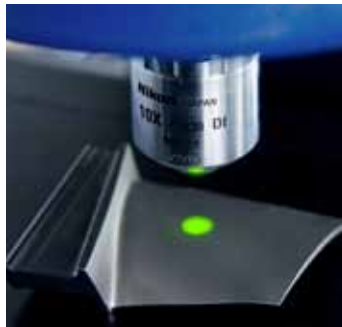


# CCI MP

Flexible, user-friendly, affordable 3D optical profiler



# CCI MP: Non contact 3D optical profiler



## Advanced optical interferometry

- 2.2 mm vertical range with closed loop piezoless Z axis scanner
- AutoStitch as standard, measures large parts with high resolution X, Y and Z stitching, up to 100 mm z measurement range
- 1024 x 1024 pixel array for large FOV with high resolution
- New Claritas 20 light conditioning, increased angle sensitivity improves data quality

## Industry leading data quality

- <math><0.2 \text{ \AA}</math> RMS repeatability, <math><0.1\%</math> step height repeatability
- 0.1  $\text{\AA}$  resolution over the entire measurement range
- FEA optimised mechanical design for excellent R&R capability
- Calibration utilizing ISO standards ensures acceptance of results

## Robust design ensures low cost of ownership

- Piezoless Z axis scanner eliminates expensive repair bills
- Automatic surface detection prevents crash damage to lens
- New XL option for larger parts without loss of data quality
- Ease of operation reduces the possibility of operator error

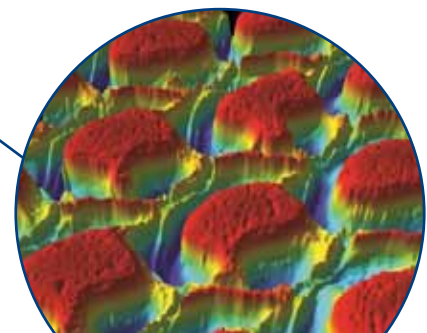
## Windows® 7 (64-bit) software

- Multi-language support including Chinese and Japanese
- Advanced 64 bit AutoStitch offers fast stitching over large areas
- New tools enables 4D analysis of 3D surfaces as they evolve over time
- Automatic report generation based on batches of measurement data



## Understanding structured surfaces

The large field of view and high resolution of the CCI MP enable the understanding of complex structured surfaces.



“The accuracy, image quality and automation of the CCI makes a great contribution to MLT’s metrology and production capabilities.”

Bosisic Parini  
Media Lario S.r.l, Italy



The CCI MP XL is optimized for the measurement of large components without compromising the resolution

## Unlimited application possibilities

Three elements of surfaces – dimension, form and texture – are critical to the function of a component. Exceptional roughness capability coupled with large area measurement, advanced data analysis (2D and 3D) and Taylor Hobson's expertise provides industry leading metrology.

Many users look to CCI MP for solving measurement problems that other instruments simply cannot handle. With outstanding range, resolution and ease of operation, the CCI MP can easily become your ideal tool for R&D and quality assurance in a wide variety of applications.

- Material research
- Bearing roughness
- Polished optics
- Textured steel
- Diamond turned surface
- Automotive injectors
- Structured surfaces
- Medical implants
- Sealing surfaces
- Crankshaft finish
- Fluid retention (bearing ratio)
- Paper / toner
- Phone handset finish
- Tooth wear
- SIMS craters
- Wafer roughness
- Wafer etch depth
- Solar cells
- LED
- MEMS
- Data storage



Medical implants



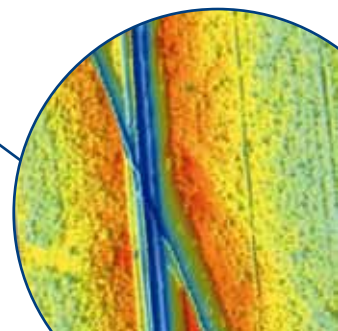
Automotive

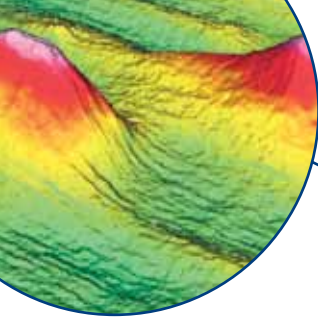


Solar cells

### Extending lifetime of orthopaedic implants

Tribological study of orthopaedic implants is critical to maximizing lifetime – CCI MP combines form, shape and texture in one evaluation.





## Identify polishing defects

Polishing defects such as comet tails can be identified quickly and easily using the high resolution 3D capability of the CCI MP.

# CCI MP offers world-beating performance for research and manufacturing

## Range, resolution, accuracy, reliability – our formula for your success

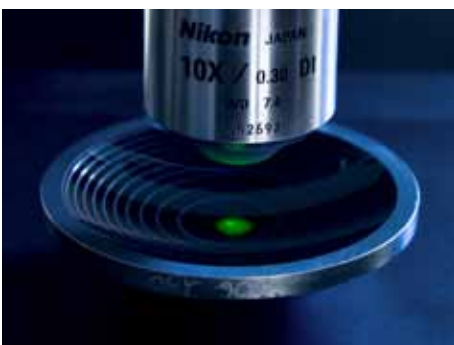
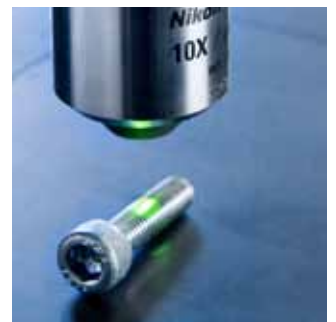
Whatever the component, however quickly you must analyse it, confidence in your 3D areal measurement result is assured with the revolutionary CCI MP non-contact optical profiler. A high performance 1 MP camera combines with 1/10 ångstrom vertical resolution and the Claritas 20 light conditioning to deliver incredibly detailed analysis of all surface types from very rough to extremely smooth.

## Versatile – ready for a production run or a research project

Ideal for cutting edge research projects, the CCI MP is ready for your most demanding measurement requirements including developing fields such as solar energy, optics and medical devices. AutoStitch increases the value of the instrument by extending the range of components that can be measured.

## Ease-of-use reduces the cost of operator training

Designed for ease of use by scientists, students, developers or production inspectors, CCI MP has innovative features such as AutoRange, AutoFringeFind and multi-site measurement that simplify setting up and staging of components. Save valuable time, reduce errors and quickly get the results you need.



## Comprehensive platform simplifies ISO-17025 integration

Greatly expand your analysis capabilities without increasing the complexity of your analysis program. A broad range of components and surfaces can be measured without the complication of switching between measurement modes or the extra burden of intermediate lens calibration. Standardized methods, procedures and reporting make it easy to integrate the of CCI MP into your quality management system.

“The CCI has greatly helped our team keep in the forefront in the exciting area of precision engineering and surface characterisation.”

Dr S.V Rama Gopal  
Scientist, Aspherics Group, CSIO, India

## Modern optical profiling

### One measurement mode

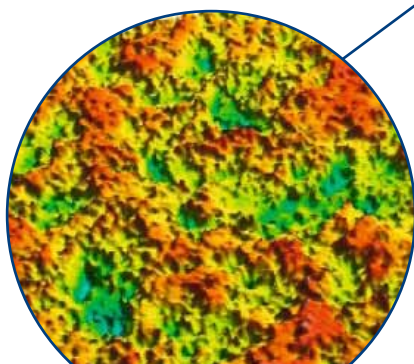
Streamline your inspection program by eliminating multiple inspection routines and incompatible measurement reports. Our patented Coherence Correlation algorithm provides sub-ångstrom resolution regardless of scanning range so that all surfaces at any stage in production can be measured and directly compared, regardless of surface roughness. This is not possible with older designs of interferometer that use different measurement modes, or different scanners depending on roughness.

### Improved sensitivity

The new Claritas 20 light conditioning offers unrivalled data quality. Increased sensitivity provides less missing data on hard to measure surfaces and an increase in maximum angle capability, improving data quality and opening up exciting new application opportunities.

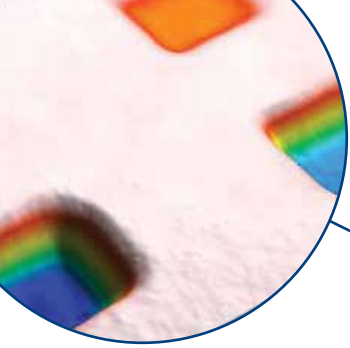
### Coating measurement

Thick film measurement capability is an exciting addition to the CCI MP. By adding a white LED to the system coating thicknesses down to 1.5 microns can be analysed easily extending the range of samples that can be measured. The unique high resolution measurement of the CCI gives industry leading thickness and step height information from single and multi layer samples.



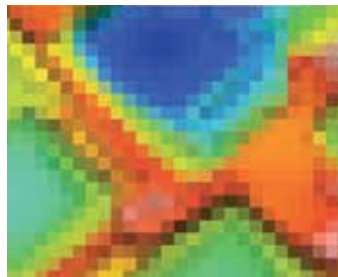
### Surface roughness control

Accurate control of surface roughness is critical for applications such as PV cells. This can only be done using Taylor Hobson's unique single measurement mode.

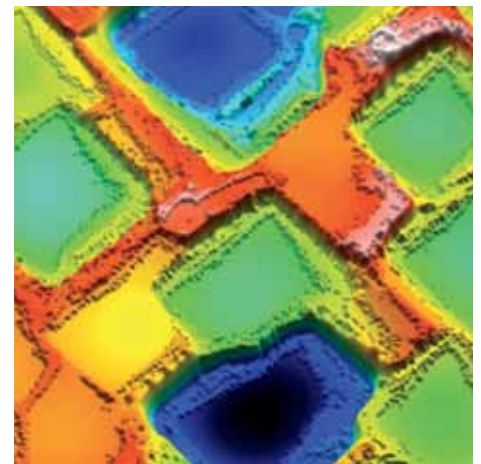


**Improving SIMS results**  
 The depth of the craters after SIMS analysis is critical for understanding the data. 3D step measurement gives more detailed information about the crater dimensions leading to more accurate SIMS analysis.

## World-leading 3D camera technology



Last century 640 x 480



CCI MP 1024 x 1024

### Higher resolution

CCI MP image sensors with 1024 x 1024 pixel arrays are vastly superior to old VGA video camera technology where 640 x 480 pixel arrays grossly limited lateral resolution. Now you can measure large areas without the complexity or potential distortion caused by field of view multipliers.

### Faster measurements

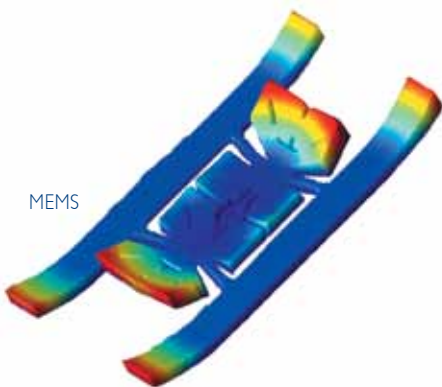
A larger FOV (field of view) means fewer set-ups, faster inspection speed and better utilization of equipment and operators. Cost effectiveness is much improved now that you can inspect more parts, more thoroughly and in greater detail without additional expense.

### Superb results

With 1 million data points and the Claritas 20 light conditioning the measured surface is defined in superb detail. You can identify surface flaws or potential areas of concern anywhere in the wide FOV and use software to “zoom in” for detailed analysis without having to waste time re-measuring the component.

### NEW camera technology

High resolution visual analysis provides an essential tool for monitoring and improving your manufacturing process. Stunning 3D images with sub-micron detail can also be used to increase the understanding of the surface.



MEMS

# Powerful automation features



## AutoStitch

XYZ stitching increases the ease of use and flexibility of the instruments. As well as the standard stitching options large circular, spherical and annular surfaces are easily measured with the minimum of effort. The XY stitching can be combined with Z stitching and other automation options to measure large complex samples with high resolution quickly giving the user high quality data with the minimum of complications.

## Multi-site measurement

Automatic measurement of multiple parts or multiple sites on a single part without operator intervention can greatly increase efficiency whether in production or research environments. Features such as AutoRange, AutoFringeFind, AutoCentre and AutoStitch offer advanced automation options to give quick, accurate and repeatable data, saving the user valuable time and effort.

## Z step and measure

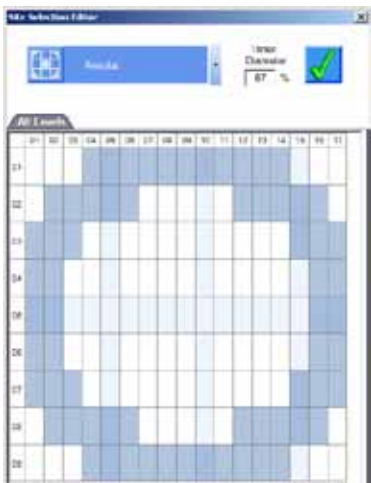
Combining the innovative CCI closed loop scanner and a unique algorithm the software allows you to maximise the measurement range without compromising resolution. Measurement ranges of 40 mm or greater with 0.01 nm resolution are now possible with this unique feature.

## Automatic range setting

Significant reductions in measurement time are achieved with our exclusive AutoRange feature which automatically sets the optimum scan range based on the sample surface. Manual setting of the scan range is typically a guessing game that often results in over scanning, longer measurement times and frustration for even the most skillful operators.

## Automatic surface detection

AutoFringeFind will increase inspection throughput by eliminating manual set-up and the need to re-take measurements caused by false identification of the sample surface. Unlike common auto focus routines which require a flat and smooth surface, this innovative coupling of software and optical expertise can detect all types of surfaces quickly and automatically.



Stitched measurement of an annular sealing surface

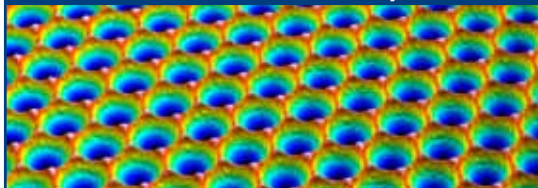
As well as flatness the fine detail is ideal for looking at roughness and surface defects.



# Unrivalled application possibilities

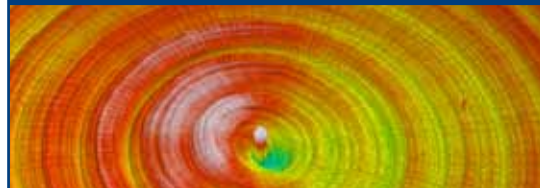
CCI single measurement mode gives unbeatable range resolution and accuracy

## Micro lens array



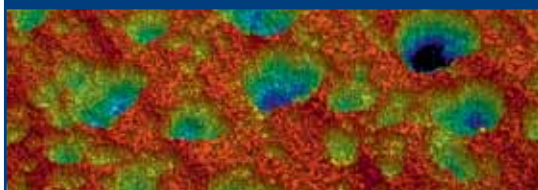
Detailed information over large areas is easily obtained with the high resolution CCI. Adapters such as FOW optics are not suitable for this type of measurement as either the measurement area or the lateral resolution are compromised.

## Diamond turned surfaces



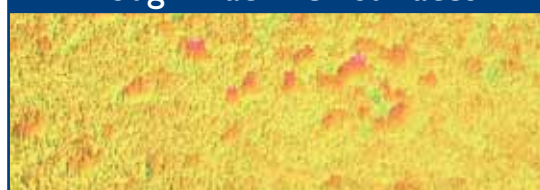
Faults such as tool height errors can be identified and rectified. Roughness and waviness analysis tools for cutting performance evaluation and feedback (chatter, spoke, color, etc) will optimise optical performance.

## Corroded surfaces



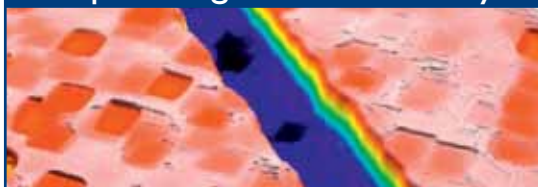
Complex surfaces such as corroded samples need a modern interferometer to understand the detailed surface. The range and resolution of the CCI MP are critical for this type of measurement.

## Rough machined surfaces



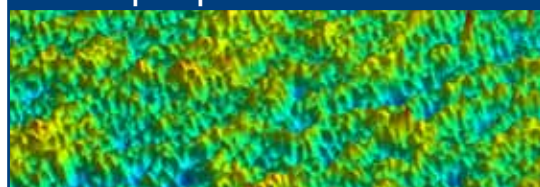
Because rough surfaces scatter light they are often difficult to measure. The unique CCI algorithm and high sensitivity camera gives less missing data points than any of our leading competitors.

## Optimising PV cell efficiency



Uniform trench depth prevents conducting material flowing out of the trench reducing efficiency – CCI evaluates depth, width and volume of trench-like features.

## Super polished surfaces

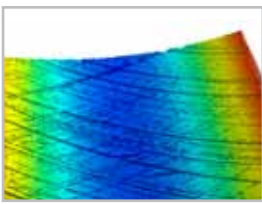


The low noise performance of the CCI MP is necessary to measure super smooth surfaces. Identifying differences in surfaces with roughnesses of  $<0.5$  ångstrom is now common.

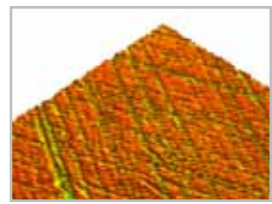


# CCI MP offers a wide range of advanced analysis tools

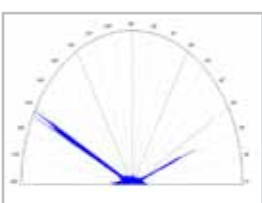
## Measurement of honed surface



3D honed surface



Form removed surface



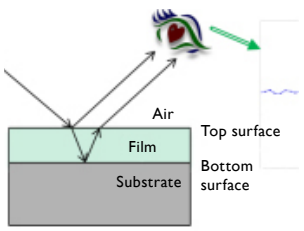
Texture direction

ISO 25178			
Height Parameters			
Sq	5.94	µm	RMS mean square height
Ssk	0.638		Skewness
Sku	2.23		Kurtosis
Sp	20.1	µm	Maximum peak height
Sv	14.1	µm	Maximum pit height
Sz	31.3	µm	Maximum height
Sa	5.94	µm	Arithmetic mean height

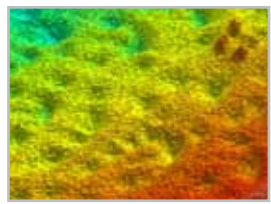
Surface parameters

High lateral resolution over large areas is perfect for 3D texture direction analysis. A combination of fine detail and advanced analysis offers critical assessment of advanced engineered surfaces.


## Thick film measurement



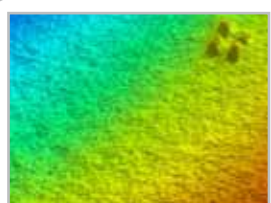
Air  
Top surface  
Bottom surface  
Film  
Substrate



Top surface




Film thickness



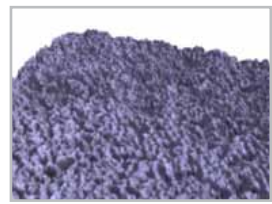
Bottom surface

Using a white light source it is possible to measure film thickness of multilayer thick films. The unbeatable sensitivity of the CCI algorithm gives unrivalled thickness and interface data.

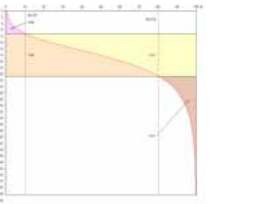
## Fluid retention analysis



Ball bearing surface



Form removed surface



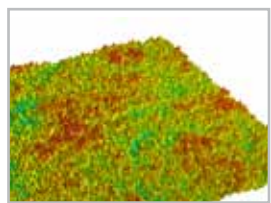
Bearing ratio analysis

Many engineering surfaces are designed to encourage fluid retention. The bearing ratio of the surface is used to optimize the number and shape of pits, optimizing performance.

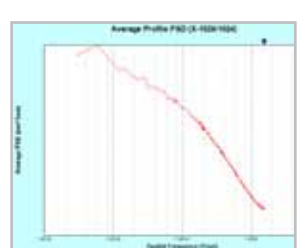
ISO 25178			
Functional Parameters (Volume)			
Vm	0.000237	µm <sup>3</sup> /µm <sup>2</sup>	µ = 101
Vv	0.00864	µm <sup>3</sup> /µm <sup>2</sup>	µ = 101
Vmp	0.000237	µm <sup>3</sup> /µm <sup>2</sup>	µ = 101
Vmc	0.00635	µm <sup>3</sup> /µm <sup>2</sup>	µ = 101
Vvc	0.0072	µm <sup>3</sup> /µm <sup>2</sup>	µ = 101
Vvv	0.00144	µm <sup>3</sup> /µm <sup>2</sup>	µ = 801

## Controlling surface roughness

ISO 25178			
Height Parameters			
Sq	1.22	nm	RMS mean square height
Ssk	0.0301		Skewness
Sku	3.10		Kurtosis
Sp	5.88	nm	Maximum peak height
Sv	7.85	nm	Maximum pit height
Sz	13.7	nm	Maximum height
Sa	0.970	nm	Arithmetic mean height



Silicon surfaces



Average profile PSD

CCI is ideal for looking at the roughness of very smooth surfaces. PSD analysis can be used to identify any issues in silicon wafer polishing.

# Powerful new software features

## Control software

Now with 64-bit processing, the CCI control software features greater flexibility, faster operating speed and improved overall performance. Compatibility with most mainstream platforms offers the possibility of collaborative research projects and development of advanced applications.

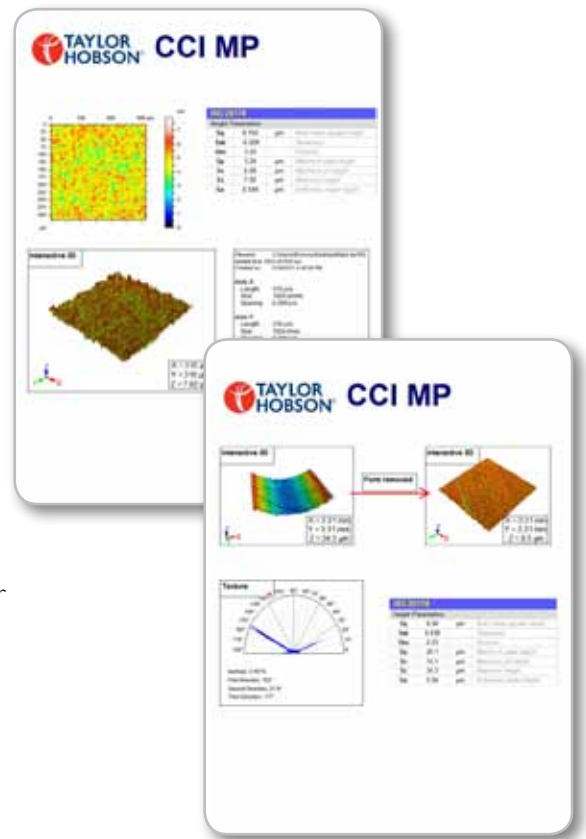
Multi-language support is now available to keep pace with the global economy and international manufacturing partnerships.

## Flexible, user-friendly, all-inclusive software

The latest generation of TalyMap software assures conformity with the latest 3D standard, ISO 25178, as well as full metrological traceability. New analytical functions include 4D analysis of 3D surfaces as they evolve over time, pressure or other physical properties. Along with photo-realistic full colour images, TalyMap also includes enhanced productivity tools such as templates for repetitive work and automatic report generation based on batches of measurement data.

Research facilities, factories and universities worldwide have made TalyMap their preferred surface analysis software. It is used for product development, process improvement, predictive behaviour analysis and routine inspection in many sectors.

TalyMap is continuously evolved by a multi-disciplinary team of specialists in metrology, software engineering and automation in order to meet present and future surface metrology needs.

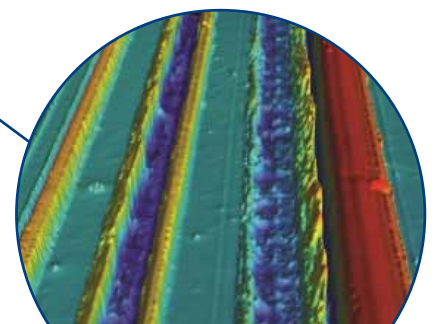


## Key features

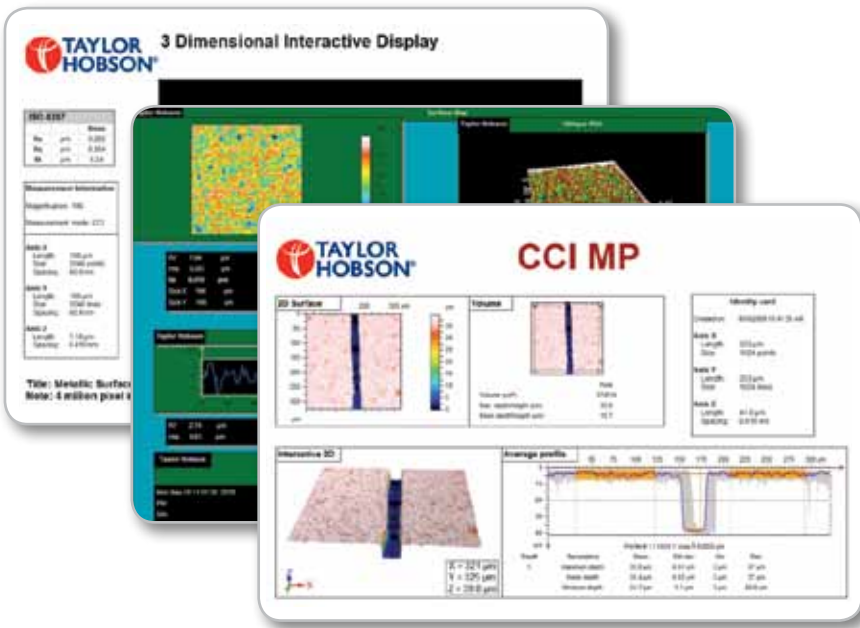
<b>Full metrological traceability</b>	New analysis workflow enables step traceability in an analysis document. New steps can be added, fine-tuned or deleted at any time.
<b>Statistics for quality control</b>	New statistics option makes it possible to track and generate statistics on parameters across multiple measurement data sets.
<b>Multi-language support</b>	TalyMap can be configured to work in one of six European languages, Japanese, Chinese or Brazilian Portuguese.
<b>Quick results</b>	Minidoc function significantly speeds up report preparation by creating shortcuts to common sequences.
<b>Customization</b>	Add company logos, measurement identity cards, screen notes and illustrations including bitmaps, text blocks and arrows.
<b>Advanced modules</b>	TalyMap advanced modules enhance its functionality by providing additional analysis or presentation capabilities.

### Nanoimprinted surface

The structure of fragile nanoimprinted surfaces can be easily understood, giving more control over the production.



# Flexible, user-friendly, all-inclusive software



The latest generation of TalyMap software assures conformity with the 3D standard ISO 25178 as well as full metrological traceability. Ideal for research and development products, the latest 2D and 3D parameters will be critical for future developments.

Along with photo-realistic full colour images, TalyMap also includes enhanced productivity tools such as templates for repetitive work and automatic report generation based on batches of measurement data.

Taylor Hobson has a well-deserved reputation for industry-leading data processing. Analysis parameters and software modules available include:

2D parameters	3D parameters
<b>Primary (unfiltered)</b> Pa, Pc, Pdc, Pdq, PHSC, PHtp, Pku, Plo, Plq, Pmr, Pp, PPc, Pq, Prms, Psk, PSm, Pt, Ptp, Pv, Py, Pz, Pz(JIS), P3z, Pfd, Pda, Pla, PH, PD, PS, Pvo	<b>Amplitude</b> Sa, Sq, Sp, Sv, St, Ssk, Sku, Sz
<b>Waviness (filtered)</b> Wa, Wc, Wdc, Wdq, WHSC†, WHtp, Wku, Wlo, Wlq, Wmr†, Wp, WPC†, Wq, Wrms, Wsk, WSm, Wt, Wtm, Wtp, Wv, Wy, Wz, Wz(JIS), W3z, Wda, Wla, Wmax, WH, WD, WS, Wvo	<b>Area &amp; volume</b> Stp, SHtp, Smmr, Smvr, Smr, Sdc
<b>Roughness (filtered)</b> Ra, Rc, Rdc, Rdq, RHSC, RHtp, Rku, Rlo, Rlq, Rmr†, Rp, RPC, Rq, Rrms, Rsk, RSm, Rt, Rtm, Rtp, Rv, Ry, Rz, Rz(JIS), R3z, Rfd, Rda, Rla, Rmax, RH, RD, RS, Rvo	<b>Data analysis</b> Step height, Lateral Distance, Pitch, Angle Measurement, Peak Count, Interactive Abbott-Firestone Curve, Volume of Islands, Fractal Analysis, Motifs Analysis, Frequency Analysis, Data Patching
<b>Rk (DIN 4776, ISO 13565-2)</b> A1, A2, Mr1, Mr2, Rk, Rpk, Rvk, Rpk*, Rvk*	<b>Functional</b> Sk, Spk, Svk, Sr1, Sr2, Sbi, Sci, Svi, Sm, Vv, Vm, Vmp, Vmc, Vvc, Vvv
<b>R&amp;W (ISO 12085)</b> AR, AW, HTrc, Pt, R, Rke, Rpk, Rvke, Rx, Trc, W, Wte, Wx, Kr, Nr, SR, SAR, Kw,	<b>Flatness</b> FLTt, FLTp, FLTs, FLTq, FLTv
<b>Autocorrelation,</b> Nw, SW, SAW	<b>Hybrid &amp; spatial</b> Sdq, Ssc, Sdr Spc, Sds, Str, Sal, Std, Sfd
<b>Straightness (ISO 12780)</b> STRt, STRp, STRv, STRq	<b>Filters</b> Gaussian, Robust Gaussian, Spline, Wavelet, Robust Wavelet and Morphological

† All parameters marked with an asterisk are suitable for user-assigned single or multiple qualifiers, e.g., material ratio (mr) may be assessed at one or more slice levels within a single measurement.

## Serving a global market

Taylor Hobson is world renowned as a manufacturer of precision measuring instruments used for inspection in research and production facilities. Our equipment performs at nanometric levels of resolution and accuracy.

To complement our precision manufacturing capability we also offer a host of metrology support services to provide our customers with complete solutions to their measuring needs and total confidence in their results.

Contracted Services from Taylor Hobson

- **Inspection services**  
measurement of your production parts by skilled technicians using industry leading instruments in accord with ISO standards
- **Metrology training**  
practical, hands-on training courses for roundness and surface finish conducted by experienced metrologists
- **Operator training**  
on-site instruction will lead to greater proficiency and higher productivity
- **UKAS Calibration and Testing**  
certification for artifacts or instruments in our laboratory or at customer's site

For the above services, contact our Center of Excellence:  
email: [taylor-hobson.cofe@ametek.com](mailto:taylor-hobson.cofe@ametek.com)  
or call: **+44 116 276 3779**

- **Design engineering**  
special purpose, dedicated metrology systems for demanding applications
- **Precision manufacturing**  
contract machining services for high precision applications and industries
- **Preventative maintenance**  
protect your metrology investment with a Tallycare service cover plan

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