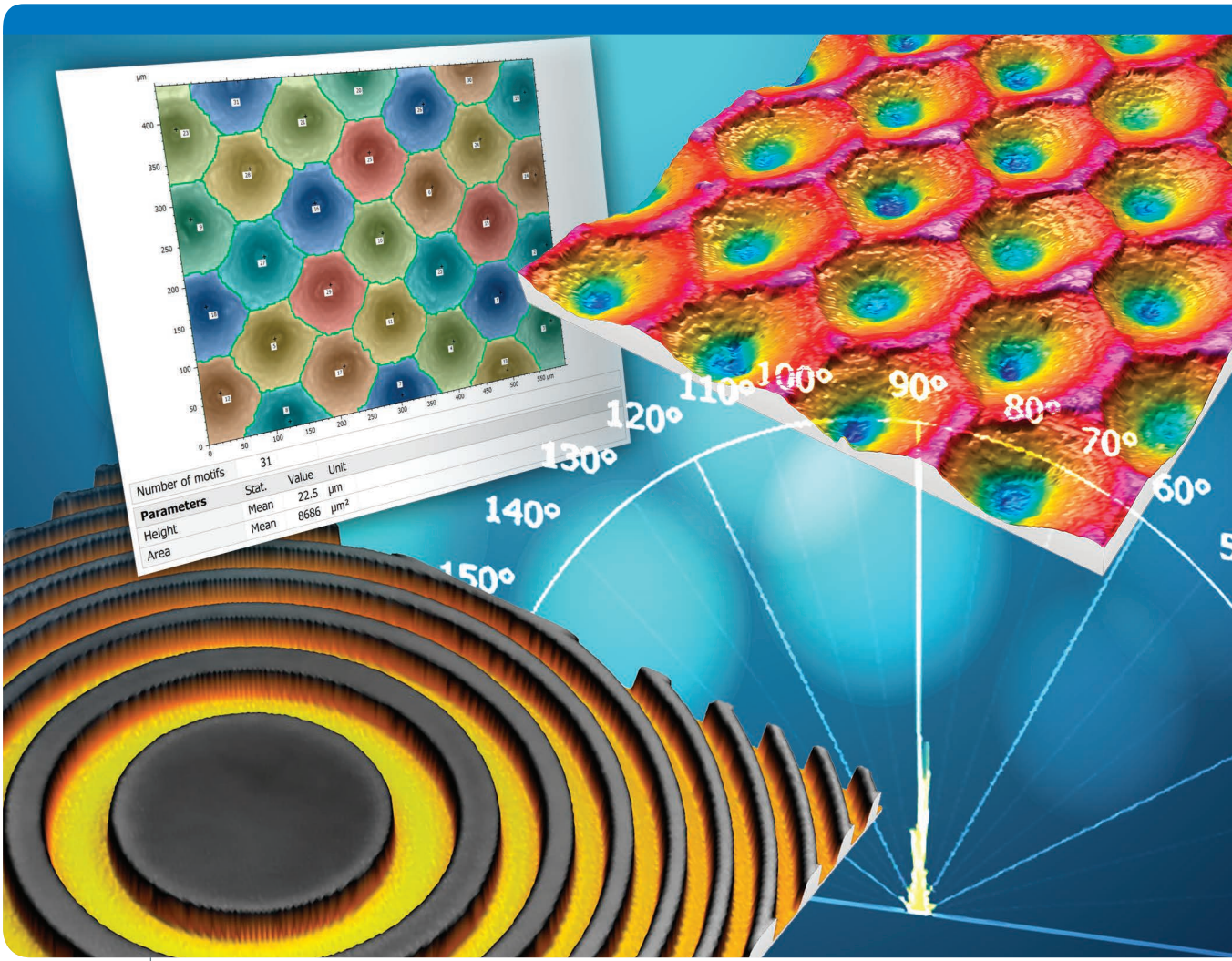
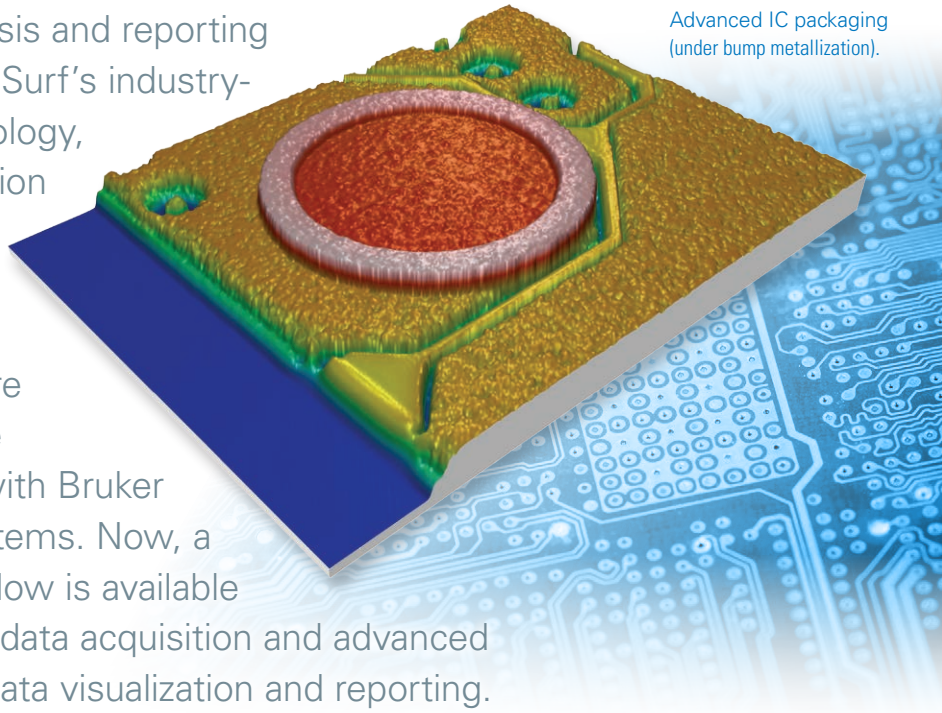


Vision64 Map

- Comprehensive 3D Surface Data Visualization and Analytical Data Reporting

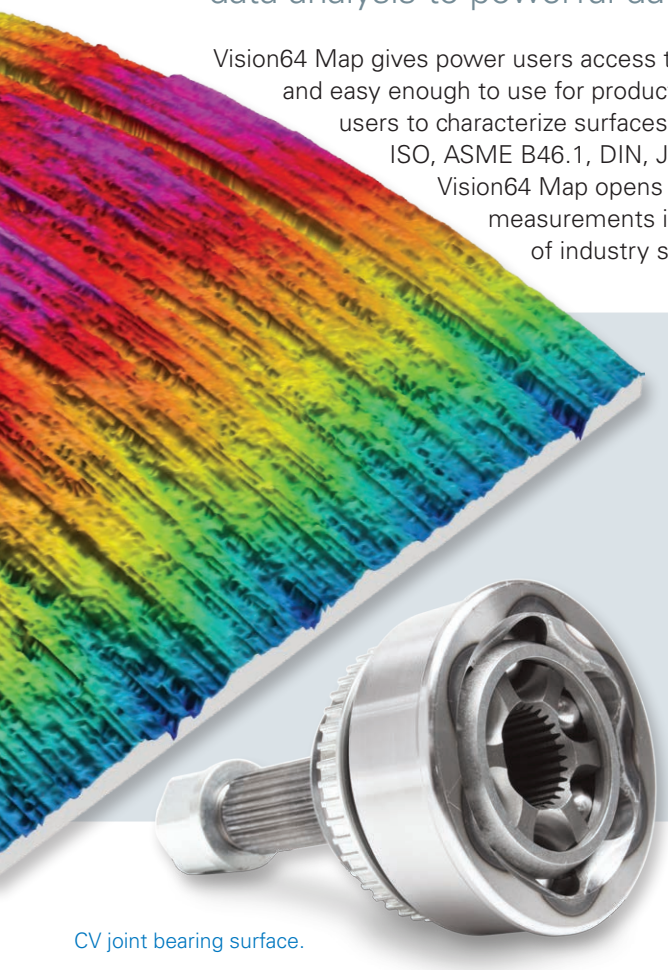
Enhanced Metrology Analysis and Reporting

Vision64 Map™ data analysis and reporting software, based on Digital Surf's industry-leading Mountains® Technology, is a comprehensive extension to Bruker's Vision64® instrument control and analysis software. Vision64 Map enables more comprehensive 3D surface visualization and analysis with Bruker 3D optical microscope systems. Now, a complete metrology workflow is available for users, from automated data acquisition and advanced data analysis to powerful data visualization and reporting.



Advanced IC packaging (under bump metallization).

Vision64 Map gives power users access to advanced, very customizable functions, yet it is also intuitive and easy enough to use for production operators on manufacturing floors. The software also allows users to characterize surfaces in accordance with the latest metrology standards, including ISO, ASME B46.1, DIN, JIS, and their equivalents in other geographic regions of the world. Vision64 Map opens up streamlined access to automated reporting of advanced surface measurements in 11 languages, while ensuring compatibility across a wide range of industry standards.



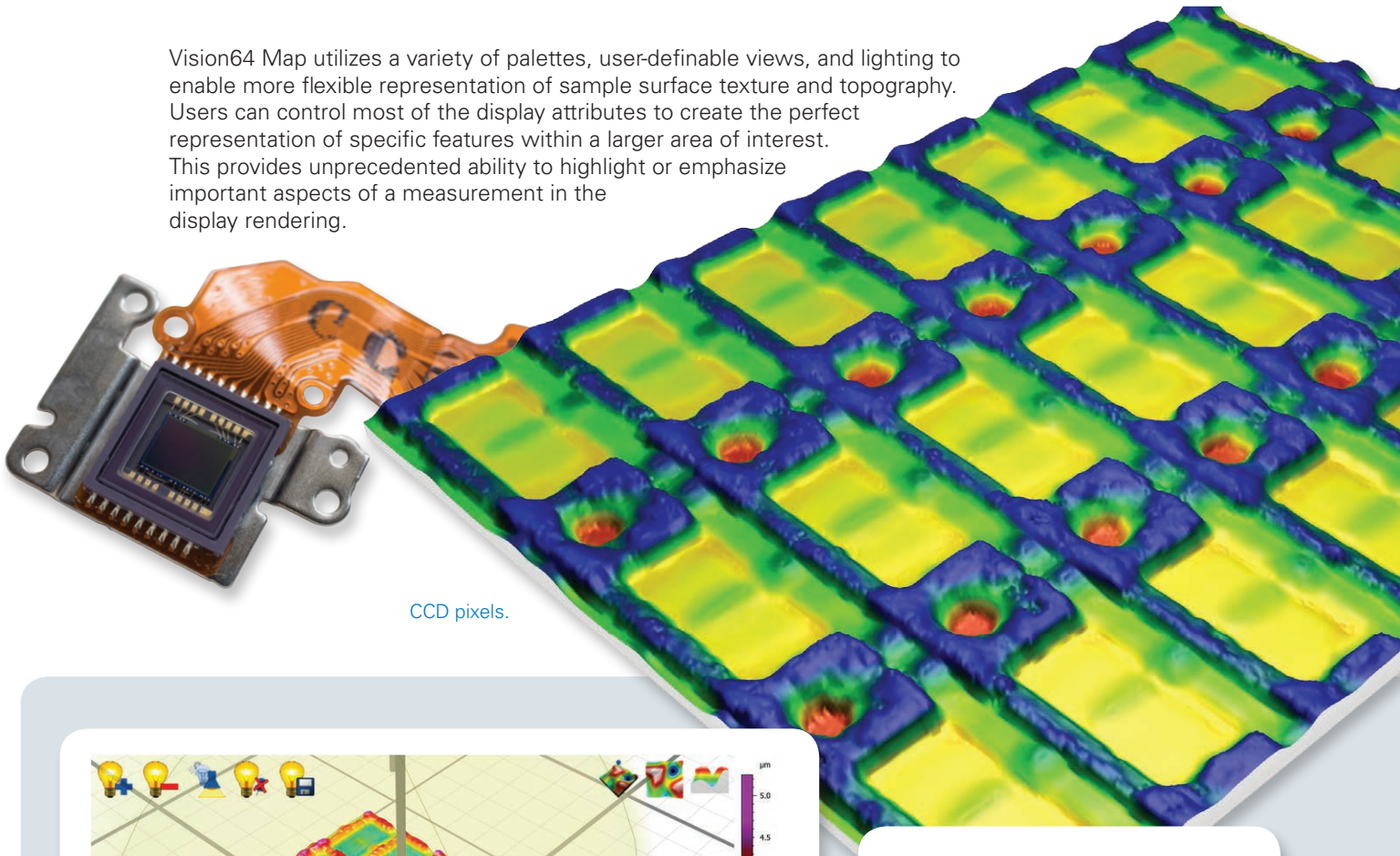
CV joint bearing surface.

Maximized Value for Bruker 3D Optical Microscopes:

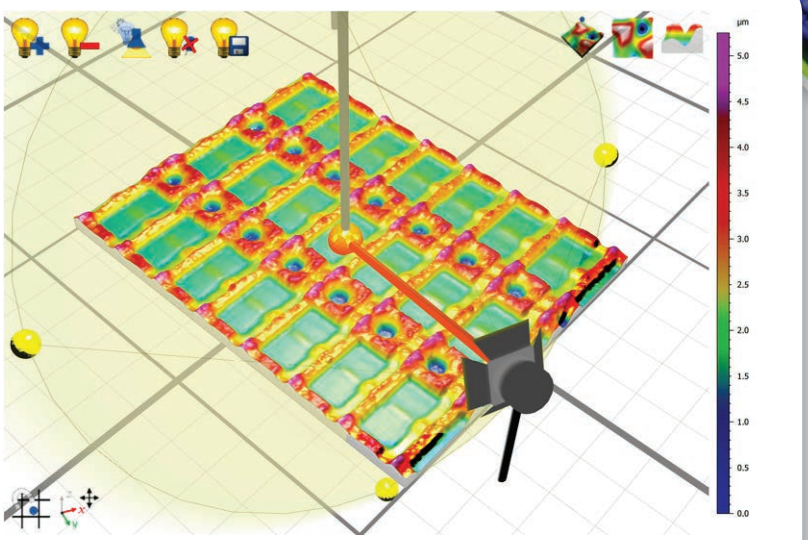
- Present or publish data with stunning 3D visualization
- Characterize surfaces in accordance with the latest metrology standards around the world
- Automate data reporting in 11 different languages
- Meet specific application needs with customized, feature-rich modules

Advanced 3D Surface Visualization

Vision64 Map utilizes a variety of palettes, user-definable views, and lighting to enable more flexible representation of sample surface texture and topography. Users can control most of the display attributes to create the perfect representation of specific features within a larger area of interest. This provides unprecedented ability to highlight or emphasize important aspects of a measurement in the display rendering.



CCD pixels.



Multiple image enhancement tools provide best representation of detailed features of interest.

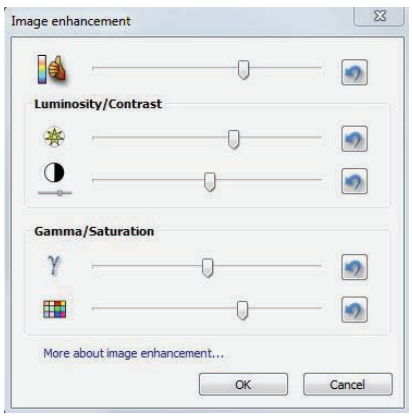
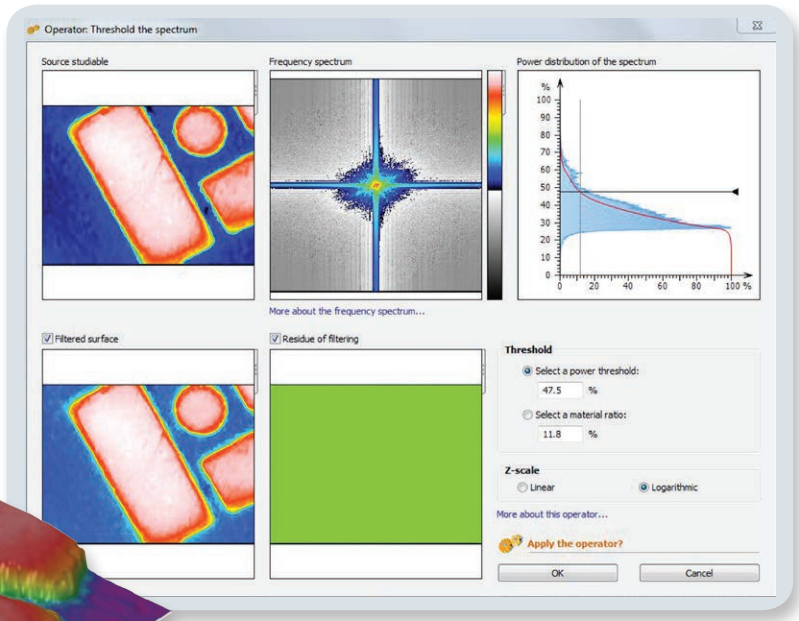


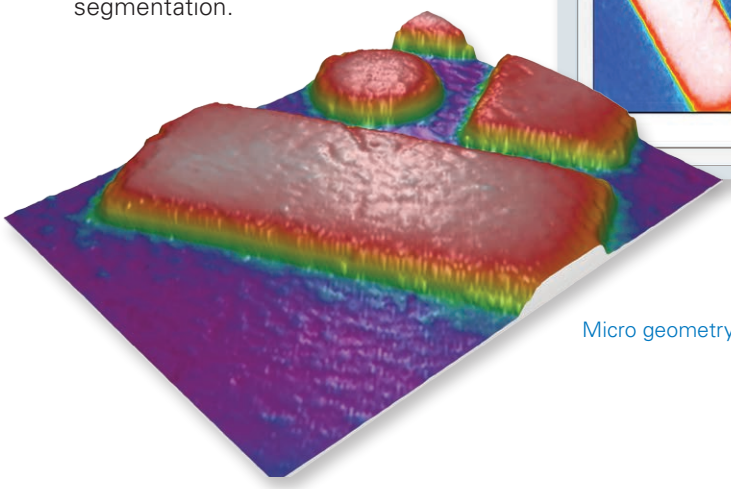
Image enhancement control console.

Comprehensive Data Segmentation and Analysis

Vision64 Map allows users to take the fullest advantage of the metrology capabilities of their Bruker 3D optical microscope systems by making it easy to segment measurement data and match it to local standards. The software enables new functional watershed segmentation for difficult data regions segmentation according to international standard methodology (ISO 25178). For example, results on rough topography do not display the obvious peaks and valleys found in traditional histogram-based segmentation.

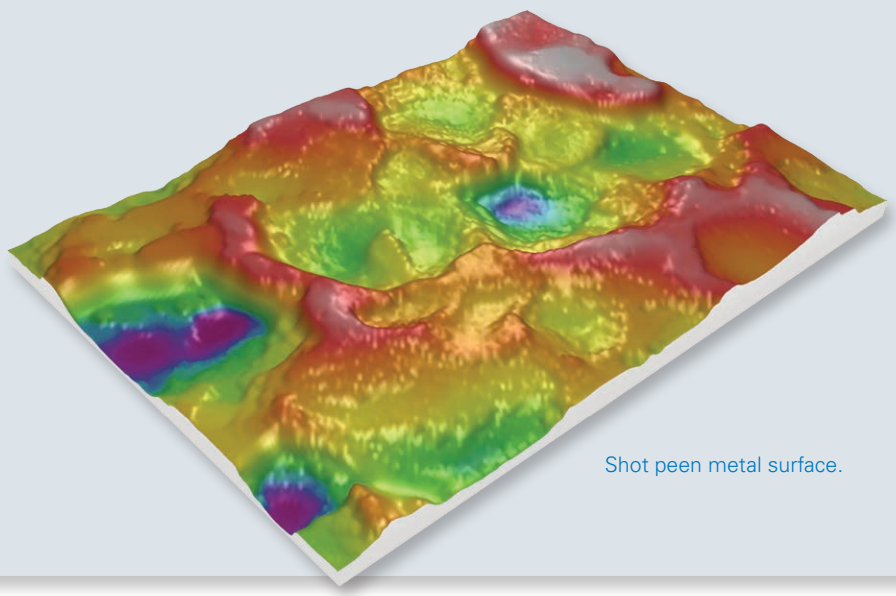


Frequency spectrum threshold filtering.

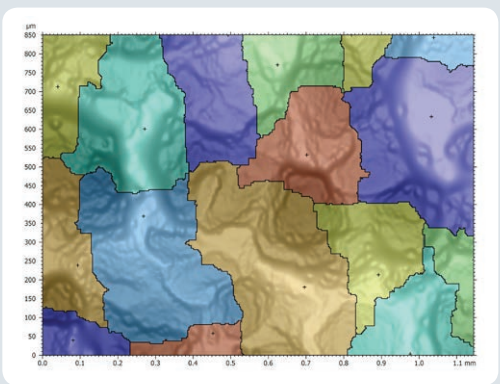


Micro geometry.

Watershed segmentation of motifs analysis



Shot peen metal surface.

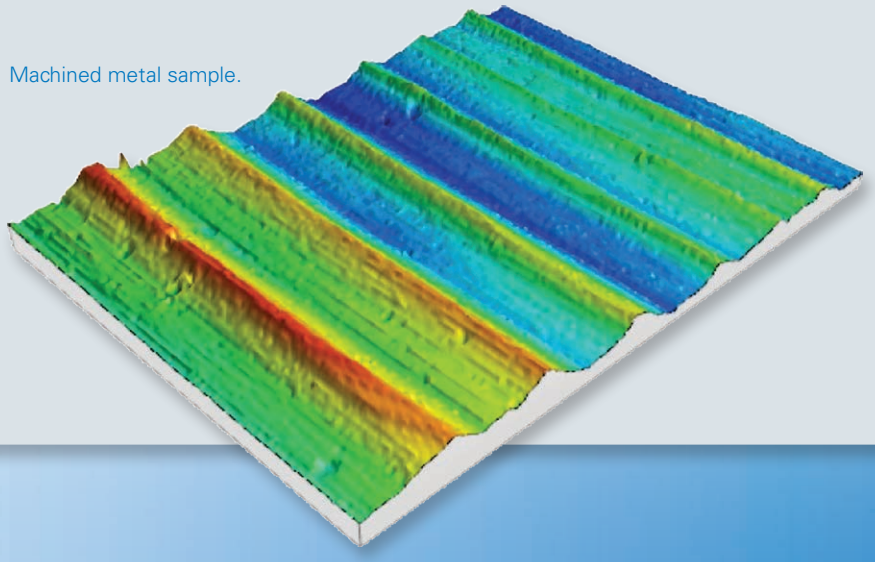


Number of Motifs	16	
Parameters	Statistic	Value
Height	Mean	7.73 nm
Area	Mean	61298 µm²

Reporting to Standards in Your Region and Language

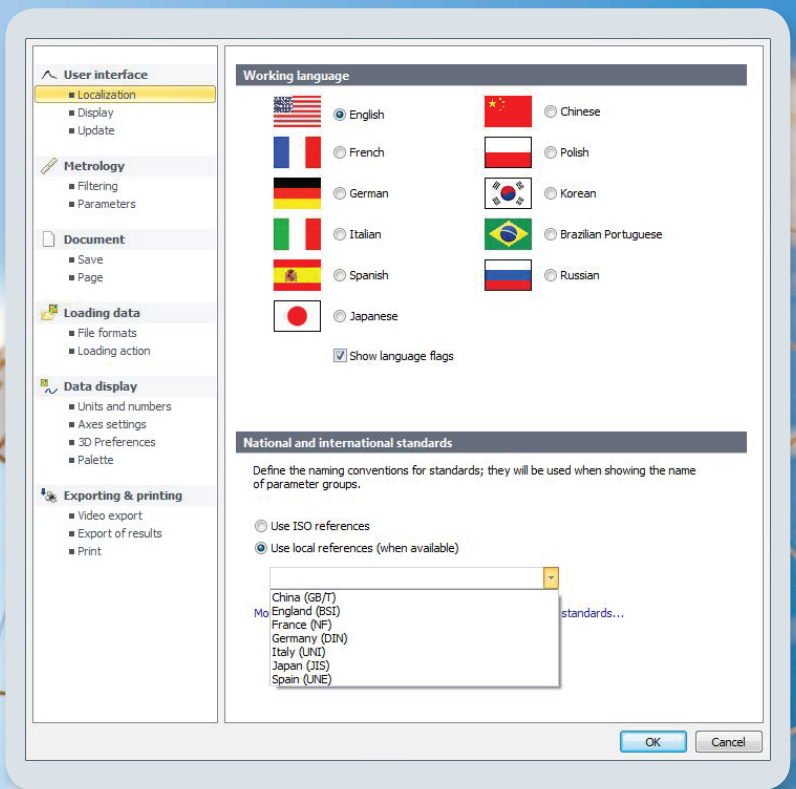
ISO 25178	
Height Parameters	
Sq	2.30 µm
Ssk	0.574
Sku	2.95
Sp	9.96 µm
Sv	5.97 µm
Sz	15.9 µm
Sa	1.85 µm

Machined metal sample.



Working reports feature user-interface and reporting selection in 11 available languages—

English, French, German, Italian, Spanish, Japanese, Chinese, Polish, Korean, Brazilian Portuguese and Russian.



Characterize surface texture in accordance with international standards—

In addition to ISO parameters, Vision64 Map calculates ASME B46.1 2D and 3D parameters (USA), displays GB/T (China), DIN (Germany), JIS (Japan), NF (France), BSI (UK), UNE (Spain) and UNI (Italy) equivalents of ISO parameters when they are available, and calculates the older EUR 15178 3D parameters. More parameters are available with optional modules.

Feature-Rich Modules for Specific Application Needs

Vision64 Map is available with a number of optional modules that make it even easier to customize your analyses and reports to your specific applications. Modules and their features and analyses include, but are not limited to:

Vision64 Map 2D Advanced Surface Texture Module

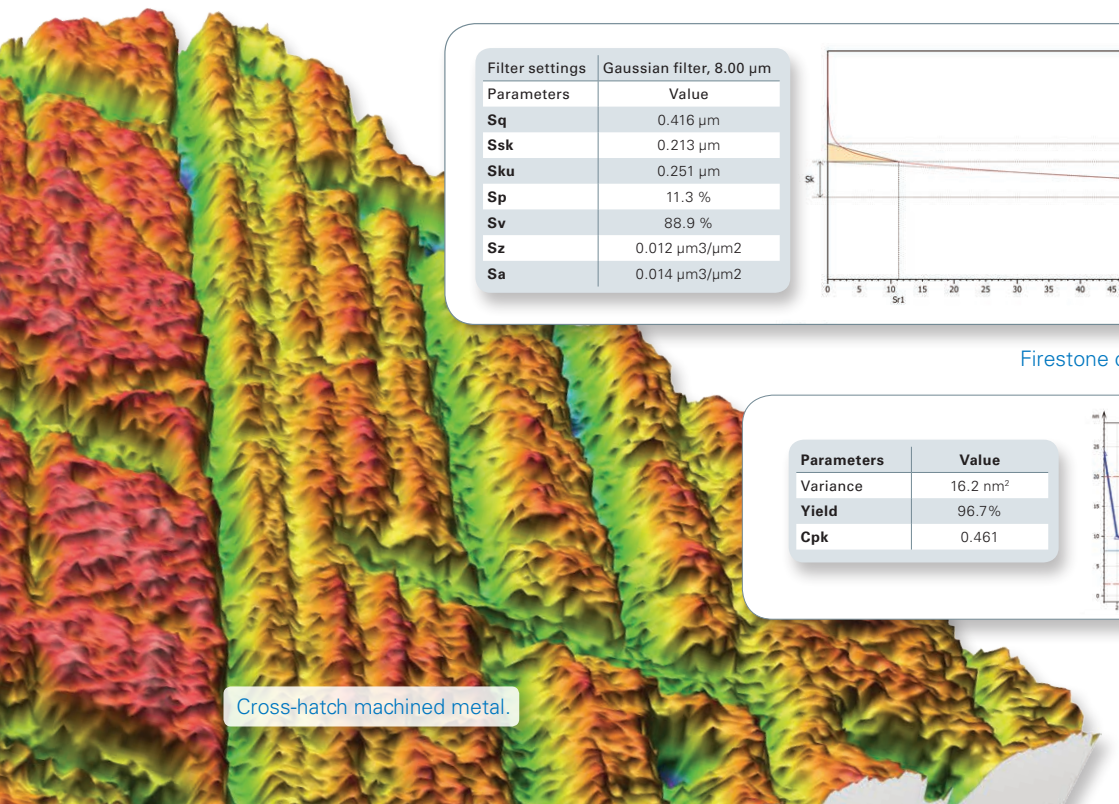
- **Advanced 2D filtering techniques** — remove form and apply roughness/waviness filters from 2RC to ISO 16610, apply morphological filters using a straight or round structuring element, or filter noisy profiles directly by editing the FFT plot within selected upper and lower bounds
- **Surface functionality assessments** — study the bearing ratio curve and depth distribution histogram to evaluate surface functionality or subtract profiles to assess wear
- **Analyze process-surface interactions and other surface characteristics** — use FFT-based tools to display frequency spectrum and power spectrum density plots or carry out autocorrelation and intercorrelation studies

Vision64 Map Advanced Contour Module

- **Full-form deviation analyses** — specify tolerances for any dimension, compare measured data with CAD data (DXF) or user-defined nominal form, analyze profiles with significant positional tolerances, show magnified form deviation graphics on arcs and lines, or calculate form error parameters
- **Automatic table generation and data export** — generate a table of analysis results automatically and export them in Excel-compatible format for quality management systems

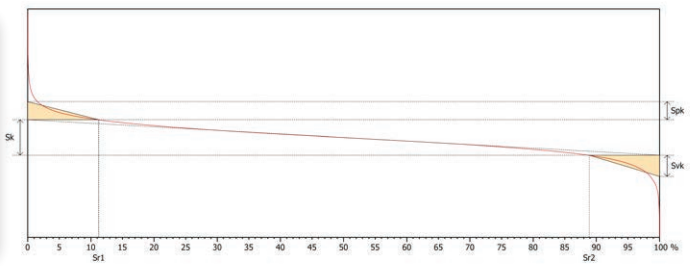
Vision64 Map 2D Automotive Module

- **Automotive industry analysis and reporting** — generate a comprehensive set of 2D parameters in accordance with international and national standards (ISO 13565-2 Rk parameters, ISO 13565-3 primary and roughness parameters, ISO 12085 roughness and waviness parameters, ISO 4287 waviness parameters, ISO 12780 straightness parameters, and ISO 12781 roundness parameters)
- **Wear and lubrication parameter studies** —display functional Rk parameters graphically



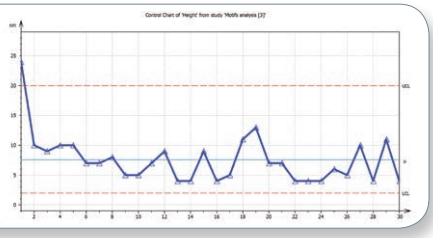
Cross-hatch machined metal.

Filter settings	Gaussian filter, 8.00 µm
Parameters	Value
Sq	0.416 µm
Ssk	0.213 µm
Sku	0.251 µm
Sp	11.3 %
Sv	88.9 %
Sz	0.012 µm3/µm2
Sa	0.014 µm3/µm2



Firestone curve (bearing curve) related parameters.

Parameters	Value
Variance	16.2 nm²
Yield	96.7%
Cpk	0.461



Control chart including UCL, LCL and showing computation of CpK (process capability) as well as yield.

Vision64 Map Statistics Module

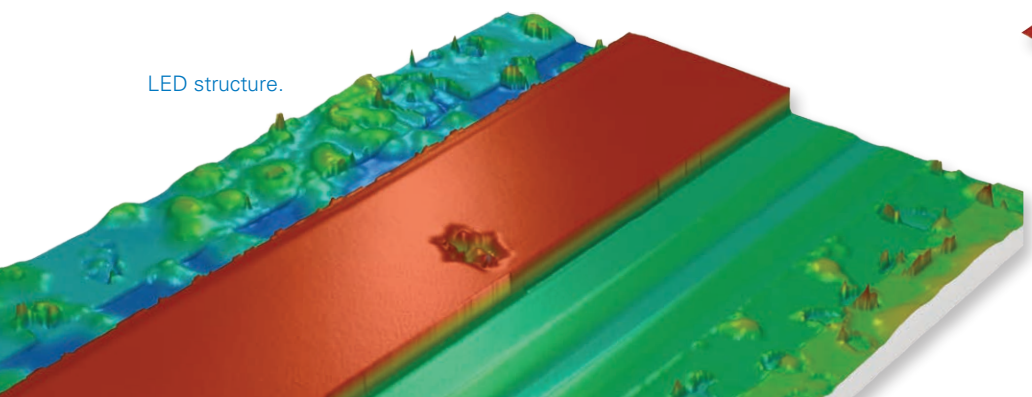
- **Automated data preparation** — apply a template to analyze each measurement in a population automatically and generate one analysis document per measurement containing all of the parameters for statistical analysis
- **Multiple populations** — define multiple populations for statistical analysis by simply selecting the analysis documents corresponding to each measurement population or by specifying the folder where they are located, calculate statistics for one or more populations including dimensions (distances, areas, volumes, step heights, angles) and parameters (e.g., ISO 4287 or ISO 25178)
- **Control your process** — display control charts for an instant picture of whether or not a parameter is out of limits, together with histograms, box plots and scatter plots

Vision64 Map 3D Advanced Surface Texture Module

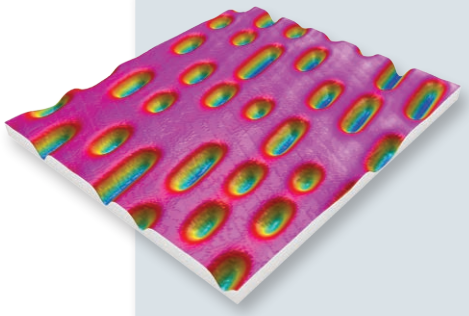
- **Subsurface analyses** — extract a geometric subsurface (for example a component layer) from a full surface that has been partitioned using the ISO 25178 segmentation by watersheds algorithm, calculate its flatness instantaneously, and analyze it in the same way as a full surface
- **Functional volume analyses** — display ISO 25178 and Sk functional volume parameters graphically to facilitate studies of wear and lubrication, or study peak/grain/particle distribution and density
- **MATLAB compatibility** — load or write MATLAB scripts and execute them to carry out custom operations, including filtering

Vision64 Map 3D Fourier and Wavelets Module

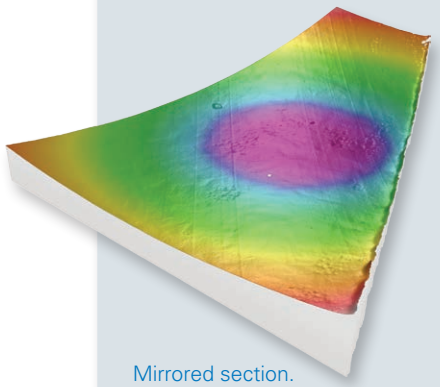
- **Frequency spectrum plotting** — display frequency spectrum plots for 3D surfaces with x and y, wavelength, angle, magnitude and phase, or display 2D frequency spectrum plots for 2D profiles with wavelength, magnitude and phase
- **Autocorrelation and intercorrelation characterization** — study 3D surface and 2D profile autocorrelation and intercorrelation
- **Discrete wavelet filtering** — decompose a 2D profile or 3D surface into a set of profiles or surfaces at different levels of scale, select the scale levels for inclusion in the roughness profile and hence the waviness profile, or use Coiflet, Daubechies, Discrete Meyer, Spline and Symlet wavelet families (wavelet spline filtering is an advanced filtering technique defined in ISO 16610)



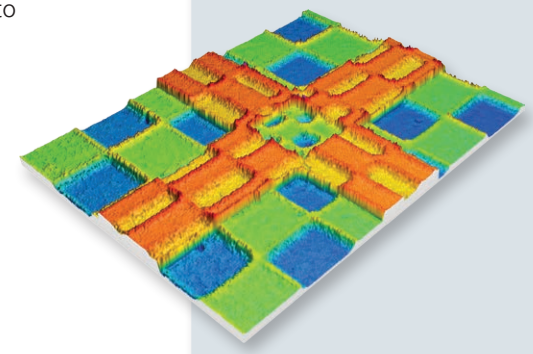
LED structure.



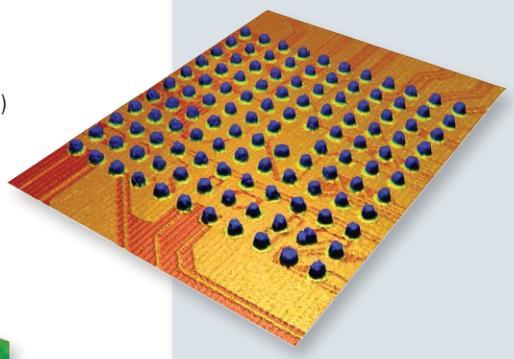
CD data pits.



Mirrored section.



Stepped surface.

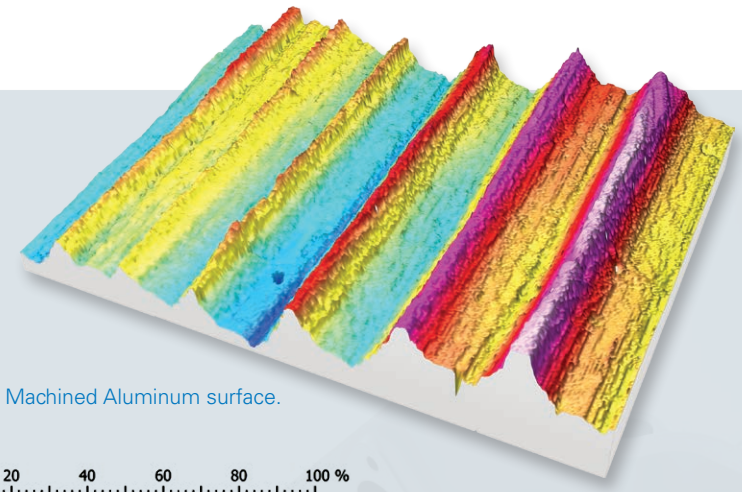


Solder bumps.

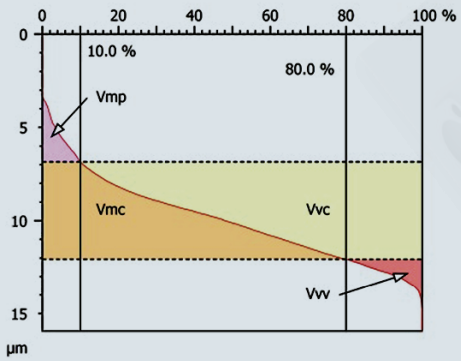
Vision64 Map Applications

Vision64 Map on a Bruker 3D optical microscope system enables the widest range of customized analyses:

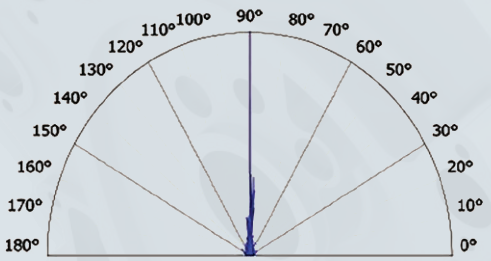
- **Research**
  - New materials characterization
  - New process evaluation
- **Industrial**
  - Precision surface machining
  - Corrosion and wear
- **Semiconductor**
  - Advanced IC packaging
  - Surface topography
- **MEMS**
  - Sensors and actuators
  - Radio frequency (RF) and microfluidics devices
- **Medical Implants and Devices**
  - Surface texture
  - Defect inspection



Machined Aluminum surface.

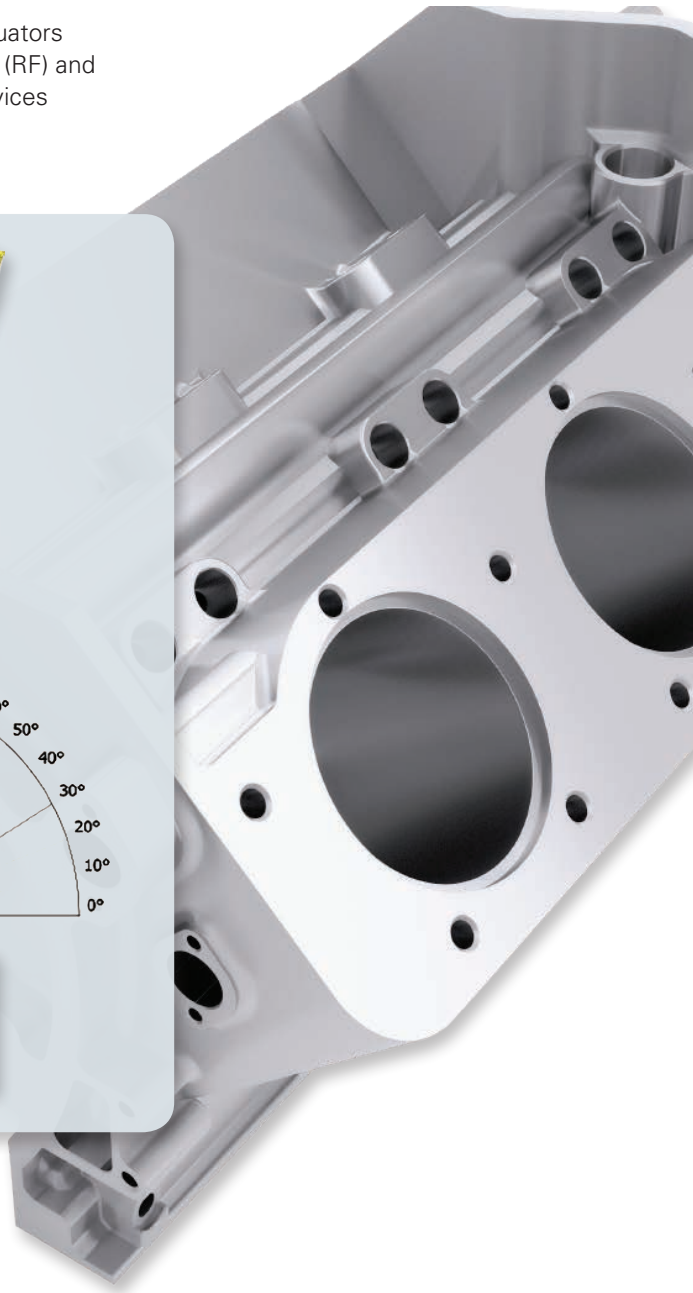


Parameters	Value
Vmp	0.150 ml/m2
Vmc	2.11 ml/m2
Vvc	3.12 ml/m2
Vvv	0.155 ml/m2



Parameters	Value
Isotropy	17.3%
First Direction	89.9°
Second Direction	84.4°
Third Direction	95.7°

Example report of volume parameters and surface texture direction.



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