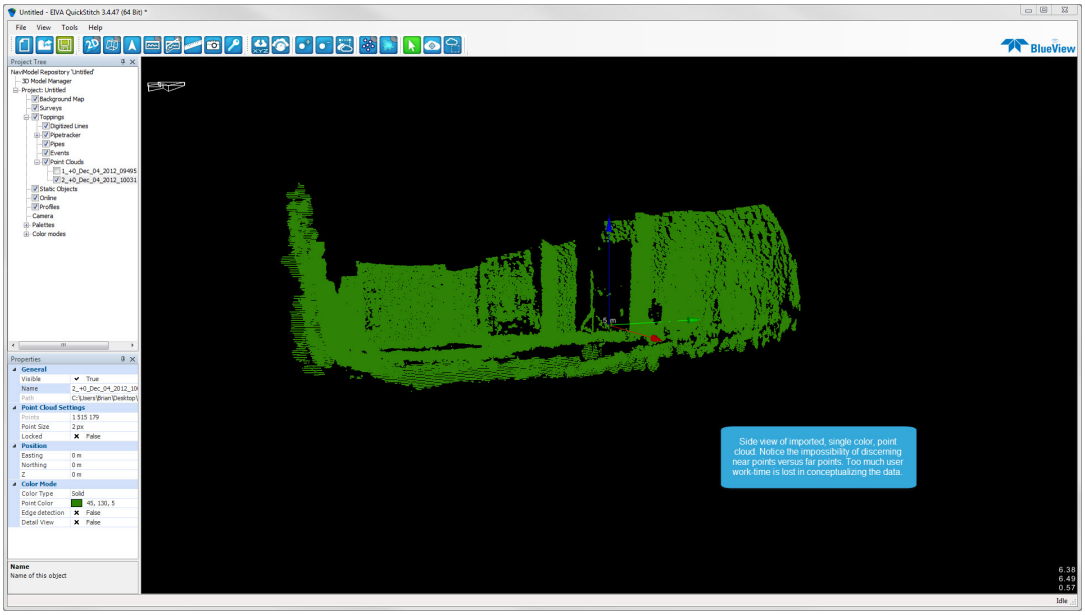
The end result: 10 cm cell size with well-matched features across two separate point cloud data sets merged into one

3 View Settings

This sub-section is designed to explain in detail the available point cloud viewing tools contained in the software.

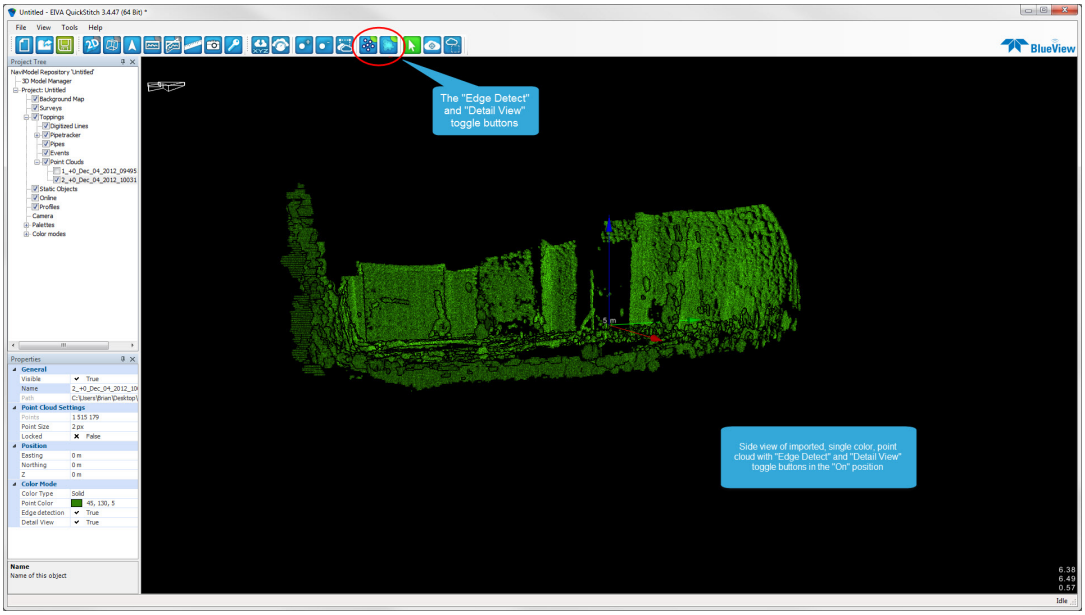
Edge Detection and Detail View Modes

All points in a point cloud data set are imported into the QuickStitch Main window in a single color. This is useful when importing multiple data sets as the individual points from any individual file are readily discernible. For a user, this could also lead to some confusion while spatially conceptualizing a single data set in the Main window. The following example images illustrate the mentioned issue regarding single-color point cloud rendering:



Determining near-field vs far-field data points is difficult

QuickStitch utilizes point edge detection and detail view settings to mitigate the difficulty in conceptualizing a single color data set rendered in the Main window. Left-click both the "Edge Detection" and "Detail View" toggle buttons on the Main toolbar above the Main window.



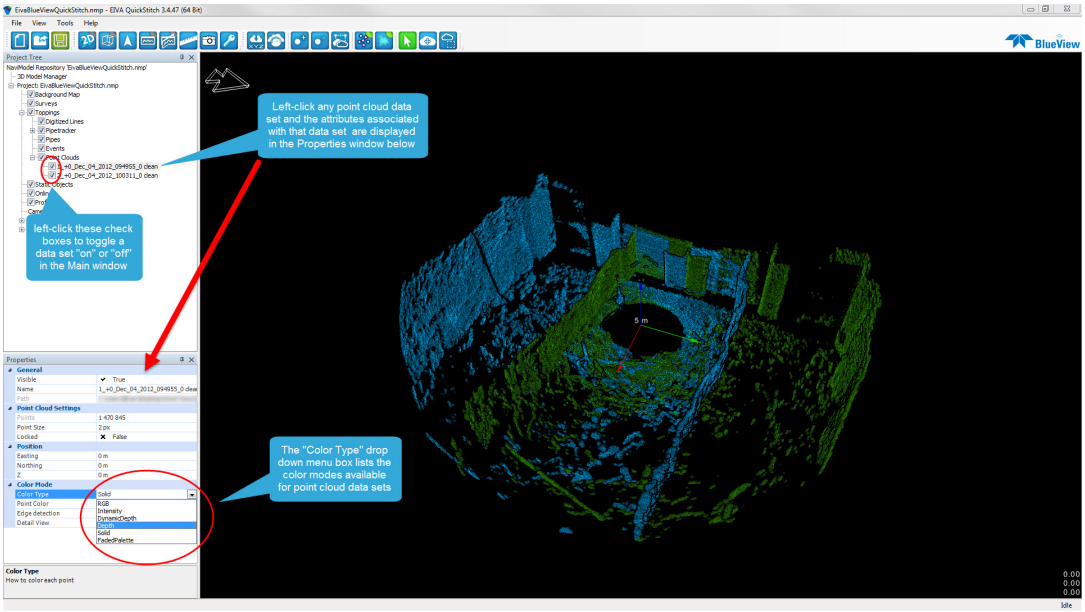
Note the enhanced 3D representation created by turning on the Edge Detection and Detail View toggle buttons

- Edge Detect toggle button: Creates a black outline around groups of localized points. The grouping is determined by zoom-level and the proximity of one point in relation to another
- Detail View toggle button: Utilizes partial point transparency to visually orient points in 3-dimensional space

The data set is not changed in any way by using either of these settings. Both of these toggle buttons are best left in the "On" position until a specific situation requires one or both be set to "Off".

Color Modes

Various pallet choices are available for displaying the loaded point cloud sets. Each data set maintains a unique set of independent attributes that are managed via the Properties window. Left-click an imported point cloud data set in the Project Tree window under the Project > Toppings > Point Clouds heading and the attributes associated with that selected point cloud are displayed in the Properties window.



Each point cloud data set has an associated set of modifiable attributes that display in the Properties window

The selectable color schemes are as follows:

- RGB

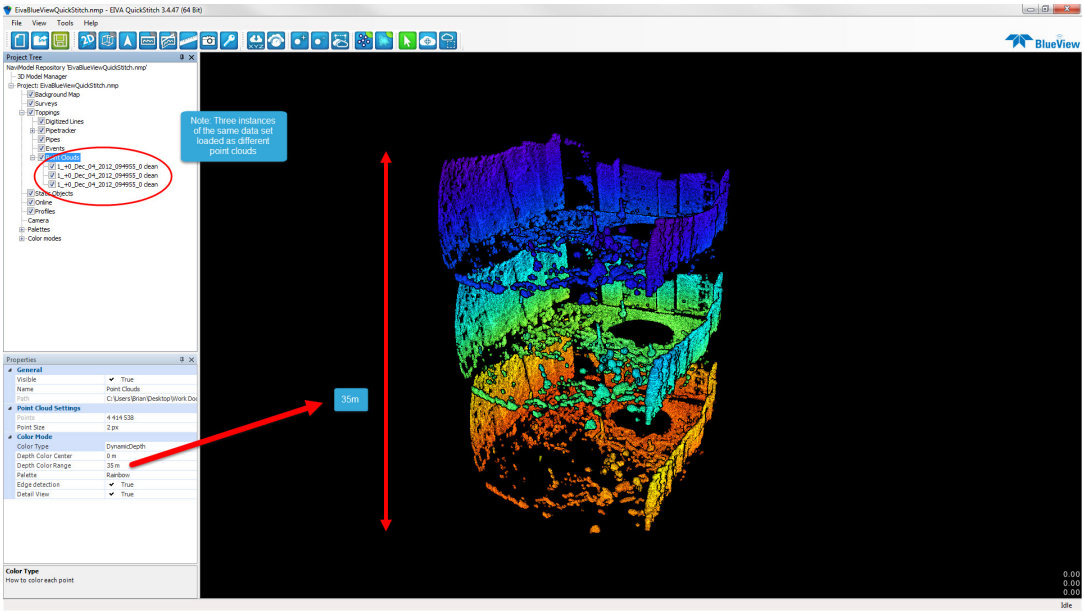
Default color pallet without additional modifiable attributes

- Intensity

Refers to backscatter strength of the sonar return and shades the point cloud data set proportionally. Point clouds without backscatter information or point clouds sonifying uniform materials (such as the inside of a metal sphere, for example) will be represented as monochrome under this color type selection. Intensity is best explained as the return magnitude of the transmitted sonar pulse. Less "hard" surfaces will tend to absorb a larger percentage of the pulse energy yielding a darker color-value, while "harder" surfaces will reflect more of the transmitted energy leading to brighter colored points in the point cloud. It is important to remember that this color type is not associated with displaying data density in any way, but rather suggests gradients between the "hardness" of sonified surfaces. See below for an example of a point cloud data set displayed using the "Intensity" color type.

- Dynamic Depth

This color type assesses the depth (Z) value of all loaded points across all point cloud data sets and assigns the shoalest point the associated least-depth color-value of the selected color pallet. The point with the highest depth value across all loaded data sets is assigned the max-depth color-value of the same color pallet. Each remaining point is linearly assigned a color-value based on its depth in relation to the max/min Z across all loaded data sets.



Illustation of the Dynamic Depth color type across 3 identical but translated data sets

Note: The value in the Properties > Color Mode > Depth Color Center edit box does not affect the assigned point color-values in the "Dynamic Depth" color type. The value in the Properties > Color Mode > Depth Color Range edit box sets the color-value range as one-half of the value above and one-half of the value below the origin. The origin is assigned the middle color-value of the selected color pallet.

- Depth

While the Dynamic Depth color type assigns color-values across all data sets, the Depth color type assigns color-values based on a max/min Z value per individual point cloud data set. Across different data sets, points with the same depth may have different color-values, but within each point cloud all points with identical depths will share the same color-value.

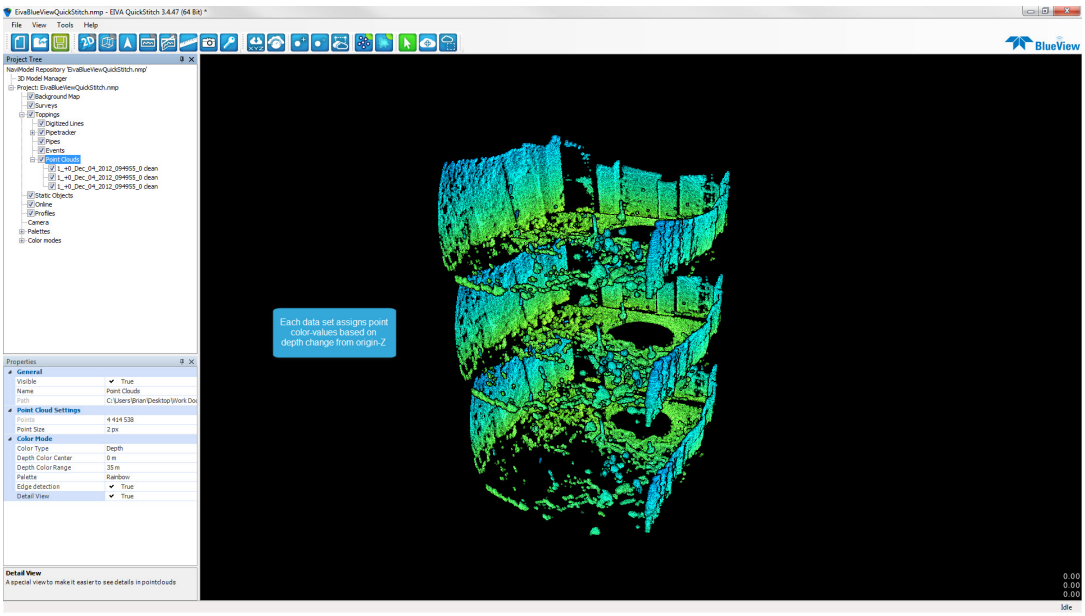


Illustration of the Depth color type across 3 identical but translated data sets

Note: The value in the Properties > Color Mode > Depth Color Center edit box translates the origin per data set that amount. Color values are then assigned to points in the same data set based on the value in the Properties > Color Mode > Depth Color Range edit box and the translated origin. Remember that the "Depth" color type assigns color-values per data set.

- Solid

Assigns identical color-values to points contained in the same data set. Each point cloud data set can be assigned the same or different color-values via the Properties > Color Mode > Point Color edit-box/drop-down-menu.

- FadedPalette

As the distance from the origin increases, points are assigned an increasing "darkness" value until the distance from the origin as set in the Properties > Color Mode > Fade distance edit box is reached. At this distance, all points further from the origin are rendered completely black. Changing the background color in the View Settings window to a value other than Black will display the completely darkened points as having a black color-value.

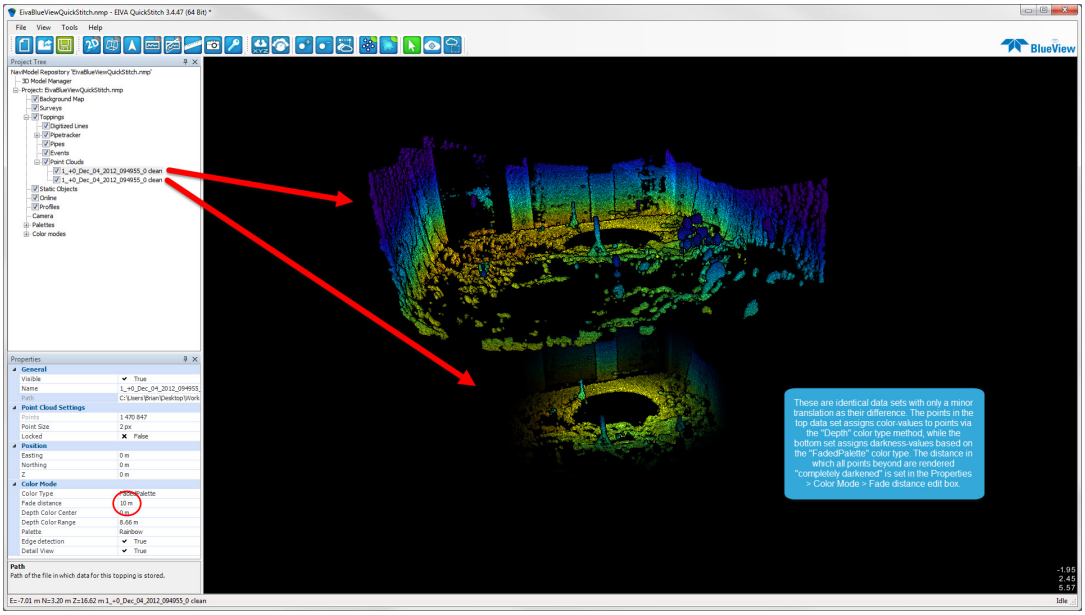
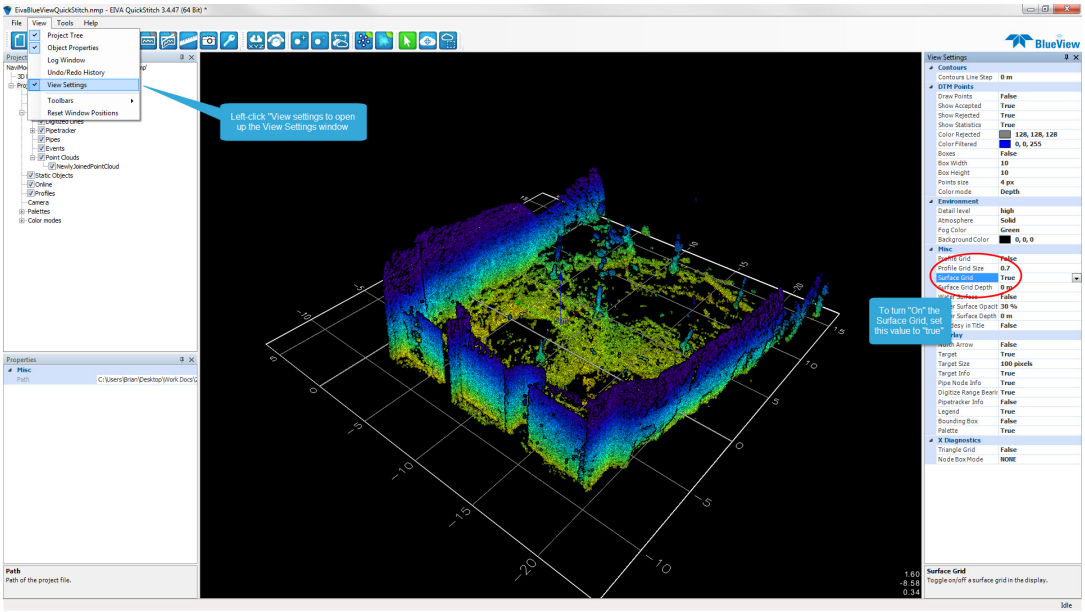


Illustration of the FadedPalette color type across 2 identical but translated data sets

The Surface Grid

The surface grid is used as a spacial reference while assessing disjointed point cloud data sets. Distances are easily estimated across the project space when the Surface Grid is "On". It can be turned on via the main File menu.

- Left-click View > View settings in the main File menu
- Find the Misc > Surface Grid selection box in the View settings window and change the value from "false" to "true" by using the drop-down menu



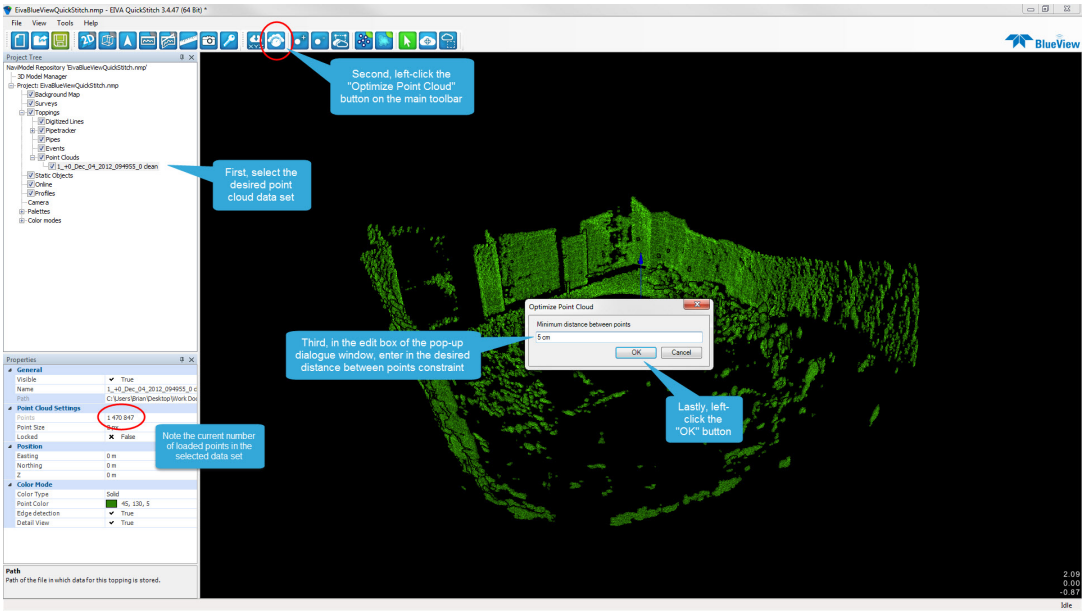
Illustrating turning on the Surface grid

4 Optimizing

This sub-section is designed to explain in detail the point cloud optimization tool designed to pare-down excessive amounts of data points.

MBES scanners and profilers can collect excessive amounts of data points. Sometimes, project specifications require the deletion of sonar record data points to a given resolution typically measured in points-per-cell whereby cell size is also designated. QuickStitch provides a toolbar function to pare-down point cloud data as needed based on project constraints. It also follows that less-dense point clouds significantly reduce data processing time by orders of magnitude.

Under the "Point Clouds" heading in the Project Tree window, left-click the desired point cloud data set to optimize. Left-click the "Optimize Point Cloud" button on the main toolbar. In the "Optimize Point Cloud" pop-up dialogue box, enter the desired minimum distance between data points. For example, an entered value of "5 cm" will leave a single point at the center of a sphere with radius of 5cm and delete the remaining points within the sphere. This guarantees that the next nearest point will be no less than 5cm from the first one. Left-click the "OK" button in the "Optimize Point Cloud" pop-up dialogue window.

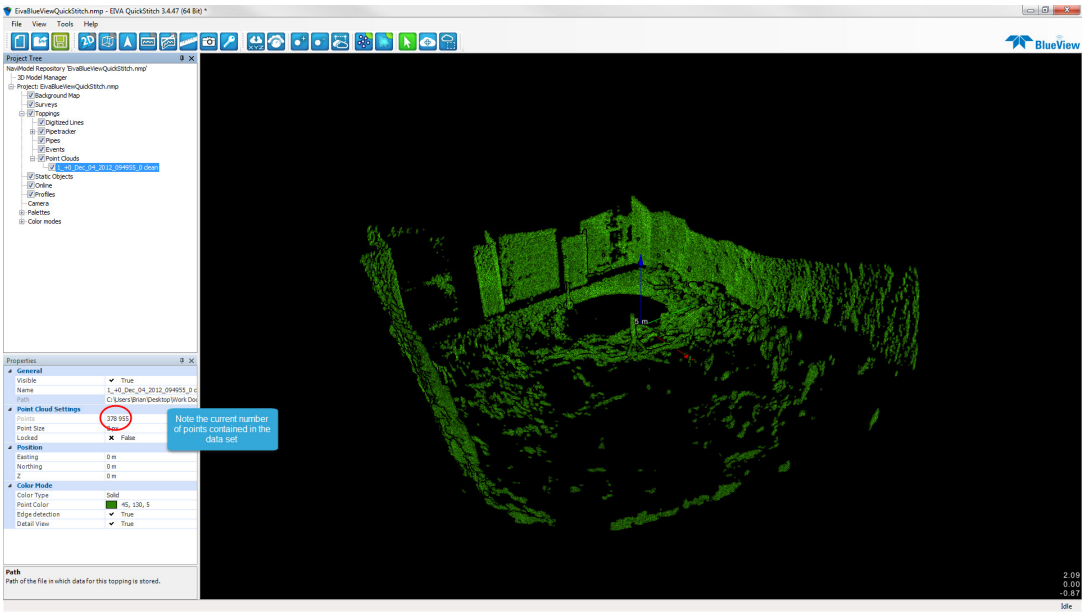


Process for paring-down the number of points in a loaded data set

The algorithm proceeds through the data set eliminating points until all those remaining are verified as valid given the entered distance constraint. The "Optimize" pop-up dialogue box opens detailing the number of points to be removed based on the supplied distance value entered during the previous step. Left-click the "OK" button to accept the removal of the deleted points, or left-click "the "Cancel" button to reject the removal of the marked points.

Left-clicking the "OK" button removes the marked points and updates the Main window with

the pared-down data set.



Note that in this example the number of points in the data set decreased from 1.4 million to under 0.4 million

For this data set the reduction to 5 cm node points decreased the point count to less than 1/3 the original number.

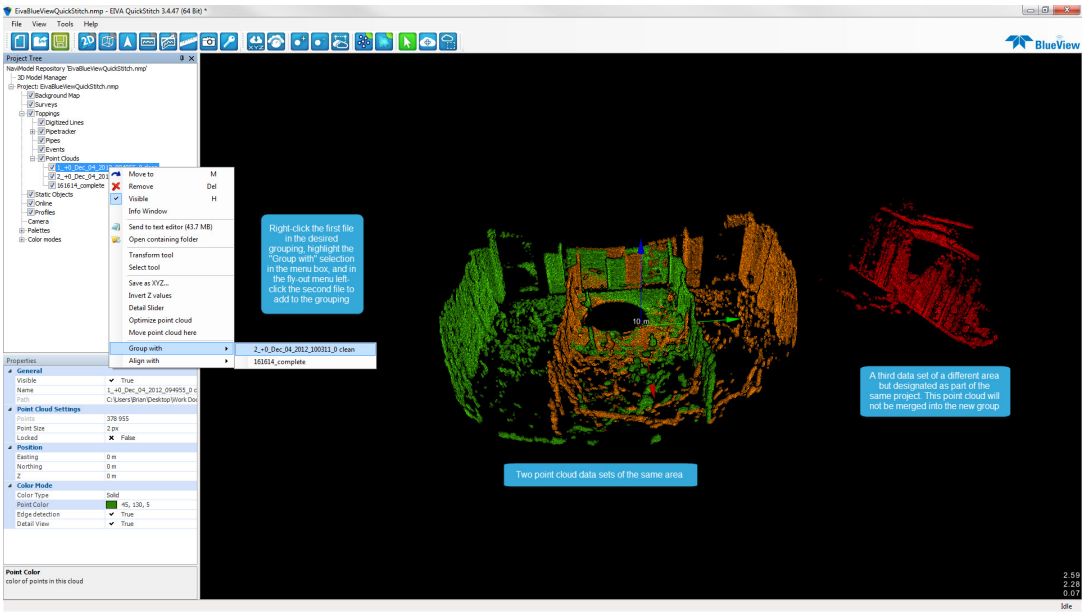
5 Merging and Splitting

This sub-section is designed to explain in detail the steps involved in associating and disassociating two or more distinct point cloud data sets into one manipulable grouping.

In QuickStitch it is possible to load multiple data sets and perform manipulations on each set individually. However, it is also possible to associate two or more data sets into one or more groupings and perform algorithms on each of these individual sets of associated point clouds. This can be useful if, for example, four point cloud data sets exist in a single area, two of these sets are near one fixed reference point, and the other two data sets are near a second fixed reference point. All four data sets are part of the same project, but clearly they should be grouped along the lines of the corresponding proximity to fixed locations.

In the following example, two MBES sonar records are collected of the same area and should be grouped for joint manipulation while excluding a third data set of a different yet adjacent area.

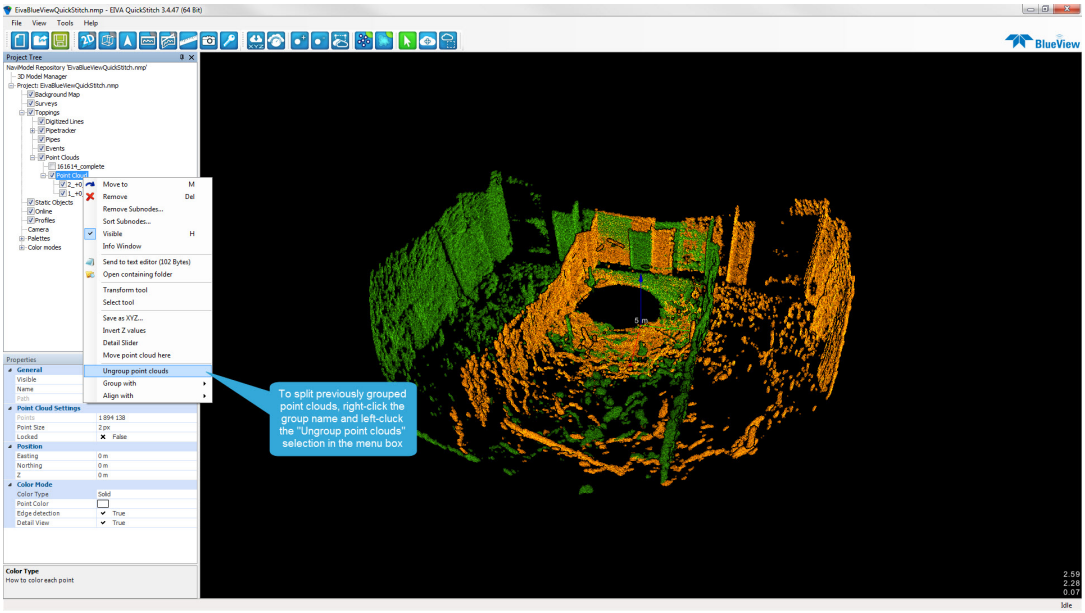
In the Project tree window under the "Point Clouds" heading, right-click the first file name of the two sets to be grouped together, highlight the "Group with" selection in the menu box, and in the fly-out menu left-click the second file to add to the desired grouping.



Process for merging two separate point cloud data sets into a single point cloud group

After the two data sets are grouped under a single heading with the modifiable default name of "Point Cloud", the attributes in the "Color Mode" collection box in the Properties window can be modified with any changes propagated through to the member data sets of the grouping automatically. Additionally, point cloud translations can now be affected throughout the new group. The individual point cloud data sets are manipulable individually and the ability to manipulate the group as a whole is added.

To split the data set grouping into its component point cloud parts, right-click the group name in the Project Tree window (the "Point Cloud" heading in this example), and left-click the "Ungroup point clouds" menu selection in the menu box.



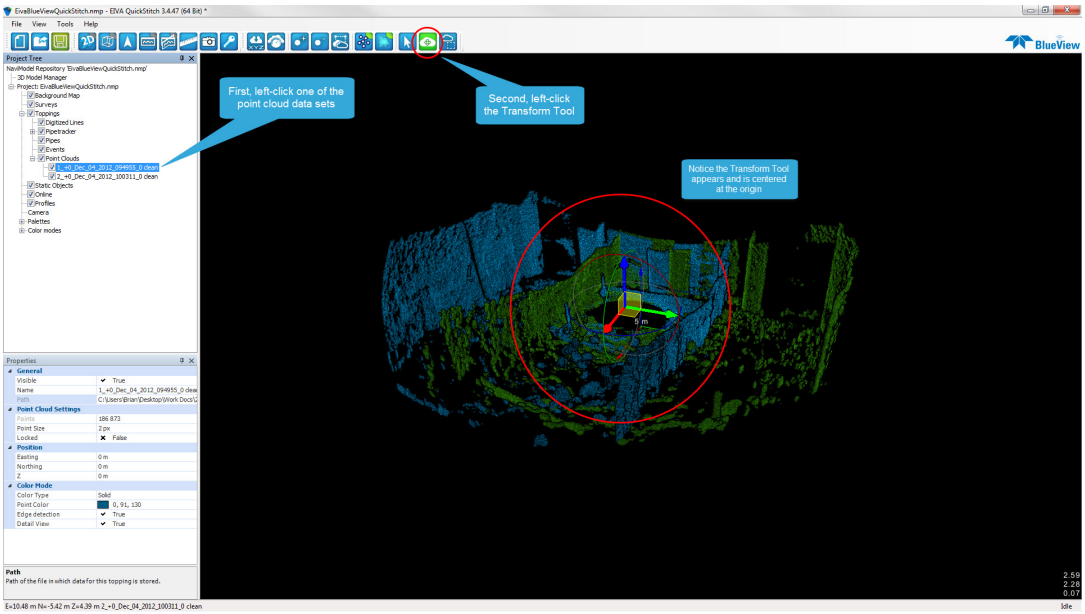
Ungrouping point cloud data sets

6 Manual Adjustments

This sub-section is designed to explain in detail the steps involved in manually translating various point cloud data sets using the Transform Tool.

While QuickStitch offers automated tools for point cloud manipulation, sometimes well-reasoned manual manipulation of data sets is required to produce an acceptable result. The Transform Tool allows three-axis movement and rotation. Additionally, point cloud data sets can move along any of the two-dimensional planes freely.

Left-click a point cloud data set under the "Point Clouds" heading in the Project Tree window and then left-click the "Transform Tool" icon in the main toolbar above the Main window. A spherical tool opens in the main window centered at the origin (0,0,0).

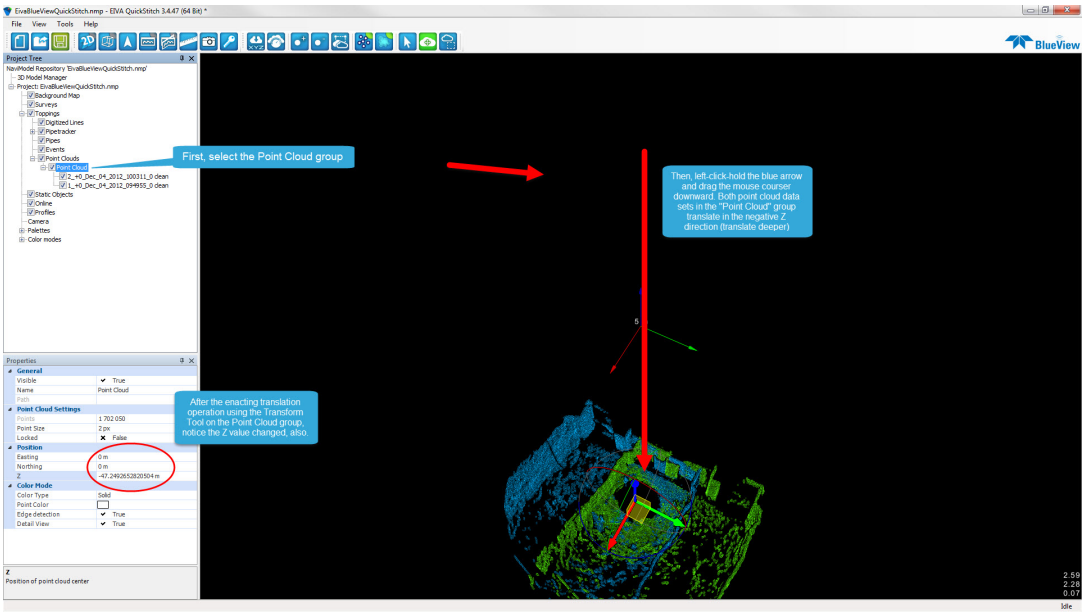


Opening the Transform Tool

The pivot point of Transform Tool is initially set to the origin. Left-click-hold on the blue arrow of the Transform Tool allows for depth axis translation, the red arrow translates in the +/- Easting direction, and the green arrow translates in the +/- Northing direction. Left-click-hold either the blue, red, or green circle. As the mouse courser is moved along the arc of the circle, the point cloud is rotated around the correspondingly colored axis. Rotations around each axis can be positive or negative depending on the arc chosen on a given axis circle. Additionally, the smaller yellow square planes created for each of the three planes allow point cloud movement bound in that associated plane. For example, left-click-hold on the yellow square created between the red and green arrows. Drag the mouse courser anywhere in the Main window and the selected point cloud data set will move in the Easting-Northing plane.

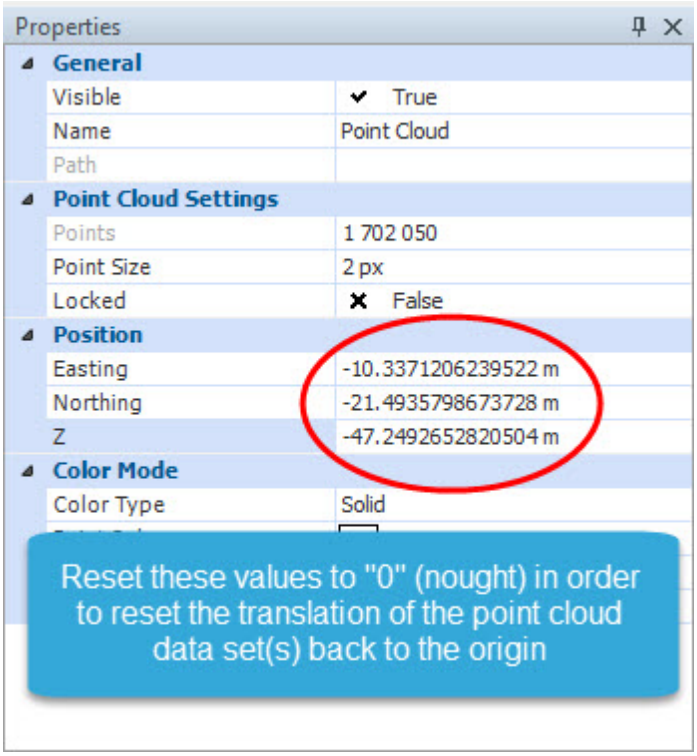
Left-clicking between data sets allows for translation of the current selected point cloud.

Data set groups can also utilize this tool. Create a group of two or more point cloud data sets. The default name of the newly created group is "Point Cloud" and is located under the "Point Clouds" heading in the Project Tree window. Select the Point Cloud group by left-clicking on the group label in the Project Tree window. The Transform Tool now performs translations and rotations on both data sets included in the Point Cloud group.



Translating a grouping of point cloud data sets is handled similarly to translating a single point cloud

If it is desired to recenter one or more loaded data sets after successive translations, then type the value "0" (nought) in each of the "Easting"/"Northing"/"Z" edit boxes in the Properties window under the Position collection. Each data set translated back to the origin needs selection in the Project Tree window before the three fields of a given data set are editable in the Properties window.



Set values to "0" to translate data sets back to the origin

7 The Undo/Redo Box

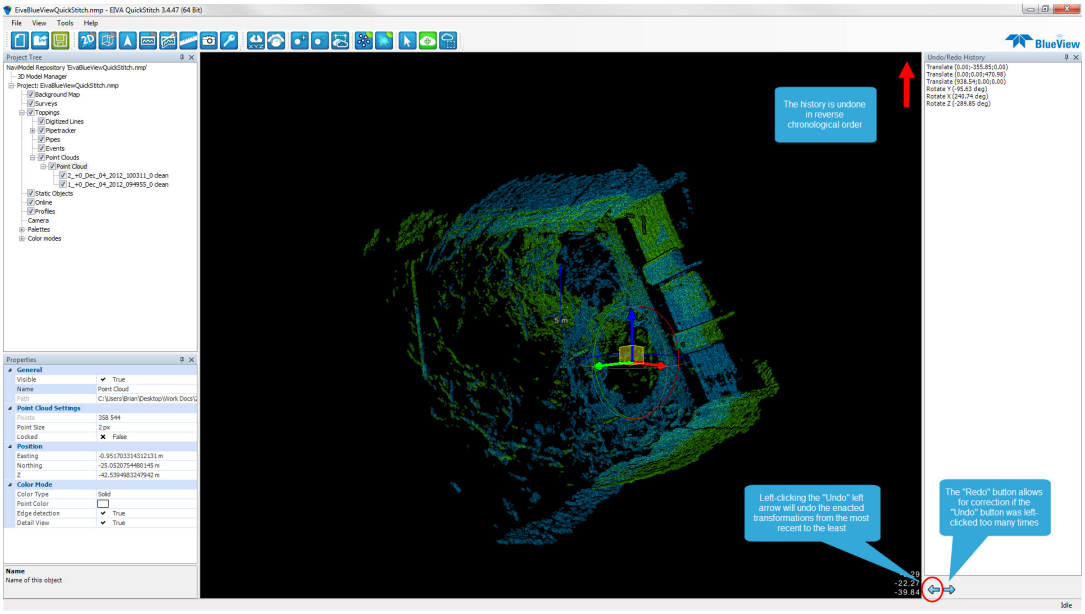
This sub-section is designed to explain in detail the functionality of the Undo/Redo box.

Rotations and transformations are occasionally done in err or excess. QuickStitch tracks the history of these manipulations and allows a convenient to rectify such occurrences.

- In the main File menu, left click View > Undo/Redo History.

A box entitled "Undo/Redo History"opens and anchors within the Main window. As translations and rotations of the point cloud data sets occur, an ordered list of the actions will propagate within this box. Left-clicking on the blue left and right arrows at the bottom of this box will undo (left) and redo (right) the user's data transformations. The most recent action is always at the bottom of the list and will be undone upon the first left-click of the left arrow. The list operates as a Fist In Last Out (FILO) queue and no entries may be skipped or jumped.

Using the "Transform Tool" button, enact a number of transformations on the selected point cloud data set.



The FILO Undo/Redo box explained

- Left-click the "Undo" and "Redo" buttons to return the data sets to the original postiion

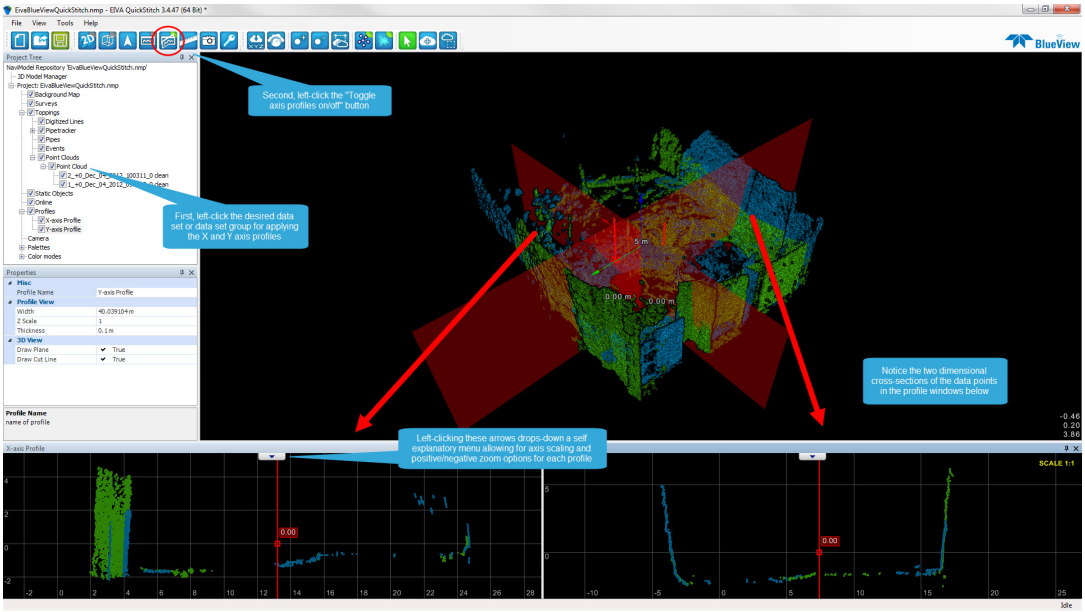
8 Profile Views

This sub-section is designed to explain in detail the steps involved in accessing the available profile views of the point cloud data sets.

Sometimes it is good to view the point cloud data sets in cross-profile, two-dimensional framework. QuickStitch supplies built-in functionality for simultaneous X and Y plane dynamic profiles. These profile views allow users to notice and delete noisy data points that otherwise might be overlooked.

- In the Project Tree window left-click a data set or data set group containing points to observe in the X and Y axis profile windows
- Left-click the "Toggle axis profile on/off" button in the main toolbar

The X and Y axis profiles open anchored at the bottom of the Main window. Two shaded planes bisect the point cloud displayed in the Main window. These shaded planes correspond to the view of the axis profiles at the bottom of the Main window. Positive zoom in the X-axis Profile window results in the X-axis shaded plane becoming smaller, while negative zoom will result in a lager X-axis plane in the Main window.



X and Y axis profile view. Notice the red vertical lines in the profiles correspond to the red arrows along the shaded planes in the Main window

Using the arrow keys on the keyboard will move the profiles forward and back yielding continuous cross-sections of the point cloud. This is very useful for determining outlying points that missed deletion earlier on in the point cloud cleaning process. The Transform Tool can be used in tandem with the profile views.

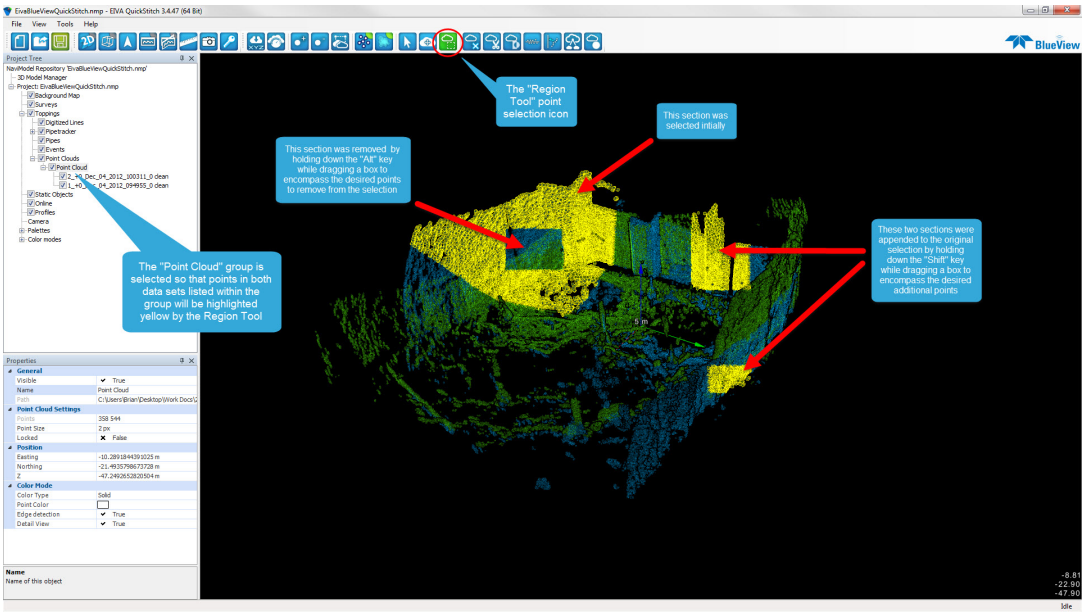
9 Point Selection

This sub-section is designed to explain in detail the steps involved in selecting and deselecting point cloud points and utilizing the functions associated with these actions.

Box Selection Mode

Point selection is most frequently used to delete additional points from a given point cloud data set or to re-accept points previously deleted in error.

To select a set of points, left-click the point cloud data set to edit in the Project Tree window. On the main toolbar above the Main window left-click the "Region Tool" icon. Additional icons will appear on the toolbar. Move the mouse courser to the Main window and left-click-hold to drag a box enclosing the desired points. All selected points will turn yellow. To deselect points, hold the "Alt" key while click-holding the left mouse button to drag a box enclosing the points to remove from the current yellowed selection. To append additional points to the selected set, hold the "Shift" key while click-holding the left mouse button to drag a box enclosing the new points to include. The selected areas do not have to be contiguous.

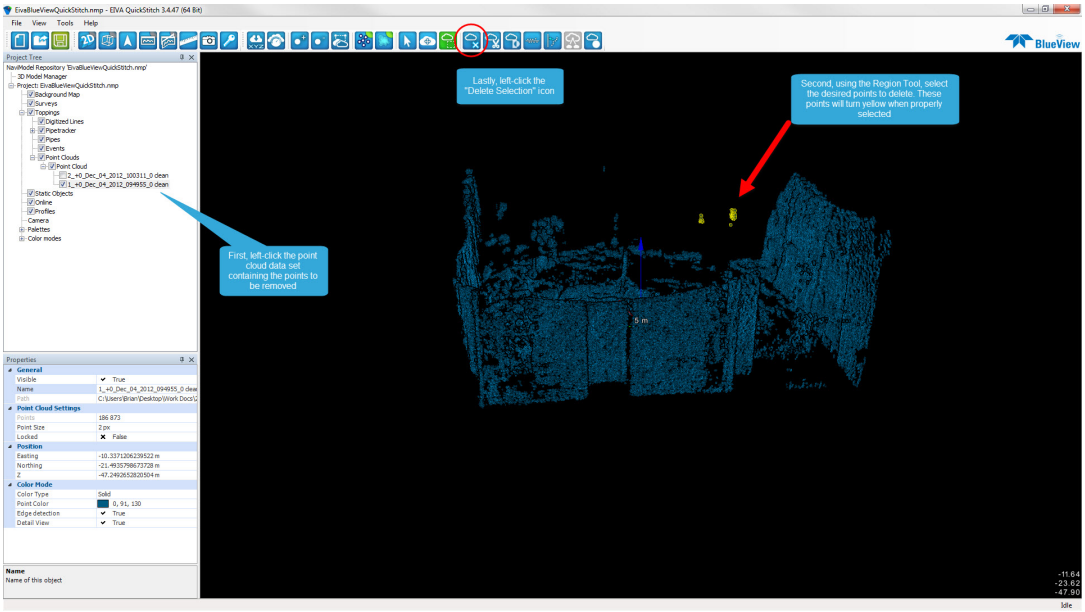


Holding the "Shift" key appends additional points to a selection, while holding the "Alt" key removes previously designated points from a selection

The Region Tool can be used to select points in a single data set or in multiple data sets. Points across multiple data sets can be selected by creating a group containing two or more point clouds as detailed in the Merging and Splitting Point Cloud data Sets section of this manual and then selecting the created merged group in the Project Tree window.

To delete points, left-click the desired point cloud data set or group in the Project Tree

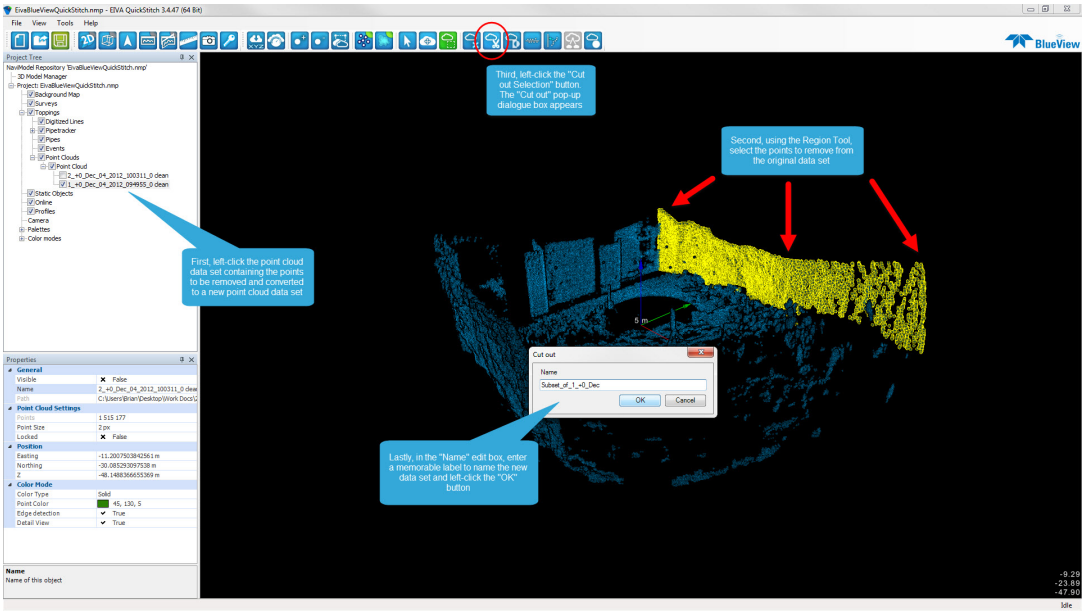
window, use the Region Tool to select the points to delete in the Main window, and left-click the "Delete Selection" icon on the main toolbar.



Deleting points from a single point cloud data set

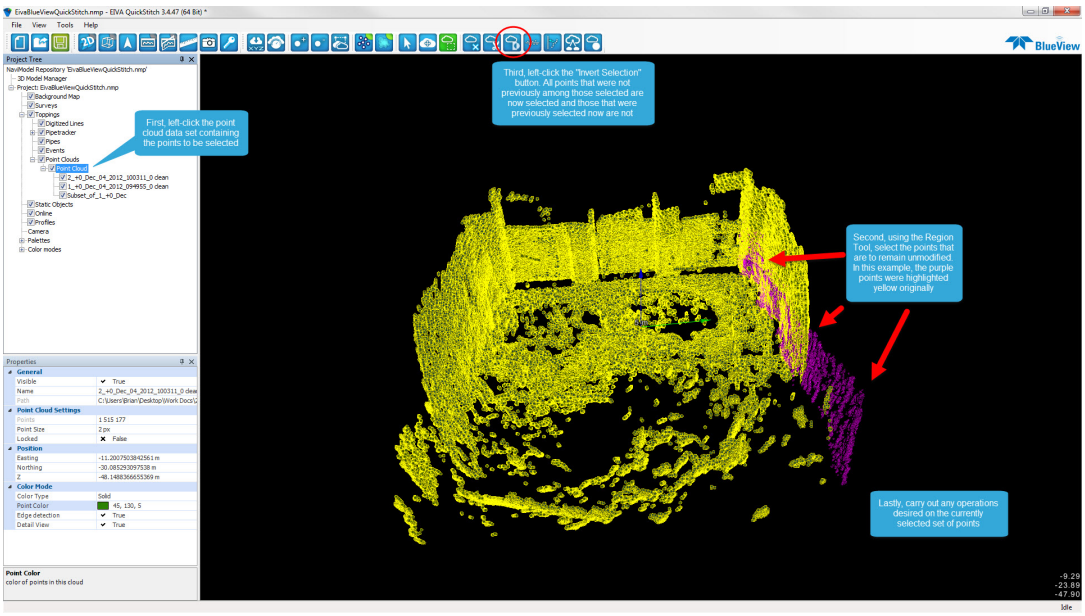
The Cut Out Selection Mode

The "Cut out Selection" button on the main toolbar removes a subset of points from a point cloud and creates a new point cloud data set with those removed points. Left-click the desired point cloud data set or group in the Project Tree window, use the Region Tool to select the points to remove from the first data set in the Main window, and then left-click the "Cut out Selection" button on the main toolbar.



Cutting a new data set from an existing point cloud

At times it is useful to select a small portion of a data set and delete all points outside that selection. The "Invert Selection" main toolbar button allows for this functionality. Left-click the desired point cloud data set or group in the Project Tree window, use the Region Tool to select the points to keep in the data set(s) in the Main window, and then left-click the "Invert Selection" button on the main toolbar. This button deselects the previously designated points and selects every other point not previously selected from the current point cloud data set. If a group of data sets was selected in the Project Tree window, then all other points across all data sets in the group are included in the inverse selection. At this point, the user can manipulate the yellow highlighted points as needed (delete, cut, etc).



The functionality of the "Invert Selection" main toolbar button

Radius Selection Mode

A last useful method to select points is to use the "Radius select" mode via the "Radius Select" button in the main toolbar. Radius select mode allows for point selection based around the target axes out to a user designated radius. Often, it is difficult to get a good rotation of the Main window display in order to delete a desired set of points in a point cloud. Radius select mode allows the selection of these difficult to designate points in the following manner:

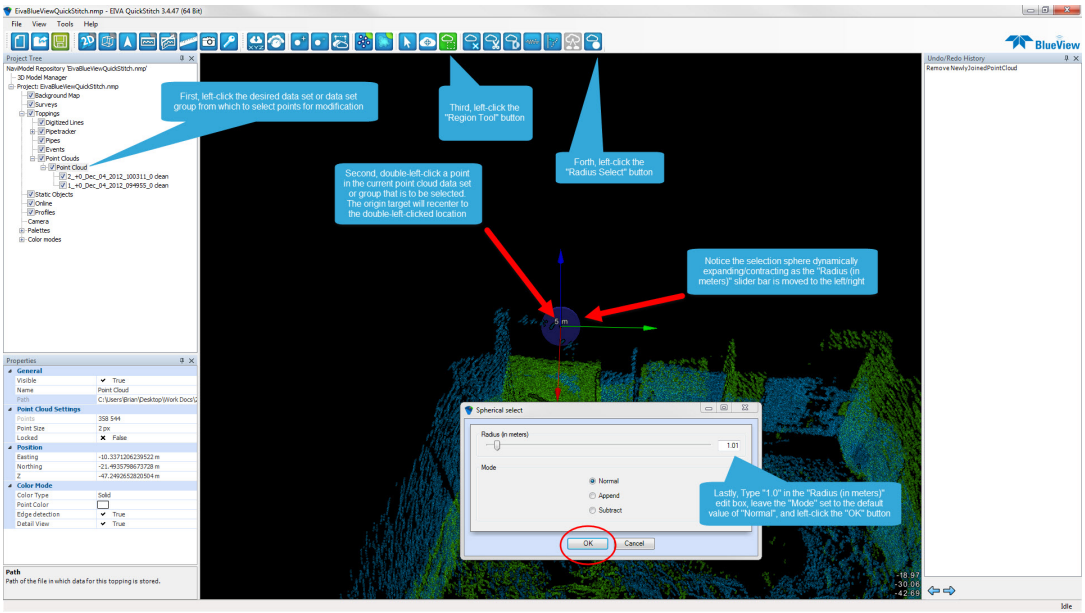
- In the Project Tree window left-click a data set or data set group containing points to delete
- In the Main window, double-left-click a point in an area of few or many points to delete. The view focus of the Main window will move to center the target origin on that double-left-clicked point
- Left-click the "Region Tool" button in the main toolbar
- Left-click the "Radius Select" button in the main toolbar

The "Spherical select" pop-up dialogue box opens. The "Radius (in meters)" slider bar or edit box are used to set the selection radius out from the target origin in the Main window. The "Mode" collection box has three mutually exclusive radio buttons. "Normal" means that only this current radius selection matters; if any other selections were made previously, then discard them. "Append" means to add the current radius selection to the set of already selected points, and "Subtract" means to remove the current radius selection of points from the previously selected set.

- Type "1.0" into the "Radius (in meters)" edit box and leave the "Mode" collection defaulted

to the "Normal" value

Before left-clicking the "OK" button, notice the small blueish sphere centered at the target origin in the Main window. The radius of this sphere matches the value entered into the "Radius (in meters)" edit box in the "Spherical select" pop-up dialogue box. The sphere will dynamically scale as the "Radius (in meters)" slider bar is moved to the left or the right.



The Radius Select point selection process

- Left-click the "OK" button

The points from within the sphere from the selected data set or group are highlighted yellow. Any other available operation can now be preformed on the selected points.

10 Plane Alignment

This sub-section is designed to explain in detail the steps involved in using the Snap-To functions to automatically move two corresponding dense areas of separate point cloud data sets.

The two available "Snap Points to" functions are "Water Level" and "Wall".

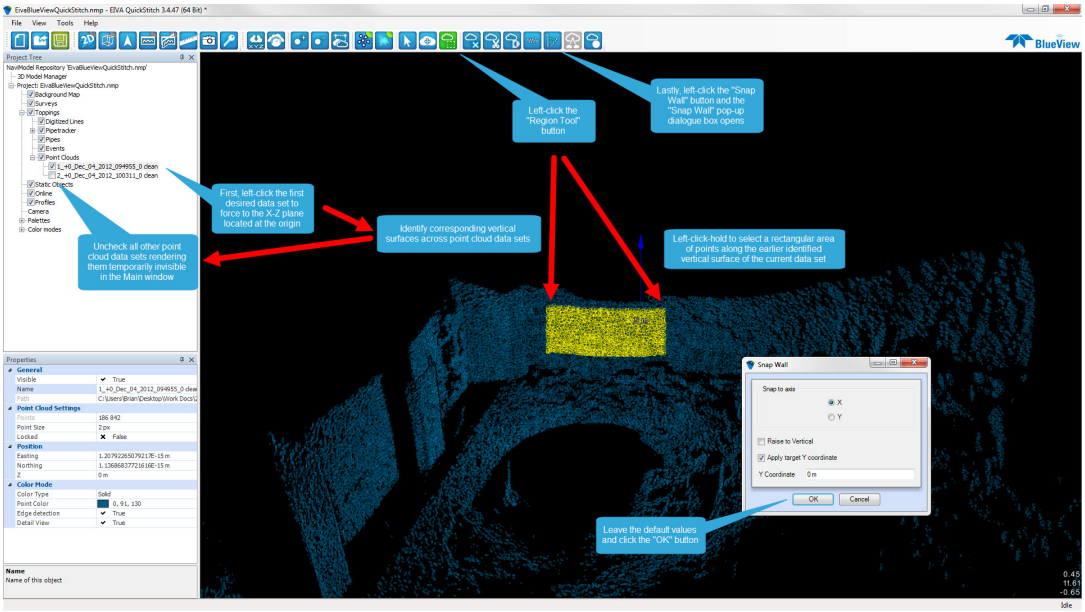
- Snap Points to Water Level attempts to level out the point cloud "floor" to nought degrees of inclination in any direction. Since point clouds are never uniformly flat anywhere this function creates a best approximation of the orientation of the "floor" of the point cloud and levels that approximation to zero degrees.

- Snap Points to Wall attempts to move and level vertical features against the X-Z plane at the origin. The basic idea is that two separate point cloud data sets of the same area should match together pretty well when forced against the same translations and rotations (i.e. the fixed X-Z plane at the origin).

These functions are good, quick starting off points for the fine-tuning of manual manipulation using the Transform tool.

Snap Points to Wall Function

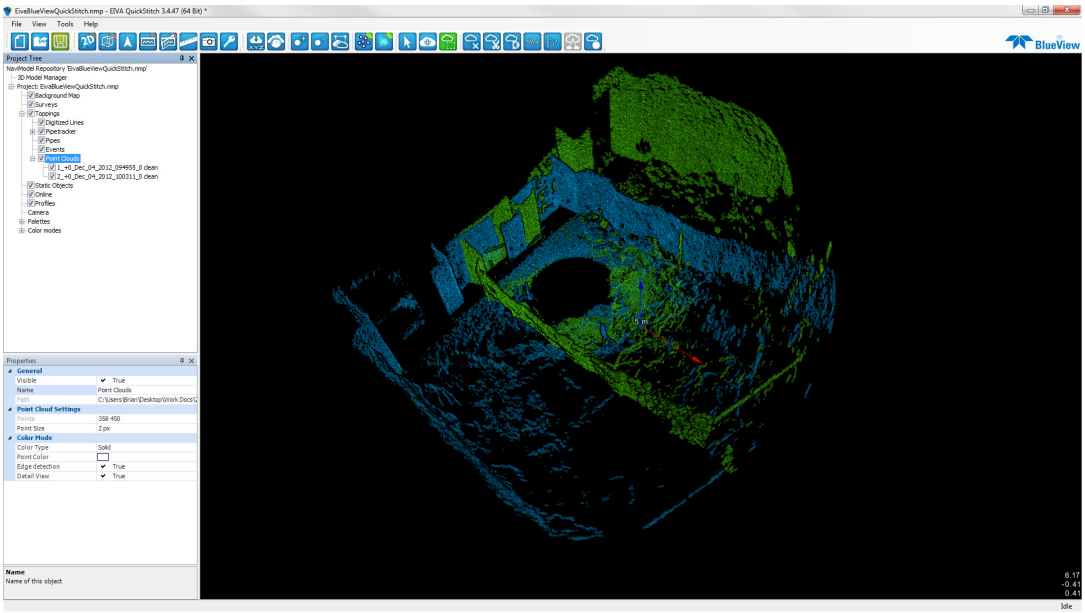
- Under the "Point Clouds" heading in the Project Tree window, left-click the first data set to utilize the "Snap Points to Wall" function
- Identify corresponding vertical surfaces across point cloud data sets
- Uncheck the check-box next to any other point cloud data sets in the Project Tree window in order to effectively turn all other data sets "off"
- Left-click the "Region Tool" button in the main toolbar
- Left-click-hold to select a rectangular area of points along the identified vertical surface in the current data set. A larger rectangular selection of points is preferable to a smaller one
- Left-click the "Snap Wall" button in the main toolbar
- Leave the default values in the opened "Snap Wall" pop-up dialogue box
- Left-click the "OK" button



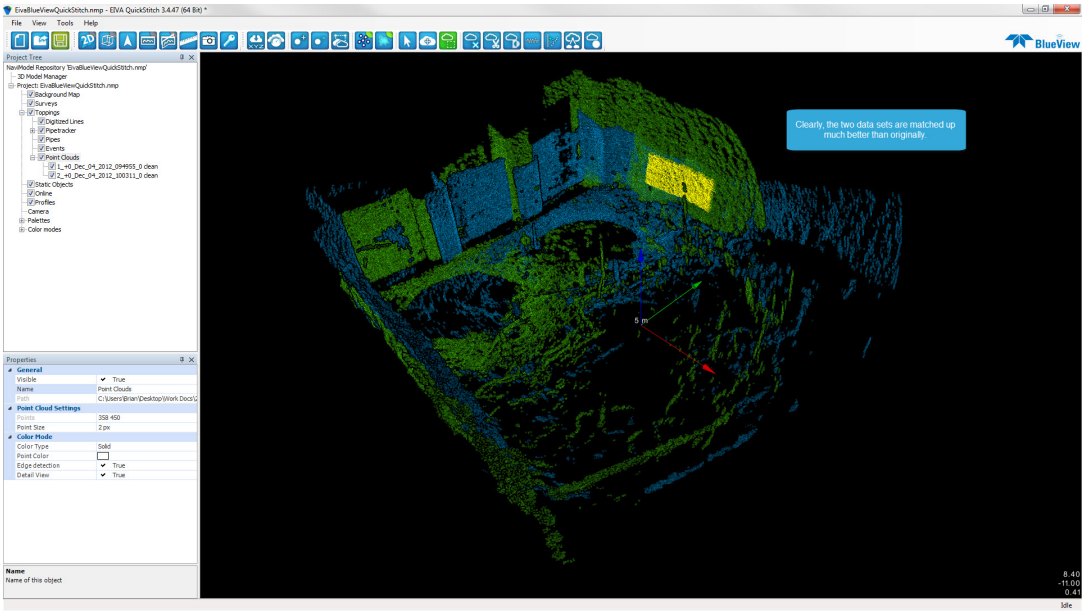
Illustrating the use of the "Snap Points to Wall" function

- Run the same process on another local data set. Be sure to select the same vertical surface in the second data set as was selected in the first.
- Turn "on" all point cloud data sets to view the results in the Main window

The Before picture containing raw data:



The Post-Processing picture after running the "Snap Points to Wall" function on the two contained point cloud data sets:

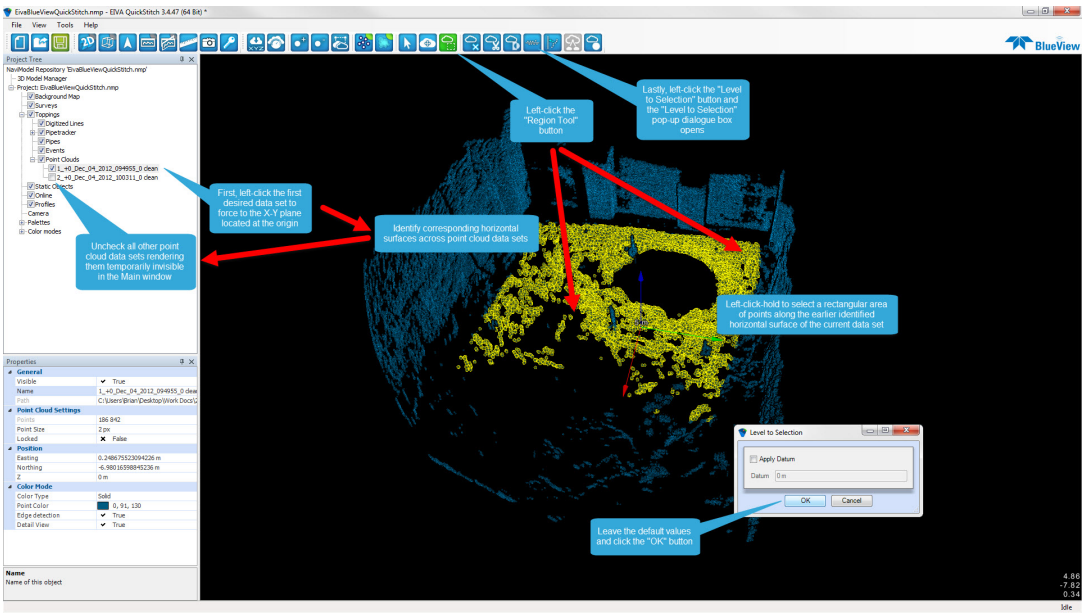


The end result of the rough "Snap Points to Wall" function

Snap Points to Water Level Function

Now that the "Snap Points to Wall" function has oriented the point cloud data sets mostly on top of each other, the data can be better refined by using the "Snap Points to Water Level" function.

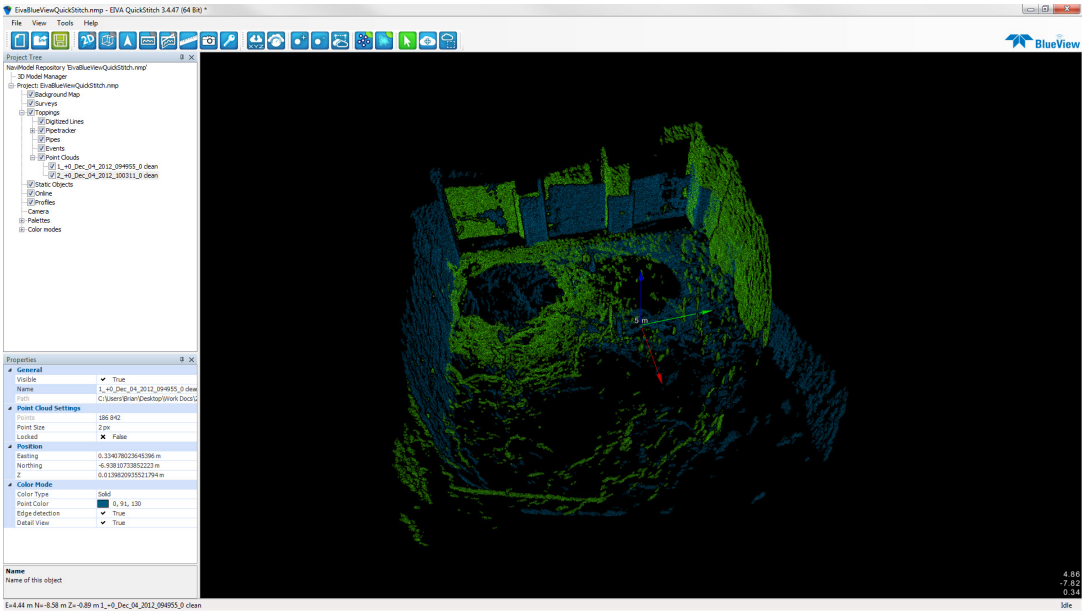
- Under the "Point Clouds" heading in the Project Tree window, left-click the first data set to utilize the "Snap Points to Water Level" function
- Identify corresponding horizontal surfaces across point cloud data sets
- Uncheck the check-box next to any other point cloud data sets in the Project Tree window in order to effectively turn all other data sets "off"
- Left-click the "Region Tool" button in the main toolbar
- Left-click-hold to select a rectangular area of points along the identified horizontal surface in the current data set. A larger rectangular selection of points is preferable to a smaller one
- Left-click the "Level to Selection" button in the main toolbar
- Leave the default values in the opened "Level to Selection" pop-up dialogue box
- Left-click the "OK" button



Illustrating the use of the "Snap Points to Water Level" function

- Run the same process on another local data set. Be sure to select the same horizontal surface in the second data set as was selected in the first.
- Turn "on" all point cloud data sets to view the results in the Main window

The Post-Processing picture after running both the "Snap Points to Wall" and "Snap Points to Water Level" functions on the two contained point cloud data sets:



While the results are not perfect nor complete, the Quick-and-Dirty "Snap Points to Wall" and

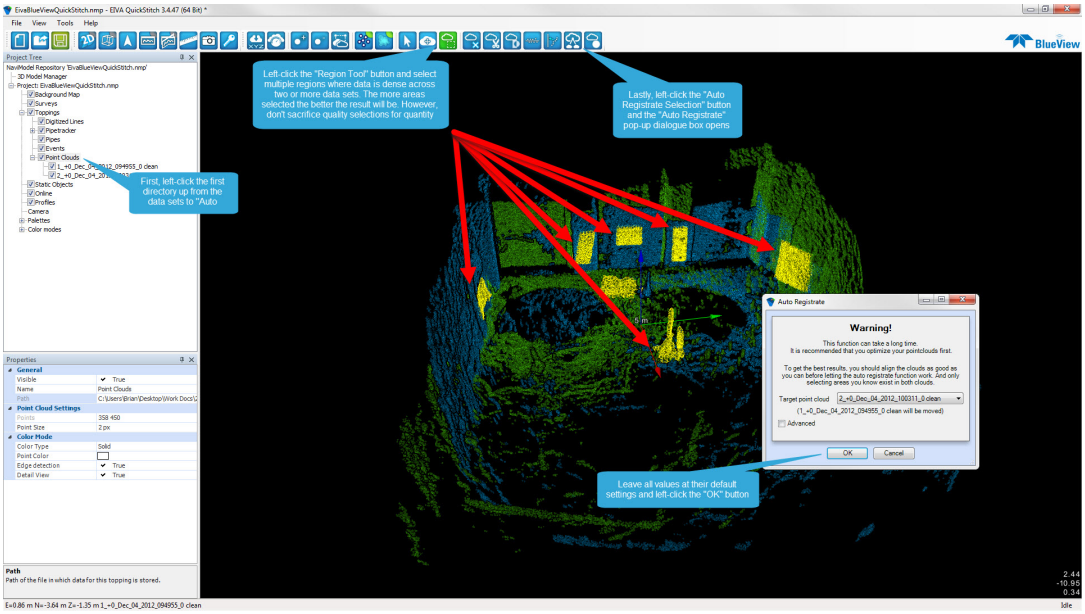
"Snap Points to Water Level" functions yield a much nicer place to start than the raw data.

11 Auto Stitching

This sub-section is designed to explain in detail the steps involved in letting QuickStitch auto stitch together two separate point cloud data sets.

Auto Stitch works best when data sets are already roughly matched by previously using the "Snap Points" functions and the "Transform Tool" on the data. However, Auto Stitch does a great job of rotation and translation in getting data sets of the same area to match up. Auto stitch requires two or more point cloud data sets to function.

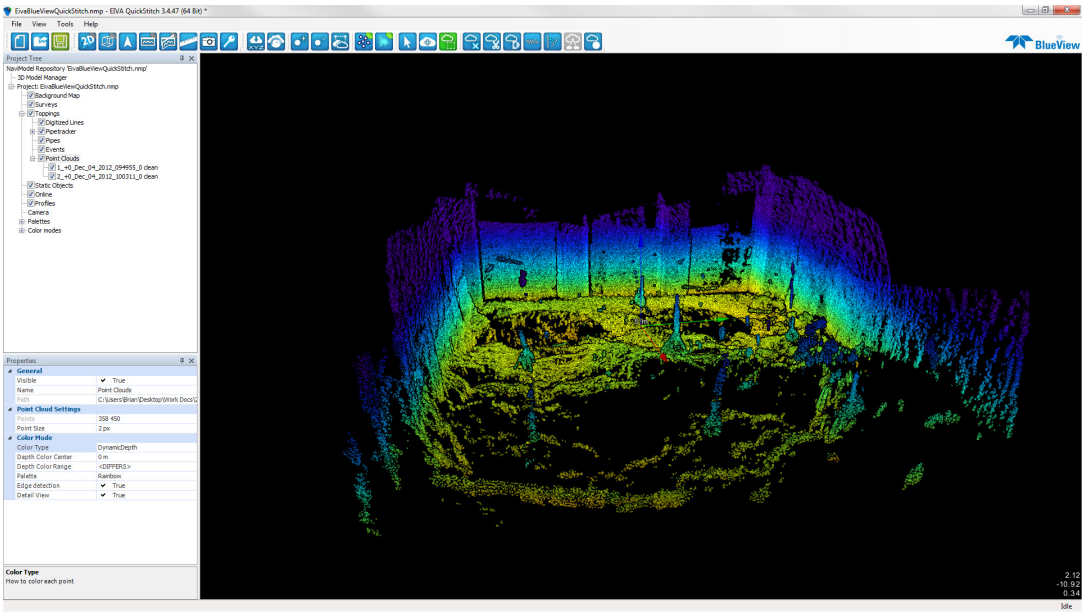
- Under the "Point Clouds" heading in the Project Tree window, left-click the first directory up from the data sets to auto stitch. Typically, this directory will be labeled "Point Clouds".
- Check the check-box next to all point cloud data sets to be auto stitched in the Project Tree window in order to effectively turn all data sets "on"
- Left-click the "Region Tool" button in the main toolbar
- Left-click-hold to select a rectangular area of points along any surface that contains two or more data sets with sufficiently dense sets of points in each. Holding the "Shift" key, repeat this selection process multiple times. As more areas are selected, the function returns better results. However, do not select insufficiently dense areas of points as the quality of the result will deteriorate rapidly.
- Left-click the "Auto Register Selection" button in the main toolbar
- Leave the default values in the opened "Auto Register" pop-up dialogue box
- Left-click the "OK" button



The process in Auto Stitch implementation

The end result of the Auto Stitching procedure is displayed below with the following final processing steps:

- The color type was changed to "Dynamic Depth" value in order to better see the interior features of the sonified area
- The auto stitched point cloud data sets were exported as a single data set and then re-imported back into QuickStitch
- Once the single point cloud data set was re-imported the "Optimize Point Cloud" function was run again to once more pare-down the amount of superfluously loaded data points



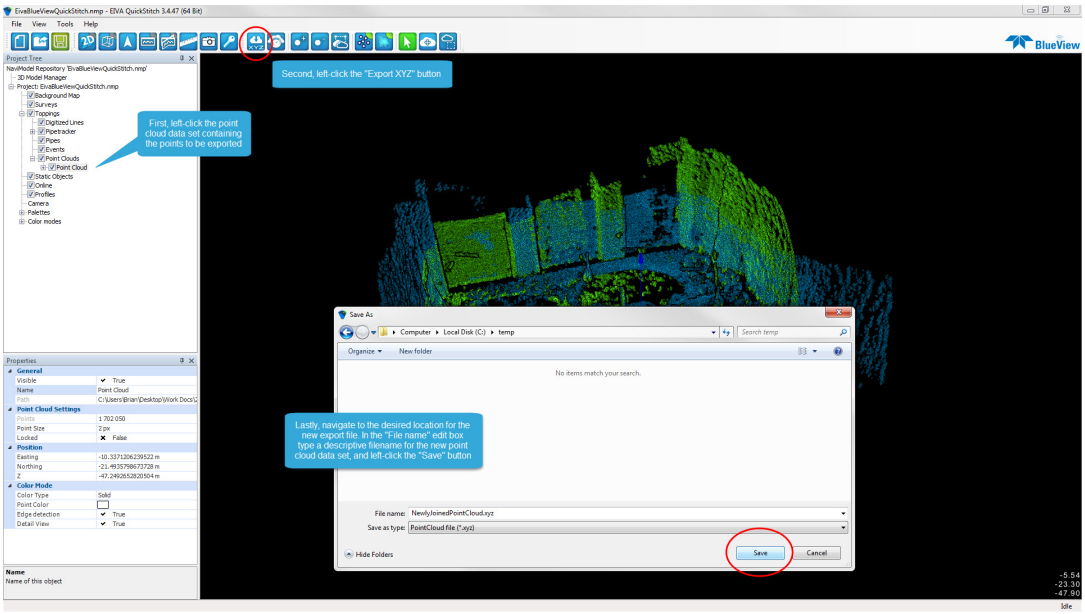
The end result: 10 cm cell size with well-matched features across two separate point cloud data sets merged into one

12 Exporting Point Data

This sub-section is designed to explain in detail the steps involved in exporting modified point cloud data sets.

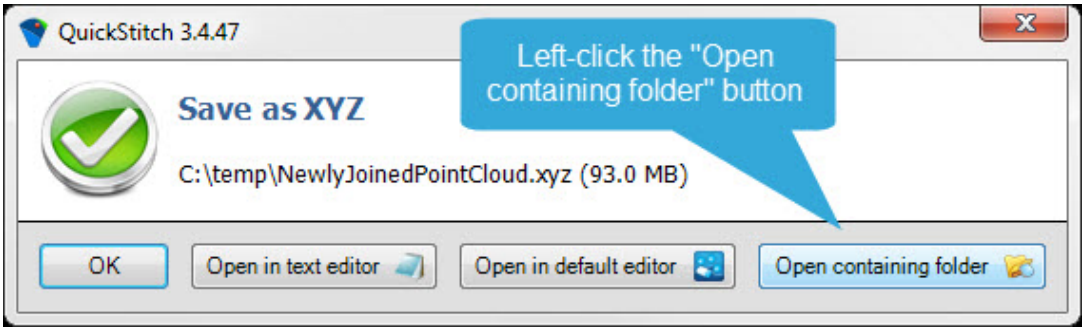
After modifying one or more point cloud data sets, it is important to be able to export the modifications. QuickStitch enables this functionality via the "Export XYZ" button in the main toolbar. To export the modified point cloud(s) follow these steps:

- Left-click the point cloud data set or group in the Project Tree window to export
- Left-click the "Export XYZ" button on the main toolbar
- In the Windows Explorer pop-up "Save As" dialogue box, navigate to the directory to story the exported *.xyz file
- In the "File Name" edit box, type a descriptive file name to represent the newly modified point cloud
- Left-click the "Save" button



Exporting modified point cloud data sets

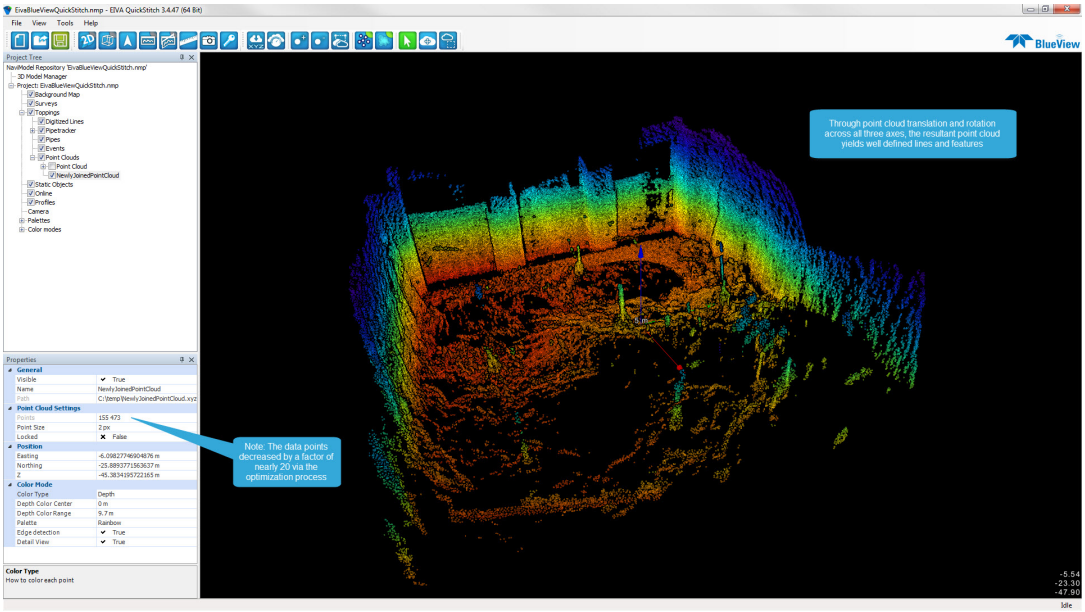
A confirmation pop-up dialog box opens. Left-click the "Open containing folder" button.



A Windows Explorer pop-up window opens to the newly exported *.xyz file location. Drag and drop the newly created *.xyz file into the Main window of the QuickStitch program for successful export verification.

This new point cloud data set can be optimized as well to pare-down the number of points to one per user designated area (10 cm in this example).

The final product of two manually manipulated data sets optimized and exported as a single point cloud is illustrated in the image below:

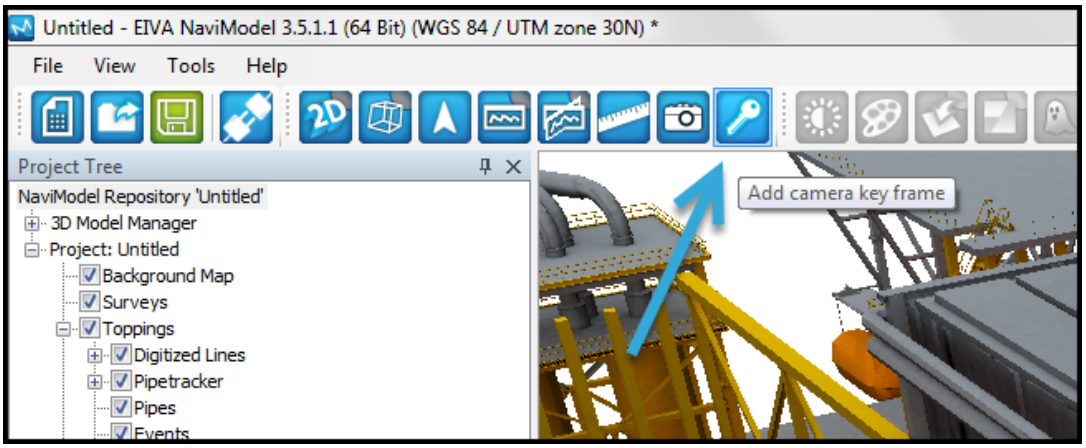


Final joined and exported point cloud data set

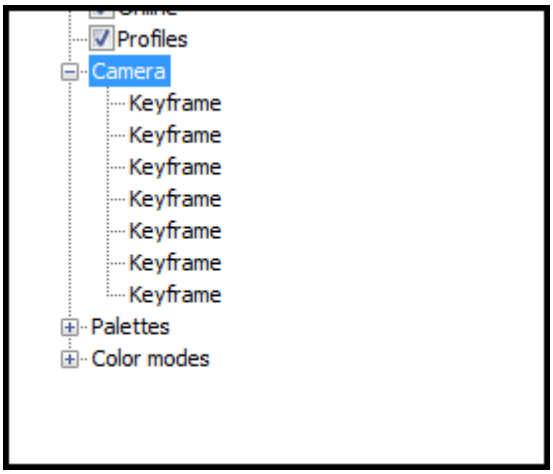
13 Fly Through Recording

You can create fly through videos directly from QuickStitch. The resulting video is guaranteed to be 30 fps, although the frame rate might be lower during the actual rendering and recording of the video. To create a fly through, you should first define the camera path.

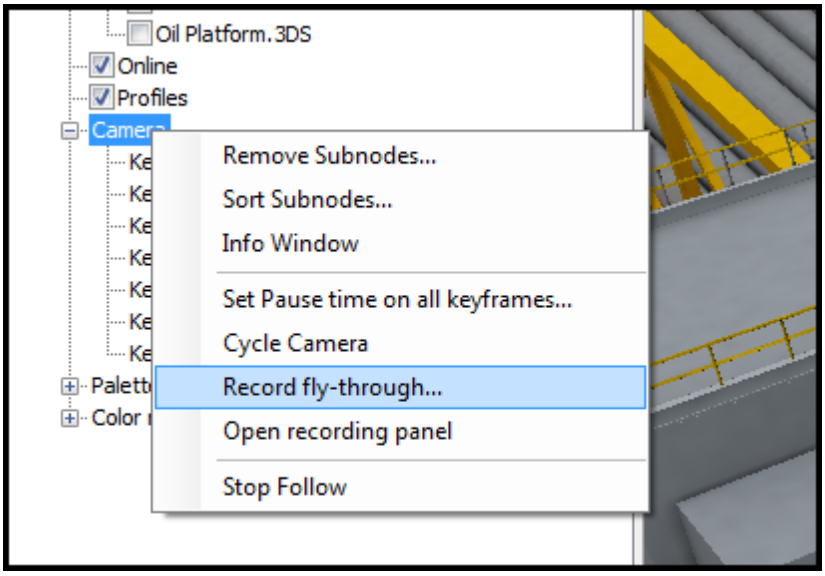
1) Move the view to where the fly through should start.
2) On the View Toolbar, click the "Add camera key frame" button.



3) Move to where you want the camera to move next, and click the "Add camera key frame" button again.
4) Keep adding key frames until you have designed all stops on your route



5) Right click the Camera node to "Record fly-through..."


Oil Platform.3DS
Online
Profiles
Remove Subnodes...
Sort Subnodes...
Info Window
Set Pause time on all keyframes...
Cycle Camera
Record fly-through...
Open recording panel
Stop Follow