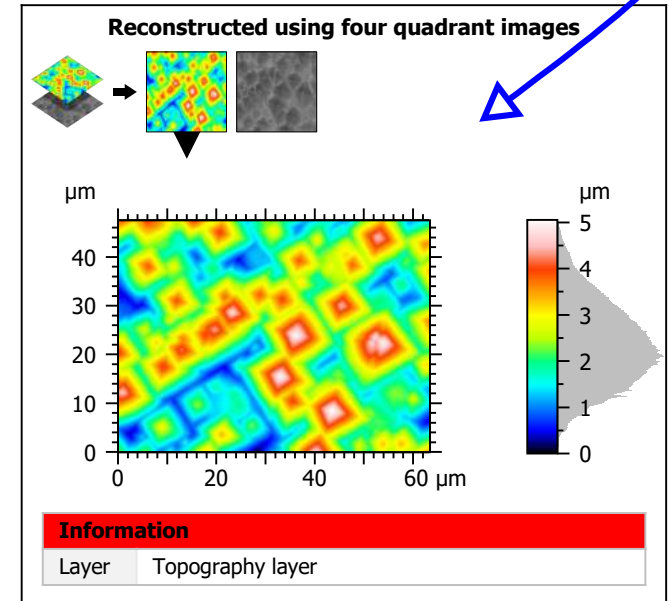


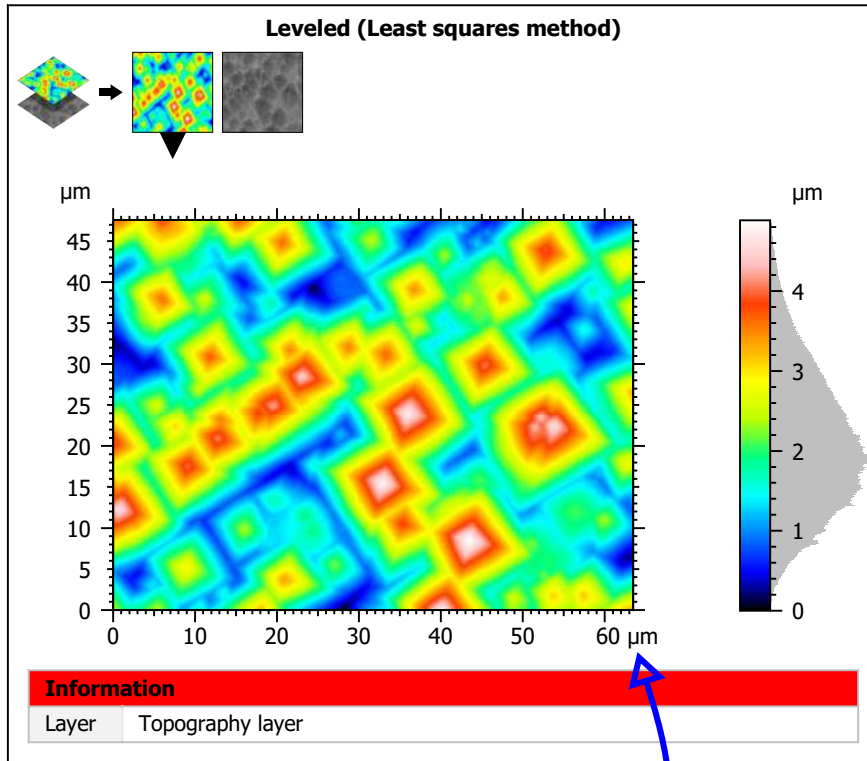
Four directional backscatter images from a Hitachi SEM can quickly be converted into a 3D surface height map, showing topography with a color spectrum. Once we have a height map, a lot of data can be quickly collected.



Contact us about Hitachi map 3D here:

microscopy@hitachi-hita.com
1-800-253-3053
www.hitachi-hightech.com/us

For demonstration purposes only!



After the surface is generated, it can be leveled using multiple methods, and if a form (bow or curvature) is still present in the surface, it can also be removed.

ISO 25178			
Height Parameters			
Sq	0.819	μm	Root-mean-square height
Ssk	0.295		Skewness
Sku	2.67		Kurtosis
Sp	2.69	μm	Maximum peak height
Sv	2.05	μm	Maximum pit height
Sz	4.74	μm	Maximum height
Sa	0.666	μm	Arithmetic mean height
ASME B46.1			
3D Parameters			
St	4.74	μm	Maximum height
Sp	2.69	μm	Maximum peak height
Sv	2.05	μm	Maximum pit height
Sq	0.819	μm	Root-mean-square height
Sa	0.666	μm	Arithmetic mean height
Ssk	0.295		Skewness
Sku	2.67		Kurtosis
SWt	*****	μm	Area waviness height
ISO 12781			
Flatness Parameters			
FLTt	3.30	μm	Peak-to-valley flatness deviation of the surface
FLTp	1.85	μm	Peak-to-reference flatness deviation
FLTv	1.46	μm	Reference-to-valley flatness deviation
FLTq	0.651	μm	Root-mean-square flatness deviation

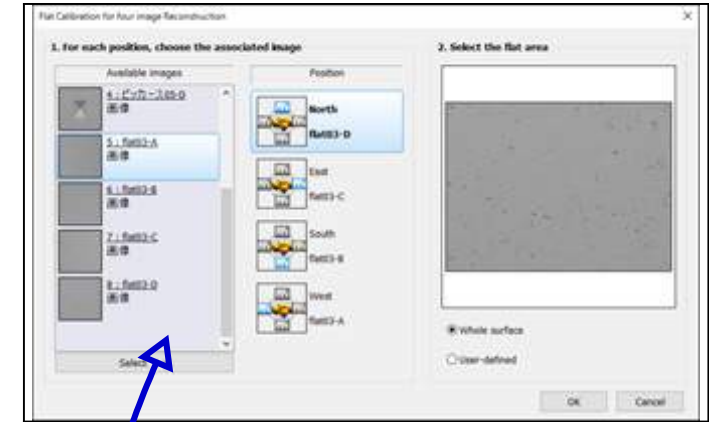
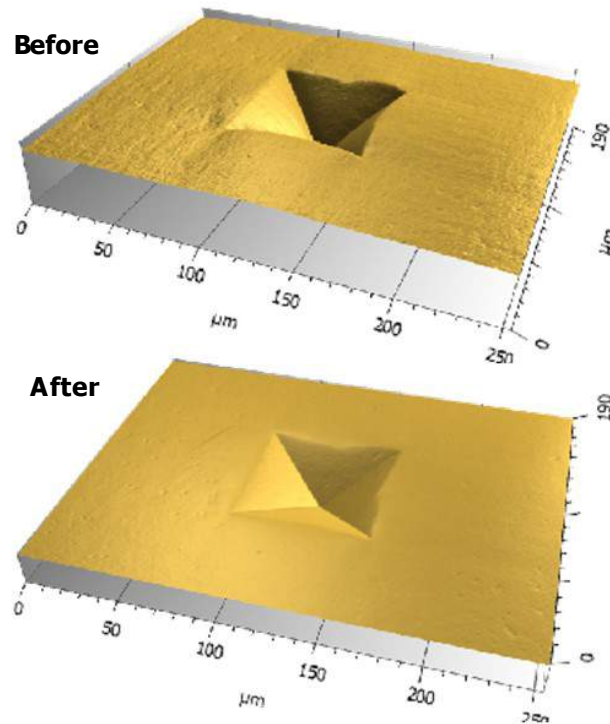
A results table like the one above can be taken from almost any frame. Different studies will have different parameters to choose from, with hundred of options available overall. The table colors and layout is editable and can be exported as an image or into a .CSV or .TXT file.

For demonstration purposes only!

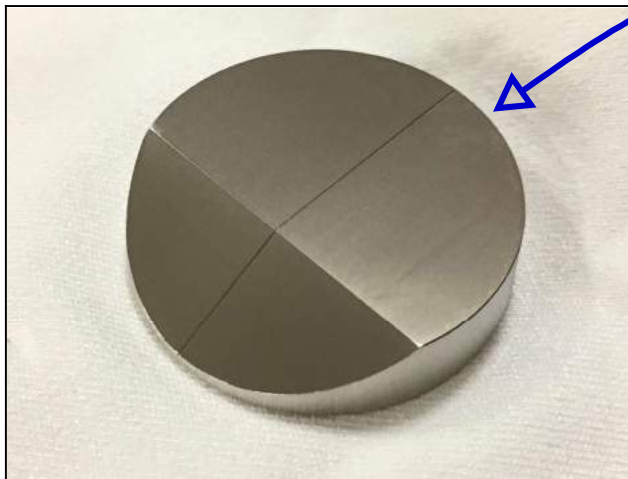
Calibration

Hitachi map 3D

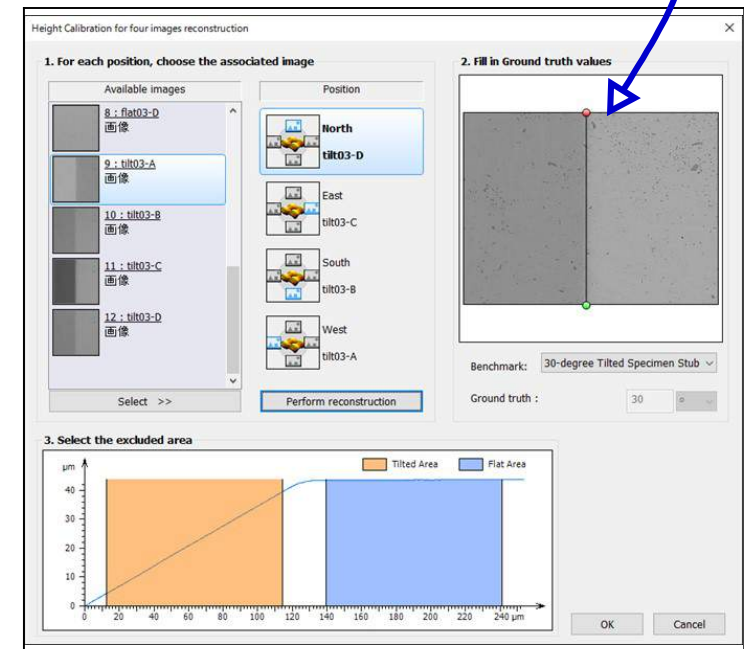
Hitachi map 3D has the ability to calibrate not only Z-height measurements, but also flatness. The flatness calibration (a unique feature of Hitachi map 3D) helps to ensure the most accurate results obtainable with this method of measurement on the market today.



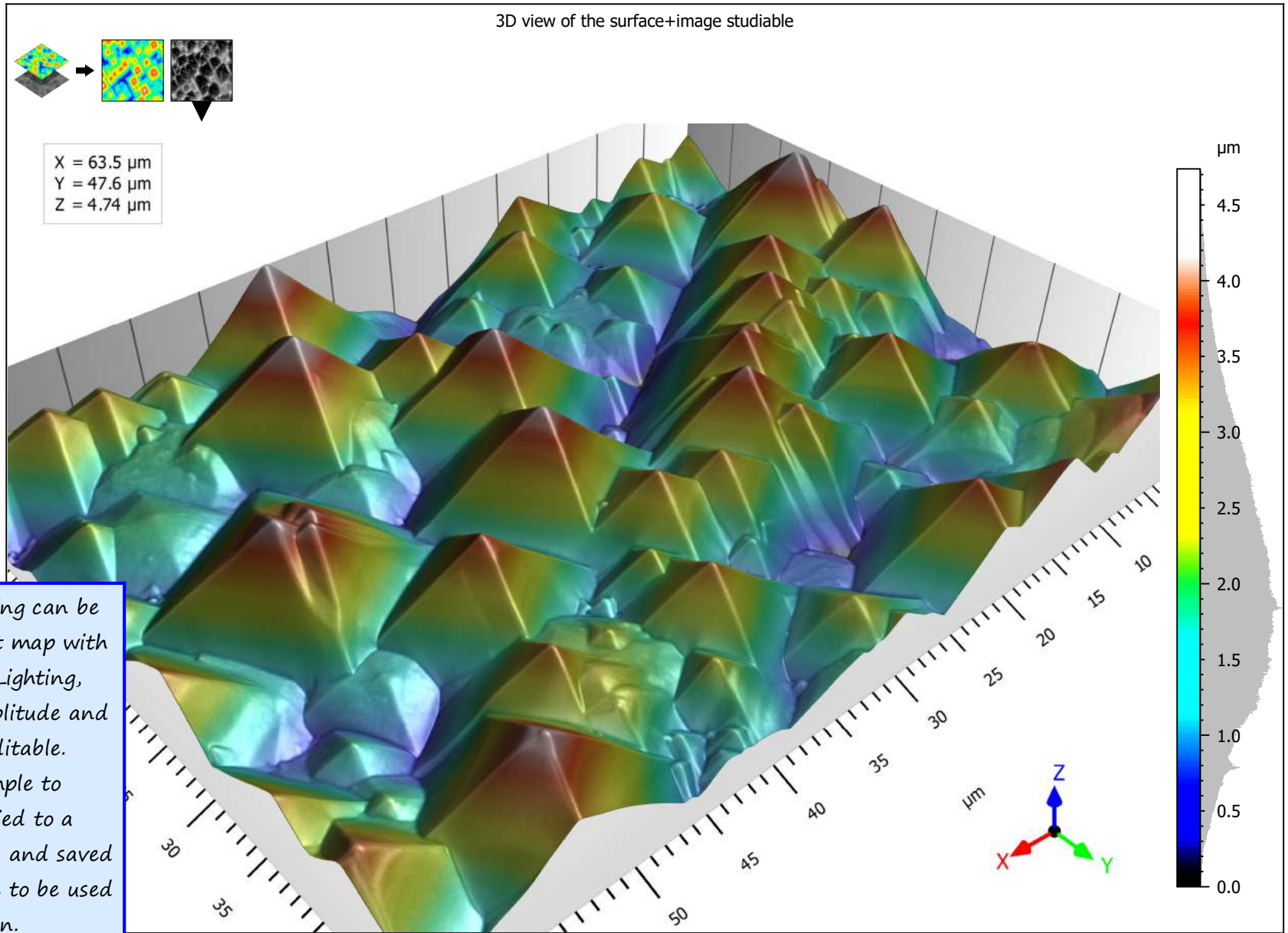
Calibrate Flatness and Height



Hitachi map 3D comes with a calibration sample with a 30 degree slope and flat area. Other samples (such as a Vickers hardness indentation, or another structure with a known slope) can be also used for calibration.



For demonstration purposes only!



A 3D surface rendering can be made from the height map with a single mouse click. Lighting, surface qualities, amplitude and colorization are all editable. Animations (from simple to complex) can be applied to a surface and recorded and saved as a .WMV or .AVI file to be used later in a presentation.

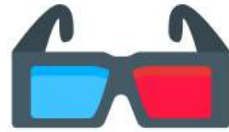
For demonstration purposes only!

3D Anaglyph

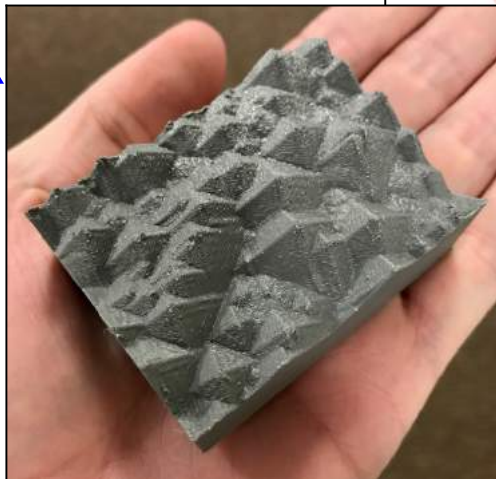
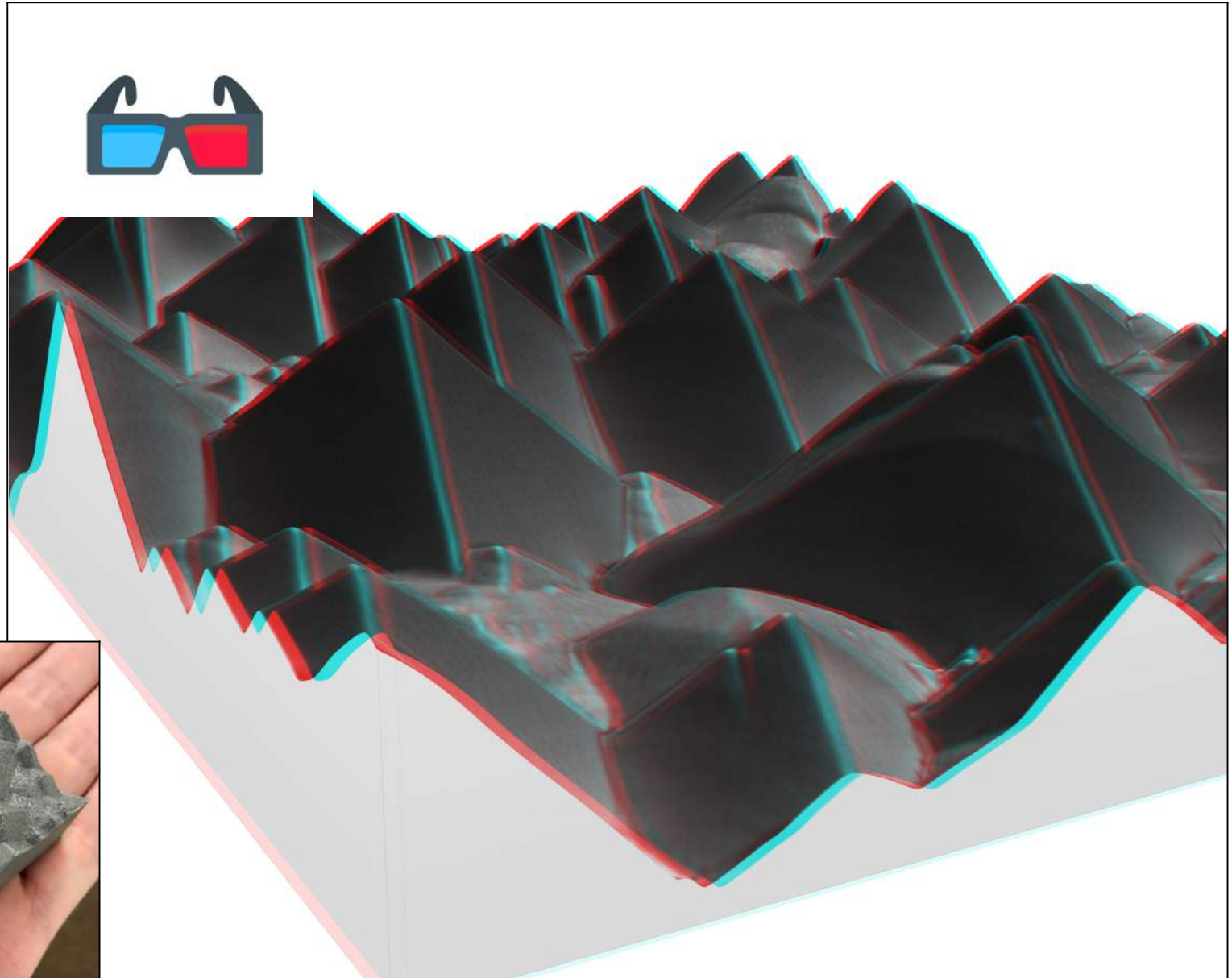
Hitachi map 3D



A single mouse click will turn any 3D surface into a red/blue anaglyph, allowing a true 3-dimensional view of the surface.



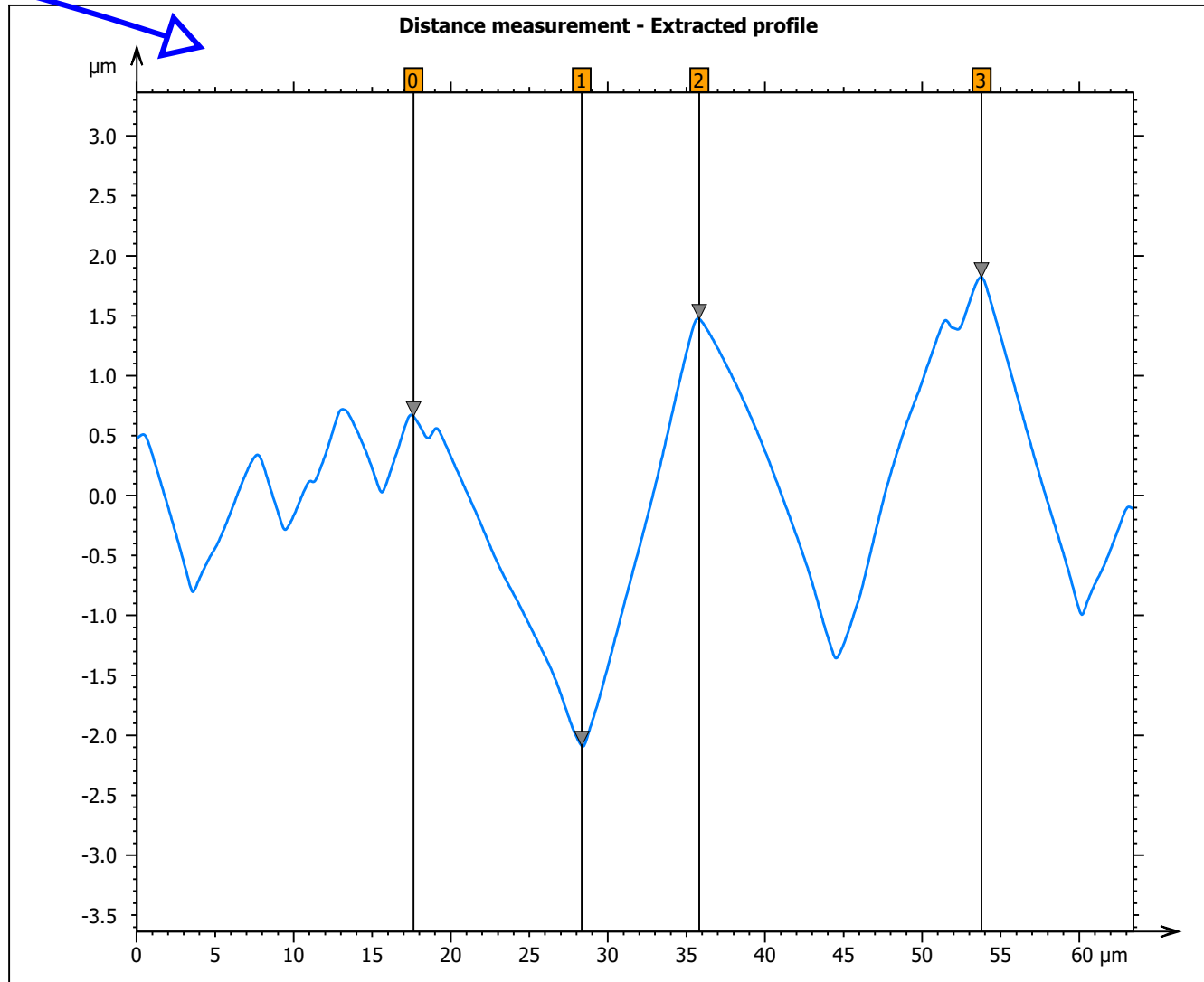
Also, any surface rendering can be exported as a .STL or .3MF file for 3D Printing!



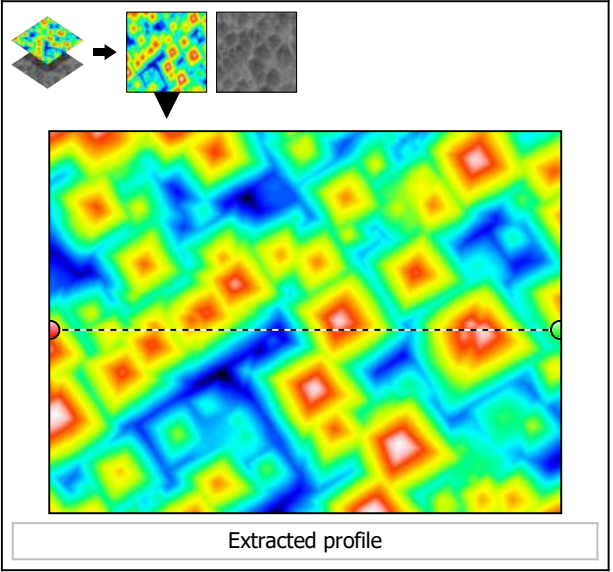
For demonstration purposes only!



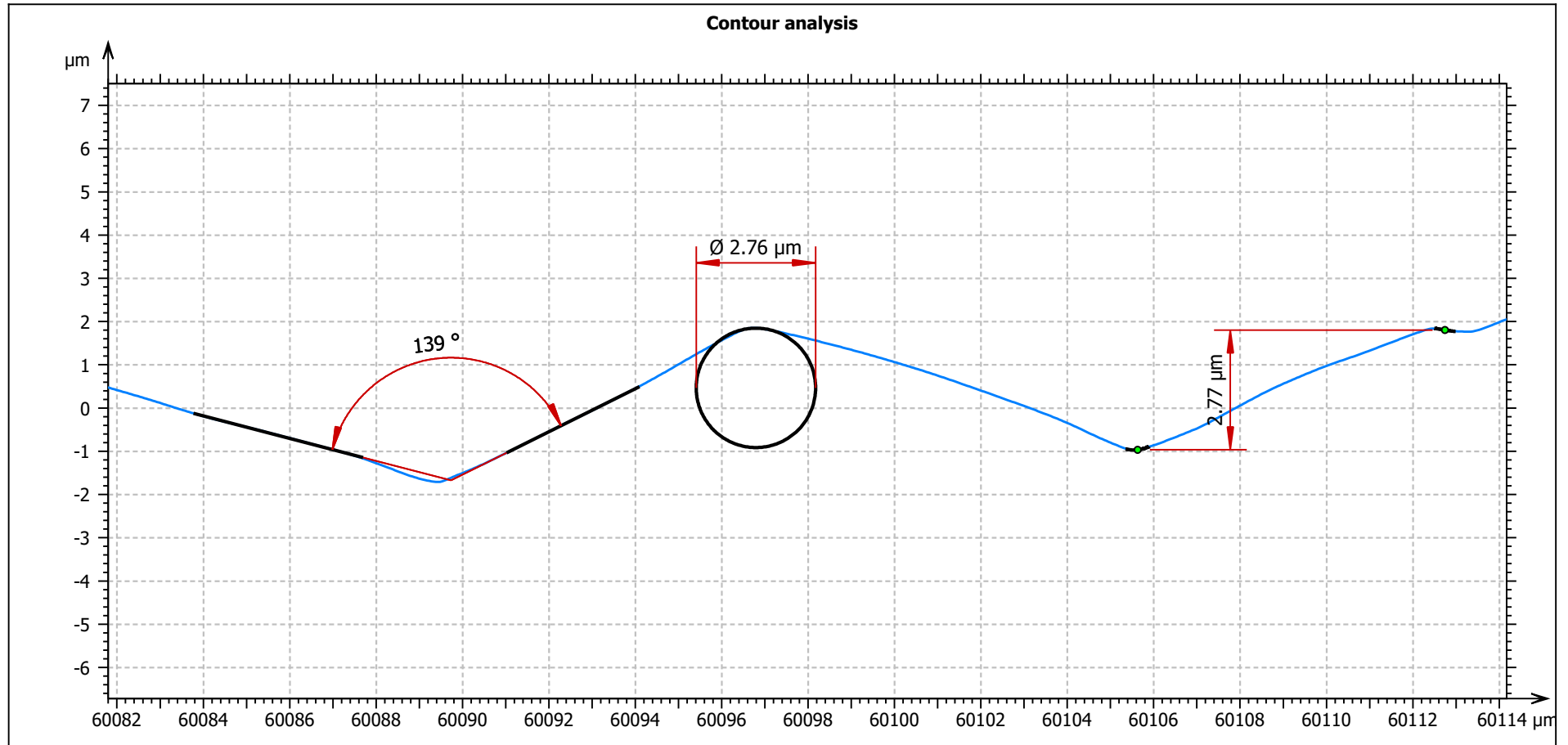
Step heights are measured interactively inside Hitachi Map 3D. Results are updated in real time. Single points or an averaged length of the line profile (which is user defined) can be used for measuring step height.



Parameters	Unit	0-1	2-3
Horizontal distance	μm	10.7	18.0
Height difference	μm	-2.75	0.349
Slope	$\mu\text{m}/\mu\text{m}$	-0.257	0.0194

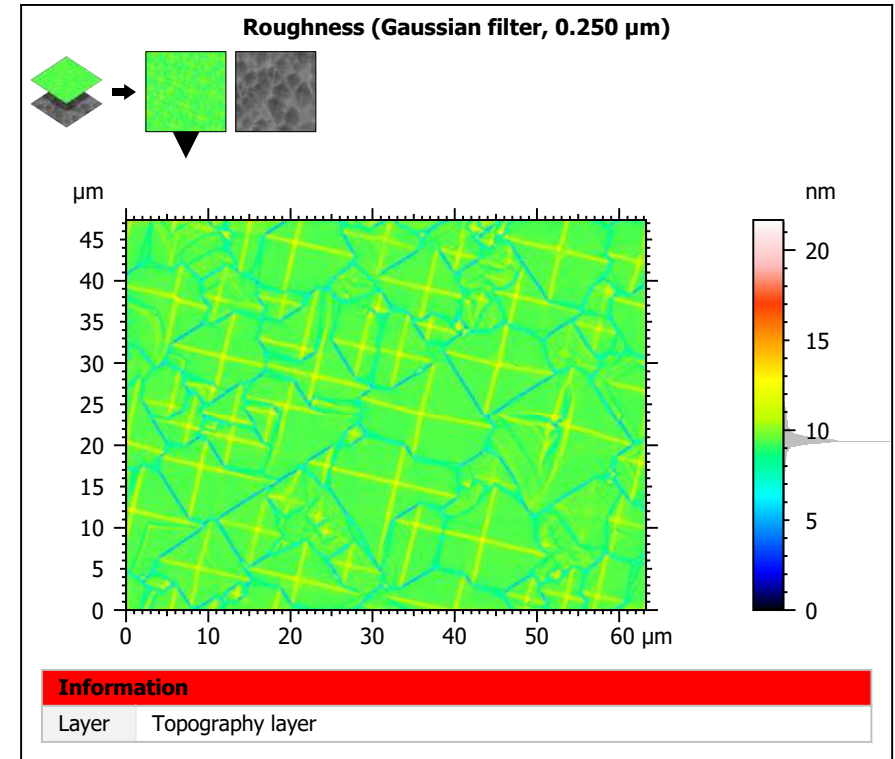
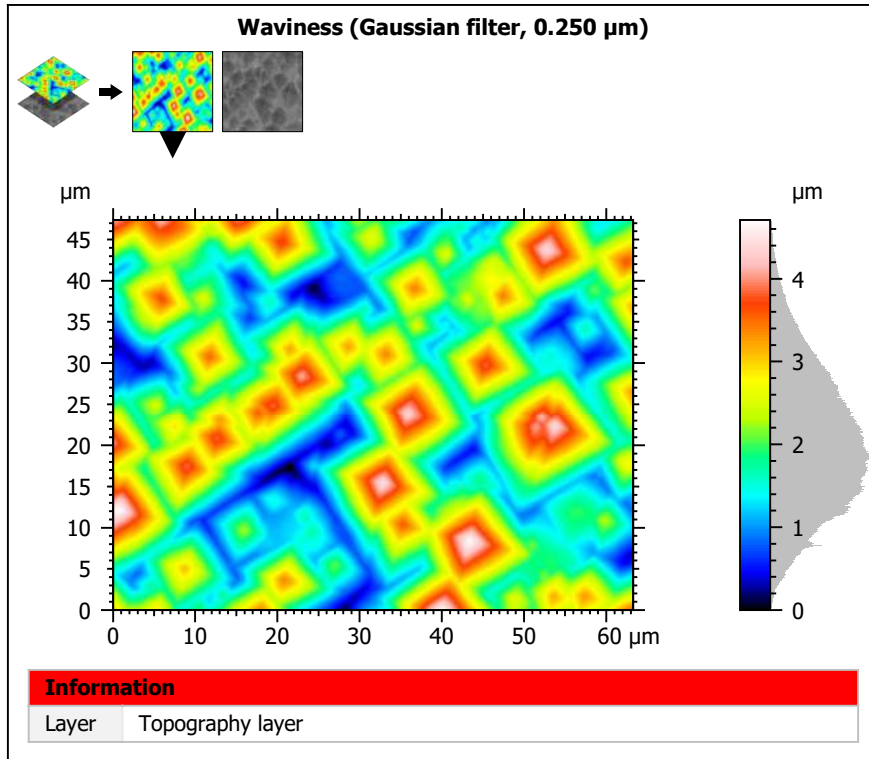


For demonstration purposes only!



A contour analysis can be performed on any extracted line profile (horizontal, vertical, parametric or closed). This allows the user to measure distances, angles, radii, straightness defects, etc. directly on the line.

For demonstration purposes only!



ISO 25178		
Height Parameters		
Sq	0.817	μm
Ssk	0.295	
Sku	2.67	
Sp	2.67	μm
Sv	2.04	μm
Sz	4.71	μm
Sa	0.664	μm

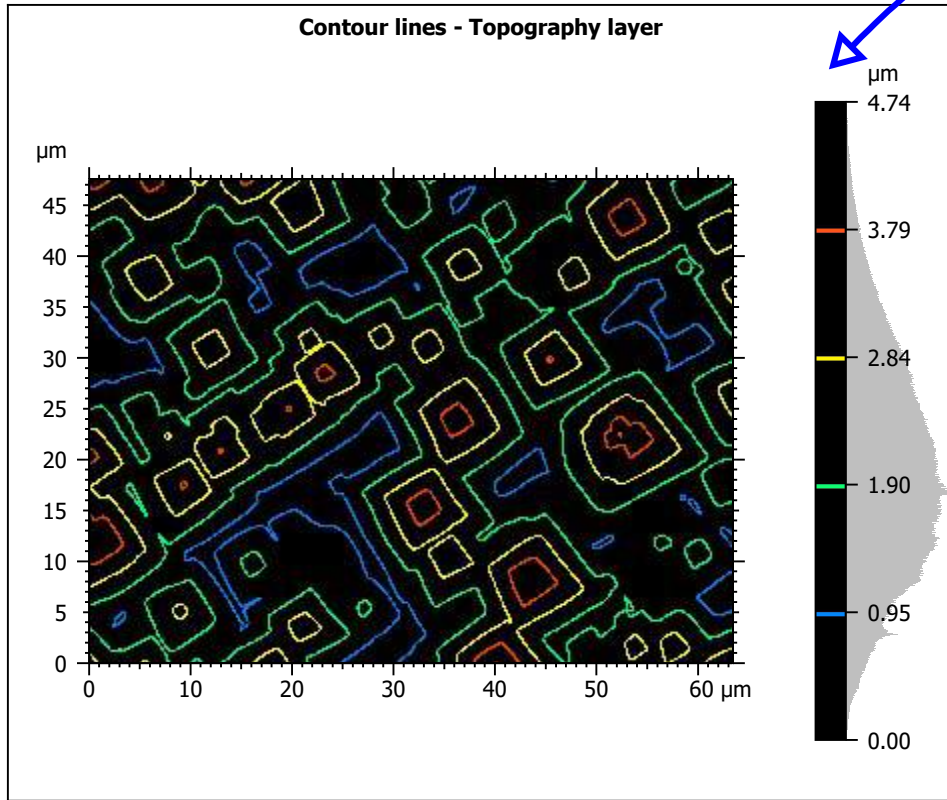
Applying a Standard Filter to the surface can be used to separate the roughness and waviness phenomena of the surface. The filter distributes the large wavelengths to the waviness and the small wavelengths to the roughness. The quality of the separation depends both on the type of filter and the cut-off value (which is editable when applying the filter). This operator allows you to obtain a roughness surface and a waviness surface that can then be studied individually.

ISO 25178		
Height Parameters		
Sq	0.916	nm
Ssk	-1.48	
Sku	12.6	
Sp	12.3	nm
Sv	9.40	nm
Sz	21.7	nm
Sa	0.501	nm

For demonstration purposes only!

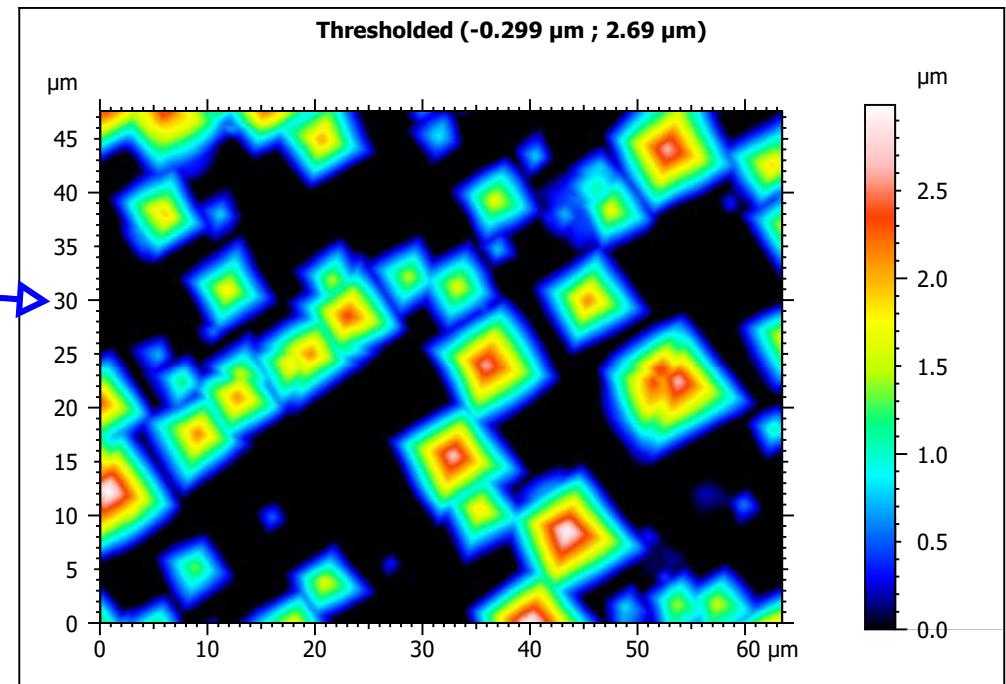
Contour & Threshold

Hitachi map 3D

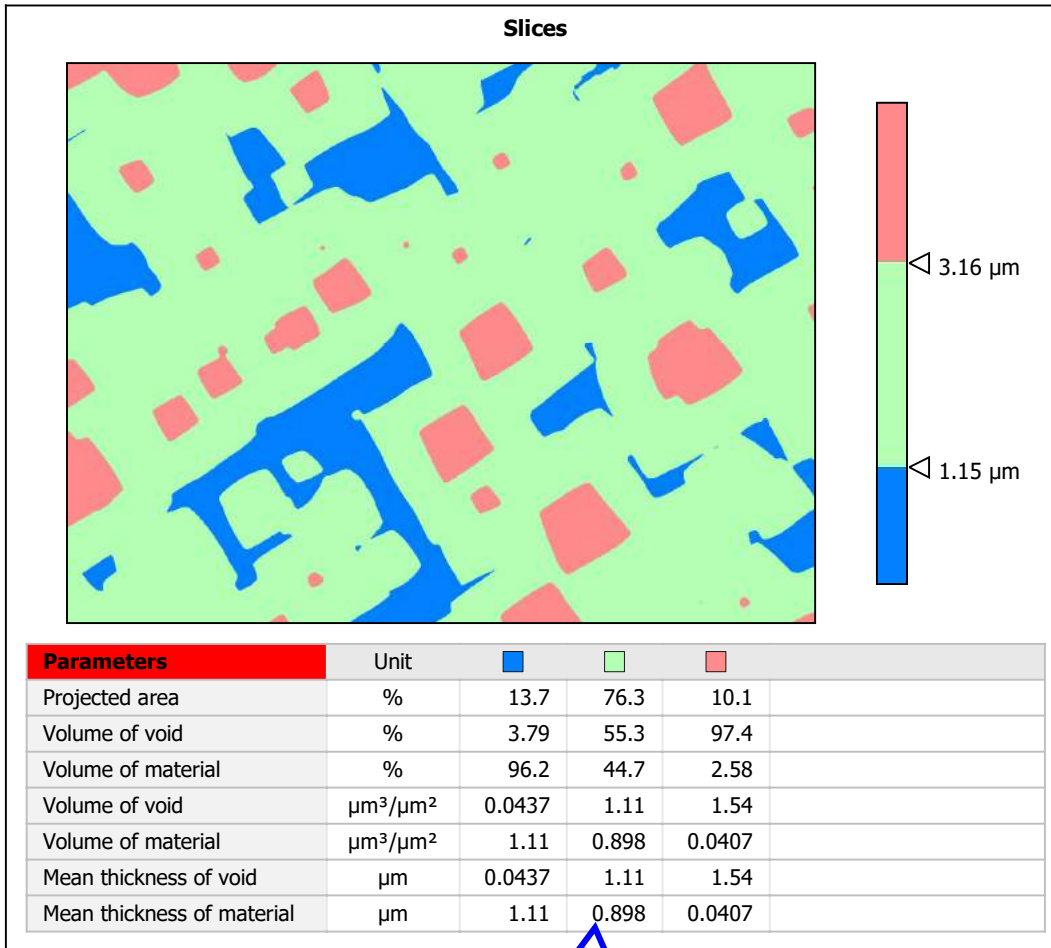


Contour lines display a 2D graph where the surface of an extracted topography layers has been divided into horizontal slices. The number of slices is adjustable.

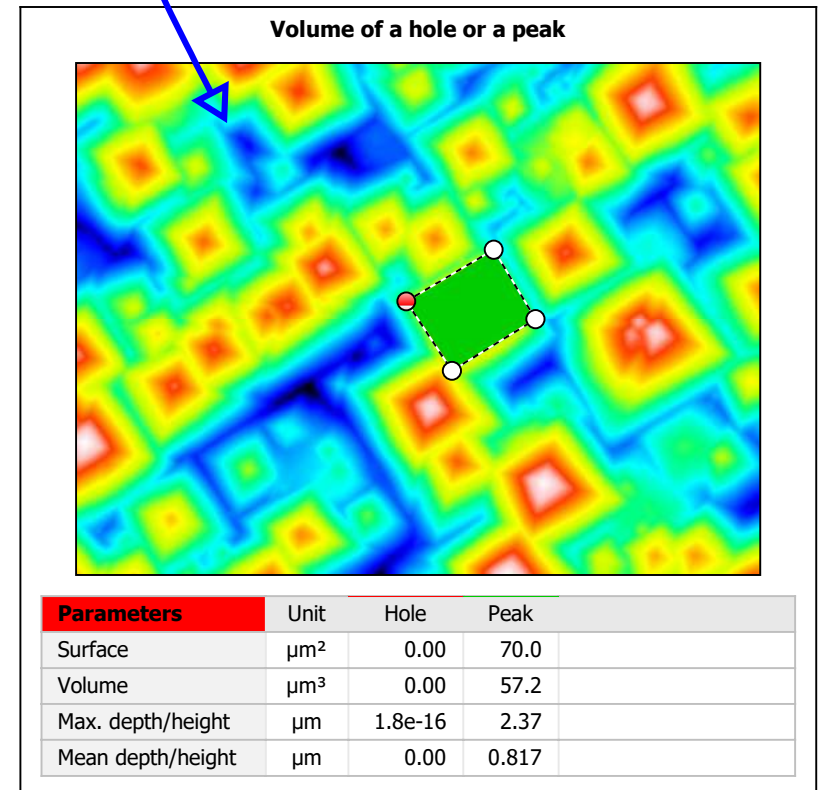
An extracted topography layer can be thresholded to exclude outliers or select a Z plane of interest.



For demonstration purposes only!



Individual areas of a surface can be analyzed by selecting an area around a hole (or peak) using the mouse. Its volume, surface, maximum and average depth are calculated in real time.

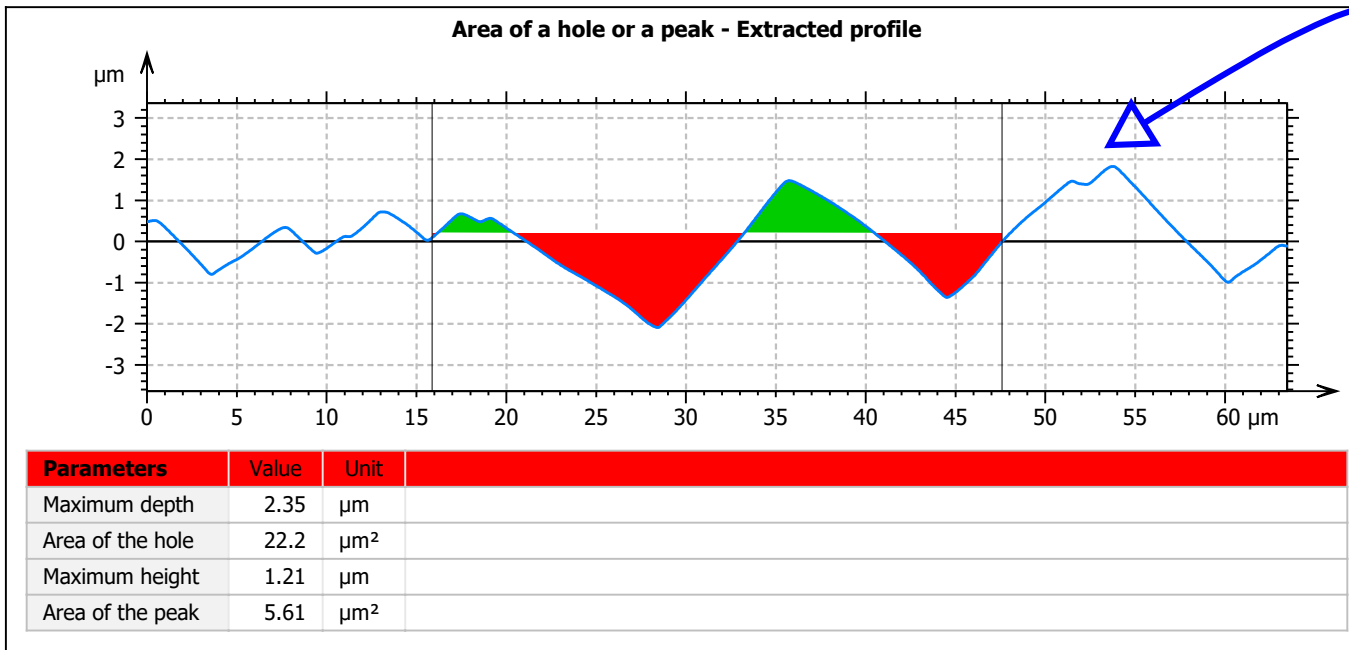


Editable slices can give the volume of material above or below the surface (which is user defined). Results can be exported as an image or a .CSV or .TXT file.

For demonstration purposes only!

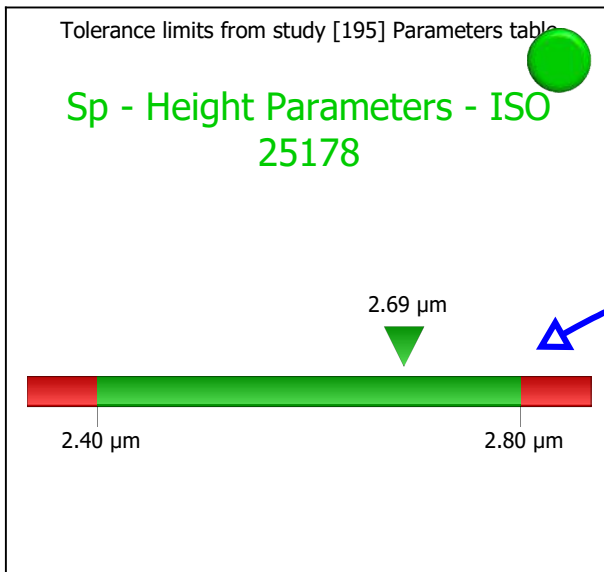
Volumes from a Line Profile

Hitachi map 3D



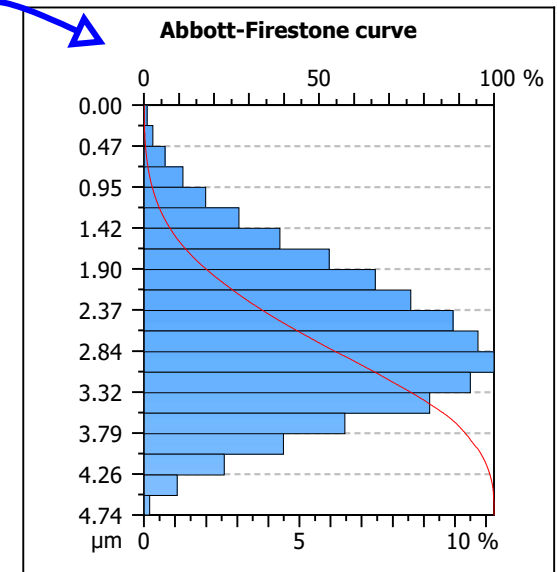
Hitachi map 3D can also calculate peak and hole volume data from an extracted line profile.

This allows the user to characterize the depth of scratches and holes and calculate related parameters.



The Abbott-Firestone curve study shows the statistical distribution of the depths of the points on the surface.

A tolerance value or upper/lower limits can be set by the user. This can be done for any number of parameters for any surface or line profile.



For demonstration purposes only!



Quickly and easily colorize 2D micrographs with automatic image segmentation and a paint bucket.

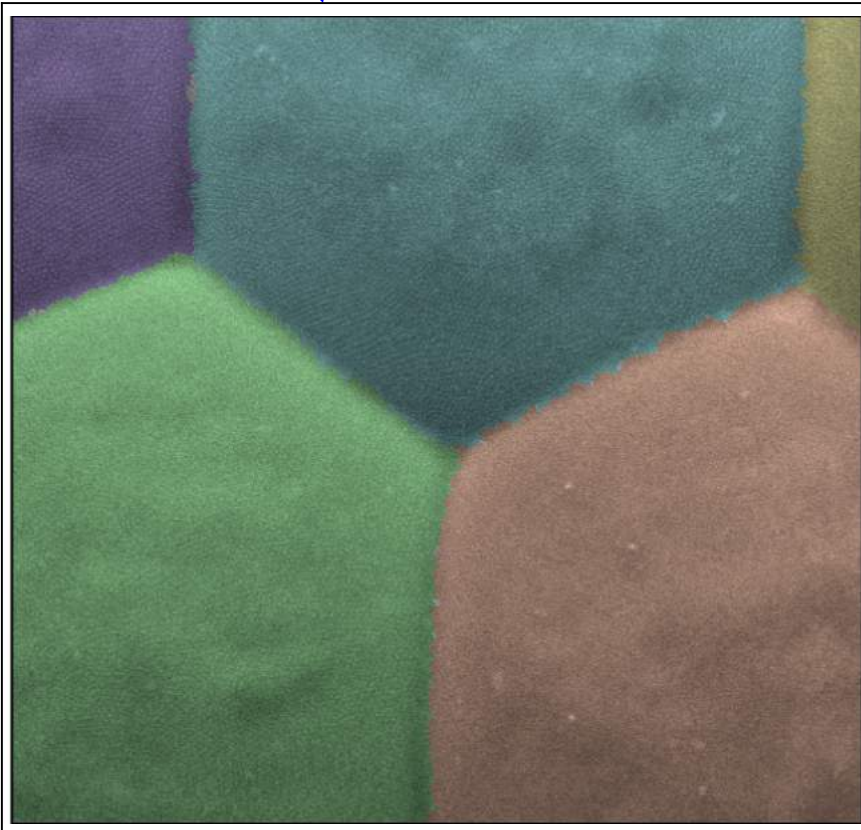
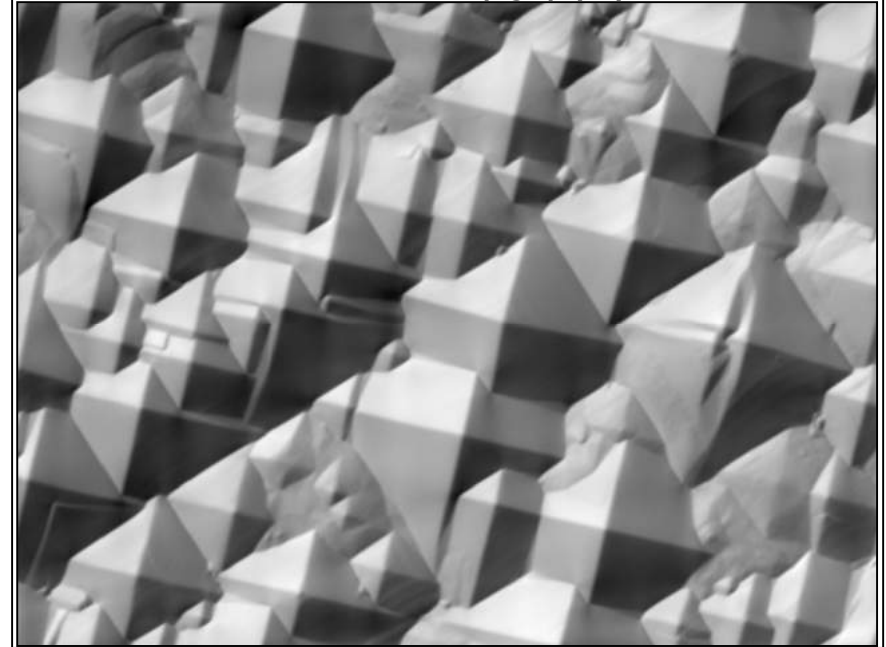


Photo simulation - Topography layer



Generate a simulation of a 2D photograph from an extracted topography layer.

For demonstration purposes only!