2D profilometry software

for laboratory scanning profilometers (contact and non-contact)

- State of the art metrology for 2D profilometers
- View primary, waviness and roughness profiles
- Study profile geometry
- Calculate 2D surface texture parameters according to the latest standards
- Secure batch processing
- Add modules for advanced analysis
- Automate analysis and publish results easily
Analyze surface geometry and texture
Distances, angles, areas, step heights, roughness, bearing ratio, depth distribution

Visualization of measurement data
Visualize primary, roughness and waviness profiles independently. Level a profile, invert it on the X or Z axis, zoom in on a section, set thresholds to remove anomalous spikes, resample to achieve better resolution, and retouch points on the profile.

Geometric analysis
Measure distances, height differences, slopes, angles, areas of peaks and holes, and up to six step height measurements on a single profile.

Functional analysis
The Abbott-Firestone bearing ratio curve and depth distribution histogram facilitates the analysis of friction and wear.

Roughness parameters
Calculate the most commonly used 2D parameters: ISO 4287 primary profile, waviness and roughness parameters (Ra, Rq, Rsk, Rmr, Rdc, Rdq, RPC, etc.) and ASME B46.1 2D parameters.

Material ratio and depth distribution

ISO 4287
Amplitude parameters - Roughness profile
- **R_{p**: 2.70 μm, Gaussian filter, 0.8 mm
- **R_{v**: 1.00 μm, Gaussian filter, 0.8 mm
- **R_{z**: 3.70 μm, Gaussian filter, 0.8 mm
- **R_{c**: 1.75 μm, Gaussian filter, 0.8 mm
- **R_{t**: 4.11 μm, Gaussian filter, 0.8 mm
- **R_{a**: 0.459 μm, Gaussian filter, 0.8 mm
- **R_{q**: 0.632 μm, Gaussian filter, 0.8 mm
- **R_{sk**: 1.55 μm, Gaussian filter, 0.8 mm
- **R_{mr**: 6.45 μm, Gaussian filter, 0.8 mm

Material Ratio parameters - Roughness profile
- **R_{mr**: 2.98 %
- **R_{dc**: 0.872 μm, p = 20%, a = 80%, Gaussian filter, 0.8 mm

Standard surface texture analysis in MountainsMap® Profile including LS form removal, separation of roughness and waviness profiles and calculation of ISO 4287 roughness parameters.
Highly intuitive desktop publishing environment
Full metrological traceability, powerful automation features

Visual analysis reports
Build a visual analysis report as you analyze the profile, working in a comfortable desktop publishing environment. Frames contain the 2D profiles under study, analytical studies, surface texture parameters, illustrations and measurement identity cards.

Smart user environment
The smart user environment - with logical top-down organization of all functions and contextual object-oriented ribbons - means that you can go from idea to action with minimum effort. Work in portrait or landscape format, or on full screen mode for maximum comfort. Work in your own language - the user interface provide a first level of help - is available in ten languages. In addition, a complete reference manual with illustrations and examples can be accessed simply by pressing the F1 key.

Full metrological traceability
Every analysis step is recorded in a hierarchical analysis workflow to assure full metrological traceability. Analysis steps in the workflow can be fine tuned at any time. All dependent steps are recalculated automatically.

Powerful, automation features
Once an analysis report has been completed it can be applied as a template to automate the analysis of multiple measurement data files. Templates that are applied by operators in a workshop or production environment can be locked to prevent modification.

Pass/fail with tolerancing
Pass/fail criteria with tolerances can be defined for any parameter. Green/red pass fail traffic lights are displayed automatically and the parameter value and tolerance limits are shown graphically.

Data export
Frames and pages can be exported as bitmaps. Finished reports can be exported in PDF and RTF formats for easy circulation.
All numerical results, including pass/fail status, are accessible in the Results Manager panel and can be exported in Excel-compatible text files for interfacing with 3rd party software including quality management software (SPC).
MountainsMap® Profile Optional Modules
For advanced and specialized applications

**+ 2D advanced surface texture module**

**Advanced 2D analytical studies and filters**

- Apply advanced 2D filtering techniques – remove form and apply roughness/waviness filters from Gaussian to ISO 16610 – apply morphological filters – denoise profiles using the FFT plot editor.
- Analyze fractal dimensions of profiles using the enclosing boxes and morphological envelopes methods.
- Compatibility with 3D profilers – display of pseudo-color images of 3D surfaces – extraction of 2D profiles from these surfaces.
- Overcome measurement limits virtually – join overlapping profiles.
- Generate statistics on series of profiles – the profiles in the series can be extracted from a series of surfaces or from the same surface.
- MATLAB™ compatibility – use Matlab™ scripts to define custom filters for 2D profiles - execute the scripts in MountainsMap®.

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**+ 2D Automotive module**

**2D functional parameters and studies**

- Calculate 2D parameters developed by the automotive industry - ISO 13565-2 Rk parameters (Rk, RpK, RvK, etc.) - ISO 13565-3 parameters - ISO 12085 motifs parameters (R, AR, Rx, etc.) – ISO 12780 straightness parameters (STRt, etc.) – ISO 12781 roundness parameters (RONt, etc.).
- Study Rk parameters associated with wear and lubrication graphically - visualize friction, core and lubrication zones on tribological profiles.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Value</th>
<th>Unit</th>
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<tr>
<td>Rk</td>
<td>0.206</td>
<td>μm</td>
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<tr>
<td>RpK</td>
<td>0.101</td>
<td>μm</td>
</tr>
<tr>
<td>RvK</td>
<td>0.236</td>
<td>μm</td>
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</table>

Graphical study of Rk parameters
**Contour analysis module**

Straightforward component dimensioning

- Define nominal form of a profile using straightforward interactive tools to associate geometric elements with contours.
- Calculate dimensions (including distances, radii, diameters and angles) using autodimensioning and interactive tools.

**Advanced contour analysis module**

Comprehensive form deviation analysis

- All features in the Contour Analysis module.
- Compare measured contours with CAD data (DXF) or user-defined nominal form.
- Specify tolerances including large positional tolerances if required.
- Visualize form deviations easily with magnified graphics.
- Automatically generate a table of results including pass/fail status.
- Gothic arch analysis of bearings.

**Statistics module**

Multiple static/dynamic data populations

- Prepare data automatically using templates - include all parameters for statistical analysis in a predefined analysis workflow - use it as a template for automatically generating analysis reports - option to lock templates for secure use on factory floor.
- Generate statistical reports - select the static or dynamic population(s) to be analyzed and create a report with parameter tables, control charts, histograms, box plots and scatter plots as required - statistics for dynamic populations are updated automatically.
- Monitor key metrological and process parameters - control charts include standard deviation limits (1 to 3 sigma), control limits and vertical bars separating different populations, together with yield, capability (Cpk) and other parameters.
Selected standard and optional features

MountainsMap® Profile

Compatibility
Contact (stylus) and non-contact (chromatic confocal, auto-focusing, laser triangulation, single point WLI) 2D (x,z) profilometers – (plus with 2D Advanced Surface Texture Analysis option): 3D (x,z) profilometers (profiles can be extracted from surfaces for 2D analysis)

Smart desktop publishing user environment

Profile visualization
Primary, roughness and waviness profiles (x,z)

Data preparation
Level profile – invert axes (x,z) – zone extraction – thresholding for removing anomalies – resampling to increase resolution – retouching of isolated artifacts

Geometric analysis of profiles
Horizontal and oblique distance, height difference, slope between two points, angle with respect to X axis, etc. - multiple step height measurements on positive steps (bumps) and negative steps (holes) using ISO 5436-1, automatic and manual methods – area of peaks and holes

Surface texture analysis of profiles

MountainsMap® Profile Optional Modules

2D Advanced Surface Texture
ISO 16610 2D roughness/waviness filters – morphological filters – 2D Fourier analysis including frequency spectrum and power spectrum density – FFT plot editor – profile data correction tools – profile joining – profile subtraction – 2D fractal analysis – series of profiles creation and analysis with statistics – MATLAB® compatibility (custom filters) – load 3D profiler x,y,z data and view pseudo-color images of surfaces – extract profiles and surfaces for 2D analysis

Contour Analysis
Nominal form definition by association of geometric elements with x,z profile – geometric dimensioning

Advanced Contour Analysis
Comparison of profile with CAD model (DXF) or user-defined nominal form – definition of tolerances including large positional tolerances – magnified form deviation graphics – form deviation parameters – table of pass/fail results – Gothic arch bearings analysis

Statistics
Automated data preparation using templates (lockable for secure use on the factory floor) – statistical reports on multiple static and/or dynamic surface data populations – control charts for monitoring metrological and process parameters

2D Automotive

PC requirements

Minimum requirements
Operating system
Windows 8 (64-bit or 32-bit) or
Windows 7 (64-bit or 32-bit) or
Windows Vista (64-bit or 32-bit)
RAM
4 GB
Graphics board
Hardware accelerated OpenGL or Direct3D
Resolution
1280 x 768 in thousands of colors
HDD free space
800 MB
Other
1 free USB port

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