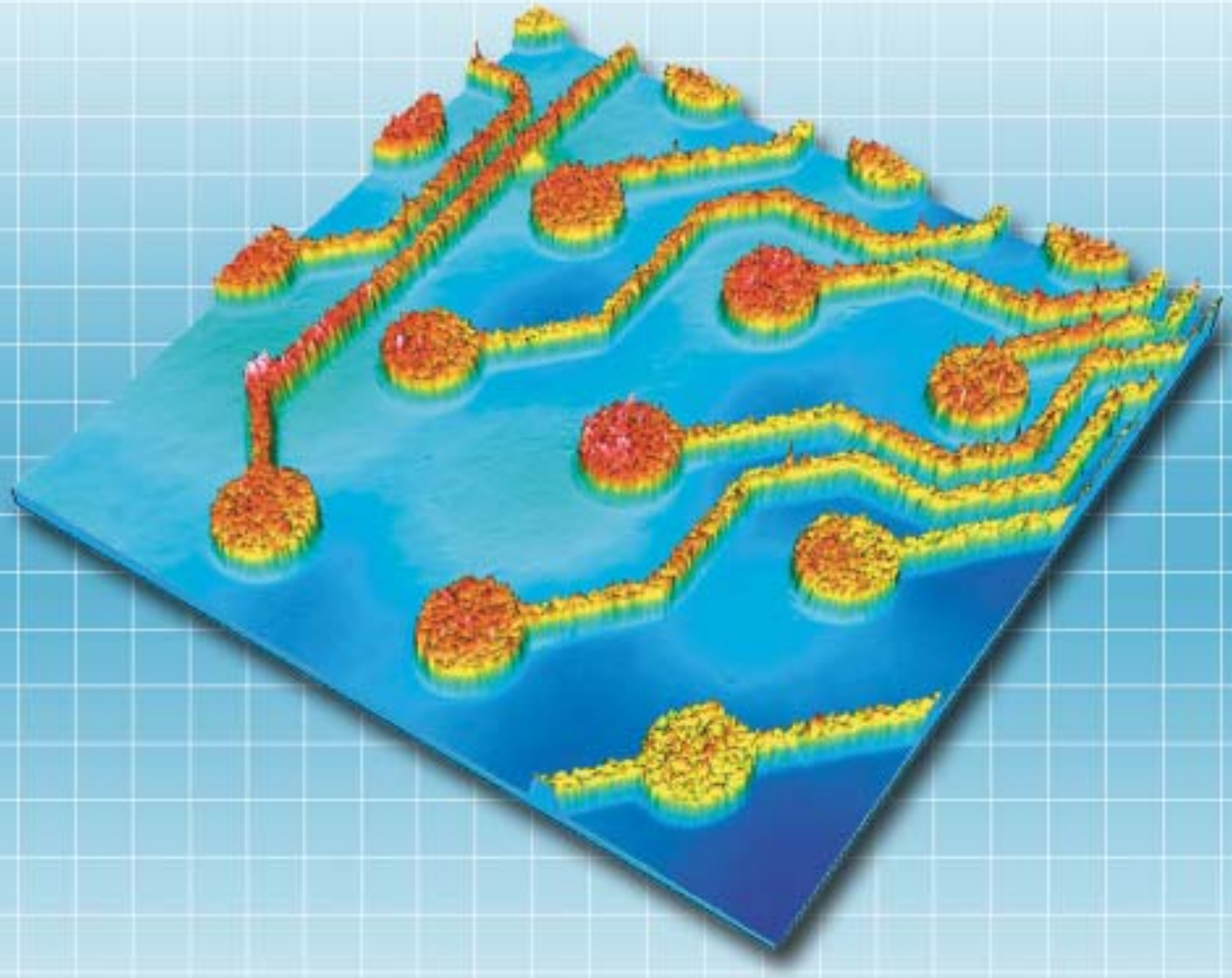
TalyMap Software

SOFTWARE

State of the art 2D, 3D and 4D surface analysis software



- ☑ Full support for the new ISO 25178 3D standard
- ☑ Fast and accurate report generation with full traceability
- ☑ Series of surfaces providing '4D' view
- ☑ Comprehensive visual analyses and dimension checking
- ☑ Automation features for significantly reduced analysis time

Taylor Hobson PRECISION

TalyMap surface analysis software – a worldwide reference

TalyMap surface analysis software is used by research laboratories and industrial facilities worldwide for product development, process improvement and predictive behavior analysis. It is used in many sectors including abrasives, aerospace, automotive, bearings, cosmetics, cutting tools, dental, electronics, medical, MEMS, mold making, paper, PCB's and semiconductor.

TalyMap is developed by a multi-disciplinary team of specialists in metrology, software engineering and automation in order to meet present and future surface metrology needs. Regular software releases incorporate a stream of innovations, together with the very latest standards and methods.

New generation brings even more powerful analysis

The latest generation of TalyMap software assures conformity with the new 3D standard ISO 25178. TalyMap 5 provides full metrological traceability together with faster surface metrology report generation. New analytical functions include 4D studies of series of 3D surfaces and statistics.

Integration of the latest standards on 3D and filtering

ISO 25178 is the first international standard on 3D areal surface texture. TalyMap integrates the height, functional bearing ratio, functional volume, hybrid, spatial and feature parameters defined in this standard. Some of these parameters were anticipated by EUR 15178 EN. TalyMap can be configured to use the new ISO 25178 parameters or the old EUR 15178 EN ones for compatibility with earlier projects.

TalyMap integrates advanced filters as defined by the new ISO/TS 16610 standard on filtration techniques. The range of filters includes spline, robust Gaussian and morphological filters.

Full metrological traceability

A new analysis workflow makes it easy to trace every step in an analysis document. New steps can be added and existing steps can be fine-tuned or deleted at any time.

Quicker results

Using the new Minidoc function, any sequence of analysis steps can be defined and saved into a Minidoc library. Any Minidoc can be inserted into a document at any time, significantly speeding up the preparation of a new analysis report. Minidocs are a powerful addition to TalyMap's armory of automation tools.

Flight simulation

It is possible to simulate a flight over a surface. Different flight paths can be defined and saved as .avi animations for use during presentations.

Statistics for quality control

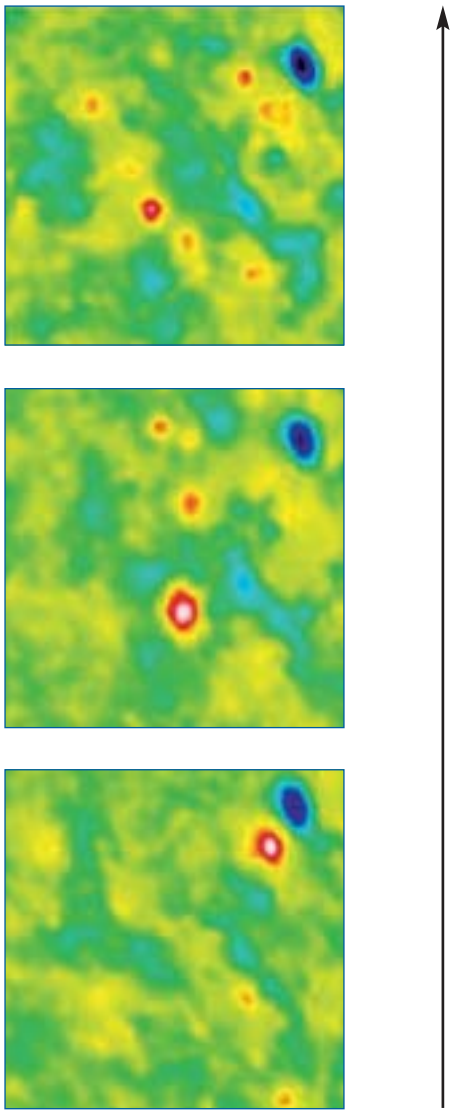
The new statistics option makes it possible to track and generate statistics on parameters across multiple measurement data sets.

4D analysis of 3D series of surfaces

4D analysis is a powerful tool for studying surface change. Applications include studies of wear, corrosion, erosion, evolution of nanostructures, minute changes in composite materials, deformation of components exposed to temperature change, cracks, delamination, depolymerization, germination, dehydration, cell growth, micro and nanocomponent dynamics, and many more.

Variation of a series of 3D (x, y, z) surfaces can be studied across a 4th dimension, for example time, temperature or pressure.

2D, 3D - now 4D



Series of 3D surfaces showing progressive evolution of surface features.

ISO 25178					
		Mean	Std dev	Min	Max
Height Parameters					
Sq	mm	0.0381153	0.00224457	0.032870	0.0388558
Ssk		-0.0321089	0.363626	-0.525076	0.341154
Sku		13.6308	3.46816	8.21948	17.8860
Sp	mm	0.284912	0.0232863	0.252753	0.307199
Sv	mm	0.256773	0.0110861	0.244211	0.271178
Sz	mm	0.541685	0.0125731	0.523930	0.551400
Sa	mm	0.0244989	0.00247825	0.0213944	0.0274624

Table of selected ISO 25178 parameters for a series of 3D surfaces. Control charts, scatter plots and histograms are also available.

Note: Some features are dependent on the software option

Fast and accurate surface metrology reports

Intuitive desktop publishing environment

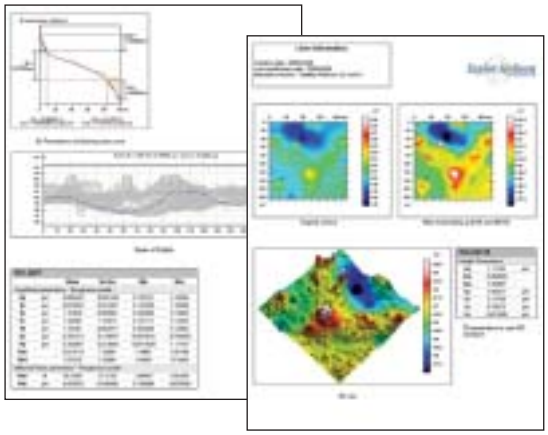
Using TalyMap, an analysis document can be built quickly and easily frame by frame, applying filters and scientific operators to measurement data, and carrying out graphical analytical studies.

Additional information

Company logos, measurement identity cards, screen notes and illustrations including bitmaps, text blocks, arrows can all be added to enhance the report

Fast report generation

Using the in-built desktop publishing facilities, the report layout can be finalized to create a professional quality report.



Example pages from a TalyMap analysis document

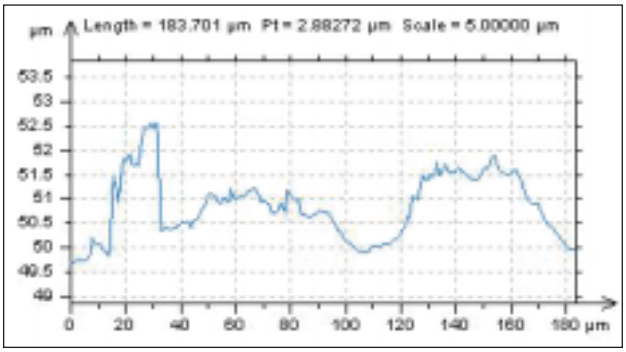
Analysis of different types of measurement data

TalyMap analyses a full range of measurement data sets from 2D profiles through to 4D series of 3D surfaces.

2D profiles

2D (x, z) analysis of profiles is appropriate when the surface under study is anisotropic and presents the same characteristics regardless of measurement direction.

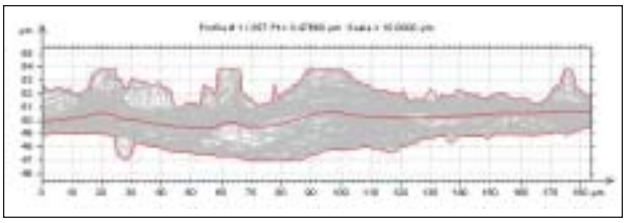
However most industrial surfaces are anisotropic. They have a directed structure (turned, ground, brushed, etc.) or a periodic structure (EBT impacts, grained plastics, etc.). Some anisotropic surfaces can be characterized at least partially by analyzing 2D profiles. Profiles can be measured in the direction which has the greatest amplitude (in accordance with ISO 4288), for example a brushed surface has parallel grooves that can be analyzed by measuring a profile perpendicular to the brush marks.



2D profile

Series of 2D profiles

Surfaces that are moderately anisotropic, for example fine grained surfaces, can be analyzed by measuring multiple profiles of the same length in different directions and taking the average of the parameters that are obtained. In TalyMap this is facilitated by the ability to add the profiles to a series of profiles and calculate the mean, minimum value, maximum value and standard deviation of any parameter over the whole series.



Series of 2D profiles showing mean, min and max profiles

3D surfaces

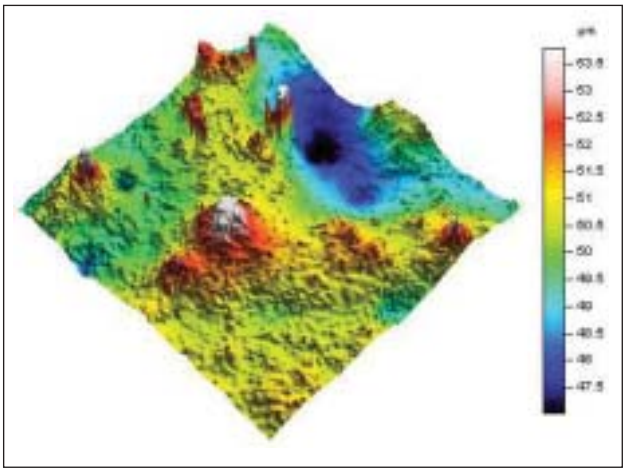
3D (x, y, z) visualization and analysis is essential for strongly isotropic surfaces and for understanding functional characteristics. For example, 3D is required to tell apart a profile that represents a series of grooves and a profile that represents a series of evenly spaced holes. 3D makes it possible to locate bumps that will prevent two flat surfaces from sealing together, to calculate peak volume for wear evaluation, and to determine if a lubricant will be trapped in a closed void. Moreover, isolated anomalies such as buckles, craters, flakes and blowholes can only be detected in 3D.

4D series of 3D surfaces

4D (x, y, z, t) visualization and analysis of series of 3D surfaces facilitates the analysis in any fourth dimension, for example time or temperature.

Compatible with contact and non-contact measurement data

TalyMap applications are capable of handling non-measured points generated by optical instruments 100% seamlessly.



3D surface with color scale

Real time 3D surface imaging

TalyMap provides complete 3D (x, y, z) surface visibility at any angle in real time.

Multiple surface views

Numerous different views of a surface are available including pseudo-color images, photo simulations, contour diagrams and 3D views. Using OpenGL technology, it is possible to change the viewing angle, zoom, level of detail and height amplification of a 3D view in real time. Any image (e.g. a photo) can be overlaid on a 3D surface.

Maximizing surface texture visibility

Color codes on the z axis can be adjusted interactively to reveal or highlight surface features. Gold, silver, copper, tin, chrome and plastic material color schemes can also be applied to a surface to generate synthetic images and make surface texture more visible.

Stitching

Overcome measurement instrument limitations by assembling a single surface or profile from more than one measurement data set.

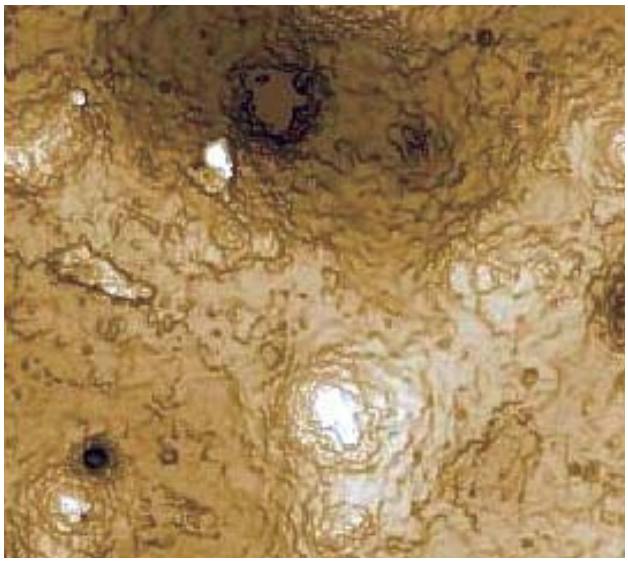


Photo-simulation

Intelligent preprocessing

TalyMap contains numerous operators for normalizing measurement data and eliminating noise, aberrations or anomalies.

Symmetries
Correct profile and surface symmetries.

Alignment
Rotate a surface so that its predominant lay is aligned with an axis.

Zoom
Select a rectangular, circular or polygonal zone for study.

Leveling
Level a surface or profile.

Form removal
Remove a selected form (circle, cylinder, sphere) or best-fit polynomial form from a surface, prior to the analysis of surface texture.

Thresholding
Remove anomalous peaks and valleys.

Resampling
Improve image resolution.

Non-measured points
Fill in non-measured points using intelligent algorithms.

Retouching
Remove anomalies interactively.

Denoising
Improve image quality and highlight details (e.g. edges) using spatial or morphological filtering, or by directly editing the FFT.

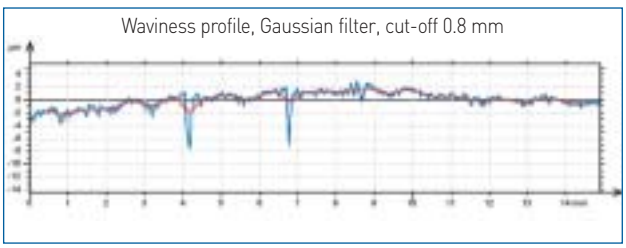
Metrological and Scientific Filters

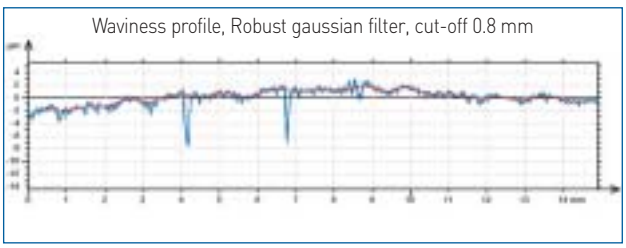
TalyMap contains a complete set of filters for surface texture analysis.

Metrological filters
Metrological filters for frequency separation (e.g. high frequencies, roughness and waviness) include the advanced spline and robust filters specified in ISO 16610, together with earlier filters to preserve compatibility.

Robust filters
Available in TalyMap, the robust filters improve the separation between waviness and roughness, reduce neighboring peak and valley errors and, in particular, make evaluations based upon the bearing ratio much more reliable.

Scientific filters
A variety of other filters are available, including morphological, Laplacian and Sobel filters.





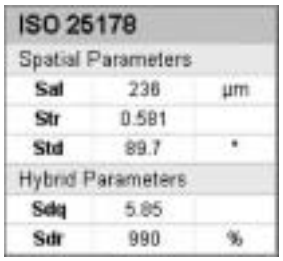
Integration of international 2D, 3D and flatness standards

ISO 25178

TalyMap integrates ISO 25178, the first international standard on 3D areal surface texture. It can also be configured to use the the old EUR 15178 EN 3D parameters for compatibility with earlier projects.

Height Parameters quantify the z axis perpendicular to the surface.

Sq	Root mean square height of the surface (standard deviation of the height distribution or RMS surface roughness)
Ssk	Skewness of the height distribution (third statistical moment, qualifying height distribution symmetry)
Sku	Kurtosis (fourth statistical moment, qualifying the flatness of the height distribution)
Sp	Maximum peak height (height between the mean plane and the highest peak)
Sv	Maximum valley height (height between the deepest valley and the mean plane)
Sz	Maximum height (height between the deepest valley and the highest peak)
Sa	Arithmetical mean height (mean surface roughness)



Spatial Parameters quantify the lateral information present on the x and y axes of the surface.

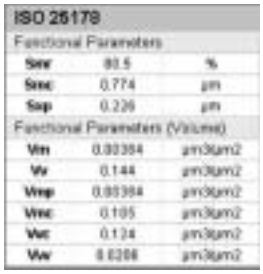
Hybrid parameters quantify the information present on the x, y and z axes.

Sal	Fastest decay auto-correlation rate
Str	Texture aspect ratio of the surface
Std	Texture direction of the surface (angle between 0° and 360° counterclockwise from a reference angle, given by the maximum of the polar spectrum)
Sdq	Root mean square gradient of the surface
Sdr	Developed interfacial area ratio

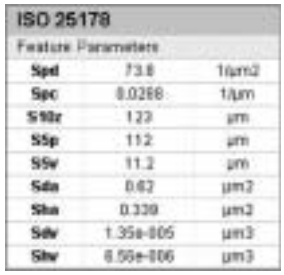
Full set of 2D parameters

TalyMap supports over 130 2D parameters (roughness, raw profiles, waviness, Rk, plastic, roundness) in accordance with ISO and (ASME, CNOMO, DIN, JIS, NF, etc.) standards.
The ISO standards that are supported include: ISO 1101, ISO 1302, ISO 3274, ISO 4287, ISO 4288, ISO 5436, ISO 11562, ISO 12085, ISO 12181, ISO 12780, ISO 12781, ISO 13565, ISO 16610.

Functional Parameters are calculated from the Abbott-Firestone curve obtained by the integration of the height distribution on the whole surface.



Smr	Surface bearing area ratio or areal material ratio (by default the height c used in the calculation of this parameter is calculated with respect to the mean plane – in Mountains® it can be calculated with respect to various references including the mean plane and the highest point)
Smc	Height of surface bearing area ratio or inverse areal material ratio
Sxp	Peak extreme height (by default p and q used in the calculation of this parameter are set to 97.5% and 50% respectively – in Mountains® other values for p and q can be specified)
Vm	Material volume of the scale limited surface at a given height
Vv	Void volume of the scale limited surface at a given height
Vmp	Peak material volume of the scale limited surface
Vmc	Core material volume of the scale limited surface
Vvc	Core void volume of the scale limited surface
Vvv	Valley void volume of the scale limited surface



Feature Parameters are derived from the segmentation of a surface into motifs (hills and dales). Segmentation is carried out in accordance with a watersheds algorithm.

Spd	Density of peaks
Spc	Arithmetic man peak curvature
S10z	Ten-point height of the surface
S5p	Five-point peak height
S5v	Five-point valley height
Sda	Open dale area
Sha	Open hill area
Sdv	Open dale volume
Shv	Open hill volume

Flatness parameters

FLTt, FLTp, FLTv and FLTq defined in ISO 12781 are also supported.

Functional 3D analysis

TalyMap 3D functional studies have applications in many fields including tribology, lubrication, adhesion, absorbency, honed cylinder liner characteristics, reflectivity and ageing. In particular, they are pertinent to the prediction of the in-service performance of engineered and textured surfaces.

Bearing ratio curve

The Abbott-Firestone or bearing ratio curve and depth distribution histogram are fundamental to many functional studies. The interactive Abbott curve for a profile or surface makes it easy to find out what depth corresponds to a given bearing ratio and what the bearing ratio is at a given depth.

Graphical study of ISO 25178 functional volume parameters

The new functional volume parameters replace the old Sk parameters and the EUR 15178 EN functional indices.

Vertical slices

Parameters calculated for two or three vertical slices of a surface include void volume, material volume and thickness.

Motifs analysis

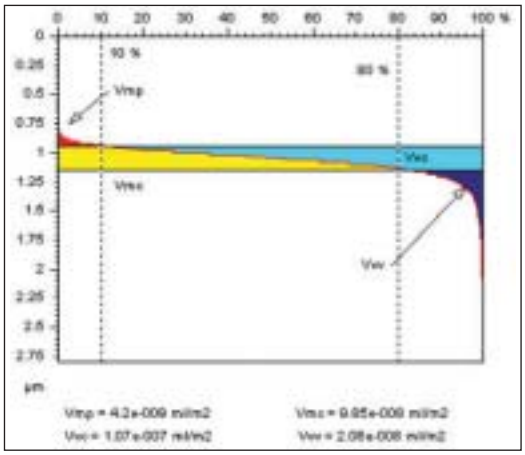
The goal of motifs analysis is to find relationships between peak and valley locations and functional requirements.

Segmentation by watersheds and Wolf pruning algorithms are applied to partition a 3D surface into motifs and locate significant peaks and pits. The algorithms are also applied in the calculation of the ISO 25178 feature parameters Spd (peak density) and Spc (arithmetic mean peak curvature).

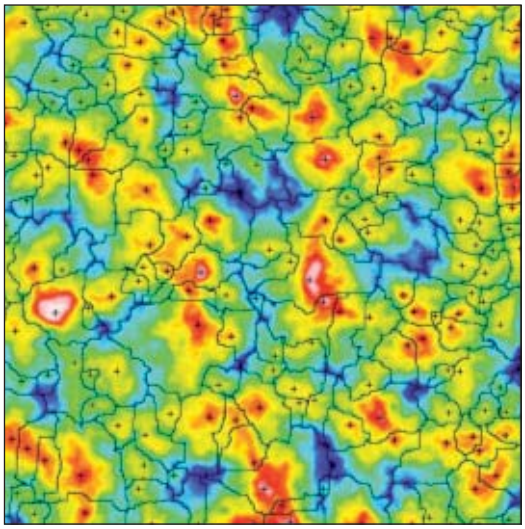
Height, area and volume parameters are calculated for all or individual motifs. Small or insignificant motifs can be merged into larger ones by applying user-selected criteria.

Surface subtraction

A requirements for erosion characterization is to compare a sample before and after a wear process. TalyMap includes a dedicated surface subtraction routine for this purpose.or morphological filtering, or by direct editing of the FFT.



Graphical study of the ISO 25178 functional volume parameters (Vmp, Vvc, Vmc, Vvv)



Surface segmented in 197 motifs with Wolf pruning: 3% Sz. The motifs are bounded by course lines and their peaks are marked by crosses.

Granulometric analysis of textured surfaces

TalyMap contains a full set of features for analyzing grains, particles, islands, bumps and holes (collectively referred to as "grains") to meet requirements in many areas including metallurgy, plastics, polymer manufacturing, dermatology, and self-assembled and self-organized nanostructures.

Grain/particle identification

Separation of grains from a background with respect to a reference plane or by binary segmentation of motifs.

Statistics on all or individual grains

Area, perimeter, equivalent / mean / min / max diameter, form factor, aspect ratio, roundness, capacity and orientation.

Charts

Charts show grain distribution with respect to any parameter.

Grain sort

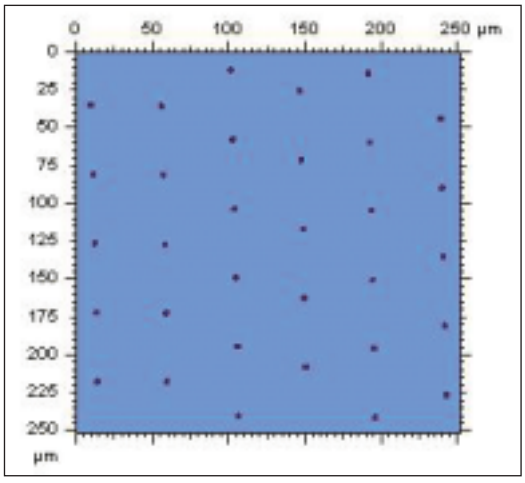
Sort grains into two sets with respect to any parameter.

Grain topography

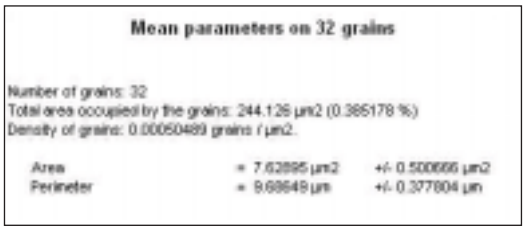
Visualization of the topography of a set of grains.

Statistics on grains/islands above a threshold height

Number, mean volume, mean height, mean surface area, mean height/surface ratio.



Grains identified by binarization



Grains parameters

Sub-surface analysis

A unique feature in TalyMap is the ability to select a sub-surface using several methods and to analyze the sub-surface in exactly the same way as the whole surface. Example applications are the calculation of the flatness or roughness of a sub-surface and the calculation of the coplanarity of multiple isolated contact zones.

Sub-surface analysis based on segmentation

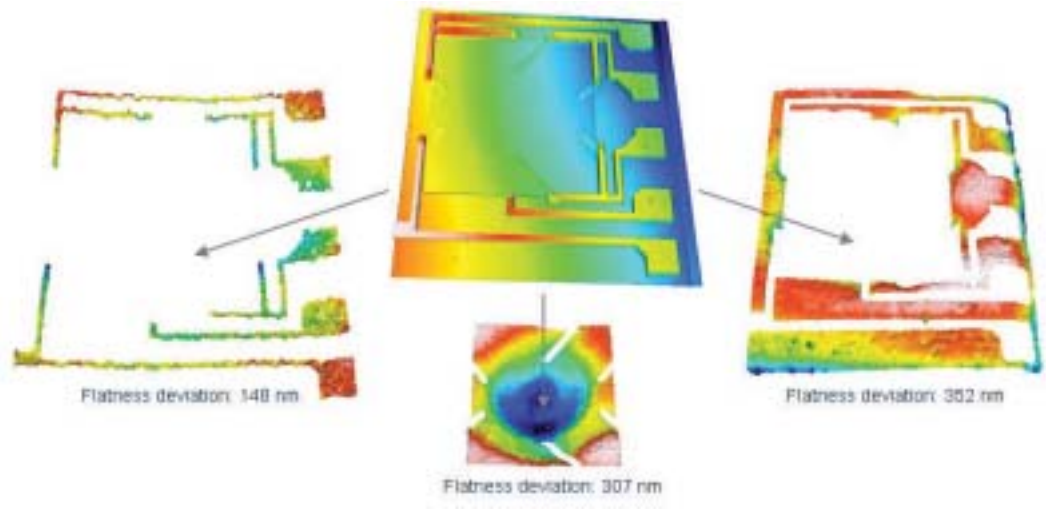
In the case of geometric layered surface, for example on a MEMS, the motifs analysis in TalyMap partitions the surface into motifs using a segmentation by watersheds algorithm. Filtering and pruning criteria can be adjusted to merge small or insignificant motifs into larger ones.

A sub-surface is created by selecting a set of motifs. Any parameters can be calculated on the sub-surface, for example flatness parameters.

Sub-surface analysis based on the introduction of non-measured points

In TalyMap, a surface that contains non-measured points can be visualized and analyzed in exactly the same way as a full surface.

It is possible to introduce non-measured points deliberately in order to analyze or process a sub-surface.



Division of a section of a MEMS into three sub-surfaces. Each sub-surface is made up out of a subset of the motifs in the original surface. The flatness deviation for each sub-surface is calculated automatically.

Checking dimensions

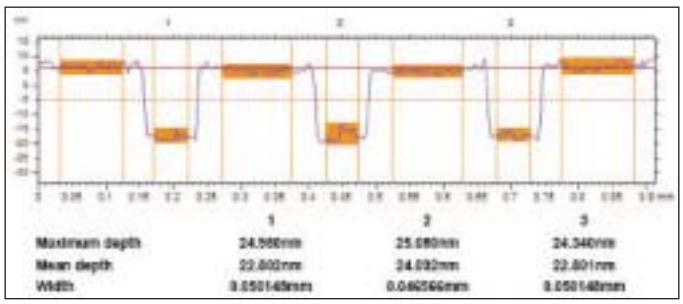
TalyMap contains a complete set of tools for checking dimensions:

Distances, angles, areas and volumes.

Step heights on profiles.

Step heights on surfaces (the reference area and the measurement area are defined with respect to one or more zones).

Contour dimensions on a profile.



step height analysis

Spectral, auto-correlation and fractal analyses

TalyMap includes numerous advanced analysis functions including FFT (Fast Fourier Transform) analysis and ACF (Auto-Correlation Function) analysis which can give valuable insights into machine tool performance and maintenance requirements.

Advanced functions include:

Fourier spectrum of a profile or surface.

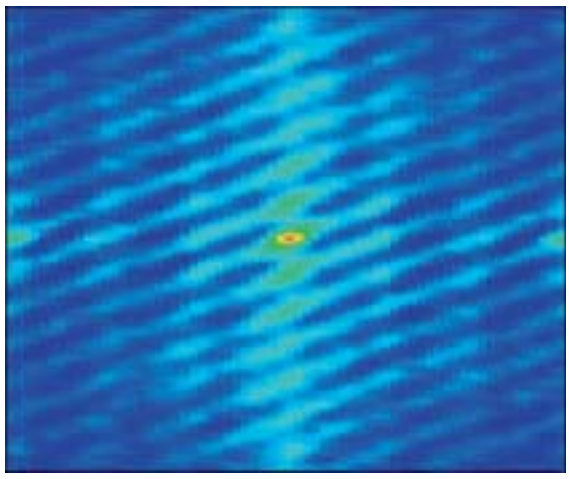
Power spectrum density (PSD) plot of a profile and the averaged

PSD plot of a surface.

Texture isotropy and direction based on FFT.

Texture isotropy and periodicity based on ACF .

Fractal analysis for profiles and surfaces using enclosing boxes method or morphological envelope method: fractal dimension, slope of the regression line, correlation coefficient of the regression line.



Autocorrelation on a surface with distinct lay pattern

Intelligent documents for traceability and high productivity

Traceability
Trace every analysis step in the interactive analysis workflow which shows the dependencies between every step.

Fine tuning
Add an analysis step at any time, fine tune a step or delete a step. Everything is recalculated automatically.

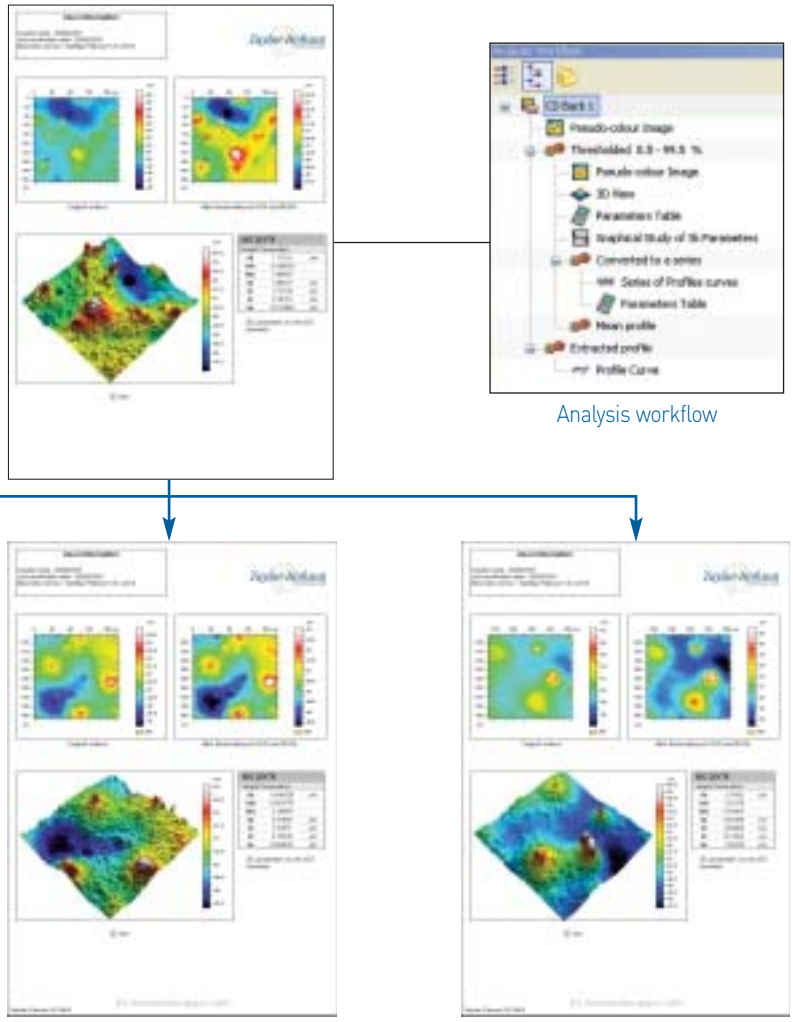
Minidocs
Use "Minidocs" (pre-defined sequences of analysis steps or macros) to speed up analysis document creation.

Automated analysis
Use a finished document as a template for analyzing other measurement data sets. Apply a template to all measurement data sets in a folder to generate an analysis report on each measurement data set automatically.

Using a finished document as a template

A document with its analysis workflow is applied to other measurement data sets.

Analysis documents for these data sets are generated automatically with the same analysis workflow.



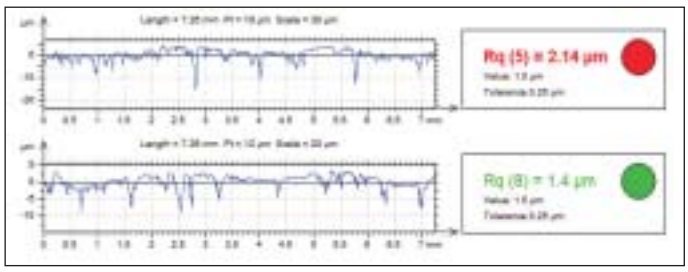
Analysis workflow

Production applications
Production applications are facilitated by the ability to set pass/fail criteria with respect to any parameter, for example roughness.

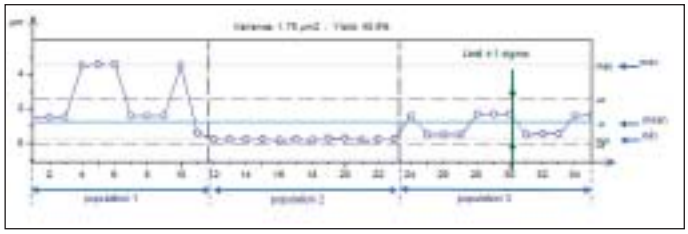
Export options make it easy to interface with external data collection and quality management systems. Analytical data including parameters can be exported to Excel and the graphical data in any frame can be exported as an image file (.bmp, .jpg, .gif, .png).

Analysis templates can be defined by metrologists so that production operators can apply them to different measurement data sets. The templates can be password protected against modification on the factory floor.

Statistics can be generated for each surface texture and geometric parameter. They include control charts displaying standard deviation (with a range between 1 sigma and 3 sigma), tables showing mean, min and max values and standard deviation, scatter plots and histograms.



Pass/fail criteria for roughness



Parameter control chart for multiple populations

TalyMap Advanced Modules

TalyMap Advanced Modules add further features to TalyMap software. Some of the features are generic and are provided free of charge (Basic Modules) with each new copy of TalyMap. Other features are application specific and are provided as chargeable options. Whichever Advanced Modules are used, they integrate seamlessly with TalyMap, adding further operations or analyses on surfaces or profiles.

Basic modules

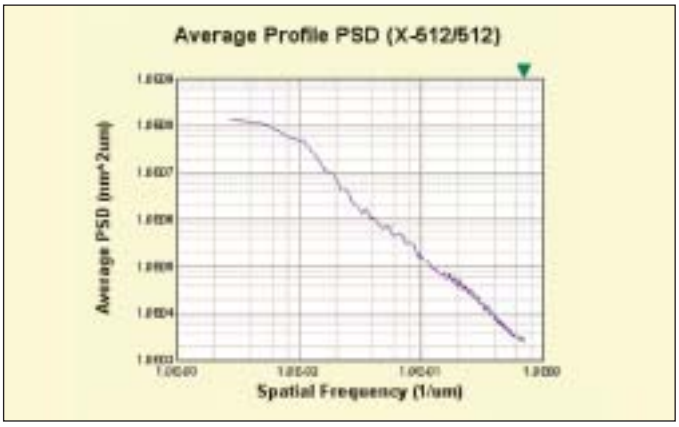
The basic modules provided with TalyMap include the following:

- **Advanced 3D View**
- **Advanced Plan View**
  - both of these provide new options for light source etc, improving the ability to visualize surface features
- **Advanced Profile View**
  - adds new functionality including log-lin and log-log plots
- **Data Segmentation Leveling**
  - provides the ability to segment the surface and choose which region(s) to use as a reference for leveling
- **Advanced Filtering**
  - adds extra filtering and form-fitting techniques

Application specific modules

The application specific modules have been developed to meet the requirements of a number of different industries including optics, semi-conductor and hard-disk drive industries. The current list of modules includes:

- **Advanced Stitching**
  - extends the area of measurement of our CCI 3D scanning interferometer
- **Advanced Step Height**
  - use data segmentation to identify regions and tabulate their step heights
- **Twist Analysis**
  - used in the automotive industry for analyzing machining pat terns for shaft-sealing applications
- **Crown, Cross-crown and Twist**
  - provides analysis of important features on hard-disk drive read heads
- **Laser Zone Texture**
  - uses specially developed segmentation algorithms to automatically calculate parameters on laser ablated features in the head landing zone on a disk surface.
- **3D Aspheric Analysis**
  - provides a three-dimensional fit to a rotationally symmetric aspheric surface. It supports radius optimization and clear aperture limits.
- **Average Profile Power Spectral Density (PSD) Function**
  - computes the PSD function for a user-specified number of lines within a surface and averages the result. It is of particular interest in the optics and semiconductor industries.



Average Profile PSD shown using Advanced Profile View

TalyProfile Advanced Modules

TalyProfile provides a full set of features* for the visualization and analysis of 2D profiles including the latest ISO 16610 filters, ISO and national 2D parameters, functional analysis and dimension checking. It can be used with laboratory instruments, near line instruments and portable instruments such as the Surtronic 25.

Full set of ISO 2D parameters

ISO 4287 parameters can be calculated respectively on the raw profile (P) and, after filtering, on the roughness profile (R) or on the waviness profile (W). The type of filter and the cut-off to be used are defined for each parameter.

ISO 12085 parameters and ISO 13565 parameters are dedicated to the automotive industry. Initially called CNOMO and then adopted as a French standard, ISO 12085 R&W parameters are roughness and waviness motif parameters. Originally grouped together in the German Standard DIN 4776, ISO 13565 parameters are functional bearing ratio parameters that characterize functional aspects of a profile. They have been applied, for example, to predict lubrication when cylinder bores are run in.

ISO 16610 filters

TalyProfile includes the cubic spline (ISO/TS 16610-22) and robust Gaussian (ISO 16610-31) filters, as well as the older filters for compatibility with earlier projects.

Checking dimensions

Distances, areas of holes/peaks and step heights are all calculated.

Powerful 2D analysis features

2D functional analysis studies include the bearing ratio curve and depth distribution histogram and a graphical study of the functional Rk parameters. Advanced spectral and fractal analysis functions are also available.

Series of profiles

Multiple profiles that are measured on anisotropic surfaces can be added to a series of surfaces for statistical analysis.

ISO 4287			
Amplitude parameters - Roughness profile			
Rt	10.5312	µm	
Ra	0.807272	µm	
Rq	1.08456	µm	
Material Ratio parameters - Roughness profile			
Rmr	0.611405	%	
Rdc	1.44203	µm	
ISO 13565			
ISO 13565-2			
Rk	1.62857	µm	
Rpk	0.457403	µm	
Rvk	2.65619	µm	

Results from different calculations combined in a single parameter table

*Some features dependent on software option

Feature group	Feature	TalyMap Platinum	TalyMap Gold	TalyMap Silver	Twist	Talyprofile Platinum	Talyprofile Gold	Talyprofile Silver
General	Desktop publishing environment, apply analysis document template to multiple measurement data sets, Minidocs (predefined sequences of analysis steps), document pages viewer, illustrations (logo, text, bitmaps, screen notes, frames, arrows, measurement data set identity card), set pass/fail criteria on any parameter, data export to Excel spreadsheet, frame export to bitmap, file explorer and favourite folders	✓	✓	✓	✓	✓	✓	✓
	Analysis workflow	✓	✓	✓	✓	✓	✓	✗
Measurement data	Analysis of 2D profiles	✓	✓	✓	✓	✓	✓	✓
	Analysis of series of 2D profiles	✓	✓	✗	✗	✓	✗	✗
	Analysis of 3D surfaces	✓	✓	✓	✓	✓	✗	✗
	Analysis of 4D series of 3D surfaces	✓	✗	✗	✗	✗	✗	✗
Non-measured points 3D surface imaging	Seamless analysis of surfaces containing non-measured points	✓	✓	✗	✗	✓	✗	✗
	Pseudo-colour image, colour-coded z axis and palette manager	✓	✓	✓	✓	✓	✗	✗
	Photo simulation, real-time 3D view	✓	✓	✓	✓	✗	✗	✗
	Contour diagram	✓	✓	✓	✗	✗	✗	✗
	3D flight simulation and .avi export	✓	✓	✗	✗	✗	✗	✗
Pre-processing of 3D measurement data	Levelling (option to include/exclude zones), symmetries (mirroring), zoom, rotation, thresholding, resampling, form removal (predefined shape or best fit polynomial)	✓	✓	✓	✓	✗	✗	✗
	Line correction, retouch surface points	✓	✓	✗	✓	✗	✗	✗
	Fill in non-measured points, surface patching (stitching of multiple measurement data sets)	✓	✓	✗	✗	✗	✗	✗
	Edit surface axes	✓	✓	✗	✗	✗	✗	✗
3D filters	Gaussian, spline and robust Gaussian (with optional management of end effects)	✓	✓	✓	✓	✗	✗	✗
	Morphological, spatial (smoothing/denoising, min/max, edge detection), direct edition of the FFT	✓	✓	✗	✗	✗	✗	✗
3D and flatness parameters	ISO 25178 height parameters (Sq, Ssk, Sku, Sp, Sv, Sz, Sa) ISO 25178 functional bearing ratio parameters (Smr, Smc, Sxp) EUR 15178 EN amplitude parameters (Sa, Sq, Sz, Ssk, Sku, Sp, Sv, St) EUR 15178 area & volume parameters (Smr, Sdc)"	✓	✓	✓	✓	✗	✗	✗
	ISO 25178 spatial parameters (Sal, Str, Std) ISO 25178 hybrid parameters (Sdq, Sdr) ISO 25178 functional (volume) parameters (Vm, Vv, Vmp, Vmc, Vvc, Vvv) EUR 15178 EN spatial parameters (Str, Std, Sal) EUR 15178 EN hybrid parameters (Sdq, Sds, Ssc, Sdr) EUR 15178 EN functional parameters (Sk, Spk, Svk, Sr1, Sr2, Spq, Svq, Smq) EUR 15178 EN functional indices (Sbi, Sci, Svi)"	✓	✓	✗	✓	✗	✗	✗
	ISO 25178 feature parameters (Spd, Spc, S10z, S5p, S5v, Sda, Sha, Sdv, Shv)	✓	✓	✗	✗	✗	✗	✗
	ISO 12781 flatness parameters (FLTt, FLTp, FLTv, FLTq)	✓	✓	✓	✗	✗	✗	✗
3D analysis	Abbott-Firestone bearing ratio curve/depth distribution	✓	✓	✓	✗	✗	✗	✗
	Interactive Abbott curve, graphical study of ISO 25178 volume parameters, graphical study of Sk parameters, statistics on islands above a threshold height, peak count distribution	✓	✓	✗	✗	✗	✗	✗
	Material, void and thickness analysis of vertical slices	✓	✓	✓	✓	✗	✗	✗
	Partition levelling (segmentation of surface, selection and analysis of sub-surface consisting of one or more segments), 3D motifs analysis, vectorisation of microvalleys network, depth of a single valley	✓	✗	✗	✗	✗	✗	✗
	Surface subtraction	✓	✓	✗	✓	✗	✗	✗
Binary analysis of 3D grains (particles, bumps, holes)	Binarization with respect to reference plane, binary segmentation of motifs, binary image, binary masking, parameters of single grain, statistics on parameters for all grains, distribution of grain parameters, grain sorting, morphological operations on grains	✓	✗	✗	✗	✗	✗	✗
Dimension checking on 3D surface	Distance, horizontal angle and position measurement, volume of a hole/peak, step height measurement on surface (with respect to reference zones and measurement zones)	✓	✓	✓	✗	✗	✗	✗
Advanced 3D analysis functions	Fourier spectrum, averaged power density spectrum, fractal analysis, intercorrelation	✓	✓	✗	✗	✗	✗	✗
	Autocorrelation	✓	✓	✓	✗	✗	✗	✗
	Texture isotropy and direction (FFT), texture isotropy and periodicity (ACF)	✓	✗	✗	✗	✗	✗	✗
Twist	Twist analysis	✗	✗	✗	✓	✗	✗	✗
4D analysis of series of 3D surfaces	Pseudo-colour image of each surface, grid view, 4D view with animation, movie mode, statistics (parameter table, control chart, scatter plot, histogram), Abbott-Firestone curve and depth distribution, add/remove/extract surface, transversal profile extraction, spatial filtering, Karhunen-Loève transform and filtering	✓	✗	✗	✗	✗	✗	✗

Feature group	Feature	TalyMap Platinum	TalyMap Gold	TalyMap Silver	Twist	TalyProfile Platinum	TalyProfile Gold	TalyProfile Silver
2D profile curves	Profile curve, roughness and waviness profile curves	✓	✓	✓	✓	✓	✓	✓
Pre-processing of 2D profile measurement data	Levelling, zoom, symmetries (mirroring)	✓	✓	✓	✓	✓	✓	✓
	Form removal, retouch surface points, fill in non-measured points	✓	✓	✓	✓	✓	✓	✗
	Thresholding, resampling	✓	✓	✓	✗	✓	✓	✓
	Join two profiles	✓	✓	✗	✗	✓	✓	✗
2D profile filters	Gaussian (ISO 1562), 2CR, 2CR-PC (phase correct), cubic spline (ISO/TS 16610-22), double Gaussian (ISO 13565-1), robust Gaussian (ISO 16610-31)	✓	✓	✓	✓	✓	✓	✗
	Filtering by direct edition of the FFT	✓	✓	✗	✗	✓	✓	✗
	Morphological filtering, autocorrelation	✓	✓	✗	✗	✓	✓	✓
	Intercorrelation	✓	✗	✗	✗	✓	✗	✗
2D profile parameters	ISO 4287 primary profile parameters (amplitude Pp, Pv, Pz, Pc, Pt, Pa, Pq, Psk, Pku spacing PSm, Pdq material ratio Pmr, Pdc peak PPc) ISO 4287 roughness profile parameters (amplitude Rp, Rv, Rz, Rc, Rt, Ra, Rq, Rsk, Rku spacing RSm, Rdq material ratio Rmr, Rdc peak RPc)"	✓	✓	✓	✓	✓	✓	✓
	ISO 4287 waviness profile parameters (amplitude Wp, Wv, Wz, Wc, Wt, Wa, Wq, Wsk, Wku spacing WSm, Wdq material ratio Wmr, Wdc peak WPc) Old waviness profile parameters (WLq, Wda, WLa, WLo, WzJIS, W3z, Wmax, Wtm, Wy, WH, WHSC, WD, WS, WVo, Wrms, WTp, WHTp, Wfd)"	✓	✓	✓	✗	✗	✗	✗
	ISO 12085 (roughness R, AR, Rx, Pt, Kr, Nr, SR, SAR waviness W, AW, Wx, Wte, Kw, Nw, SW, SAW other Trc, HTrc, Rke, Rpke, Rvke) ISO 13565-2 (Rk, Rpk, Rvk, Mr1, Mr2, A1, A2, Rpk*, Rvk*) ISO 13565-3 primary profile parameters (Ppq, Pvq, Pmq) ISO 13565-3 roughness profile parameters (Rpq, Rvq, Rmq) Old primary profile parameters (PLq, Pda, PLa, PLo, PzJIS, P3z, Pmax, Ptm, Py, PH, PHSC, PD, PS, PVo, Prms, PTp, PHTp, Pfd) Old roughness profile parameters (RLq, Rda, RLa, RLo, RzJIS, R3z, Rmax, Rtm, Ry, RH, RHSC, RD, RS, RVo, Rrms, RTp, RHTp, Rfd)"	✓	✓	✗	✗	✓	✗	✗
	ISO 12780 straightness parameters (STRt, STRp, STRv, STRq) ISO 12181 roundness parameters (RONt, RONp, RONv, RONq, LSRad)	✓	✓	✗	✗	✓	✗	✗
	Plastic parameters (Af, Pg, Ch)	✓	✗	✗	✗	✓	✗	✗
2D profile analysis	Abbott-Firestone bearing ratio curve/depth distribution	✓	✓	✗	✓	✓	✓	✓
	Interactive Abbott curve	✓	✓	✗	✗	✓	✓	✓
	Graphical study of Rk parameters	✓	✓	✗	✓	✓	✓	✓
	R&W motifs (ISO 12085), fractal analysis, frequency spectrum, power spectrum density (PSD)	✓	✓	✗	✗	✓	✓	✗
	Morphological envelopes	✓	✗	✗	✗	✓	✓	✗
	Profile subtraction	✓	✗	✗	✗	✓	✗	✗
Dimension checking	Distance measurement, area of a hole/peak	✓	✓	✓	✗	✓	✓	✓
	Step height measurement	✓	✓	✓	✗	✓	✓	✗
Series of 2D profiles	Build series of 2D profiles from individual profiles, convert 3D surface into series of 2D profiles levelling, zoom, symmetries (mirroring), fill in non-measured points, resampling, automatic lateral alignment of profiles, extract profile from series for individual analysis, convert series of profiles into surface	✓	✓	✗	✗	✓	✗	✗
	Generate statistics on parameters (parameter tables with mean, standard deviation, min and max values, control charts, scatter plots, histograms), step height statistics, Abbott-Firestone curve and depth distribution histogram for each profile in the series	✓	✓	✗	✗	✓	✗	✗
Basic contour analysis	Vertical, horizontal and diagonal distances on a profile, straightness or shape deviation in accordance with ISO 1101, radius of an arc, angle between two line segments, point of intersection of two segments, extension of the segments to the point of intersection	✓	✗	✗	✗	✗	✗	✗
Chargeable options	Grains and particles analysis including statistics on all or individual grains, sorting grains into subsets, grain distribution histograms, visualisation of grains topography, display and analysis of 3D motifs	✓	✓	✗	✗	✗	✗	✗
	4D analysis of 3D series of surfaces - see feature list above	✓	✓	✓	✗	✗	✗	✗
	Statistics: generate statistics on one or more populations consisting of a set of documents. Statistics include a summary by parameter (min, max, mean, standard deviation, lower quartile, upper quartile and median) together with control charts, histograms, box plots and scatter plots for selected parameters							
	Advanced contour analysis - see Contour Analysis brochure	✓	✓	✓	✗	✓	✓	✗

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