

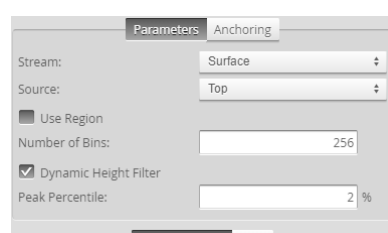
Surface Histogram Tool User Manual

1. General introduction

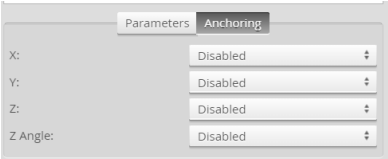
This tool computes the height statistical histogram of the user defined region, which can be a reference for segmentation.

2. Parameters


Use Region	If not chosen, all points will be used to compute the histogram. Otherwise, only points in the specific region will be involved.
Region Type	This is supported by the flexible region strategy, which includes Circle, Ellipse, Polygon and Rectangle region types.
xxx Region & corresponding parameters	When the Region Type is set to a certain type, the parameter list of the corresponding type is displayed and can be set. See FlexibleRegion docs for specific type parameter explanations.
Number of Bins	The number of the histogram bins, default to 256
Dynamic Height filter	Enable dynamic Height filter
Peak Percentile	A threshold using a percentage of histogram peak value. Points inside bins on the rightmost and leftmost side of the histogram, whose counts are below this threshold will be considered as noise. See application example section for details.



3. Anchor

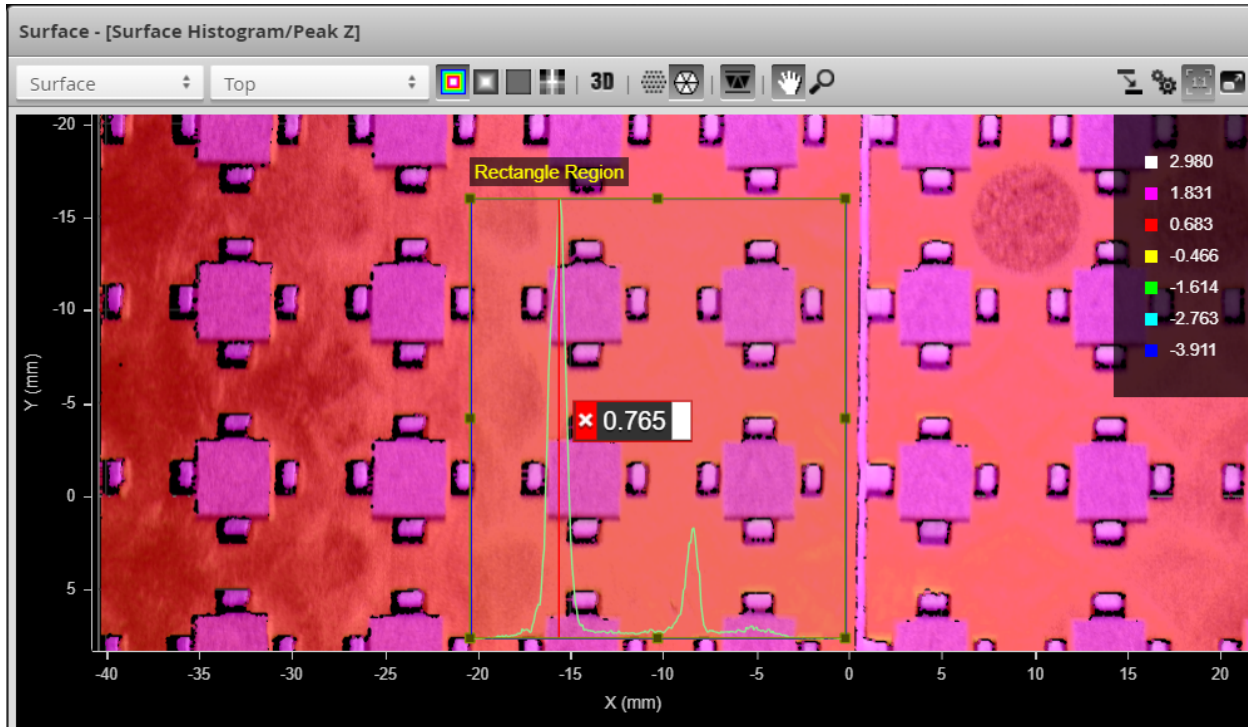
X,Y,Z	Lets you choose the X, Y, or Z measurement of another tool to use as a positional anchor for this tool.	
Z angle	Lets you choose the Z Angle measurement of another tool to use as an angle anchor for this tool.	

4. Measurements and Features

Measurements	Peak Z	Determines the corresponding height value of the histogram bin with the maximum count.	
	Start Z	Determines the corresponding height value of the histogram bin with the index of Start Index.	
	End Z	Determines the corresponding height value of the histogram bin with the index of End Index.	

5. Application Example

The height value used to distinguish the target from the background are clearly available on the statistical histogram:



Noise removal by dynamic height filtering

This is very useful to remove spike noise, which appears scattered sparsely in 3d space, see following. This type of noise often happens due to reflection or light interference so they are typically scattered higher or lower than the real object. To remove such type of noise, a histogram can be calculated. The histogram will have peak values where there is more data and appears low where there is noise.

A threshold representing a percentage of histogram peak value should be set by the user. Points inside the rightmost and leftmost bins of the histogram, whose counts are below this threshold will be considered as noise. The valid object height range will be dynamically recalculated according to the reduced histogram with noisy bins removed. Note that the noisy bins will be filtered out only on the right or left side of the histogram.

The limitation of this filter is that noise within the height range of the object remains.

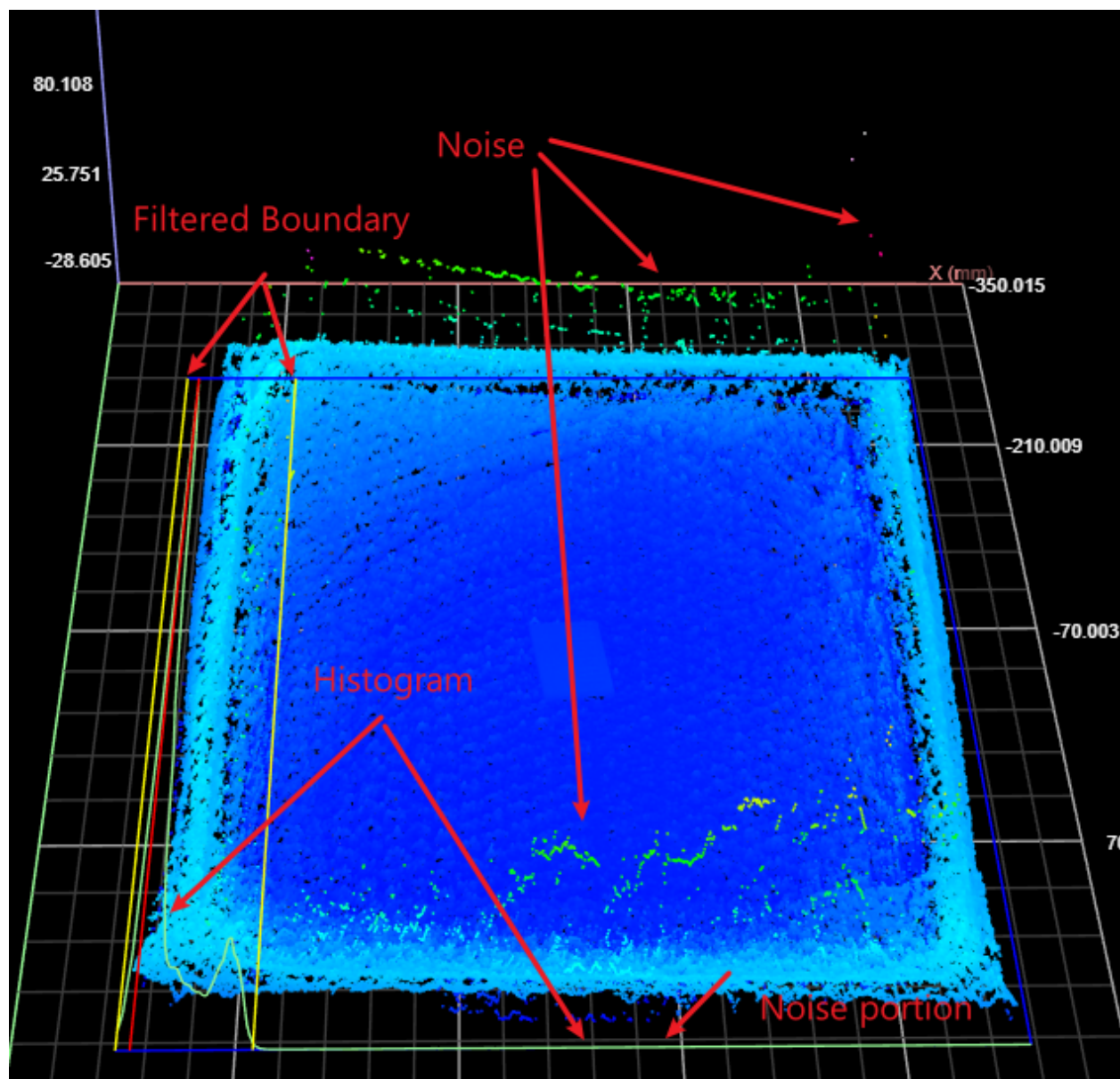


Fig.2 Object with scattered noise. A histogram is shown to have a long trailing tail. Using histogram information, the valid height range of the object will be determined thus noise can be removed in this way.

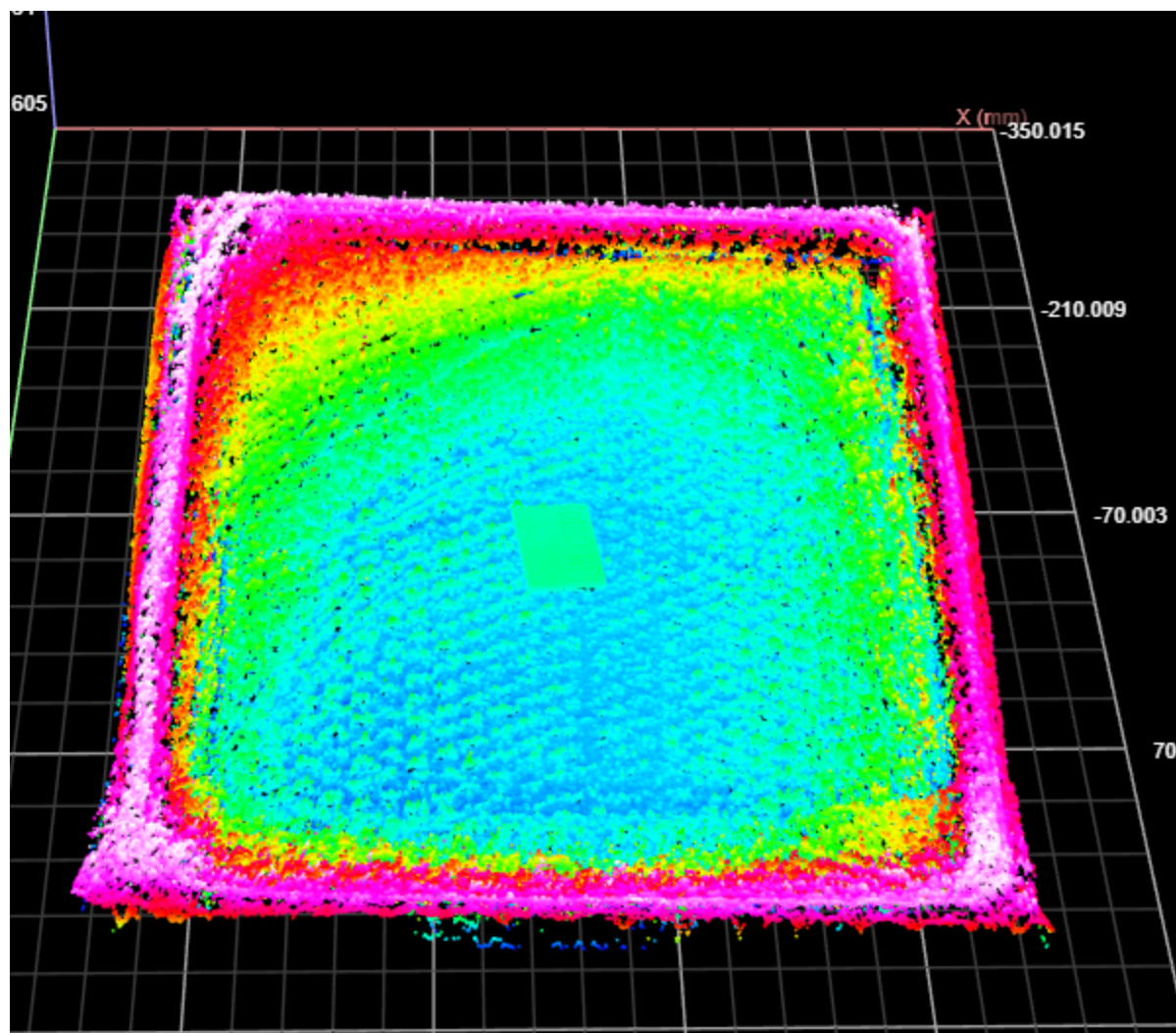


Fig.3 Filtered surface.