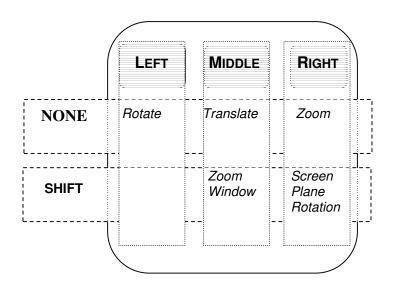
MOUSE OPERATIONS

Use the mouse in the graphical window as shown below.



FYI:

To stay in dynamic mode, press and hold the CTRL key.

To rotate or translate the image, place the mouse over a point on the image, and **<u>not</u>** in the background. This applies when the image is zoomed in so tightly that individual points are surrounded by background.

Overview of Steps

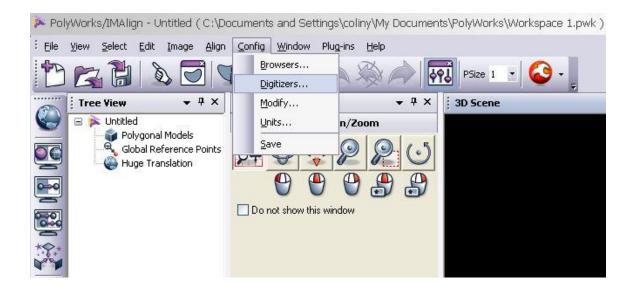
- 1. Configure the digitizer (first time only).
- 2. Open/import the first data file.
- 3. Subdivide by Range, as part of interpolation.
- 4. Import the second file, repeating the above steps.
- 5. Align the two images.
- 6. Alignment and comparison.
- 7. Global alignment (for 3 or more images).
- 8. Lock the image alignment (for 3 or more images).
- 9. Reduce the image overlap.
- 10. Save the aligned images

Step 1: Configure the Digitizer

Carry out this step the first time you use IMAlign.

- 1. Select Config \rightarrow Digitizers.
- 2. Under *Recommended Settings* \rightarrow *Digitizer*, set *Digitizer* to *Optech (in meters)*.

Select *Config* \rightarrow *Save* to save the recommended settings for all future IMAlign sessions.

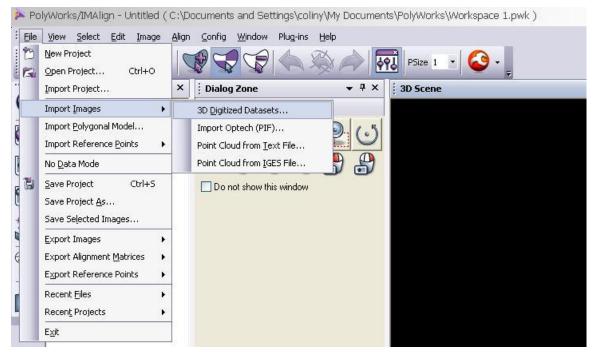


X

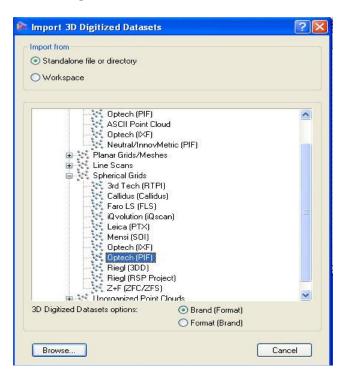
Step 2: Open/Import the First Data File

Before images can be aligned, they must be imported. Images are imported one at a time.

Select File \rightarrow Import 3D Digitized Datasets.



Select \rightarrow Spherical Grids \rightarrow Optech (PIF)



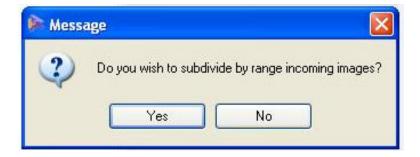
Navigate to the .pf file that you want, and press Open.

Note that *.*pf* files are created by the ILRIS-3D Parser from scanner data.

🍺 Import P	IF Files (Optech)			? 🔀
bridge 1_ta	pf ask38_section1 ask39_section1 ask40_section1 ask41_section1			
File name:	bridge 1_task39_section1		·	Open
Files of type:	Optech Files (*.pf;*.pif)	2		ancel
Keep files (external to workspace			

Step 3: Subdivide by Range, as part of interpolation.

Select \rightarrow "Yes" when asked to Subdivide By Range



Select \rightarrow OK when you set the following values

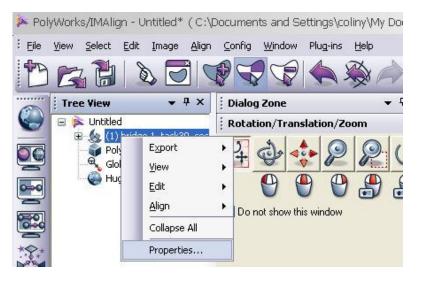
File name: bridge 1_ta	ask38_section	1.pf
Interpolation step:		
Max angle:	85.00000	0
Max edge length:		
Subdivision angle:	30	~
Subsampling factor:	1/1	~

Change the step at focus to the spot spacing of the scan or a higher value. The spot spacing value can be found in the Parsing Log text file found in the parsed Pf folder.

gelett Edit Image Align Config Window Plug-ins Help 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	🗭 Subdivide by Ran	ige 🛛 📝 🚺	5
Image: Subdivide by Kange Image: Subdivide by Kange Verdad Verdad Hogo Produktion Image: Subdivide by Kange Verdad Verdad Number of surger: 2 Verdad Hogo Produktion: 2 Verdad Base garanding: 2 Verdad Foour distance: 100 000000 Step of locus: 0.052211 Mase garanding: 0.052201 Reget minb Minimum distance: 13007546 Masimum distance: 13007546 Masimum distance: 13007546 DE: Upsdate Cancel	Number of ranges: Elevation axis: Min interpolation step: Base parameters Focus distance: Step at focus:	ask38_section1.pf (2) 3 2 0.000000 100.000000 0.063211	
	Max edge length: Range limits Minimum distance: Maximum distance: Reset	0.500000 13.007546 268.269628 Use Sliders	
Venir [Hstogram]		pdate Cancel	

Locking the First Image

1) Click on the scan located on the tree window and then right click on the mouse to bring up an Object Properties box. Select Properties.



2) Select \rightarrow the "Locked" option and press "Apply" button.

Tree View 👻 🕈 🗙	Dialog Zone 👻 🕂 🗙	3D 5
🖃 膟 Untitled	: Properties	? X
 (1) bridge 1_task39_sec Polygonal Models Global Reference Points 	Name: ridge 1_task39_section1	
Huge Translation	Format: pif Subgroup: 1 Index: 1	1
	Image Interpolation Display modes	
	Minimum Z value: Scaling factor: 1.000000 Source in workspace: bridge 1_task39_section1	
	Hidden Inverted	
	Auto-apply Previous Next	-
	Apply Close	

3) The image is now locked and another scan can be imported next.

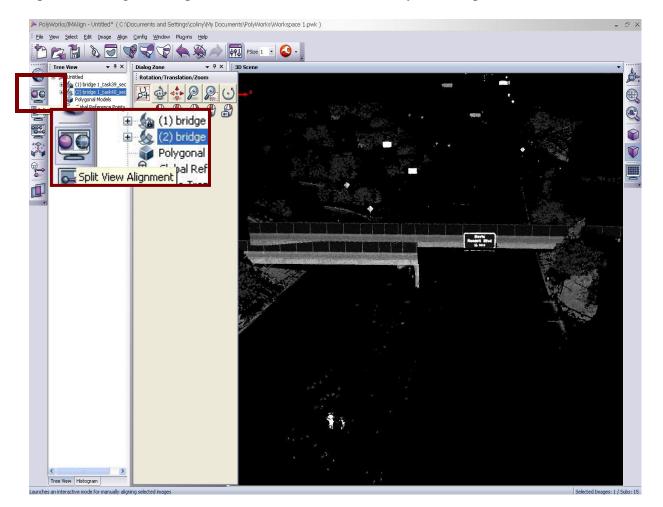
Step 4: Import the Next Image

- 1. Repeat the above steps to import the next image.
- 2. Remember to set the proper Step value for each image file.

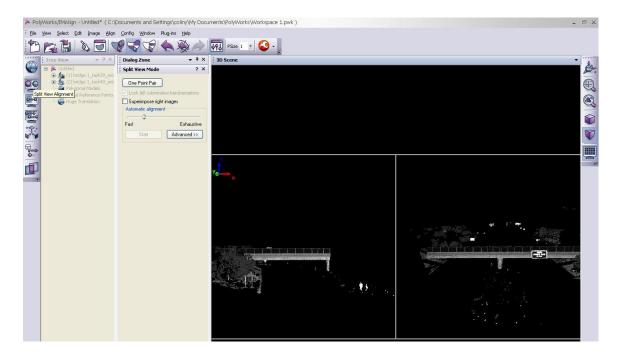
You can import more than two images.

Step 5: Align the Two Images

You will see that there is two images below after you have imported them. Click on the Split View Alignment Option button as seen below so that you can separate them.

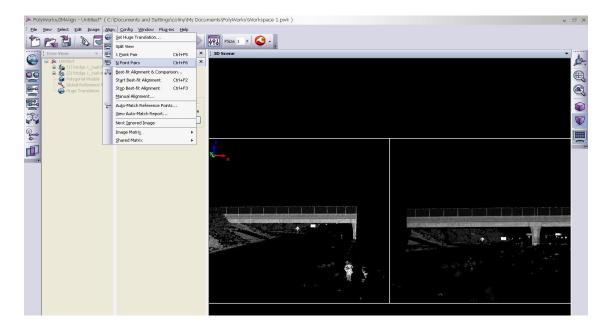


Re-orient the newly added images, aligning the two images to approximately the same perspective, by using the left image as your reference as seen below.

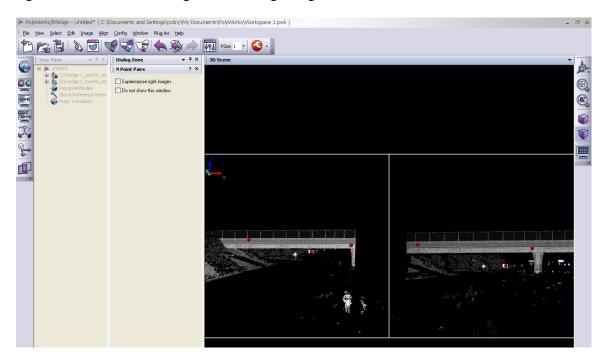


To start aligning the images select:

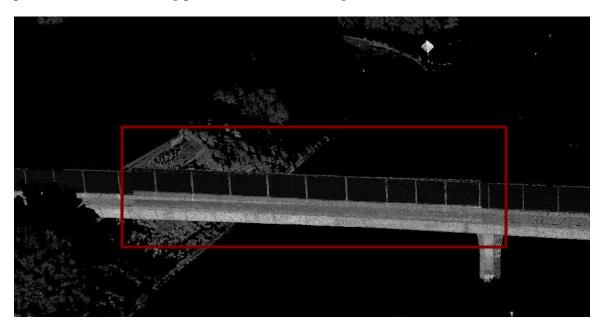
Align \rightarrow N Point Pairs (as seen below)



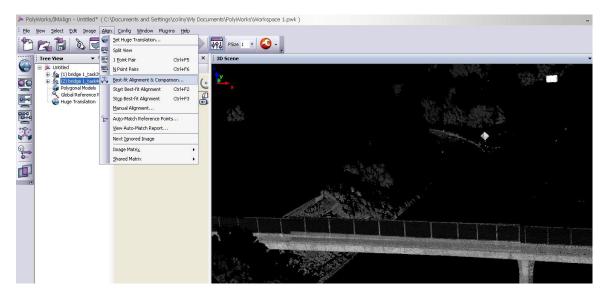
A pointer shaped as a pencil will pop up. The user can now select common features found on the two images with a minimum of three common features, which needs to be selected for the alignment to work as seen below. When you are done selecting, click on your right mouse button to bring the two images together.



After roughly aligning the two images together you can see that there is a slight misalignment on the image below. IMAlign now finds the best alignment between the images automatically. To do this, IMAlign uses an iterative algorithm that computes an optimal alignment by minimizing the 3D distance between surface overlaps in a set of 3D images acquired from unknown viewpoints. IMAlign searches a radius around each point to find the matching point from the other image.



To align the images more precisely choose Align \rightarrow Best-fit Alignment & Comparison as seen below.



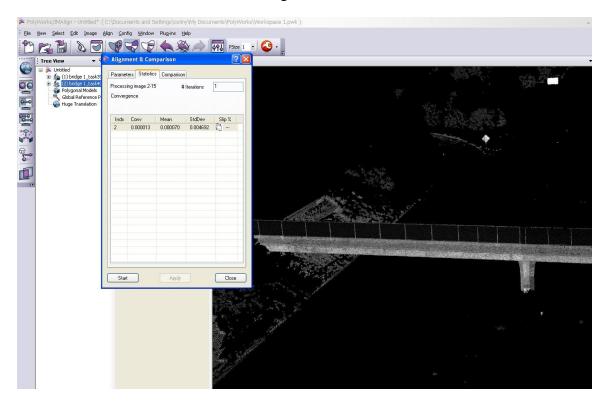
A dialogue will pop up like the one below. Start with a Maximum Distance of 1m, then use 0.1 and then finish with 0.01.

Step 6: Alignment and comparison.

🗭 Alignment & Comparison	
Parameters Statistics Comparison	
O No constraints	
Constrained by reference points	
Constrained by tolerance 0.000500	
Sequential subgroup lock	Search distance. Use a value of around 1 m to start. Larger numbers allow a larger search radius.
Maximum distance: 1	
Subsampling: 1/1	Value if you want to work with 1 to the n^{th} number (1/1 = no subsampling, all points used).
Display	points used).
Histogram range: Auto	Desired histogram is Gaussian, which
Refresh mode: Continuous	displays the error graphically.
Slipping statistics	Set how often the image is redrawn.
Show slipping color map	<i>None</i> waits until the end of alignment before redrawing. Use <i>Continuous</i> until
Acceleration factor: 10	you are experienced.
	<i>Unlimited</i> : Repeats alignment as often
Convergence # Iterations: Unlimited	as needed.
Convergence: 0.000016	Smaller numbers (adding more zeros)
	make the image more accurate, but only by a few microns.
Start Apply	Close

Select \rightarrow Start

Another dialogue box now appears showing the statistics of the alignment. The lower the standard deviation value the better the alignment.



Step 7: Global Alignment (for 3 or more images)

Once all images are aligned, use global alignment to eliminate sequential errors. This process is similar to the previous step, but with different values.

- 1. Unlock the images except for one scan (usually the first scan you imported).
- 2. Select Align \rightarrow Best-fit Alignment & Comparison.
- 3. On the Maximum Distance Option start with a value of 1m, when that process is done then use 0.1 and then finish with 0.01.
- 4. Subsampling set to 1/1 (no subsampling).
- 5. Set *Histogram range* to Auto and Refresh Mode to Continuous. Leave the rest of the options as default.

If you do not see much change, stop this process.

Step 8: Lock the Images (for 3 or more images)

1. When you are sure that all the images are aligned, select *the scans from the tree* window right click on the mouse then Select $\rightarrow Edit \rightarrow Lock$.

Step 9: Reduce the Overlap

Before saving, carry out this step to discard identical points from the merged data set.

- 1. Select Image \rightarrow Reduce Overlap.
- 2. In the *Overlap Reduction* dialog box, select *Best Data (Std)* from the scrolling list. IMAlign will find and keep the point with the best viewing angle for that data set.
- 3. Select \rightarrow Start

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Eile View Select Edit Ima		Plug-ins Help		
DRUS	Keep Best Line Data Reduce Overlap	🔦 🛞 🧼 🗖 PSize 1 🔹 🙆 •		
Tree View	Smooth Interpolate Remest Invgrt Orientation Lock Ctrl+Shift+L	Overlap Reduction Overlap reduction Visualization	1	
	Unlock Ctrl+Shift+O Group Ungroup	Maximum distance:	0.010000	
	Z Min Points	Max # of overlapping images:	10	
	Reference Points	Number of overlap layers:	5	
195		Overlap reduction:	Best Data (Std) 🛛 👻	
		Help Finds the best non-overlappin measurements, adds a tiny b these regions, and deletes th	and of overlap to	
		Start	Close	

Step 10: Save the Aligned Images

1. Select File → Save Project As..

