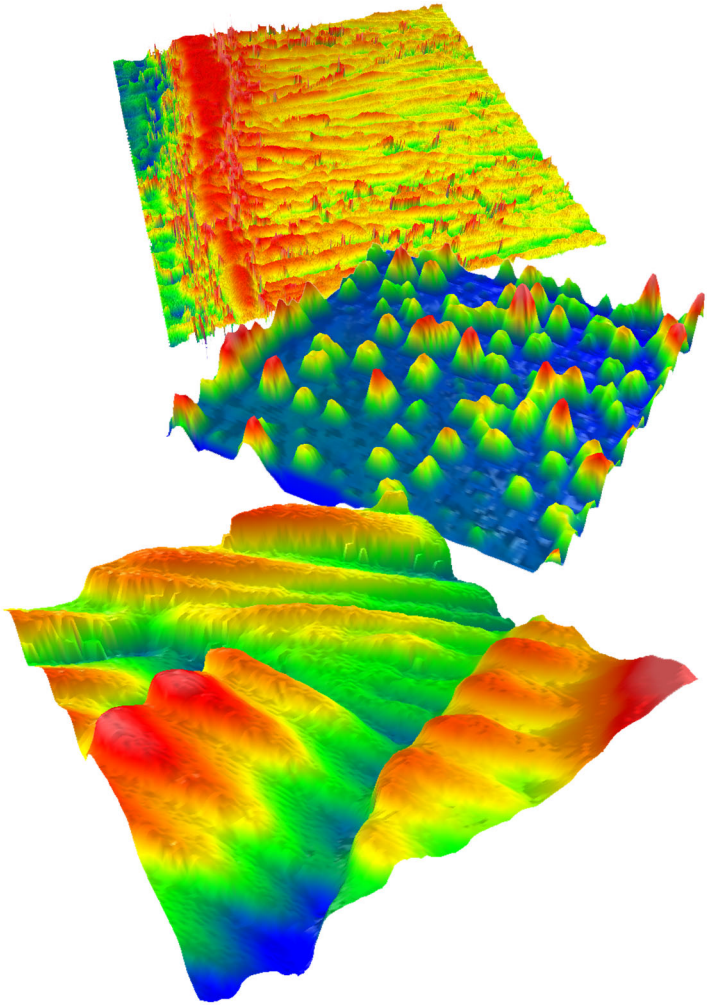
zygo®



Mx™ Surface Texture Parameters

AMETEK®
ULTRA PRECISION TECHNOLOGIES

Contents

OMP-0608A January 2017

Standards

ZYGO is an industrial leader in surface texture metrology and complies with numerous international standards, including the following:

ANSI/ASME B46.1 - Surface Texture (Surface Roughness, Waviness and Lay)

ISO 4287 - Geometric products specifications (GPS) - Surface texture: Profile method - Terms, definitions and surface texture parameters

ISO 4288 - Geometric products specifications (GPS) - Surface texture: Profile method - Rules and procedures for the assessment of surface texture

ISO 13565 - Geometric products specifications (GPS) - Surface texture: Profile method - Surfaces having stratified functional properties

ISO 16610 - Geometrical product specifications (GPS) - Filtration

ISO 25178 - Geometrical product specifications (GPS) - Surface texture: Areal

Both form remove (F operator) and filtering are implied by some of the above listed standards. It is the user's responsibility to apply these software functions.

Terminology

Areal- A three dimensional surface area.

Autocorrelation- A mathematical tool for finding repeating patterns, such as the presence of a periodic signal obscured by noise.

Cutoff Filter- Determines the wavelength at which the surface structure is differentiated between roughness and waviness data. Proper selection of the correct filter cutoff in software is critical to measurement accuracy. (λ_c)

Evaluation Length- The 2D or 3D area from which data is obtained.

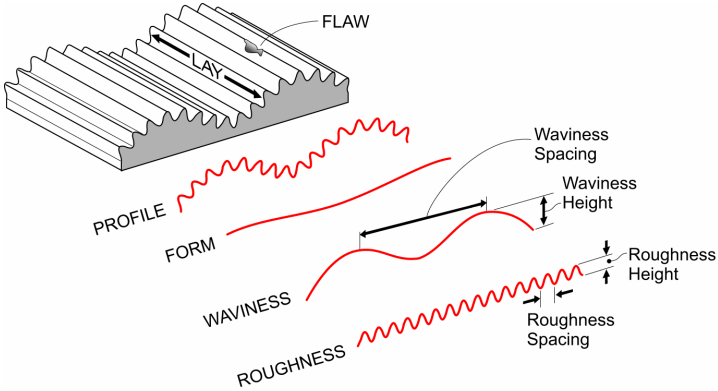
Isotropic- the surface presents identical characteristics regardless of the direction of measurement.

Mean Line- A straight line that is generated by calculating a weighted average for each data point resulting in equal areas above and below the line. Also known as center line.

Profile- A two dimensional slice through an area.

Sampling Length- The area selected to analyze having a particular cutoff; irregularities spaced farther than the sampling length are considered waviness.

Surface Texture- The topography of a surface composed of certain deviations that are typical of the real surface. It includes roughness and waviness.



Lay- direction of finish pattern.
Form- general shape of the surface (inaccurate machine, stressed part).
Waviness- widely spaced irregularities (vibration, chatter).
Roughness- closely spaced irregularities (cutting tool marks, grit of grinding wheel).

Filtering

A filter cutoff is used to separate the roughness and waviness components of a surface. Shorter wavelengths become part of the roughness data; longer wavelengths are part of the waviness data.

Choosing Cutoffs (λc)

- The (high-pass filter) cutoff must be short enough to exclude long wavelengths (waviness).
- The cutoff must be long enough for a valid sample (at least 10 tool-marks per cutoff).

Spacing (periodic)	**Roughness (non-periodic)**		**Cutoff**	**Sampling Length/ Evaluation Length**
Sm (mm)	**Rz** (μm)	**Ra** (μm)	λ_c (mm)	L_r / L_n (mm)
> 0.013…0.04	> 0.025…0.1	> 0.006…0.02	**0.08**	0.08 / 0.4
> 0.04…0.13	> 0.1…0.5	> 0.02…0.1	**0.25**	0.25 / 1.25
> 0.13…0.4	> 0.5…10	> 0.1…2	**0.8**	0.8 / 4
> 0.4…1.3	> 10…50	> 2…10	**2.5**	2.5 / 12.5
> 1.3…4	> 50…200	> 10…80	**8**	8 / 40

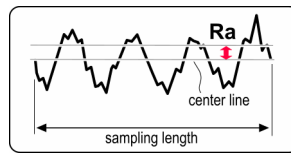
Profile ISO Parameters

Profile ISO Height Parameters

These are amplitude results based on ISO 4287.

Ra Arithmetic mean deviation of the roughness profile defined on the sampling length. Ra does not indicate the spatial frequency of the irregularities or the shape of the profile. Ra is meaningful for measuring surfaces that are sand blasted, milled, or polished.

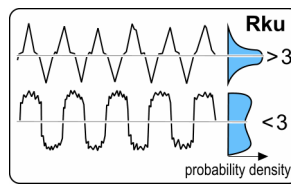
$$\mathrm{Ra} = \frac{1}{l}\int_0^l |Z\,(x)|\,dx$$



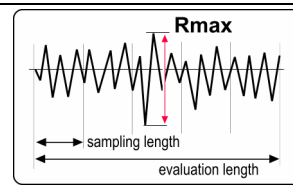
Rku Kurtosis of the roughness profile. It is a measure of the randomness of heights, and of the sharpness of a surface.

A perfectly random surface has a value of 3; the farther the result is from 3, the less random and more repetitive the surface is. Surfaces with spikes are higher values; bumpy surfaces are lower.

$$\mathrm{Rku} = \frac{1}{Rq^4}\left[\frac{1}{l}\int_0^l Z^4\,(x)\,dx\right]$$

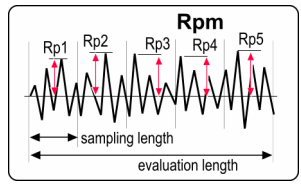


Rmax Maximum peak-to-valley profile height. The greatest peak-to-valley distance within any one sampling length.



Profile ISO Height Parameters (continued)

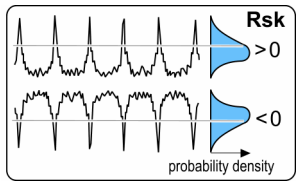
Rpm Mean peak profile height. The mean peak height based on one peak per sampling length. The single highest peak is found in five sampling lengths and then averaged.



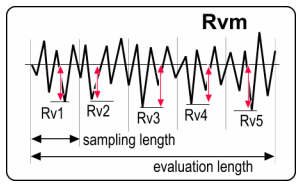
Rsk Skewness of the roughness profile. It is a measure of symmetry of the profile about the mean line.

An Rsk value of 0 depicts normal distribution about the average line. Negative values correspond to high peaks spread on a regular surface while positive values are found on surfaces with openings and scratches.

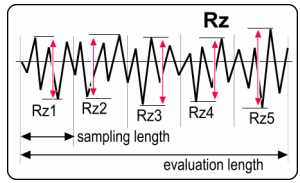
$$\mathrm{Rsk} = \frac{1}{Rq^3}\left[\frac{1}{l}\int_0^l Z^3(x)\,dx\right]$$



Rvm Mean valley profile depth. The mean valley depth based on one peak per sampling length. The single deepest valley is found in five sampling lengths and then averaged.

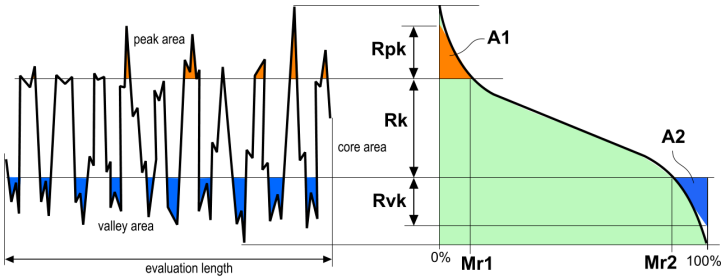


Rz	Average peak-to-valley profile roughness. The average peak-to-valley roughness based on one peak and one valley per sampling length. The single largest deviation is found in five sampling lengths and then averaged.



Profile ISO Functional (Material Ratio) Parameters

These 2D ISO results evaluate the plateau structure of the surface. These are suitable for evaluation of adhesion performance, surface treatability, wear resistance, and lubrication performance. Profile functional parameters are based on ISO 13565.



A1	Peak area defined by Rpk.
A2	Valley area defined by Rvk.
Mr1	Peak Material Component. The upper limit of the core roughness profile. This parameter is derived from the bearing ratio plot.
Mr2	Valley Material Component. The lower limit of the core roughness profile. This parameter is derived from the bearing ratio plot.
Rk	Core roughness depth. The vertical difference in the core section. It is the difference between the upper level and lower level in the core section.
Rk Midpoint	The middle point of the Rk region; it is an absolute height.

Profile ISO Material Ratio Parameters (continued)

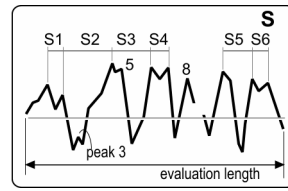
Rpk	Reduced Peak Height. Peak height above the core roughness. During a running-in operation, Rpk is the nominal height of the material that may be removed.
Rpk Threshold	The threshold between the Rpk and Rk regions; it is an absolute height.
Rvk	Reduced Valley Depth. Valley depth below the core roughness. Rvk impacts a surface's ability to trap debris and retain lubricant.
Rvk Threshold	The threshold between Rk and Rvk regions; it is an absolute height.
c1	Height (or depth) at profile material ratio control 1.
c2	Height (or depth) at profile material ratio control 2.
c2-c1	Height Difference.
Pmr(c1)	Profile Material Ratio percentage at height c1. The ratio (expressed as a percentage) of the cross sectional area of the profile as a height (c1) relative to the evaluation cross sectional area.
Pmr(c2)	Profile Material Ratio percentage at height c2. The ratio (expressed as a percentage) of the cross sectional area of the profile as a height (c2) relative to the evaluation cross sectional area.
Pmr(c2)-Pmr(c1)	Profile Material Ratio Difference.

Profile ISO Hybrid Parameters

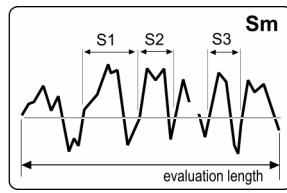
These are 2D ISO spacing parameters, typically useful for surfaces having periodic or pseudo-periodic motifs, such as turned or structured surfaces.

S The average spacing between local peaks over the evaluation length. A local peak is the highest point between two adjacent minima.

$$S = \frac{S1 + S2 \ldots + S6}{6}$$



Sm The average spacing between peaks at the mean line over the evaluation length. A peak is the highest point between an upwards and downwards crossing of the mean line. It is calculated by summing all the peak spacing and dividing by the number of spaces.

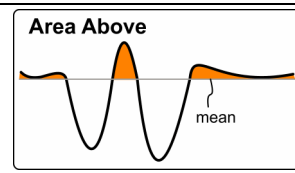


Profile Parameters

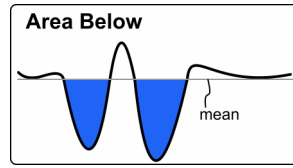
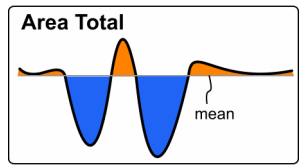
Profile Area Parameters

These are general 2D area parameters.

Area Above Area Above is the area of the profile data above the mean. Instrument calibration is required for this result. The mean is the best fit surface to the data.



Profile Area Parameters (continued)

Area Below	Area Below is the area of the profile data below the mean. Instrument calibration is required for this result. The mean is the best fit surface to the data. 
Area Net	Area Net is the overall area of the profile data. It is equal to the Area Above minus the Area Below. Instrument calibration is required for this result.
Area Total	Area Total is the sum of the Area Above and the Area Below the mean of the profile data. Instrument calibration is required for this result. The mean is the best fit surface to the data. 

Profile Dimension Parameters

These are general 2D dimensional parameters.

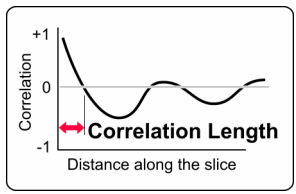
Length Circum	The length or circumference of the slice.
NPoints	The number of points or pixels in a slice.
Radius	The radius of a circular slice.
Size	The overall extent of the profile plot.

Profile Hybrid Parameters

Correlation Length

Correlation Length is the length along the x-axis where the Autocovariance (ACF) function first crosses zero. Autocovariance is used to determine the periodicity of a surface; it shows the dominant spatial frequencies along a cross section of the test surface. ACF is a measure of "self-similarity" of a profile - the extent to which a surface waveform pattern repeats. If the surface is random, the plot drops rapidly to zero. If the plot oscillates around zero in a periodic manner, then the surface has a dominant spatial frequency.

$$\mathrm{ACF} = \sum_{i=1}^{N-m} Y_i \; Y_i + m$$

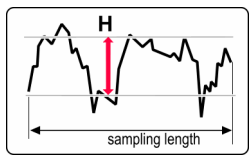


Surface/Profile Height Parameters

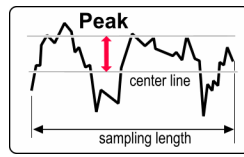
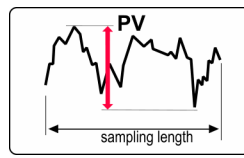
These are general parameters that apply to *both* profile and areal surfaces.

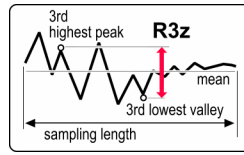
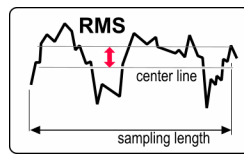
H

Swedish height. The roughness between two predefined reference lines. The upper line exposes 5% of the data, and the lower line exposes 90%. H is less sensitive to data spikes than peak-to-valley.

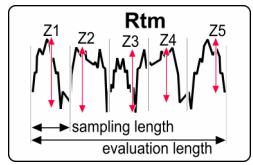
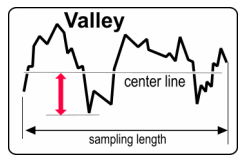


Surface/Profile Height Parameters (continued)

Mean	The arithmetic average of a set of values. It is calculated by summing the data and dividing by the number of points. The mean is often quoted along with the standard deviation- the mean describes the central location of the data, and the standard deviation describes the spread. $$\overline{X} = \frac{1}{n}\sum_{i=1}^{n} X_i$$
Peak	Peak is the maximum distance between the center line and the highest peak point within the sample. The center line is defined as the best-fit surface selected with the remove function. Peak is the value of the highest data point. 
Peak Location X	The x-axis location in camera coordinates of the highest point.
Peak Location Y	The y-axis location in camera coordinates of the highest point.
PV	(Peak-to-Valley) The distance between the highest and lowest points within the sampled data area. PV is the worst case point-to-point error in the data set. PV compares the two most extreme points on the surface; thus, it is possible for two very different surfaces to have the same PV value. 

R3z	Base roughness depth. The distance between the third highest peak and the third lowest valley. A peak is a portion of the surface above the mean line and between center line crossings. Only applicable to profile data. 
RadCrv	RadCrv is the overall radius of curvature. Convex surfaces are positive numbers, whereas concave surfaces are negative numbers.
RadCrv X	RadCrv X is the radius of curvature in the x-axis.
RadCrv Y	RadCrv Y is the radius of curvature in the y-axis.
RMS	(Root-Mean-Square) The root-mean-square deviation from the center line. This is a method of calculating an average by squaring each value and then taking the square root of the mean. The center line is defined as the best-fit surface selected with the remove function. The RMS result is the root-mean-square of surface figure error or transmitted error relative to a reference surface. The RMS result is an area weighted statistic; when used for optical components, it more accurately depicts the optical performance of the surface being measured than the PV statistic because it uses all the data in the calculation. $$\text{rms} = \left(\frac{y_1^2 + y_2^2 + y_3^2 \ldots + y_N^2}{N}\right)^{1/2}$$ 

Surface/Profile Height Parameters (continued)

Rtm	Mean peak-to-valley roughness. It is determined by the difference between the highest peak and the lowest valley within multiple samples in the evaluation area. For profile data it is based on five sample lengths. Only applicable to profile data. $$\text{Rtm} = \frac{Z1 + Z2 \ldots + Zn}{n}$$ 
StdDev	(Standard Deviation) A simple measure of the variability or dispersion of a data set. A low standard deviation indicates that the data points tend to be very close to the same value (the mean), while high standard deviation indicates that the data are “spread out” over a large range of values.
Valley	The maximum depth between the center line and the lowest point within the sampled data. The center line is defined as the best-fit surface selected with the remove function. Valley is the value of the lowest data point. 
Valley Location X	The x-axis location in camera coordinates of the lowest point.
Valley Location Y	The y-axis location in camera coordinates of the lowest point.

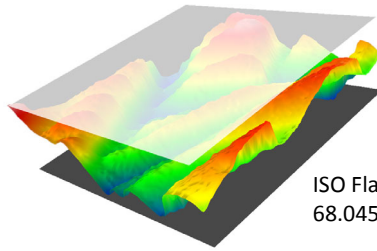
Areal ISO Parameters

Areal ISO Height Parameters

ISO Flatness

Areal flatness deviation. The measure of surface deviation from perfectly flat. It is the distance between two parallel planes obtained by applying a Chebychev fit to the surface data.

The Chebychev fit is a mathematical technique that effectively uses two parallel planes to "squeeze" the surface data points from both inside and outside, adjusting the angle to minimize the distance between the planes.

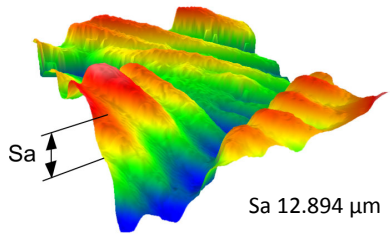


ISO Flatness
68.045 µm

Sa

Average roughness evaluated over the complete 3D surface.

$$\mathrm{Sa} = \frac{1}{A}\iint_A |Z\,(x,y)|\,dxdy$$



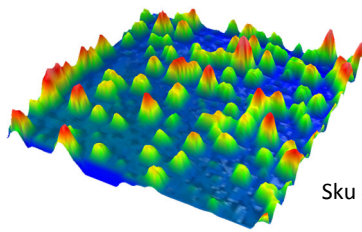
Sa 12.894 µm

Sku

Kurtosis of the areal surface.

This indicates the presence of inordinately high peaks or deep valleys (Sku>3.00) or lack thereof (Sku<3.00) making up the surface.

$$\mathrm{Sku} = \frac{1}{S_q^4}\left[\frac{1}{A}\iint_A (Z(x,y)^4)\,dxdy\right]$$



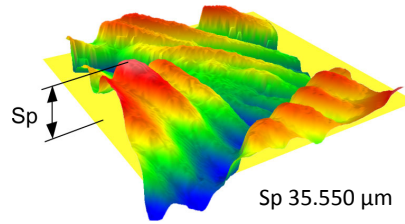
Sku 4.57

Areal ISO Height Parameters (continued)

Sp

Maximum peak height of the areal surface.

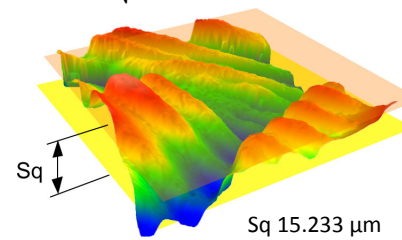
$$\mathrm{Sp} = \max\left(Z(x,y)\right)$$



Sq

Root mean square roughness evaluated over the complete 3D surface.

$$\mathrm{Sq} = \sqrt{\frac{1}{A}\iint_A Z^3\,(x,y)\,dxdy}$$

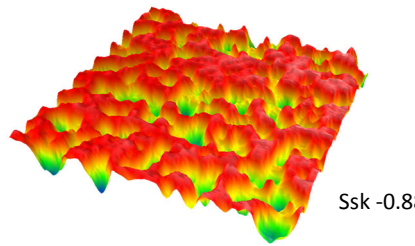


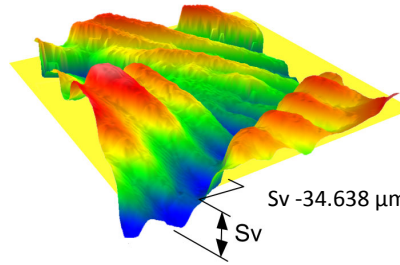
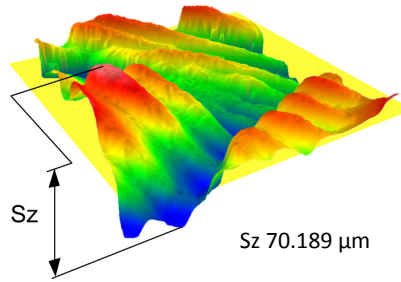
Ssk

Skewness of the areal surface.

This represents the degree of symmetry of the surface heights about the mean plane. The sign of Ssk indicates the predominance of peaks (Ssk>0) or valley structures (Ssk<0) comprising the surface.

$$\mathrm{Ssk} = \frac{1}{S_q^3}\left[\frac{1}{A}\iint_A (Z(x,y)^3)\,dxdy\right]$$



Sv	Maximum valley depth of the areal surface.	$\mathrm{Sv} = \min\left(Z(x,y)\right)$ 
Sz	Maximum height of the areal surface. It is the peak to valley height.	$\mathrm{Sz} = \mathrm{Sp} + \mathrm{Sv}$ 

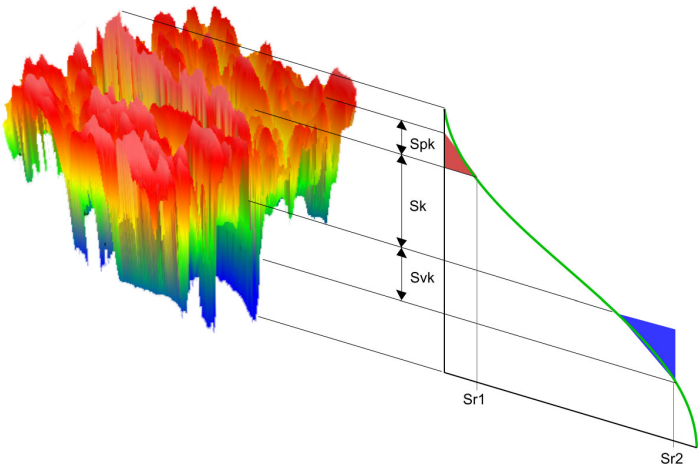
Areal ISO Functional Parameters

These areal parameters are used to evaluate the lubrication performance of a 3D plateau structured surface.

Smq	The material ratio at which the line-fits of the two characteristic linear regions of the material probability curve intersect.
Spq	The root-mean-square average of the height deviations in the peak or plateau portion of the Material Probability plot.
Svq	The root-mean-square average of the height deviations in the valley portion of the Material Probability plot. This result is useful as a predictor of original surface roughness before the removal of more material in subsequent processes.
Sxp	Peak Extreme Height. A measure of the difference in heights on the surface from the areal material ratio value of "p" and the areal material ratio of “q”. According to the ISO standard, the default value for p is 2.5% and the default value for q is 50%.

Areal ISO Functional (Material Ratio) Parameters

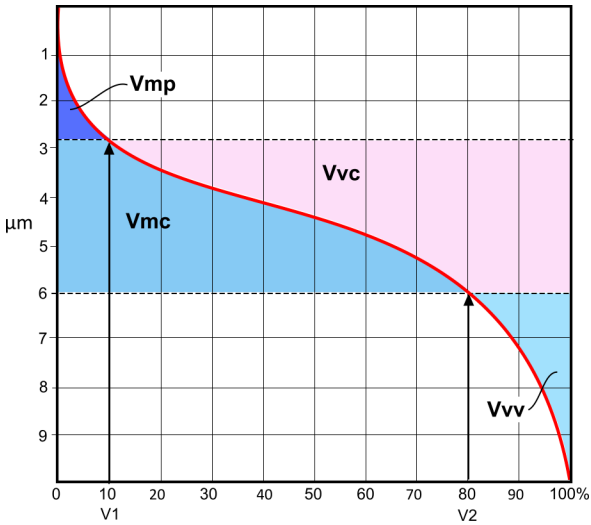
Areal functional parameters are based on ISO 25178.



Sa1	The peak surface area between the upper intersection line and the Material Ratio Curve.
Sa2	The valley surface area between the lower intersection line and the Material Ratio Curve.
Sk	Core Roughness Depth. A measure of the "core" roughness (peak-to-valley) of the surface with the predominant peaks and valleys removed. This is a measure of the nominal roughness (peak-to-valley) and may be used to replace parameters such as Sz when anomalous peaks or valleys may adversely affect the measurement.
Spk	Reduced Peak Height. The area above the region of the material ratio curve which delimits the core roughness. A measure of the peak height above the core roughness. During a running in operation, Spk is the nominal height of the material that may be removed. A large Spk implies a peak dominant surface.
Spk Threshold	The threshold between the Sk and Spk regions; it is an absolute height.

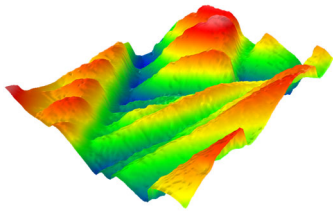
Sr1	Peak Material Component. Sr1 represents the upper limit of the core roughness profile. This parameter is derived from the bearing ratio plot.
Sr2	Valley Material Component. Sr2 represents the lower limit of the core roughness profile. This parameter is derived from the bearing ratio plot.
Svk	Reduced Valley Depth. A measure of the valley depth below the core roughness. Svk impacts a surfaces ability to retain lubricant and trap debris.
Svk Threshold	The threshold between the Sk and Svk regions; it is an absolute height.
c1	Height (or depth) at surface material ratio control 1.
c2	Height (or depth) at surface material ratio control 2.
c2 – c1	Height Difference.
Smr(c1)	Surface Material Ratio at height c1. The ratio (expressed as a percentage) of the cross sectional area of the surface as a height (c1) relative to the evaluation cross sectional area.
Smr(c2)	Surface Material Ratio at height c2. The ratio (expressed as a percentage) of the cross sectional area of the surface as a height (c2) relative to the evaluation cross sectional area.
Smr(c2) - Smr(c1)	Surface Material Ratio Difference.

Areal ISO Functional (Volume) Parameters

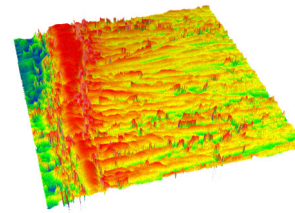


V1	The material ratio control setting where Vmp and Vmc meet. Default value is 10% (ISO 25178-3:2008); however, it is user adjustable.
V2	The material ratio control setting where Vmc and Vvv meet. Default value is 80% (ISO 25178-3:2008); however, it is user adjustable.
Vmc	Core Material Volume. The volume of material bound by the surface texture between heights of "V1" and "V2". The default values of V1 and V2 are 10% and 80% respectively (ISO 25178-2:2012).
Vmp	Peak Material Volume. The volume of material bound by the surface texture at a height of V1 to the highest peak (Tp = 0%). The default value of V1 is 10% (ISO 25178-2:2012).
Vvc	Core Void Volume. The void volume enclosed from V1 to V2 of surface material ratio and normalized to the unit sampling area.
Vvv	Valley Void Volume. The volume of space bound by surface texture at a height of V2 to the lowest valley (Tp = 100%). The default value of V2 is 80% (ISO 25178-2:2012).

Areal ISO Spatial Parameters



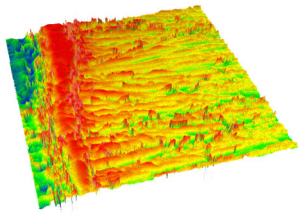
Sal 427.9 µm
Std 30.7°
Str 0.19



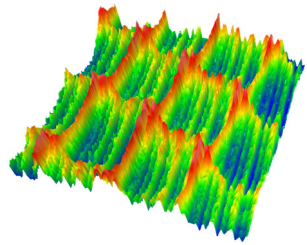
Sal 68.8 µm
Std 0.0°
Str 0.17

Sal	Shortest autocorrelation length. It is a measure of the distance over the surface such that the new location will have minimal correlation with the original location. The direction over the surface chosen to find Sal is the direction which yields the lowest Sa**l** value.
Std	Surface texture direction. A measure of the angular direction of the dominant lay comprising a surface. Std is defined relative to the Y axis. Thus a surface with a lay along the Y axis has a Std of 0 deg. Std is useful in determining the lay direction of a surface relative to a datum by positioning the part in the instrument in a known orientation.
Str	Texture aspect ratio. It is a measure of the spatial isotropy or directionality of the surface texture. Str is useful in determining the presence of lay in any direction and has a range from 0 to 1. A surface with a dominant lay (anisotropy) will be less than 0.5; Str greater than 0.5 indicates strong isotropy.

Areal ISO Hybrid Parameters



Sa 0.63 µm
Sdq 230.9 µm/mm
Sdr 0.05



Sa 0.02 µm
Sdq 21.1 µm/mm
Sdr 0.00

Sdq	Root mean square gradient of the surface. Sdq is a general measurement of the slopes which comprise the surface and may be used to differentiate surfaces with similar average roughness (Sa). Sdq is affected both by texture amplitude and spacing. Thus for a given Sa**,** a wider spaced texture may indicate a lower Sdq value than a surface with the same Sa but finer spaced features.
Sdr	Developed interfacial area ratio. Expressed as the percentage of additional surface area contributed by the texture as compared to an ideal plane the size of the measurement region. Sdr may differentiate surfaces of similar amplitudes and average roughness. Typically, Sdr increases with the spatial intricacy of the texture whether or not Sa changes. Sdr is useful in applications involving surface coatings, adhesion, and lubricants.

Areal ISO Birmingham Parameters

These areal functional index parameters deal with bearing and fluid retention.

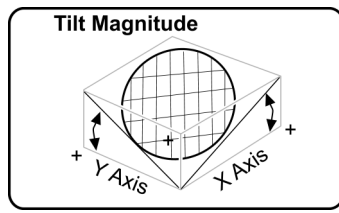
Sbi	Surface Bearing Index. For Gaussian surfaces Sbi=0.61; good bearing surfaces have a high Sbi value.
Sci	Core Fluid Retention Index. For Gaussian surfaces Sci= 1.56; the smoother the surface the smaller the Sci value.
Svi	Valley Fluid Retention Index. For Gaussian surfaces Svi= 0.11; surfaces with good fluid retention have a larger Svi value.

Surface Parameters

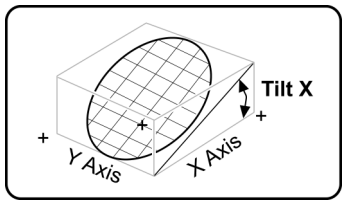
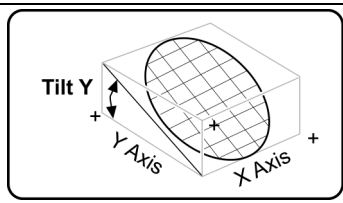
These are general parameters that apply to 3D surfaces.

See also Surface/Profile Height Parameters.

Angle Parameters

Tilt Angle	The direction of tilt in the data. Tilt Angle is the direction that water would flow if it was poured onto the plane.
Tilt Mag	Tilt Magnitude. The overall angle of inclination between the reference and test beams of the interfero-meter. If measuring a surface, tilt is the angle between the reference and test surface. $\text{Tilt Mag} = \sqrt{Tilt\ X^2 + Tilt\ Y^2}$ 
Tilt PV	The PV of a surface defined by a plane with the same tilt as the data, and masked by the valid data pixels.

Angle Parameters (continued)

Tilt X	The tilt of the part relative to the reference surface in the X direction. Lateral calibration is required.	
Tilt Y	The tilt of the part relative to the reference surface in the Y direction. Lateral calibration is required.	

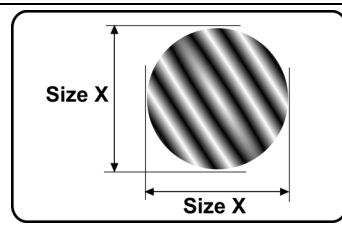
Spatial Parameters

Centroid

Centroid X	Dimension in the x-axis to the center of all valid data points. $\text{Centroid X} = (x1 + x2 + x3 + \ldots Xn) / n$
Centroid Y	Dimension in the y-axis to the center of all valid data points. $\text{Centroid Y} = (y1 + y2 + y3 + \ldots Yn) / n$

Size

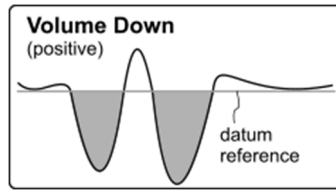
Area	Area is a quantity that expresses the extent of a two-dimensional surface.
Mean Size X	This is the mean dimension of the data set in the x-axis of the live display. This result is the average width based on every row of data in the data set. If a test mask is defined and applied, it is the dimension in the test mask area. Lateral calibration is required.

Mean Size Y	This is the mean dimension of the data set in the y-axis of the live display. This result is the average width based on every column of data in the data set. If a test mask is defined and applied, it is the dimension in the test mask area. Lateral calibration is required.
NPoints	The number of points or pixels in a valid areal region.
S2A	S2A is the lateral area of tiling following the ISO standard. Both S2A and S3A tile the data with triangles in the manner prescribed via ISO 25178-2. S3A and S2A are the numerator and denominator, respectively, of the ratio used as the definition of Sdr. S3A is the surface area of the triangle tiling, and S2A is the lateral area of this tiling. Both S2A and S3A tend to report a slightly smaller area than the Area result because data samples are considered between valid points in space rather than as pixels. This results both in a domain smaller than the pixel domain by a half-pixel on all sides, and also effectively widens, with respect to the pixel model, the holes introduced by missing data.
S3A	Surface Area of the triangular tiling following the ISO standard. See S2A.
Size X	The size or extent of the data in the x-axis. Lateral Calibration required to display units. 
Size Y	The size or extent of the data in the y-axis. Lateral Calibration required to display units.

Volume Parameters

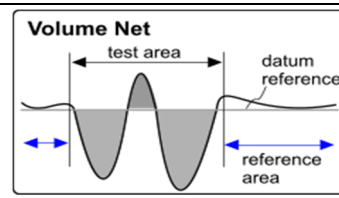
Volume Down

Volume Down is the volume of the test area which is lower than the reference area. Positive Volume Down can be thought of as the space occupied by pits on the test area; a negative Volume Down result would protrude above the reference area.



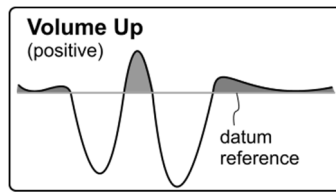
Volume Net

Volume Net is the overall volume of the test area. It is equal to the Volume Up minus the Volume Down.



Volume Up

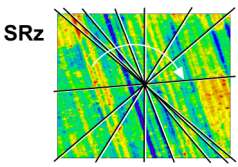
Volume Up is the volume of the test area which is higher than the reference area. Positive Volume Up can be thought of as the space occupied by bumps on the test area; a negative Volume Up result would extend below the reference area.



Legacy Parameters

For SR ISO parameters, a surface area is analyzed by fitting a minimum enclosing rectangle and applying a 5 x 5 sampling grid, for a total of 25 sampling areas. All sampling areas together make up the evaluation area.

SR3z	Base roughness areal depth. The height of the 3rd highest peak from the 3rd lowest valley per sampling area. The base roughness depth is found in each sampling area and then averaged.
SRmax	Maximum peak-to-valley height over the entire areal evaluation area.
SRtm	Mean peak-to-valley areal roughness. The mean peak-to-valley roughness based on one peak and one valley per sampling area. The single largest deviation is found in each sampling area and then averaged.
SRvm	Mean valley areal depth. The mean valley depth based on one peak per sampling area. The single deepest valley is found in each sampling area and then averaged.
SRz	Average radial peak-to-valley areal roughness. The average of the largest half of many individual Rz results determined by slicing the areal data array about its center through 360 degrees. The Rz results are sorted by magnitude and SRz is calculated by averaging the largest 50% of the Rz values. A line-generation algorithm is used to determine the actual pixel-to-pixel path of each slice; there is no interpolation between pixels. SRz covers the entire array, and due to its radial generation it is lay independent.



Many Rz results are analyzed by radial slicing data; the largest half are averaged.

Zygo Corporation
United States

Phone: 860-347-8506
E-mail: inquire@zygo.com

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