


# Spike Noise Filter Tool User Manual

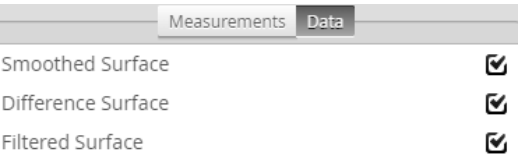
## 1. introduction

Due to reflection, we often see spike noise on a scanned surface, which appears scattering sparsely in 3d space. This tool is used to remove them. The idea behind this tool is that an input surface is firstly smoothed out with a very large kernel so that every high frequency feature disappears. In a second step, the difference between the original and smoothed surface is calculated to obtain the high frequency feature. A threshold is finally used to remove the most salient high frequency feature.

## 2. Parameters

Smooth X	Smooth kernel size X.	
Smooth Y	Smooth kernel size Y.	
Height Threshold	Height threshold applied on the difference surface.	

## 3. Measurements

Smoothed Surface	The smoothed surface by averaging points in a small region defined by the kernel.	
Difference Surface	The difference between the input surface and the smoothed surface.	
Filtered Surface	The result surface after removing noise, which is indicated by values above 'Height Threshold' in difference surface.	

## 4. Application Example

Here is an example showing scans with strong noise, smoothed/difference/filtered surface.

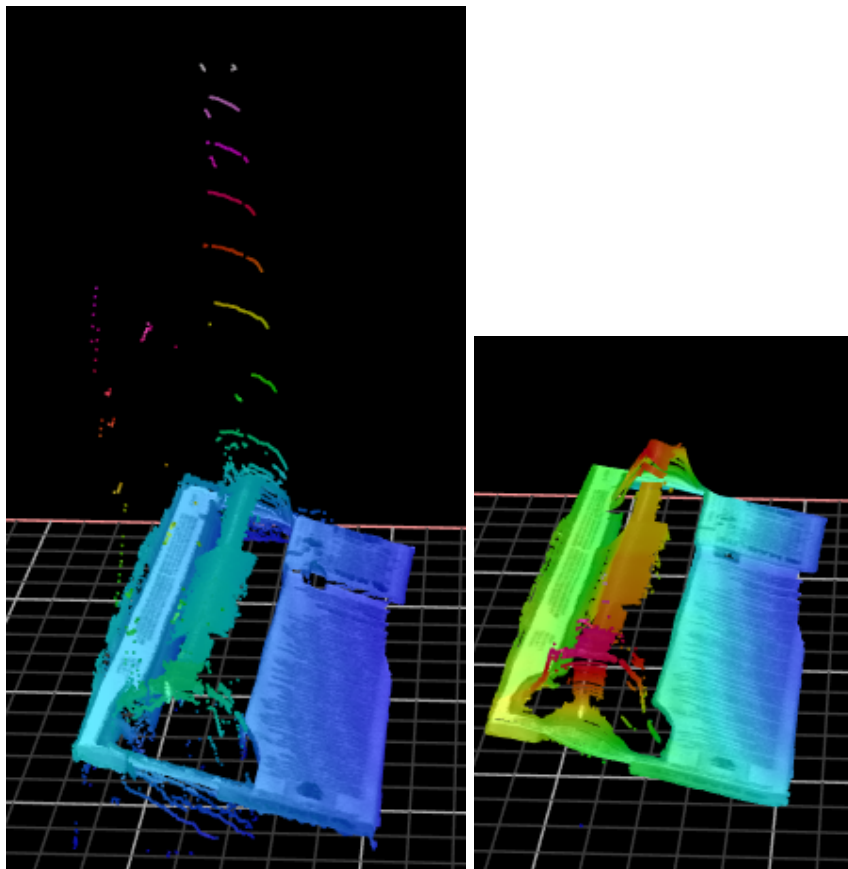


Fig. (left) original surface with noise. (right) smoothed surface, note that data on the real object is also significantly smoothed.

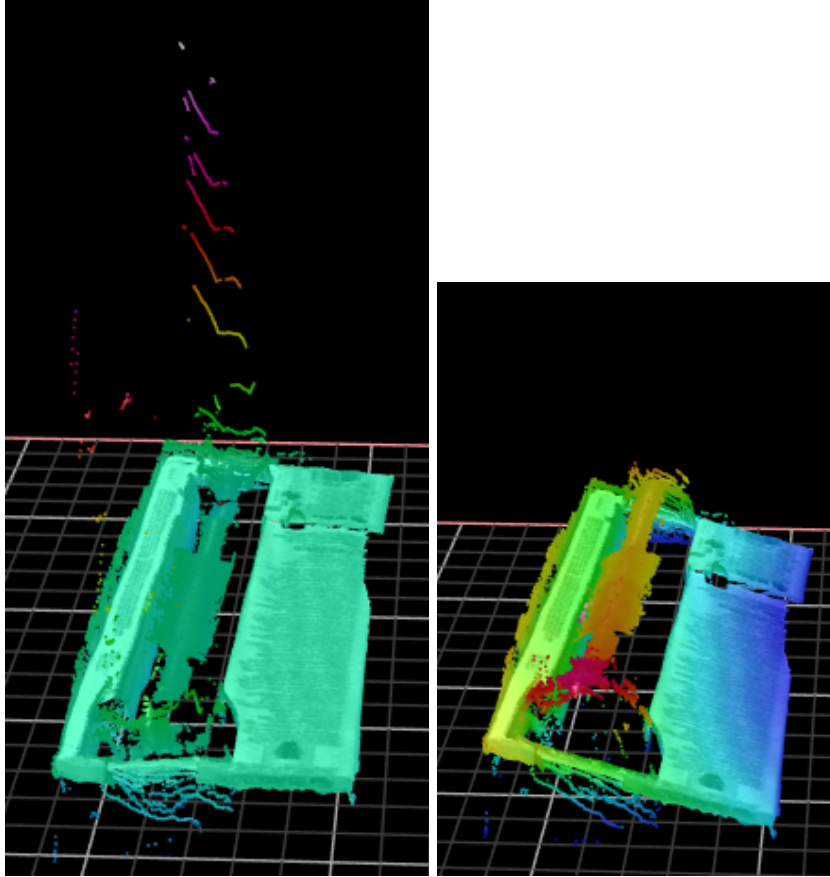


Fig. (left) Difference surface. High frequency info / noise will appear high and the real object data is around zero. (right) filtered surface with noise removed but keeping object data untouched.

### Limitation:

If there are high frequency features on the real object, these high frequency features will get removed to some extent. However, in typical applications, this will not be the case, see below.

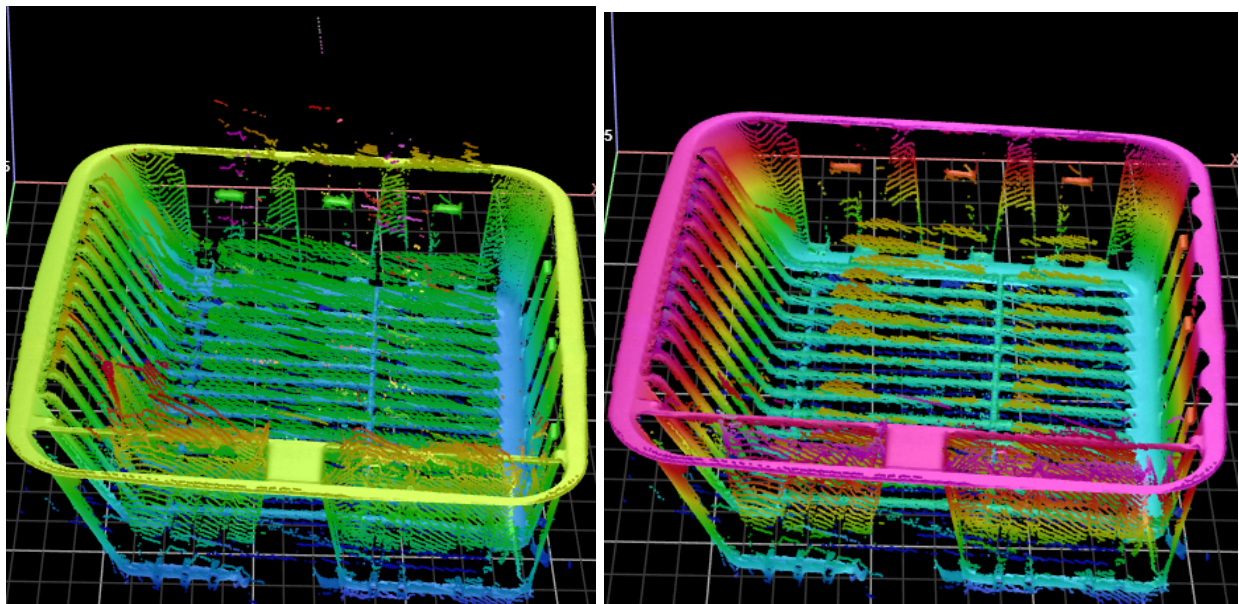


Fig. (left) Original surfaces with high frequency feature (right) Noise removed as well as high frequency feature by the filter.