Product Information
Version 1.0

ZEISS ConfoMap

Surface Imaging and Analysis Software for ZEISS Microscopes

ZEISS ConfoMap: Surface Imaging and Analysis Software for ZEISS Light Microscopes

› In Brief

› The Advantages

› The Features

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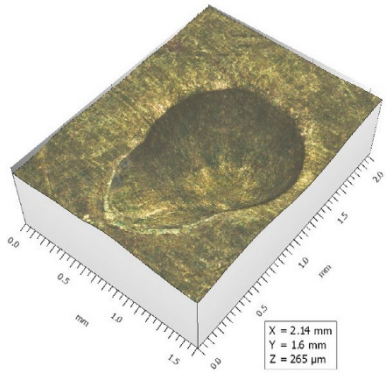
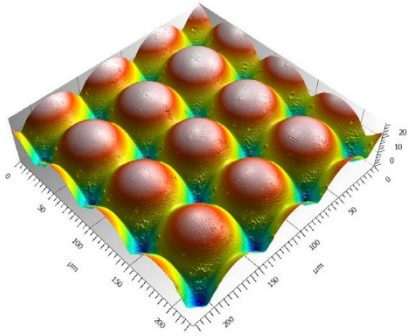
The standard ConfoMap® ST package, based on MountiansMap® software from Digital Surf, includes numerous analytical studies. Geometric studies calculate distances, angles, areas, volumes and step heights on 2D profiles and 3D surfaces. Functional studies, including the bearing ratio curve and height distribution, facilitate the assessment of friction and wear on engineering surfaces. The roughness and waviness components of a surface are separated using the latest ISO advanced filtering techniques and 3D surface texture parameters are calculated in accordance with ISO 25178 standard (see modules for selected parameters). Additionally a layer or region of interest on a micro-mechanical or electronic component can be extracted and analyzed in exactly the same way as a full surface.





ConfoMap® ST software can be extended by adding modules for advanced surface texture analysis, dimensional analysis, grain and particle analysis, 3D Fourier analysis, the analysis of surface evolution, and statistics.

Working in ConfoMap®, a visual surface analysis report is built straight forward frame by frame in accordance with latest international and national metrology standards and methods. Every analysis step is recorded in an analysis workflow to assure full metrological traceability.

This powerful software package works in conjunction with both ZEISS confocal and widefield microscope systems providing ease of use for complex analyses.

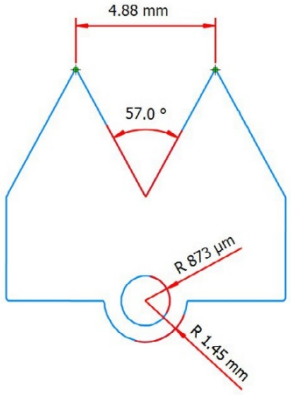
ISO 25178		
Height Parameters		
Sq	82.1	nm
Ssk	0.228	
Sku	3.15	
Sp	414	nm
Sv	295	nm
Sz	709	nm
Sa	65.3	nm
Functional Parameters (Volume)		
Vm	0.00441	µm³/µm²
Vv	0.111	µm³/µm²
Vmp	0.00441	µm³/µm²
Vmc	0.074	µm³/µm²
Vvc	0.102	µm³/µm²
Vvv	0.00839	µm³/µm²

Expand Your Possibilities

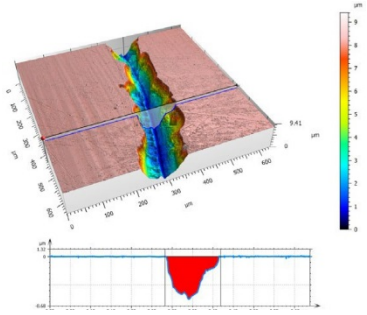
For use with ZEISS microscope systems:

- Smartproof 5 confocal microscope
- LSM 800 MAT laser scanning confocal microscope
- Smartzoom 5 digital microscope
- Many other ZEISS microscopes using ZEN 2 core imaging software

2 Dimensional



3 Dimensional



ZEISS Smartproof 5

ZEISS LSM 800 MAT

Confocal

ConfoMap

Widefield

ZEN 2 core software

A variety of Stereo, Zoom, Inverted, and Upright Light Microscopes

ZEISS Smartzoom 5

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Visualize. Analyze. Report.

See your sample in a new way

ConfoMap® ST provides the highest quality surface imaging. You can visualize a surface in 3D, zoom in and rotate in real time, apply different renderings, select the height amplification and control the lighting type. A standard or
user-defined palette can be selected for the vertical scale and the palette can be fine tuned automatically or interactively to highlight surface features. In addition true color overly is available for a real life view.

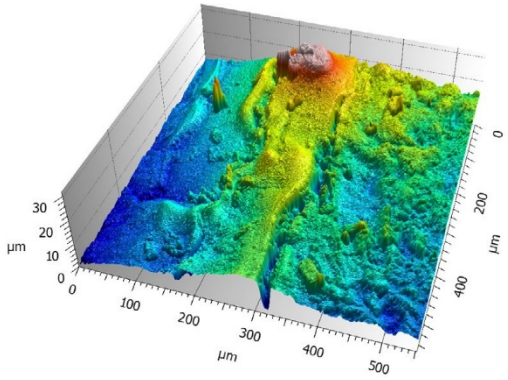
All the tools at your finger tips

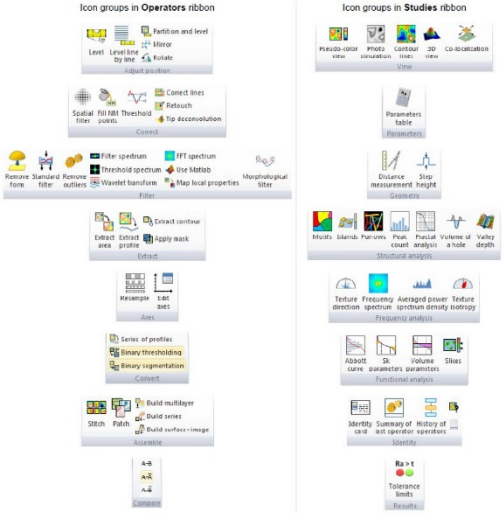
Modern look, easy to use with total GUI (Graphical User Interface) flexibility to configure your workspace. Simplify your GUI. Panels can be moved, stacked, docked, and combined for optimal use of screen space. All functions are organized in groups and sub-groups that are clearly labeled and in logical order.

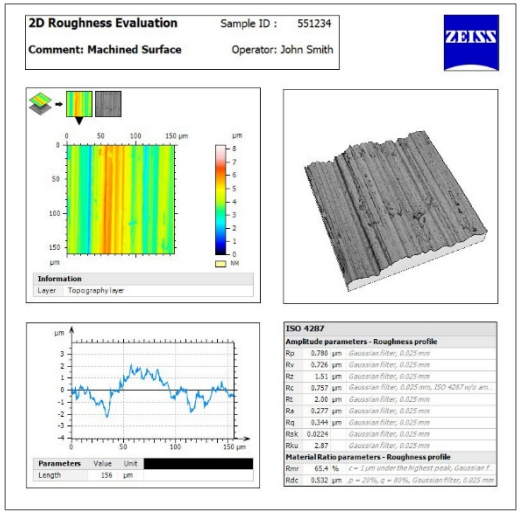
The standard version software contains a wide array of imaging and analytical tools. Depending on the application requirements modules can be added to expand the tool set.

Provide fast reporting

Fast, automated, traceable 2D, 3D and surface analysis report creation is simple and quick. Documents are built visually frame by frame. Every step (e.g. 3D surface view, application of filter, geometric study and parameter table) is shown in a graphical analysis workflow that assures full metrological traceability. Once a document has been created it can be applied as a template to automate the analysis of all similar data sets. The results of analyses can be exported in a format compatible with third party software.







Work Made Easy

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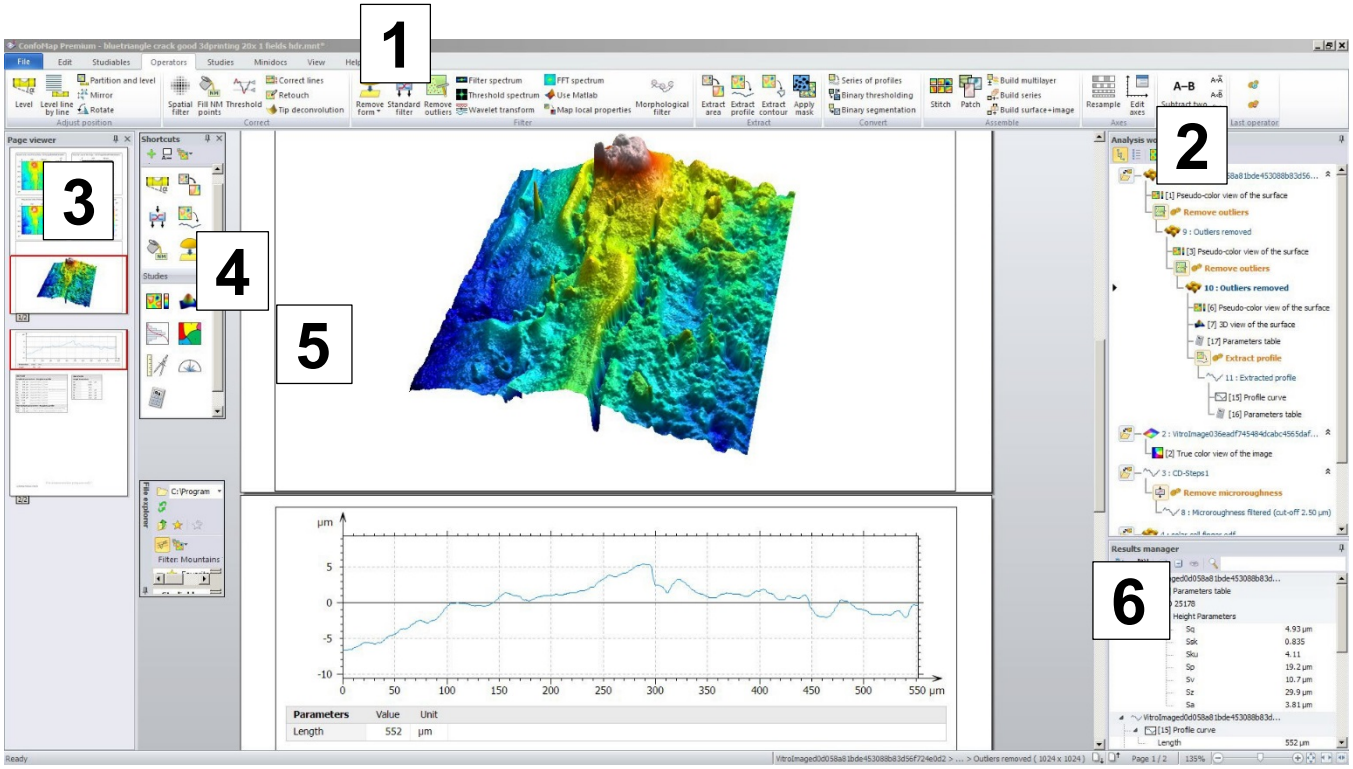
Organized to fit your needs.

Easy and simple navigation. Page View provides an overview of your document Report Pages. Shortcuts allow quick access to often used tools. The valuable Analysis Workflow records step by step processes preformed during analysis which can be reused on subsequent images with the click of the mouse. Results Manager tracks the critical data generated as a result of analysis. All analysis results can be exported in Excel format for interfacing with third party software, for example quality management systems.



1. Configurable tool bars. Context Sensitive Text
2. Analysis Workflow
3. Page View
4. Shortcuts
5. Report Pages
6. Results Manager

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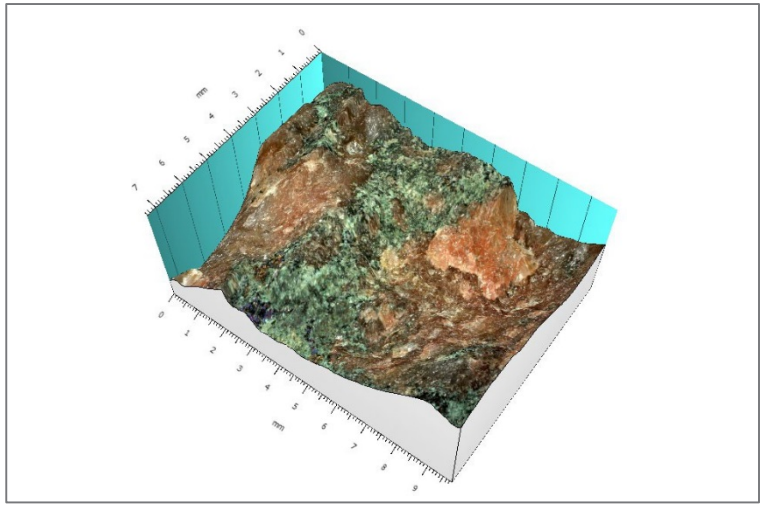
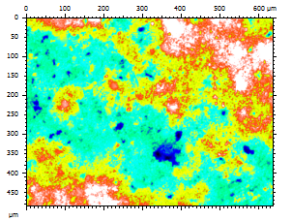
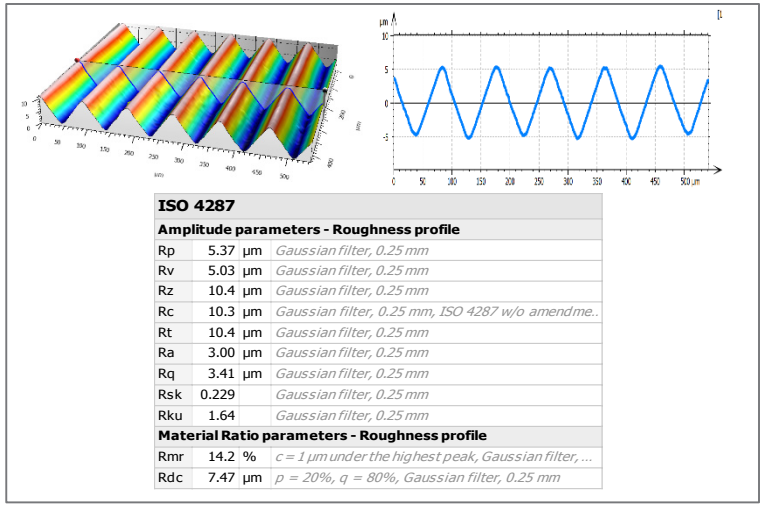


True Color Overlay with surface topography making surface features more recognizable.

ISO 25178		
Height Parameters		
Sq	0.260	µm
Ssk	-0.318	
Sku	4.25	
Sp	2.58	µm
Sv	3.35	µm
Sz	5.93	µm
Sa	0.203	µm
Functional Parameters		
Smr	0.000403	%
Smc	0.321	µm
Sxp	0.546	µm
Functional Parameters (Volume)		
Vm	0.0116	µm³/µm²
Vv	0.333	µm³/µm²
Functional Parameters (Stratified surfaces)		
Spk	0.238	µm
Svk	0.311	µm

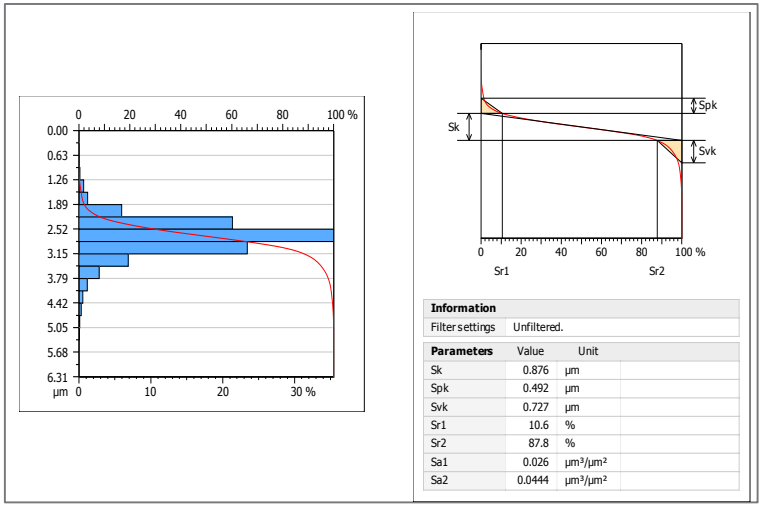


3D Surface Texture Measurement. User selectable standards and parameters.



ISO 4287			
Amplitude parameters - Roughness profile			
Rp	5.37	µm	*Gaussian filter, 0.25 mm*
Rv	5.03	µm	*Gaussian filter, 0.25 mm*
Rz	10.4	µm	*Gaussian filter, 0.25 mm*
Rc	10.3	µm	*Gaussian filter, 0.25 mm, ISO 4287 w/o amendme..*
Rt	10.4	µm	*Gaussian filter, 0.25 mm*
Ra	3.00	µm	*Gaussian filter, 0.25 mm*
Rq	3.41	µm	*Gaussian filter, 0.25 mm*
Rsk	0.229		*Gaussian filter, 0.25 mm*
Rku	1.64		*Gaussian filter, 0.25 mm*
Material Ratio parameters - Roughness profile			
Rmr	14.2	%	*c = 1 µm under the highest peak, Gaussian filter, ...*
Rdc	7.47	µm	*p = 20%, q = 80%, Gaussian filter, 0.25 mm*

2D Surface Roughness Measurement. User selectable standards and parameters.



Information	
Filter settings	Unfiltered.

Parameters	Value	Unit
Sk	0.876	µm
Spk	0.492	µm
Svk	0.727	µm
Sr1	10.6	%
Sr2	87.8	%
Sa1	0.026	µm³/µm²
Sa2	0.0444	µm³/µm²

Abbott-Firestone (bearing ratio), Sk Curve and Volume parameters useful for the functional analysis of tribological studies

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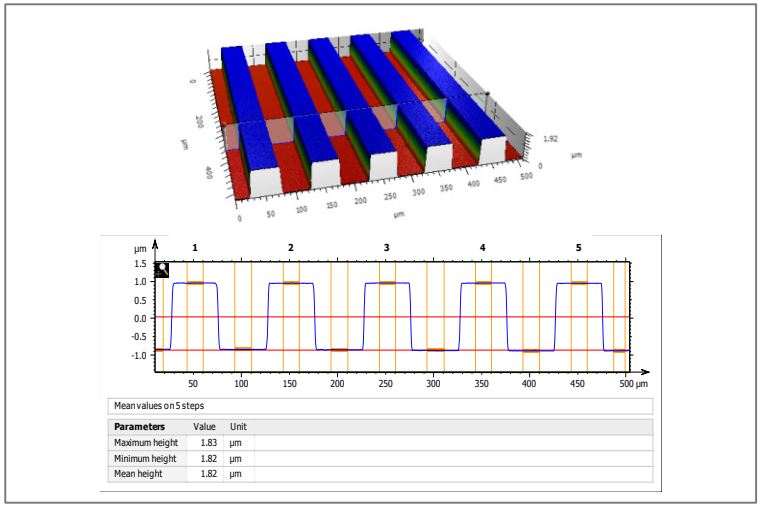
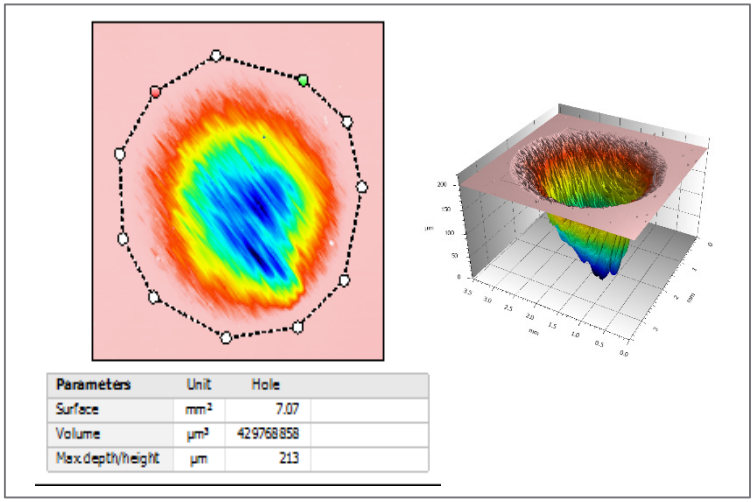
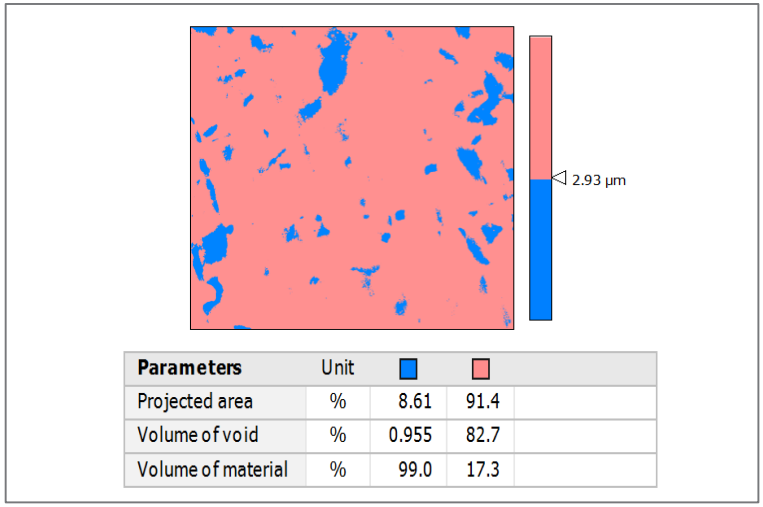


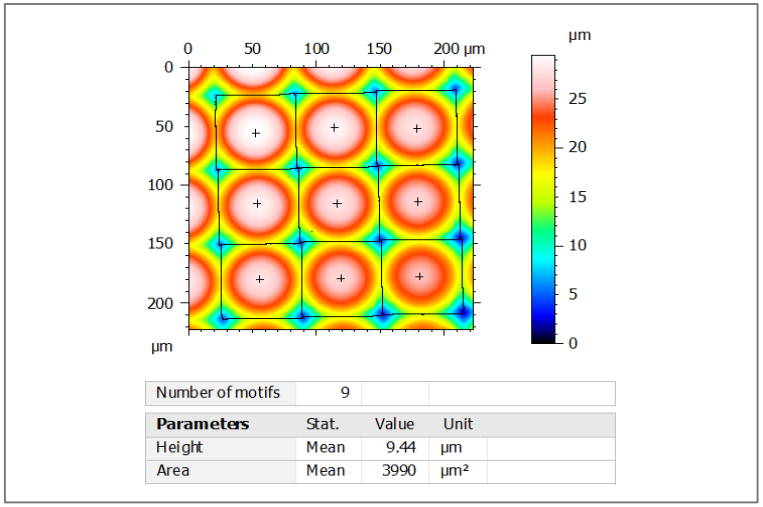
Profile extraction with automatic step height measurement.



Volumetric measurement of a hole / valley or peak. Parameters such as volume, surface, depth, perimeter, complexity.



Threshold slicing of 2D and 3D images for % area (porosity) and volumetric measurement.



Motifs Analysis is a segmentation method (new for ISO 25178) fallowing detection of the hills and dales on a surface with morphological parameters.

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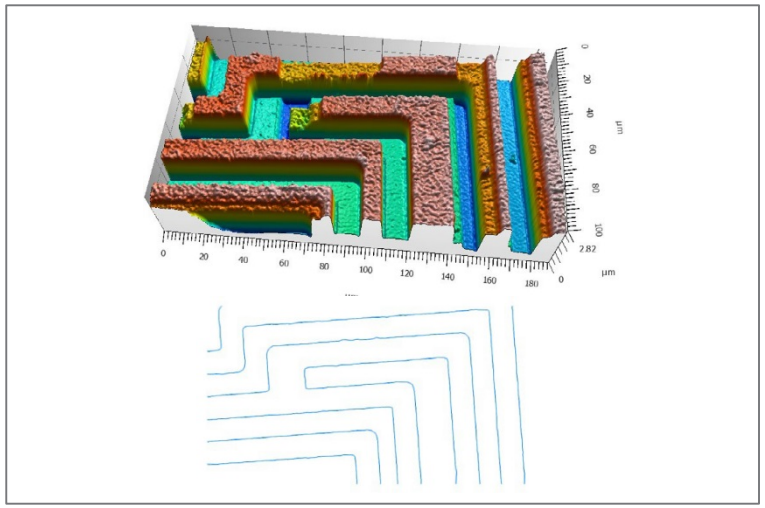
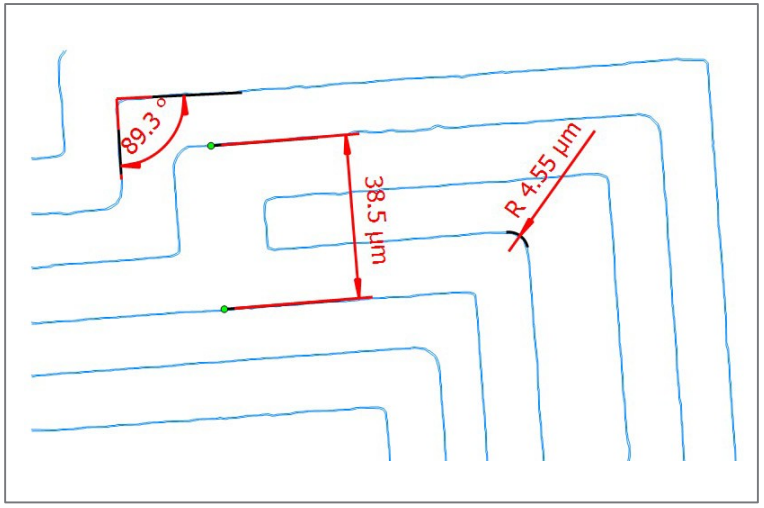
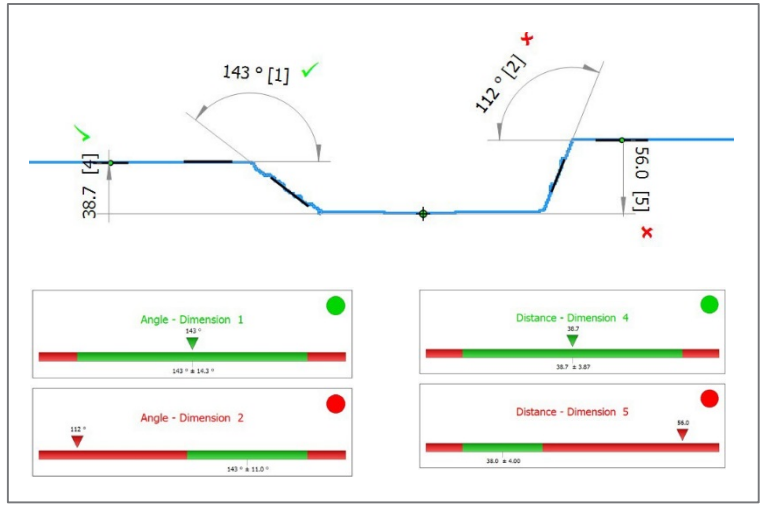


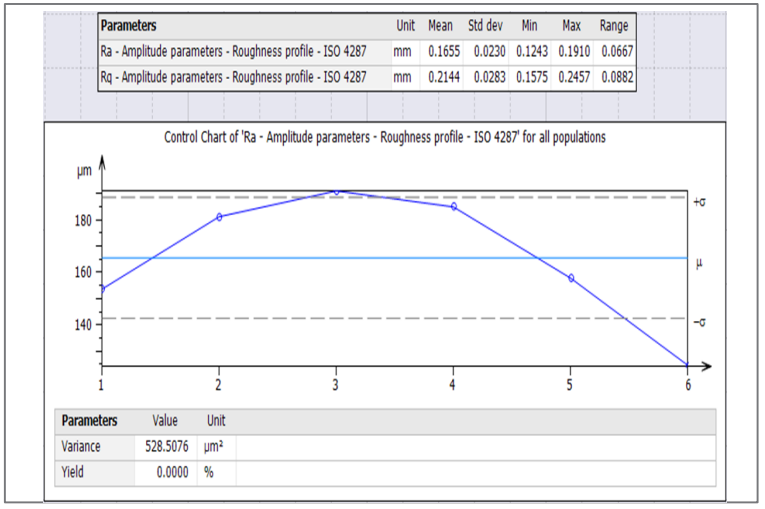
Contour Extraction extracts a horizontal profile following the edges of a segmented image resulting in a parametric profile.



Advanced Contour Analysis provides metrology on 2D images and surface profiles with automatic contour detection.



Tolerance limits can be set on measurement parameters and surface roughness measurements. Comparison to CAD files as well.



Statistics module is used to monitor numerical results and present in control charts , tables and charts with user defined control limits.

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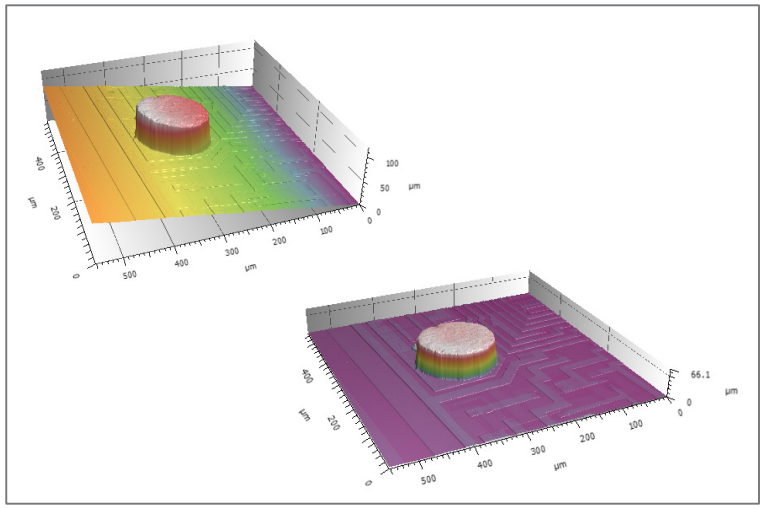
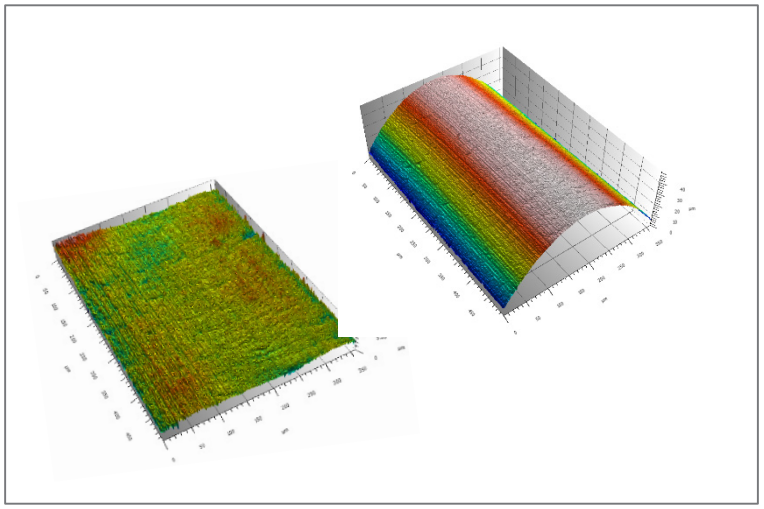
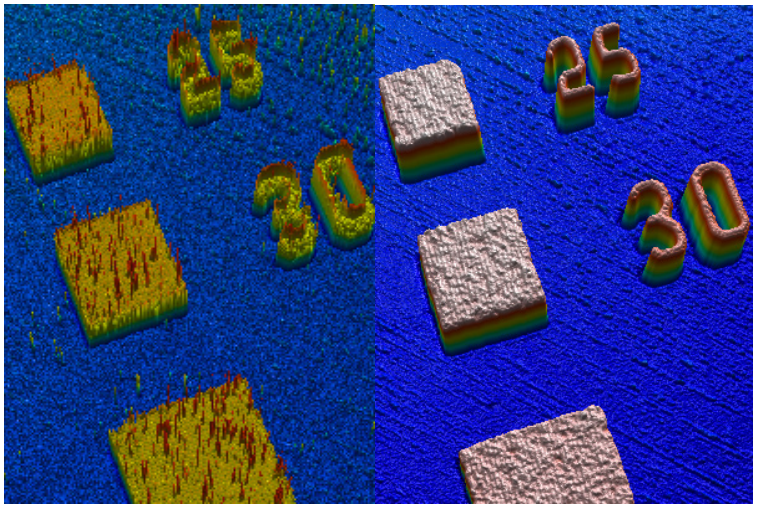


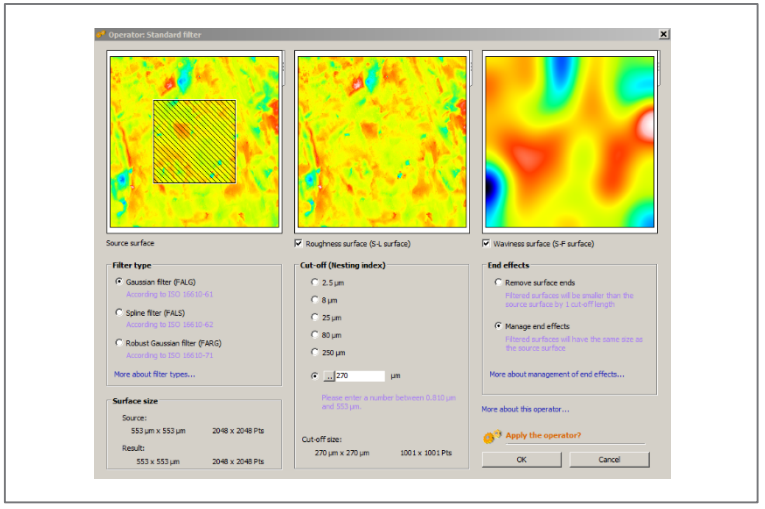
Advanced surface leveling by plane fit, subtraction or defined multipoint while ignoring surface structures.



Form removal function - mathematically removing the general form such as of cylinders, spheres and more complex shapes.



Outlier removal function. Under certain optical conditions "spikes" or non-measured points may be created in the image. The outlier removal function handles this issue in a elegant and efficient way.



Standard filter (Cut-off) used to separate the roughness and waviness phenomena of the profile. Selectable filter types (e.g. ISO).

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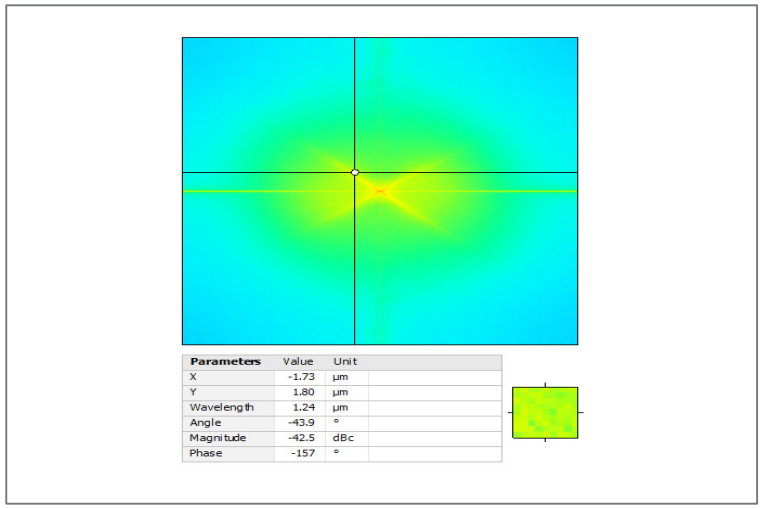
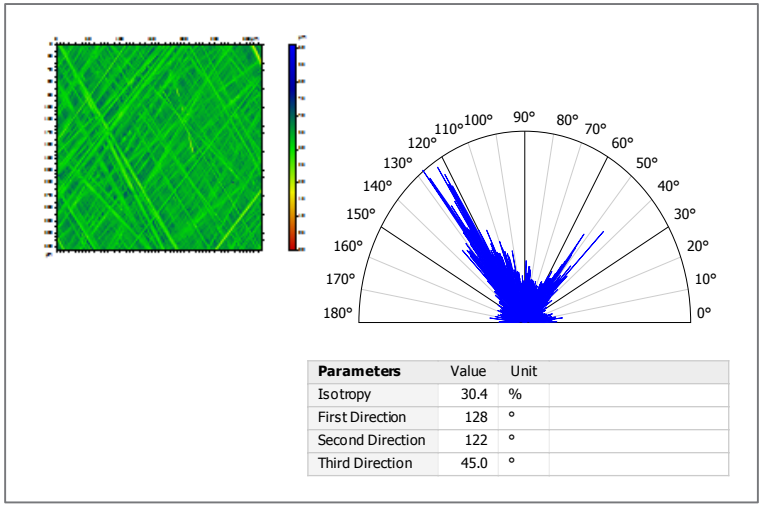


Spectral Analysis - Interactive representation and filtering of frequency spectrum(FFT). In addition avg. power spectrum density (PSD) and wavelet transform are available.



Texture Direction and Texture Isotropy for analysis of surfaces having main directions and / or periodic structures in two directions.

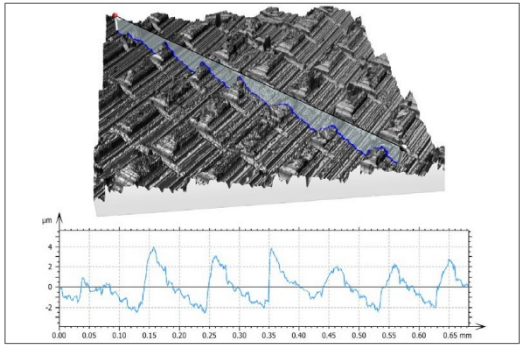
ConfoMap Applications

Typical Areas of Use

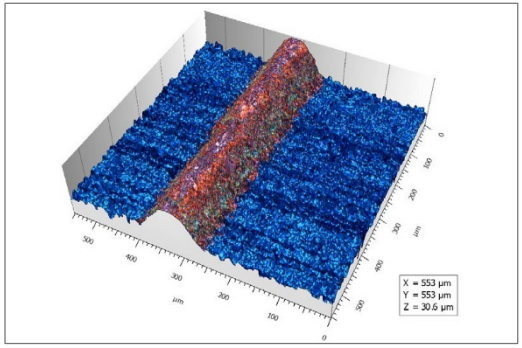
Machining and
Micromechanics Automobile
& Aerospace Medical
Devices
Electronics
Micro-optics / Micro
Replication Materials Science
Forensics

Tasks

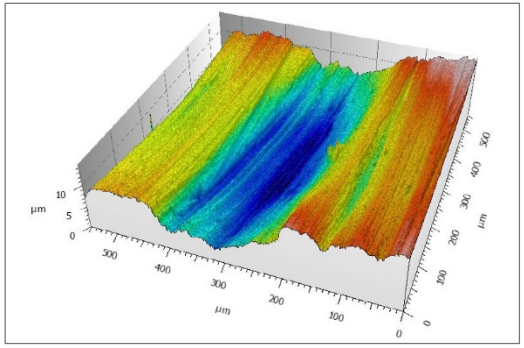
Measure surface texture/roughness
(2D/3D) Measure 3D geometric features
Measure wear (tribology)
Measure geometical features
Measure porosity
Measure volume
Measure form
And much more!



Milled aluminum surface with height profile...Smartproof 5 with C Epiplan Apochromat 20x/0.7 objective lens.



Metalized finger on solar cell surface 3D view with color overlay... Smartzoom 5 with Plan Apochromat D 5x/0.3 objective lens.



Wear mark on polymer surface of a medical device…LSM 800 with C Epiplan Apochromat 50x/0.95 objective lens.

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Functions and Modules

Modules	Processing	View	Topography	Profile
ConfoMap ST	• Formal Removal in Topo • Level Topo / Profile • Remove Outliers • Fill Non-measured Pts. • Standard Filter • Spatial Filter • Invert / Rotate • Threshold • Extract Profile • Surface Stitching	• Height Map • 3D View • Texture Overlay	• Step Height Measurement • Roughness * • Distance XYZ • Abbot Curve • Segmentation • Subtract 2 Surfaces • Define Tolerances / Limits • Volume of Hole	• Step Height Meas. • Distance XZ • Roughness *
2D Automotive Module	• Requires ConfoMap ST			• Additional Roughness Parameters * • Bearing Curve
Contour Module	• Requires Confomap ST			• Contour Analysis (size , Angle, Radii, Diameter, DXF-Template)
Advanced Contour Module	• Requires Confomap ST			• Includes Contour Module • Form Deviation • CAD Comparison (DXF-Template)
Advanced 2D Surface Texture Module	• Requires Confomap ST • Extract Multiple Profiles • Morphological Filters in Profile • Form Removal in Profile			• Fractal Analysis

* See following tables

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Modules	Processing	View	Topography	Profile
3D Advanced Surface Texture Module	• Requires Confomap ST • Morphological Filters in Profile		• Additional Roughness Parameters * • Fractal Analysis • Surface Isotropy, Directionality	
Statistics Module	• Requires Confomap ST • Statistics Analysis of Measured Data			
Grains & Particles Module	• Requires Confomap ST		• Additional Roughness Parameters * • Analysis of Structured Surfaces (Pores, Grains, ….	
3D Fourier Analysis Module	• Frequency Spectrum • Power Spectrum Density (PSD) • Isotropy, Directionality & Periodicity • Autocorrelation and Intercorrelation			

* See following tables

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2D Surface Texture	ConfoMap ST	Confomap ST + 2D Automotive Module
ISO 4287	• Amplitude Parameters – Primary profile Pa, Pc, Pku, Pp, Pq, Psk, Pt, Pv, Pz • Spacing Parameters – Primary profile Pdq, PSm • Material Ratio Parameters – Primary profile Pdc, Pmr • Peak Parameters – Primary profile PPc • Amplitude Parameters – Roughness profile Ra, Rc, Rku, Rp, Rp1max Rq, Rsk, Rt, Rv, Rv1max, Rz, Rz1max • Spacing Parameters – Roughness profile Rdq, RSm • Material Ratio Parameters – Roughness profile Rdc, Rmr • Peak Parameters – Roughness profile RPc	• Parameters from Confomap ST • Amplitude Parameters – Waviness profile Wa, Wc, Wku, Wp, Wq, Wsk, Wt, Wv, Wz • Spacing Parameters – Waviness profile Wdq, WSm • Material Ratio Parameters – Waviness profile Wdc, Wmr • Peak Parameters – Waviness profile WPc
ISO 13565		• ISO 13565-2 A1, A2, Mr1, Mr2, Rk, Rpk, Rpk*, Rvk, Rvk* • ISO 13565-3 - Primary profile Pmq, Ppq, Pvq • ISO 13565-3 – Rougness profile Rmq, Rpq, Rvq
ISO 12085		• Roughness motif Parameters AR, Kr, Nr, Pt, R, Rx, SAR, SR • Waviness motif Parameters AW, Kw, Nw, SAW, SW, W, Wte, Wx • Other motif Parameters HTrc, Rke, Rpke, Rvke, Trc

* Distance between the highest profile peak and the intersection line of the surface ratio Mr1 or distance between the intersection line of the surface ratio Mr2 and the deepest valley respectively.

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2D Surface Texture	ConfoMap ST	Confomap ST + 2D Automotive Module
ISO 12181 (Straightness parameters)		STRp, STRq, STRt, STRv
ISO 12780 (Roundness parameters)		LSRad, RONp, RONq, RONt, RON
Other 2D-Parameters		• Primary profile parameters PD, Pda, Pfd, PH, PHSC, PHTp, PLa, PLo, PLq, Pmax, Ppm, Prms, PS, Ptm, PTp, Pvo, Py, PzJIS, P3z • Roughness profile parameters RD, Rda, Rfd, RH, RHSC, RHTp, RLa, RLo, RLq, Rmax, Rpm, Rrms, RS, Rtm, RTp, Rvo, Ry, RzJIS, R3z • Waviness profile parameters WD, Wda, Wfd, WH, WHSC, WHTp, WLa, WLo, WLq, Wmax, Wpm, Wrms, WS, Wtm, WTp, Wvo, Wy, WzJIS, W3z
Applicative parameters (plastic parameters)		AF, CH, PG
ASME B46.1 (2D-Parameters)	Htp, Pc, Ra, Rda, Rdq, Rku, Rmax, Rp, Rpm, Rq, Rsk, RSm, Rt, Rv, Rz, tp, Wt	Parameters from Confomap ST

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Functions and Modules

3D Surface Texture	Confomap ST	Confomap ST + 3D Advanced Surface Texture Module	Confomap ST + Grains & Particles Module
ISO 25178	• Height Parameters: Sa, Sq, Ssk, Sku, Sp, Sv, Sz • Functional Parameters: Smc, Smr, Sxp	• Parameters from Confomap ST • Spacial Parameters: Sal, Std, Str • Hybrid Parameters: Sdq, Sdr • Functional Parameters (Volume): Vm, Vmc, Vmp, Vv, Vvc, Vw • Functional Parameters (Stratified Surface) Sk, Smq, Smrt, Smr2, Spk, Spq, Svk, Svq	• Parameters from Confomap ST • Feature Parameters: Sda, Sdv, Sha, Shv, Spc, Spd, S5p, S5v, S10z
EUR 15178N	• Amplitude Parameters: Sa, Sku, Sp, Sq, Ssk, St, Sv, Sz • Area & Volume Parameters: Sdc, Smr	• Parameters from Confomap ST • Spacial Parameters: Sal, Std, Str • Hybrid Parameters: Sdq, Sdr, Sds, Sfd, Ssc • Functional Parameters: Sk, Smq, Spk, Spq, Sr1, Sr2, Svk, Svq • Functional Indices: Sbi, Sci, Svi	• Parameters from Confomap ST
ISO 12781(Flatness)	None	None	• FLTp, FLTq, FLTt, FLTv
Other 3D - param.	None	• Sda, Smean, Spar	None
ASME B46.1 (3D- Parameters)	• St Maximum height • Sp Maximum peak height • Sv Maximum pit height • Sq Root-mean-square height • Sa Arithmetic mean height • Ssk Skewness • Sku Kurtosis • SWt Area waviness height	• Parameters from Confomap ST	• Parameters from Confomap ST

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