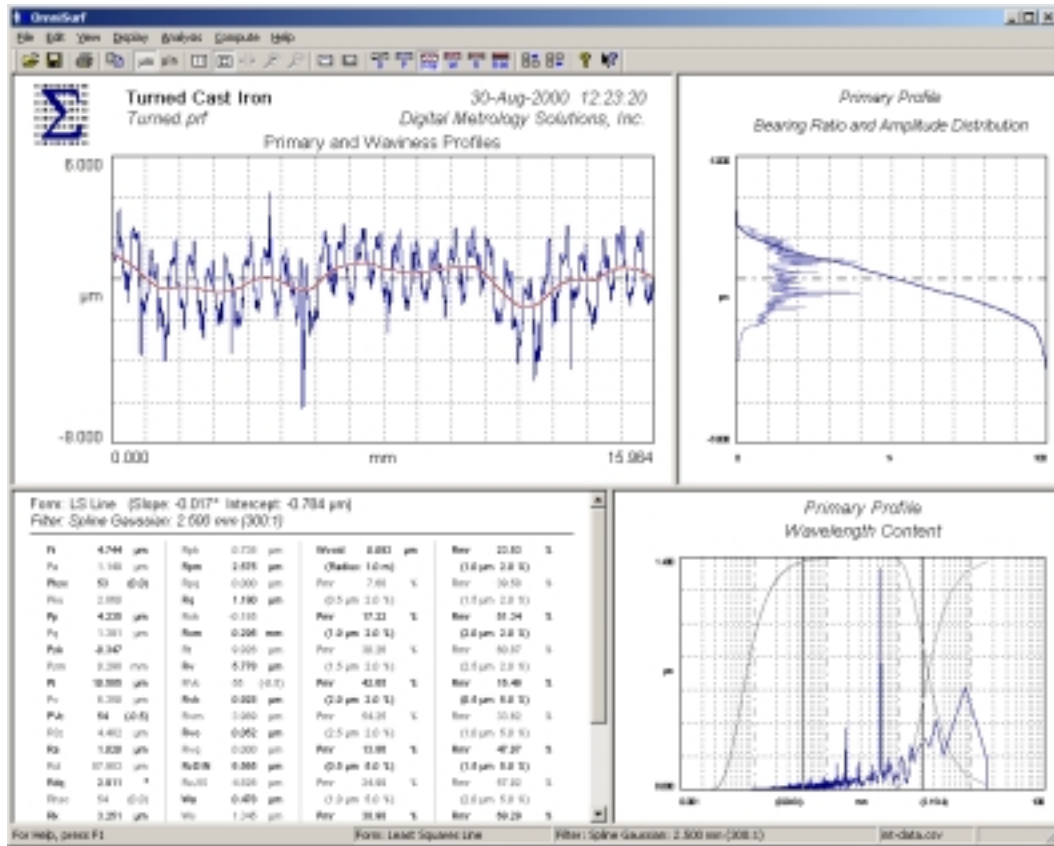


OmniSurf – A Comprehensive Surface Profile Analysis Package



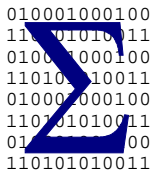
Introducing OmniSurf – an affordable surface profile analysis package designed for the most demanding analytical needs.

OmniSurf is for people who want to understand their difficult surfaces.

OmniSurf acts as a surface profile analysis “toolbox” encompassing many of the latest developments in surface analysis. With OmniSurf you can:

- Analyze data files collected from a variety of instruments from most major manufacturers
- Perform “hands off” batch processing of multiple profiles.
- Apply the latest metrology tools (many are not yet available in instruments) including:
 - *Advanced filtering methods (new filters and bandpass capabilities)*
 - *New, more functional surface texture parameters (plateaus, conformable surfaces, etc.)*
- Export parameter results to a spreadsheet file.
- Utilize many graphical analyses including:
 - *Bearing Ratio, Material Probability, Wavelength Content (Fourier)*
 - *Region-based profile analysis*

OmniSurf’s capabilities speak for themselves through the following case studies.



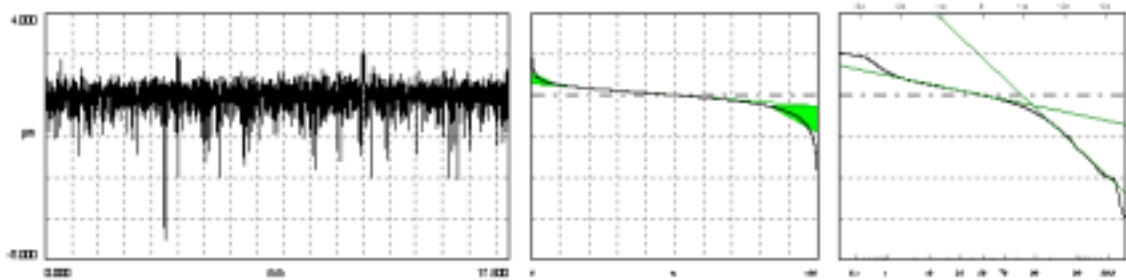
Omni?

Omni is from the Latin “omnis” meaning “all”. The concept of “all” runs throughout the OmniSurf package in that the goal is to provide every possible data analysis method for data obtained from every possible instrument. In this regard, OmniSurf seeks to provide the widest range of analytical capabilities to the widest range of data sets. This can be demonstrated through the following case studies. (NOTE: All figures have been obtained directly from OmniSurf, some text has been added for explanatory purposes.)

Case Study #1 Plateaued (Stratified) Surfaces

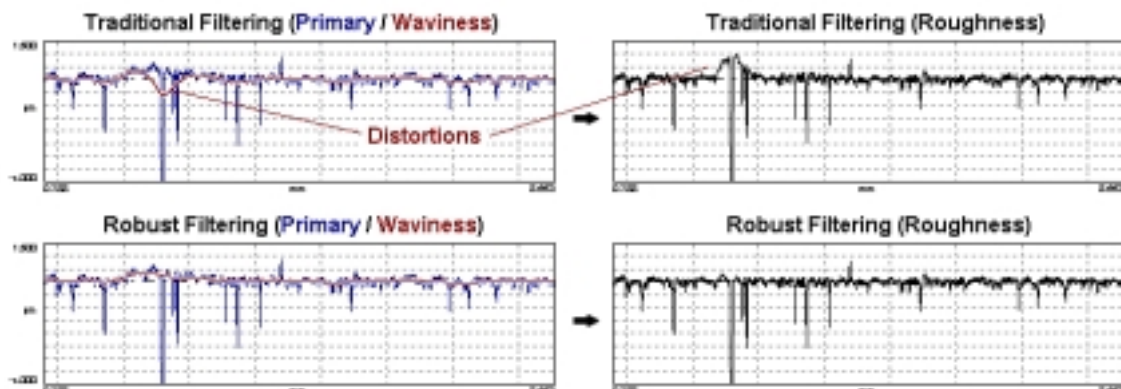
A rather common yet critical type of surface texture is that which is referred to as “plateaued”. These surfaces are found in a variety of critical sealing applications and are identified by their smooth plateau regions that are separated by relatively deep valleys.

In addition to improved filtering methods (see Case Study #2 below) OmniSurf incorporates parameters and graphical output for the ISO 13565-1996 Rk family of parameters (Rk, Rpk, Rvk, Mr1, Mr1 and Rvo) as well as graphics and parameters for the ISO 13565-1998 probability based, Rq, parameters (Rpq, Rvq and Rmq).



Case Study #2 Filtering for Porous Surfaces

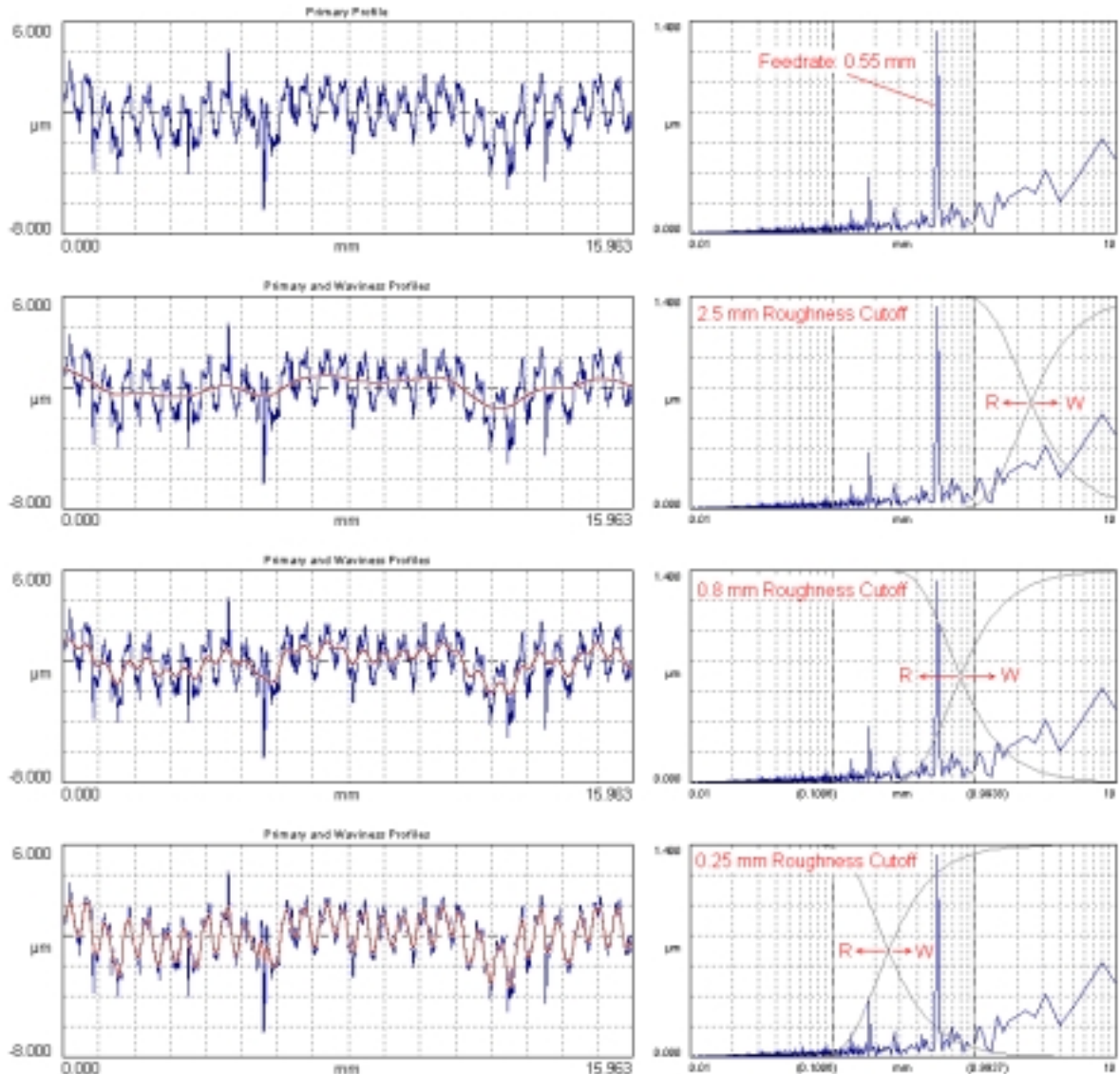
Many production measurements of surfaces can be strongly influenced by extraneous peaks (debris) or valleys (pits, pores, etc.). These extraneous features can cause significant distortions in the waviness profile and can corrupt many roughness and waviness parameters. OmniSurf incorporates the “valley suppression” filtering methodology put forth in ISO 13565-1996 as well as a new “robust filtering” approach. This robust filtering technique provides a more stable and functional meanline (without the unwanted distortions) and as a result gives more meaningful roughness and waviness profiles and values.

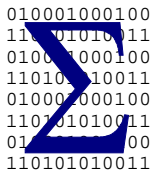


Case Study #3 Filter Cutoff Selection

When surface roughness or waviness is reported there is an implied distinction between long wavelength *waviness* and shorter wavelength *roughness*. This distinction is made mathematically in terms of a cutoff wavelength (or “roughness cutoff”). According to ASME Y14.36-1996 “...drawings ...shall state the *roughness cutoff*”. However, many product engineers and designers struggle to determine the proper cutoff for their surfaces. OmniSurf provides two tools to aid in the selection of a roughness cutoff wavelength.

The first tool is the simple display of the waviness profile overlaid on the primary profile. This display provides the user with a graphical display of the waviness and the ability to visually assess how well the waviness profile “fits” the underlying *shape* of the surface. The second tool regarding filter cutoff selection is wavelength content graph with the filter transmission characteristics superimposed. This unique graph exploits wavelength regimes in the profile and their relationship to filter cutoffs.

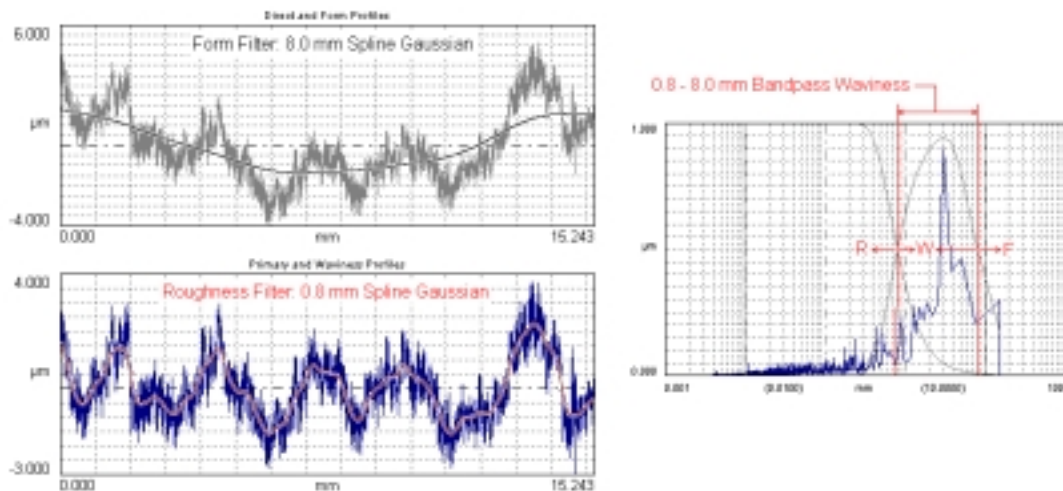




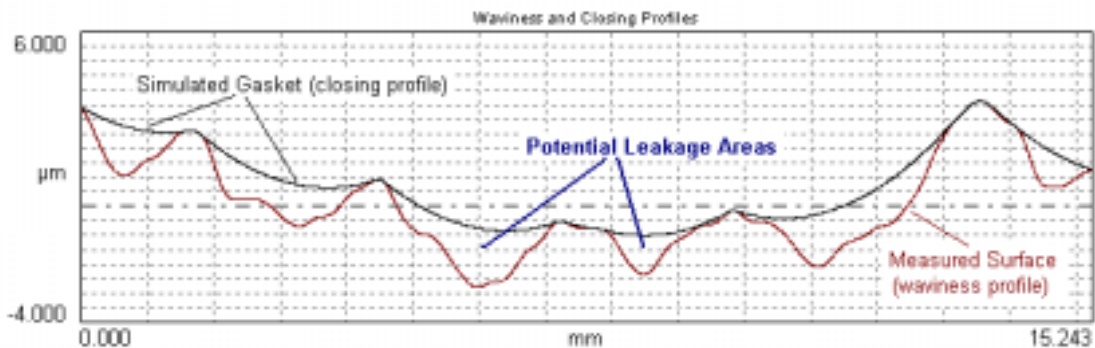
Case Study #4 Conformable Interfaces (for example, Gasket applications)

Many critical surfaces are in systems whereby they are in contact with a conformable component such as a seal or gasket. In these cases, certain shapes can be accommodated by the conformable component whereas other shapes can lead to performance problems such as leakage.

The OmniSurf package provides two analytical approaches tailored to the analysis of surfaces in contact with conformable counterparts. The first of these capabilities is known as “bandpass waviness”. In this approach, the long wavelength “Form Errors” can be extracted through using the “Spline Filter” option as the “Form Removal” method. The cutoff of this form removal filter can be selected based on the compliance of the conformable component. The peak to valley assessment of the “form profile” is then reported as “*Ft*”. Similarly, the waviness and roughness profiles can be characterized through other conventional parameters.



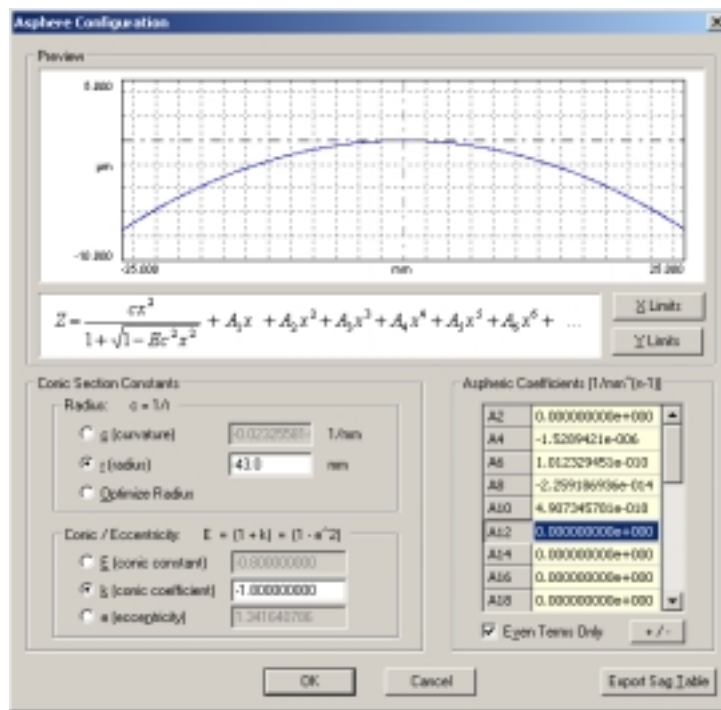
In addition to bandpass waviness, OmniSurf includes an alternative approach for conformable interfaces based on the concepts of morphological filtering. In this approach a “virtual gasket” is generated relative to the measured profile. This is accomplished by applying a morphological closing filter to the waviness profile. This closing filter generates a profile that simulates the conformable component. The gap area between the closing profile and the waviness profile can be analyzed to report a “leakage” or “void area” as the “Wvoid” parameter. The units of Wvoid are normalized based on the length of the profile and are therefore reported in terms of area (μm^2) per unit length (μm) which, in turn, simplifies to “ μm ”.



Case Study #5 Aspheric Form Analysis

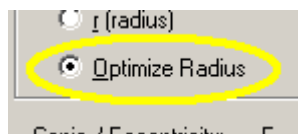
Many critical optical surfaces are *aspherical* in terms of their form and are defined by an equation combining of a conic section and an nth order polynomial. These sophisticated geometries are required in important optical applications such as telescopes, optical instrumentation, cameras and contact lenses.

OmniSurf includes the ability to analyze aspheric surfaces and provides an intuitive interface for the configuration of the aspheric reference geometry. The OmniSurf asphere configuration utility supports “drag and drop” for the polynomial coefficients as well as a scalable, live preview of the aspheric form. In addition, the Sag Table can be exported for use in other applications.

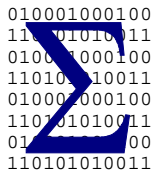


Typically, the analysis of aspheres involves measuring the component and looking at the residual form error. Usually the majority of the resulting form error is the result of an error in the component’s base radius. To determine the actual (measured) the base radius, the operator manually adjusts the nominal radius and re-analyzes the data until the residuals look acceptable.

One of the most powerful aspects of OmniSurf’s aspheric tools is the ability to automatically determine the optimal aspheric radius based on the measured data.



Under this approach, OmniSurf will analyze the measured data and determine the optimal radius – minimizing the sum of the squared form errors. The result is a much more accurate assessment of the aspheric radius while spending significantly less time analyzing data.



OmniSurf Details:

Operating System and Common Features:

OmniSurf runs on any 32-bit Microsoft Windows platform (95, 98, 98SE, 2000, NT 4.0, XP, etc.) and includes standard Microsoft features such as:

*Clipboard output of graphical sections
Drag and drop file loading
Standard Windows Printer Support
Standardized User Interface Conventions
(Menu Layout, Right Click, Double-Click etc.)*

Data Access:

OmniSurf provides for direct loading of files saved or exported from most popular surface texture instruments. Supported file types include:

*.sig .pro .pip .csv .prf
.ten .six .stp .prf .pcd
.txt .dir .hdr .pdi .sdf*

Parameters:

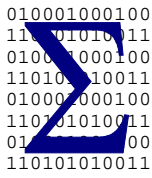
OmniSurf provides many common surface texture parameters as well as parameters resulting from recent advances in the field of surface metrology:

*Ft Pt Pa Pq Psk Pku Pp Pv Psm Phsc Pvc
Wt Wa Wq Wp Wv Wsm Wvoid Wvdd Wc
Ra Rt Rp Rv Rq Rdq Rsk Rku RzDIN RzJIS
Rpm Rvm Rmax Rsm Rhsc Rvc
Rk Rpk Rvk Rmr1 Rmr2 Rvo Rpq Rvq Rmq
Bearing Ratios: 10 Primary & 10 Roughness
Htp Values: 10 Primary & 10 Roughness*

Filters:

Standard filter cutoffs are available as well as a variety of bandpass configurations. Filter types include:

*Gaussian
Spline Based Gaussian (with adjustable tension)
Valley Suppression (ISO 13565-1 – 1996)
Robust Spline-Based Gaussian (based on robust regression)
Morphological Closing Filter (circular element applied to waviness profile)*



OmniSurf Details (continued):

Form Removal Options:

Instrument reference (mean suppression)

Least Squares Line

Least Squares Arc

Least Squares Polynomial (user specified order)

Spline Gaussian Filter (for bandpass waviness with a user specified cutoff)

Data Export:

OmniSurf allows for the export of computed parameters into a Comma Separated Values (CSV) spreadsheet. Subsequent analyses are appended to the spreadsheet as rows thereby allowing for the analysis of groups of data. In addition, OmniSurf allows for the export of several profiles and curves related to the data. These are exported as ASCII files and include:

Direct (Raw) Profile, Form Suppressed Profile

Primary Profile, Waviness Profile, Roughness Profile

Wavelength Content (Spectrum)

Primary Bearing Ratio Curve

Primary Amplitude Distribution

Roughness Bearing Ratio Curve

Roughness Amplitude Distribution

“Hands Off” Batch Processing:

Often engineers are faced with the need to process several profiles as part of a production “batch” or process/product study. OmniSurf includes a “batch processing” feature whereby an entire folder of data can be automatically processed with the current analysis settings. OmniSurf will automatically load all of the files in the specified folder and export the results to a spreadsheet file.

The Bottom Line:

OmniSurf is available as a single user license for \$750 (USD). Site licensing options are available.

Need more info?

For more information, or to order OmniSurf and to start making sense of your surfaces, contact:

Digital Metrology Solutions, Inc.

www.digitalmetrology.com