

CCI HD

HD-3D surface and film thickness optical profiler



CCI HD

Challenges your definition of impossible



Advanced optical interferometry

- 2.2 mm vertical range with closed loop piezoless Z axis scanner
- AutoStitch as standard, measures large parts with high resolution
- 2048 x 2048 pixel array for large FOV with high resolution
- New Claritas 20 light conditioning, increased angle sensitivity improves data quality

Industry leading data quality

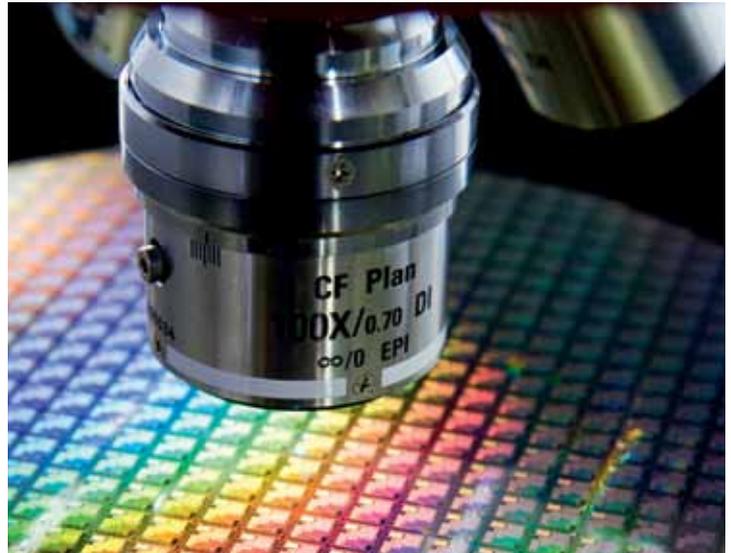
- <math><0.2\text{ \AA}</math> RMS repeatability, <math><0.1\%</math> step height repeatability
- FEA optimised mechanical design for excellent R&R capability
- 0.1 \AA resolution over the entire measurement range
- Built in anti-vibration for optimum data quality

Robust design for long term cost effectiveness

- 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

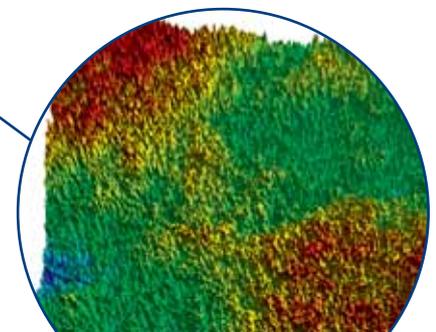
64-bit control and analysis software

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



Improving ball point pen performance

CCI HD is used to study the size, shape and volume of the pits in small bearings that control the consistent flow of ink.



“The CCI HD is an important metrology tool for the study of ultra precision engineering.”

Dr Jan Tomasik, Vice Director of Institute of Metrology and Biomedical Engineering,



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

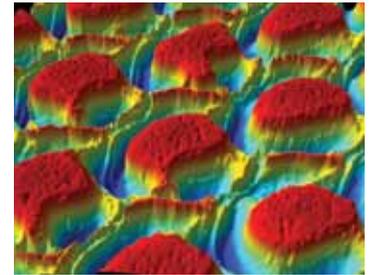


MEMS accelerometer

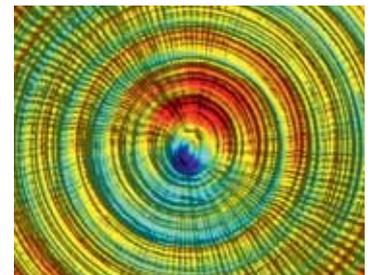
Unlimited application possibilities

Three elements of surfaces – dimension, form and texture – are critical to 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.

- Thin film thickness
- Thick film thickness
- 1st Gen. Solar cells
- 2nd Gen. Solar cells
- LED
- MEMS
- Wafer Roughness
- Material Research
- Data Storage
- Polished Optics
- Textured Steel
- Diamond Turning
- Medical Implants
- Automotive Injectors
- Crankshaft Finish
- Lubricant Thickness
- Bearing Roughness
- Paper / Toner



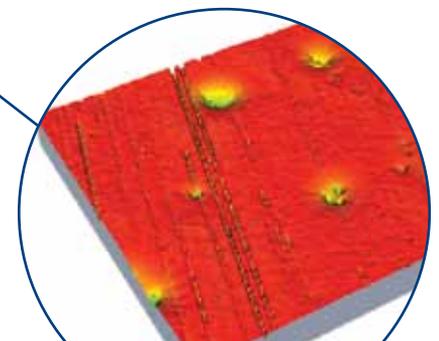
Textured steel

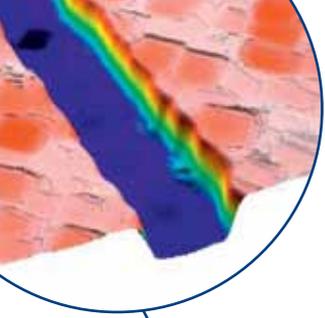


Diamond turned optic

Extending lifetime of orthopaedic implants

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





“The speed and extraordinary sensitivity makes the CCI HD an ideal tool for R&D and quality assurance.”

Prof. Michael Walls,
Professor of Photovoltaics at CREST, UK

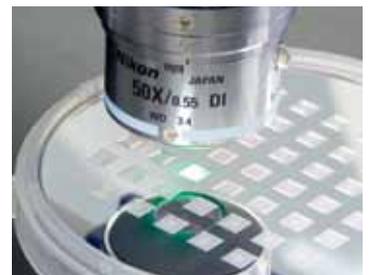
Optimising PV cell efficiency

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

CCI HD is an industry changing blend of science, experience and imagination

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 HD non-contact optical profiler. A unique 4 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

Keeping pace with the expertise of researchers and scientists, the CCI HD is ready for your most demanding measurement requirements including dramatically changing fields such as solar energy, optics and medical devices. Combining features such as AutoStitch with powerful dimensional and roughness analysis software makes the CCI HD the ideal tool for a wide variety of applications.



Ease of use reduces the cost of operator training

Designed for ease of use by scientists, students, developers or production inspectors, CCI HD has innovative features such as AutoRange and AutoFringeFind that simplify setting up and staging of components saving 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 ease the integration of CCI HD into your quality management system.

“Superior technology combined with user-friendly software makes the newly installed Taylor Hobson CCI, a powerful teaching aid.”

Dr. P.HARIHARAN Associate Professor
ANNA UNIVERSITY CHENNAI 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

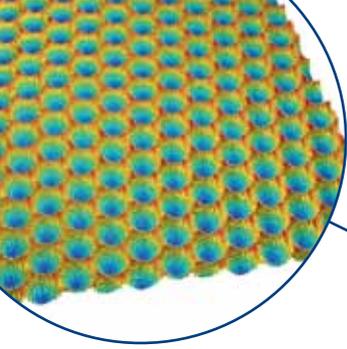
Thick film measurement capability is an exciting addition to the CCI HD. By adding a white light source to the system coating thicknesses down to 50 nm can be analyzed easily extending the usefulness of the instrument. The unique high resolution measurement of the CCI gives industry leading thickness and step height information from single and multi layer samples.



Hard drive performance

Flatness of hard drive disks is critical to performance – with wide FOV and 4 million pixels, CCI HD evaluates flatness, waviness and surface texture.

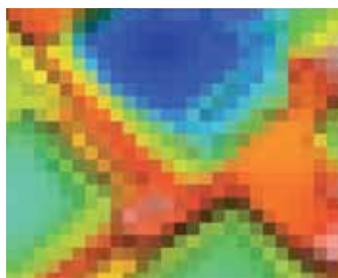




Controlling lens production

Picoprojectors require precise lens arrays. Identifying defects in all the lenses is critical for image quality.

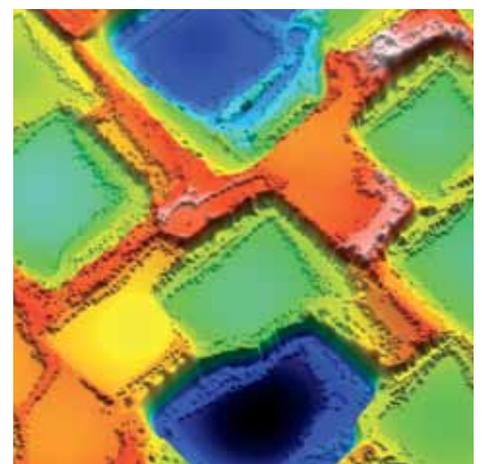
Next generation 3D camera technology



Last century 640 x 480

Higher resolution

CCI HD image sensors with 2048 x 2048 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.



CCI HD 2048 x 2048

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.

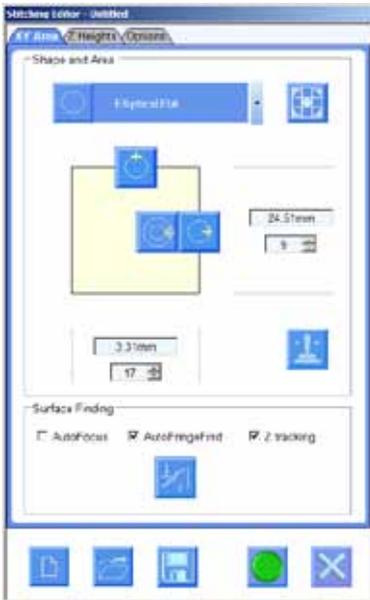
Good results

With 4 million data points and the Claritas 20 light conditioning unit, the measured surface is defined in breathtaking detail. You can identify surface flaws or potential areas of concern anywhere in the wide FOV and "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 educate, inform or simply impress potential customers with your engineering expertise.

Powerful automation features



AutoStitch

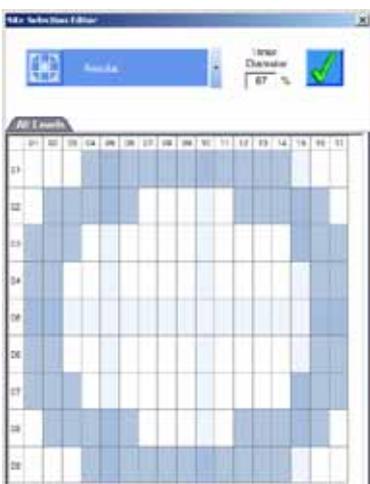
XYZ stitching increases the ease of use and flexibility of the instruments. As well as the standard stitching options large circular, spherical and annular surfaces are easily measured with the minimum of effort. The XY stitching can be combined with Z stitching and other automation options to measure 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, saving the user valuable time and effort.

Z step and measure

Combining the innovative CCI closed loop scanner and a unique algorithm the z-step and measure software allows you to maximise the measurement range without compromising resolution. Measurement ranges of 40 mm or greater are now possible with this unique feature increasing the range of samples benefiting from the high resolution of the CCI HD instrument.



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

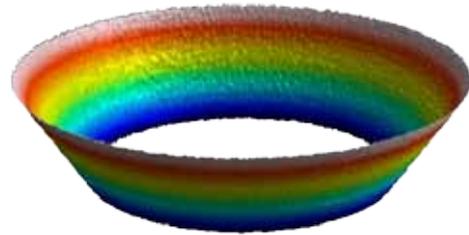
CCI single measurement mode gives unbeatable range resolution and accuracy

Micro lens array



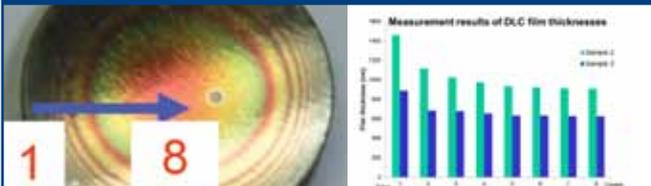
The 4 million pixel camera and the large field of view combine to maximise the measurement area and sample detail possible from a single measurement of complex structures. New Claritas 20 light conditioning increases the maximum angle that can be measured to give world leading data quality. Adapters such as FOW optics are not suitable for this type of measurement as either the measurement area, maximum measurement angle or the lateral resolution are compromised.

3D injector cone measurement



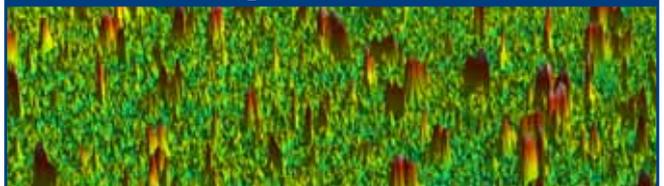
The high sensitivity of the CCI HD optics is ideal for measuring steep-sided rough surfaces. Backed up with our experience in roundness measurement the CCI HD is the perfect tool for measuring cone angle, roundness, roughness and straightness of fuel injector cones.

Thin film measurement



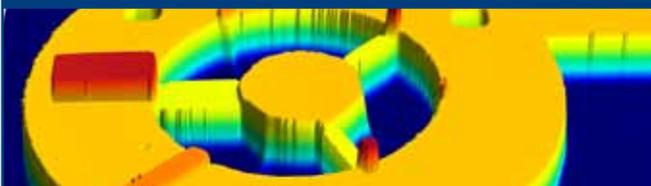
The CCI HD is the only interferometer capable of measuring film thicknesses of less than 100 nm on multiple types of coating and substrate. When combined with other functionality such as real dissimilar material correction it becomes the perfect instrument for any advanced metrology challenge.

CO₂ laser mirrors



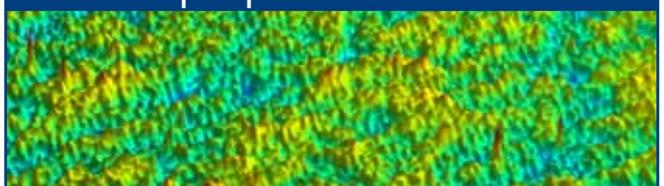
Optical mirrors used in CO₂ lasers need to be very highly polished and defect free to avoid localized heating and ultimately instrument failure. The high Z resolution and high lateral resolution of the CCI HD are critical for identifying defects down to a few nm in size.

MEMS



CCI HD can automatically measure a wide variety of MEMS parameters including roughness, waviness, form, dimensioning, step height (including real dissimilar material correction), film thickness (down to 50 nm) and displacement over time (4D software feature). The wide variety of measurement options is unmatched.

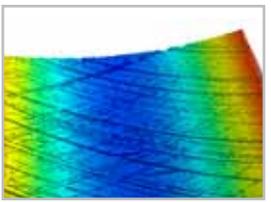
Super polished surfaces



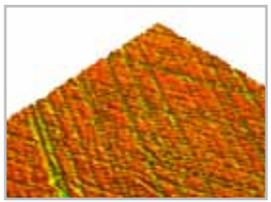
As technology advances, the requirements for highly polished surface finishes are increasing. The low noise performance of the CCI interferometers enables differentiation of different super smooth surfaces not possible on more traditional interferometers.

CCI MP offers a wide range of advanced analysis

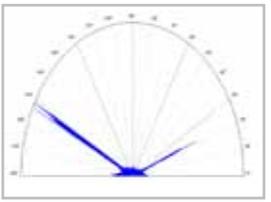
Measurement of honed surface



3D honed surface



Form removed surface



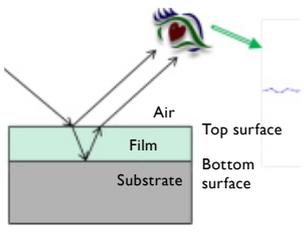
Texture direction

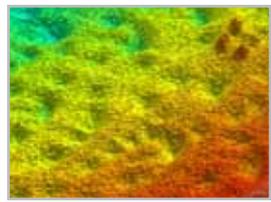
ISO 25178			
Height Parameters			
Sq	5.94	µm	RMS mean square height
Ssk	0.638		Skewness
Sku	2.23		Kurtosis
Sp	20.1	µm	Maximum peak height
Sv	14.1	µm	Maximum pit height
Sz	31.3	µm	Maximum height
Sa	5.04	µm	Average mean height

Surface parameters

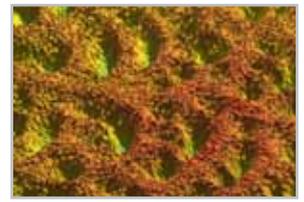
High lateral resolution over large areas is perfect for 3D texture direction analysis. A combination of fine detail and advanced analysis offers critical assessment of advanced engineered surfaces

Thick film measurement

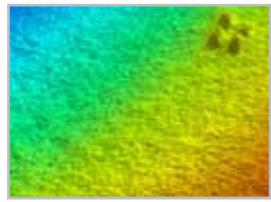




Top surface



Film thickness



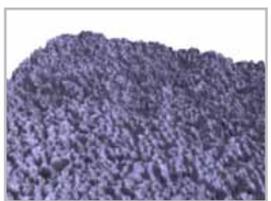
Bottom surface

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

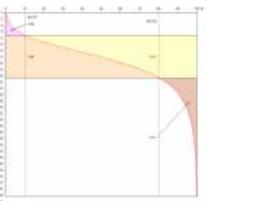
Fluid retention analysis



Ball bearing surface



Form removed surface



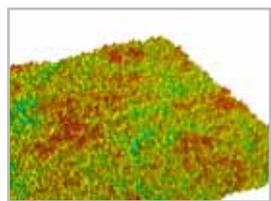
Bearing ratio analysis

ISO 25178			
Functional Parameters (Volume)			
Vm	0.000237	µm³/µm²	µ = 101
Vv	0.00864	µm³/µm²	µ = 101
Vmp	0.000237	µm³/µm²	µ = 101
Vmc	0.00635	µm³/µm²	µ = 101
Vvc	0.0072	µm³/µm²	µ = 101
Vvv	0.00144	µm³/µm²	µ = 801

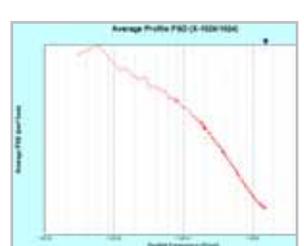
Many engineering surfaces are designed to encourage fluid retention. The bearing ratio of the surface is used to optimize the number and shape of pits, optimizing performance.

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	Average 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

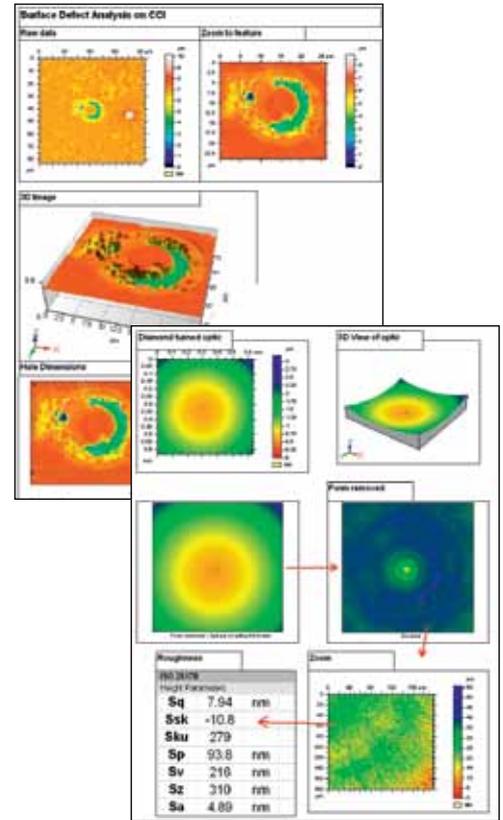
Now with **64 bit processing**, the CCI control software features greater flexibility, faster operating speed and improved overall performance. Compatibility with most mainstream platforms offers the possibility of collaborative research projects and development of advanced applications.

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

Talymap analysis software

Research facilities, factories and universities worldwide have made Talymap their preferred surface analysis software. It is used for product development, process improvement, predictive behavior 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.

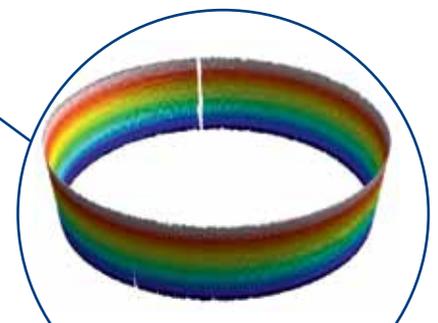


Key features

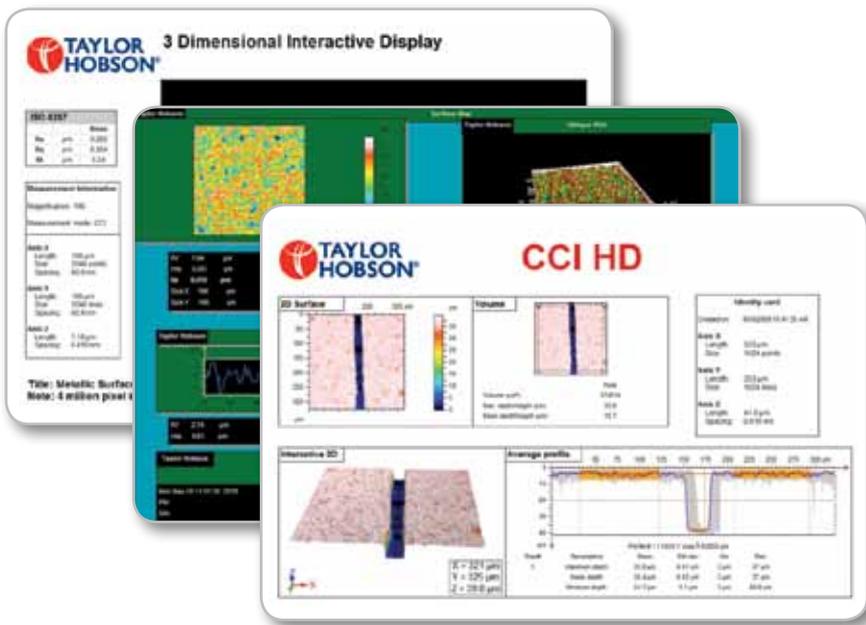
Full metrological traceability	New analysis workflow enables step traceability in an analysis document. New steps can be added, fine-tuned or deleted at any time.
Statistics for quality control	New statistics option makes it possible to track and generate statistics on parameters across multiple measurement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

Reduce fuel injector leakage

CCI HD improves performance by detecting leak paths in the fuel injector surface where the ball contacts the cone



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
Primary (unfiltered) 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	Amplitude Sa, Sq, Sp, Sv, St, Ssk, Sku, Sz
Waviness (filtered) 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	Area & volume Stp, SHtp, Smmr, Smvr, Smr, Sdc
Roughness (filtered) 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	Data analysis Step height, Lateral Distance, Pitch, Angle Measurement, Peak Count, Interactive Abbott-Firestone Curve, Volume of Islands, Fractal Analysis, Motifs Analysis, Frequency Analysis, Data Patching
Rk (DIN 4776, ISO 13565-2) A1, A2, Mr1, Mr2, Rk, Rpk, Rvk, Rpk*, Rvk*	Functional Sk, Spk, Svk, Sr1, Sr2, Sbi, Sci, Svi, Sm, Vv, Vm, Vmp, Vmc, Vvc, Vvv
R&W (ISO 12085) AR, AW, HTrc, Pt, R, Rke, Rpke, Rvke, Rx, Trc, W, Wte, Wx, Kr, Nr, SR, SAR, Kw,	Flatness FLTt, FLTp, FLTs, FLTq, FLTV
Autocorrelation, Nw, SW, SAW	Hybrid & spatial Sdq, Ssc, Sdr Spc, Sds, Str, Sal, Std, Sfd
Straightness (ISO 12780) STRt, STRp, STRv, STRq	Filters 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

Sales department

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- **Design engineering**
special purpose, dedicated metrology systems for demanding applications
- **Precision manufacturing**
contract machining services for high precision applications and industries

Service department

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- **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



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