Form Talysurf®
i-Series PRO Range

High range, high resolution systems for contour and surface finish measurement
The New Form Talysurf® i-Series PRO

Results you can trust

Introducing, a high range, high resolution, contour and surface finish measurement system

Designed for fast, accurate measurement of cylinder heads and blocks, gears, sheet metal, semi-conductors and many other applications.

The Form Talysurf® i-Series PRO is a range of high accuracy instruments capable of simultaneous surface finish and contour measurement.

The system’s low noise axes and high resolution gauge ensures measurement integrity with choice of gauge ranges providing versatility for a variety of applications.

Reliable measurement results

Decades of experience, ultra precision machining expertise and FEA optimised design combine to provide low noise and near flawless mechanical execution of the measuring axes. The use of traceable standards and exclusive algorithms effectively eliminates instrument influence from the measurement results.

Unique benefits for both design and production

One measurement, multiple results, instant feedback

Surface finish - High resolution gauges with low noise enable roughness, waviness and form in one measurement.

Step Height - Evaluate step heights with higher resolution gauge ranges to ISO standards and more.

Contour - Our patented calibration technique enables measurement of radii, angle, height, length, distance...

Topography - Using an optional motorized Y-stage and Metrology 4.0 software, transform your conventional 2D measurements into 3D.

Powerful metrology instruments

Unparalleled measurement capability

Taylor Hobson designs, manufactures, and supports a broad array of high-precision contact and non-contact products for many challenging measurement applications.

These instruments measure surface texture, shape and roundness, dimensions that are critical in many industries including, automotive, aerospace, gears, bearings, medical and optics.

Taylor Hobson’s class-leading product ranges include:

• Form Talysurf® i-Series
• Form Talysurf® PGI
• Talyrond®
• Surtronic®
• LUPHOScan
• TALYScan
Advanced metrology software
Powerful, intuitive and easy-to-use

Metrology 4.0 - Smart Software

Cutting-edge technology

The advancement in metrology software design that the market has been waiting for...

Taylor Hobson’s new advanced software enables dimensioning in accordance with part drawings and provides an exact reflection of the Part Coordinate System (PCS) delivering the final link in the manufacturing loop.

Metrology 4.0 software is easy to use with an intuitive user-interface, virtual display and real time control. The state-of-the-art point and move axis control function (SMART Move) delivers precise positioning and accurate measurement.

Operator benefits

- Virtual display - simulation of the measurement process with 'at-a-glance' status, on-screen indicators, real-time feedback and remote system control.
- SMART Move - intuitive operation for moving and measuring. Once a part has been set-up, the user can then zoom to a detail that the eye cannot see and program around the virtual part.
- Variable programming - enables users to automate measurements of a multitude of part sizes without the need for a multitude of programs.
Taylor Hobson has developed the Q-Link interface to support automation, data exchange and process control in manufacturing environments.

The Q-DAS accredited production interface is designed for shop floor environments and provides direct communication with SPC software, which delivers feedback to your manufacturing process.

This form of monitoring is used widely in automotive and aerospace component manufacturing, where data and strict standard operating procedure control is mandatory.

**User benefits**

- Programs reduce operator mistakes.
- Programmed measurement routines reduce cycle times and increase throughput.
- Display traceable pass/fail results and automatic summary reports.
- Historic traceability is made possible via data exchange and part tracking.
- Control can be managed by barcode scanners or tracking/auditing system.
- Statistics such as automatic R&R studies.
- Tolerancing - Visually identifies the parameter and tolerance band.

Taylor Hobson metrology directly monitoring production

The Form Talysurf® i-Series PRO not only continues a tradition of taking measurement accuracy to the next level, but reflects the evolution of the manufacturing industry.

"Meeting manufacturing challenges is at the heart of our business"

Dr. Bob Bennett, Technical Director
– Taylor Hobson Ltd.
Industry 4.0 in action

All of the critical components for the Form TalySurf® systems are manufactured in-house at our UK facility, with unique serial numbers for worldwide traceability.

Taylor Hobson has invested in the latest machining techniques to deliver measurement integrity through manufacturing excellence.

“Our strong investment meets the demands of high technology manufacturing”
Tim Garner, Operations Director.
— Taylor Hobson Ltd.

Taylor Hobson’s latest investment includes the Mazak Integrex i-200S with 10 axis, twin spindle, in cycle probing, tool break detection, unmanned running, temperature control, zero set up times, auto re-loading, high accuracy glass scales and 110 tool capacity.

Typical applications
Crankshafts, heads, blocks, gear box casings, camshafts, gears, conrods, injectors, valves, pistons, ball screws and hydraulic components.
Designed to meet your measurement needs
Performance in all environments

Complete trust in your measurements and results

Metrology equipment is purchased to ensure parts are manufactured to the highest standard.

Taylor Hobson take great pride in our measurement integrity and reproducibility, carrying out correlation studies across our product ranges to validate our results.

Taylor Hobson instruments benefit from the world’s best noise floor; this is the foundation for accurate measurement.

Our product design is underpinned by decades of measurement experience, ultra-precision manufacturing expertise and FEA optimised design. These attributes provide low noise and near flawless mechanical execution of the measuring axes.

System configurations

The Form Talysurf® i-Series PRO has been designed to provide configurations that suit your requirements, from sheet metal to crankshafts or engine blocks to valve guides.

A choice of gauges, traverse units, column sizes, software options and accessories allow high precision surface finish and form measurements to be made on small, large or complex components, for laboratory design analysis or production batch measurements.

World-leading gauge

The Form Talysurf® i-Series PRO is supported by a world-leading inductive gauge, supplied in 1, 2 and 5 mm ranges.

The 1 mm option offers a cost-effective, higher accuracy solution for surface finish and form.

The 5 mm gauge offers increased flexibility for more demanding applications, for parts that require surface finish, form and contour measurement.

Verification of system measurement accuracy

Taylor Hobson is the only company that can prove radius accuracy and form capability over the full gauge range.

This is to certify the integrity and reproducibility of the results the system produces.

Other manufacturers quote less radius accuracy and form capability over a significantly reduced gauge range, indicating less confidence in their measurement results.
Gauge design
The innovative gauge design delivers exceptional flexibility, through the ability to measure surfaces in any attitude.

The i-Series PRO gauge benefits from constant stylus force throughout its full gauge range. Measurements taken are always accurate and repeatable.

The small physical diameter of the gauge allows access into component features such as bores without the requirement for an extension tube.

Temperature compensation
Temperature compensation is standard across all Form Talysurf® i-Series PRO models. This unique feature monitors and feeds back changes in ambient temperature. Therefore, ensuring consistent system performance and high measurement integrity, regardless of environmental effects.

This feature is vital for the shopfloor environment, where temperatures often fluctuate.

World-leading resolution
Large range coupled with a high resolution gives flexibility in measuring large scale profiles while also ensuring small surface details are not lost.

Integrated lift-lower
All gauge options come with an integrated lift-lower mechanism. This feature minimises gauge movement over difficult and interrupted surfaces, which reduces measurement time while also providing safe operation in and around components.
The New Talysurf® PRO
Results you can trust

An affordable, low noise, high resolution system for roughness and waviness measurement

The Talysurf PRO is a simple to operate high accuracy instrument capable of roughness and waviness measurement.

The system’s low noise axes and high resolution gauge ensures measurement integrity. Powerful control and analysis software the measurement of roughness and waviness has never been easier:

Simplify the system operation by use of joystick buttons, user defined macro buttons and analysis shortcuts.

Gauge calibration

The Talysurf PRO uses an automated, fast and simple process to calibrate the gain of the system. Utilizing a traceable step height standard (calibrated to international standards), the automated routine calibrates the system without operator intervention. This provides confidence in your measurement results throughout the production process.

Form optimisation

The Talysurf PRO uses a polynomial and spline form optimisation to remove the surface shape. This quick and simple technique allows roughness and waviness to be analysed over flat and curved surfaces.

Superior gauging

- Balanced beam giving any orientation measurement
- Constant stylus force throughout its range
- Integral lift / lower as standard
- Small gauge diameter for greater accessibility

Gauge Range | Roughness
---|---
1 mm Gauge range | Low noise floor
1 nm Resolution | <8 nm Rq,
<40 nm Rz
Form Talysurf® WRi PRO

Wide range gauge
Contour analysis

A high range, versatile system dedicated for contour measurement

The Form Talysurf® WRi PRO (Wide Range Inductive) provides an in depth understanding of the measurement of contour.

Taylor Hobson’s unique ball calibration routine delivers unrivalled gauge linearity and therefore form measurement capability.

Easy operation

Simply position the component so that all features to be measured are within gauge range. As the system moves over the features the integrity of the data is assured because of the linearity over the entire range has been considered in the calibration process.

Contour software handles the manipulation and analysis of the data quickly and easily.

Simplify the system operation by use of joystick buttons, user defined macro buttons and analysis shortcuts.

Contour analysis

- Easy to learn, icon based user interface
- Full dimensional analysis, including deviation errors and tolerances
- DXF data comparison
- Automatically analyse features with large positional tolerances
- Rapid desktop report generation
- Full metrology traceability

Gauge Range

<table>
<thead>
<tr>
<th>29</th>
<th>29 mm Gauge range</th>
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<td>28 nm Resolution</td>
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In so many ways, it’s a first
Advanced metrology, made simple

Designed with the operator in mind

Powerful, intuitive and easy-to-use.

The user interface provides at a glance monitoring of the measurement process.

Real time simulation and true part co-ordinates enable monitoring and control to a level unprecedented in the industry.

Real time display

The TV view allows the user to track the measurement in real time through the on-screen profile.

This is most beneficial if any dirt, marks or obscurities are seen, as the measurement can be stopped at any point, without any loss of data.

Part Co-ordinate System (PCS)

Metrology 4.0 has two co-ordinate systems; instrument and part.

The part co-ordinate system allows the user to control measurement and movement around any component according to the part drawing.

The on-screen view provides an exact simulation of the real instrument, allowing remote monitoring and at a glance confidence in the measurement process.

Macros

A new software feature that enables the user to define icon-based functions.

These functions can be set to run custom measurement programs, media messages, instructions, warnings, calibration routines, and much more.

The user has instant and configurable access to all macro functions directly from the instrument control ribbon.

Calibration

One hit patented calibration routines provide accurate and precise measurements.

These routines are fast and do not require operator intervention ensuring maximum performance.

Media messages

Include text, images and videos as operator prompts during programs.
Icon-driven interface

Metrology 4.0 enables simulation of the measurement process with ‘at-a-glance’ status, on-screen indicators, real-time feedback and remote system control.

A range of different measurement modes are available via intuitive icons on the measurement tool bar. Tool tips give a detailed overview of the measurement.

Metrology 4.0 advanced measurement types

- Crest measurement
- Crest analysis - LS Arc, highest point, lowest point and turning point.
- Alignment routines - Cylinder alignment, axial alignment and auto levelling.

Programming

A range of different modes that offer basic elements such as recordable part programming and an advanced toolbox of programmable features including variables.

The use of variables reduces the time it takes to create and maintain multiple part programs. This function allows one program to be created for a set of parts of differing sizes.

User Levels

Tailor your instrument to suit the operator, from basic production mode to advanced administration use.

The password protected modes provide complete control of a user’s access, resulting in a tamper-proof software interface for use in the most secure environments.

SMART Move

A clever tool that allows the user to create points around a part for movement and measurement.

- Simply click on the screen to create a point.
- The instrument will then move the stylus tip to that point.
- The instrument moves using either the traverse, column, Y-stage or a combination of these axes.
- Pre-flight path, allowing the user to predict and control the axes of movement to avoid any obstructions.
- Measurements are made between pre-defined points or from points fed back from the analysis process.
- Improved accuracy and repeatability can be achieved via the unique feedback process.
- A perfect tool for offline programming.
In so many ways, it’s a first
Advanced metrology, made simple

Dedicated software analysis packages
One software platform does all.
Metrology 4.0 includes desktop publishing, automated feedback, roughness, contour, and 3D analysis.

Critical analysis types

Surface finish
• Roughness, waviness and primary.
• Form error and radius.
• Rk parameter set.
• R & W parameter set.
• Dominant wavelength.
• Slope analysis.
• Step height.
• Departure from true form (DFTF).
• Localised slope (LSLP).

Topography
• 3D mapping.
• Structured surfaces.

Contour
• Gothic arch.
• Precision diameter.
• Roller profile and drops.
• Angle.
• Distance measurement.
• DXF fitting.

Critical analysis functions
• Morphological filtering.
• Dual Profile.
• Data fusion.
• Helix angle correction.
• Profile patching.

Contour analysis
An essential tool for geometric dimensioning, tolerancing of profiles and full form deviation analysis.
Save time and increase productivity with automation features within Contour analysis.

DXF creator
A utility that allows creation of DXF data, enabling comparison of design profile to part profile.
• Logarithmic equation
• Free form equations
• Tolerance zones

Topography analysis
Transform your 2D measurement into a powerful 3D analysis to view surface and defects in greater detail using Metrology 4.0 analysis 3D software and a motorised Y-stage.

Data fusion (Advance Module)
Where components profiles are demanding in angle and form, complete analysis can be made by fitting several measured profiles together into one profile using the patented data fusion process.

Contour and topography analyses are optional.
Desktop publishing

The software allows users to create templates and use them in the analysis process, which vastly simplifies the measurement process.

The desktop publishing features are powerful and simple to use allowing customisation of result layouts and ensuring a more professional and personalised look to your brand.

Feedback measurement control

Repeatability and reproducibility are key to any production process. Metrology 4.0 closes the loop between measurement and analysis by feeding positional information back to the movement or measurement process in order to improve process control.

Movement or measurement can react or be controlled via defined features on a part such as intersections.

Feedback process

• Measure profile.
• Create datum points for critical features.
• Add datum points to instrument view.
• SMART Move to start position.
• Measure between specified points.
• Apply template to the analysis.

Benefits

• Generate interactive reports.
• Compose multi-page documents.
• Multiple documents can be displayed on screen, which enables visual comparison of multiple results at once.
• Build a professional report in a matter of minutes.

Customised analysis

Our strategy for success is simple, instead of just selling products, we provide solutions. If our standard software analysis packages do not satisfy your needs, we can customise a solution to match your requirement as an advanced module.

Alternatively Metrology 4.0 has built-in access to execute MATLAB™ files. This enables the user to writing their own scripts and execute them by loading an ‘m’ file.

Design and program your own...

• Custom filters.
• Custom analyses.
• Custom parameters.

MATLAB™ software purchased separately from external source.
Expanding your capability

Tailored to your application

Complete trust in your metrology platform

Unique circumferential roughness measurement

The ball unit offers the unique ability to measure roughness around the full circumference of a ball and/or rollers. This method provides the most precise and low-noise roughness assessment. It takes advantage of the Form Talysurf®’s highest gauge resolution setting and exceptional linearity.

Wide range gauge

Increase your system flexibility by changing to the interchangeable inductive wide range gauge to increase your gauge range to 28 mm and to fulfill your contour requirements.

Right angle attachment

90° gauge attachment to access features inaccessible by inline measurement.

Manual rotation system

Manual 15° incremental gauge rotation for surface finish and form measurements of components in different angular positions.

Automated rotation system

Fully automated 360° axial gauge rotation for surface finish and form measurements of internal bores and between faces.

Customisable user interface

Unique user interface tailored to the needs of the operator; with customisable menus, displays and user levels.

Additional stages

Add optional stages to manipulate single component, multiple components or transform your conventional 2D instrument into a powerful 3D capable system to view surface defects in greater detail.
Meeting the ever increasing demands of next-generation technologies

**Cylinder blocks and heads**
- Form, surface finish and angle of valve seats and guides
- Deck face surface finish and form
- Surface finish and form - Cylinder, balancer, crankshaft and camshaft bores
- Geometry of threaded holes

**Crankshafts and camshafts**
- Geometry and surface finish of fillet radii between thrust faces and pin bearings
- Form, geometry and surface finish of the pin and main bearings
- Tooth surface finish and geometry
- Cam heal and toe geometry

**Sheet metal**
- Evaluation of coated and uncoated rolled steel for quantifiers
- Waviness parameters - Wst, Wsa (1-5) and Wsa0.8 to latest non-skidded standards

**Gears**
- Surface finish
- Morphological filter
- DXF to CAD comparison
Modular design

Designed to meet your individual requirements

Performance in all environments

Configurations

The unique options support high accuracy measurements in all environments from shop floor to laboratory.

1. Environmental chamber, surround with shelf and display monitors at the front.
2. Surround with shelf and display monitors at the back.
3. Surround and display monitor on a separate desk.

Further versions

- Active AV mounts, environmental chamber, surround with shelf and display monitors at the front.
- Standard steel frame with display monitors on separate desk.
Datum straightness
To ensure the traverse unit conforms to specifications Taylor Hobson can supply Zerodur straightness standards.

These standards provide certainty in the traverse direction and are combined with special software routines to enhance the measuring axis for correct geometrical form.

Surface finish
Taylor Hobson can provide glass or metal roughness standards calibrated to an uncertainty of ±(2% + 4 nm) providing measurement confidence and compliance for peak parameters with respect to ISO standards.

Spacing standards are also available to an uncertainty of ±0.6 µm.

Step height
To ensure the correct gain setting of your instrument, high precision step height standards are available; calibrated with uncertainties down to ±4 nm.

Grating correction
All our traverse units are tested and enhanced using interferometric techniques ensuring accurate dimensional and surface texture measurement in the X direction.

Traceability
Taylor Hobson provides full certification for artefacts and instruments in our purpose built ISO graded clean room UKAS facility.

Our UKAS laboratory is able to measure all of the parameters associated with surface texture, including French, German, USA and Japanese derivatives.

Arcuate correction
The Form Talysurf® systems use a patented ball calibration routine to ensure that both dimensional measurement capability and gauge linearity are dealt with in a single, automated operation.

This fast and simple process uses high-precision spherical calibration artefacts that have been produced to exacting standards and then calibrated for radius and form traceable to international standards.

For further information please visit our website or contact our worldwide Centre of Excellence.

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While the use of highly automated manufacturing systems in automotive production is well established, quality control has remained a manual process. The arrival of the Form Talysurf® CNC Series for automated quality control will change that.

The system can be programmed to your individual requirements for analysis of crankshafts, heads, blocks, gear box casings and much more.

The Form Talysurf® CNC Series is supplied with Taylor Hobson’s Q-Link production interface, software that meets the Industry 4.0 philosophy.

Q-Link is designed for shop floor environments and provides direct communication with SPC software which delivers feedback to your manufacturing process.

Component handling and loading is made easy with dedicated fixtures. Operator mistakes can be prevented with programmed measurement routines and the simultaneous fast axis movements to reduce cycle times and increase throughput.

An excellent investment

- Transmission housings
- Cylinder heads and blocks
- Crankshafts and camshafts
- Valves and pistons
- Gears, conrods and injectors
- Hydraulic components

Measurement integrity and reproducibility

1 High accuracy gauge
World-leading 5 mm gauge with 0.4 nm resolution and unique temperature compensation as standard.

2 Traverse tilt
Motorised ±9° tilt and/or manual -45° tilt traverse unit, enables the measurements of fillet radii on crankshafts and valve seats on cylinder heads.

3 Precision column
Available in 700 mm or 1000 mm height. Programmed to automatically move on the motorised Y-axis stage.
Gauge

- High gauge range
  - 5 mm

Roughness

- Low noise floor
  - $<20 \text{ nm Rq}$

Contour

- Pt
  - $<0.25 \mu m$

Weight

- Large payload capacity
  - Up to 350 kg

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4 **Traverse unit**

Available in 120 mm or 200 mm length, the traverse unit enables measurement over large multi-featured parts.

5 **Fixtures**

Dedicated stable fixtures designed for fast fitting and set-up of components.

6 **Full component access**

Precise control via rotary and 300 mm X-stage for fast, simultaneous and accurate component positioning.

7 **Granite base**

The base is made out of high-grade granite to provide high vibration damping, thermal inertia and stiffness throughout the measurement cycle.

8 **Anti-Vibration system**

Self levelling, passive air mounts work in conjunction with the steel support frame to reduce measurement noise in shop floor environments.

9 **Support steel frame**

Strong rigid steel support frame; includes heavy duty levelling mechanism for all four legs.

10 **ECU cabinet**

Industrial electrical PC cabinet designed to control temperatures and optimise cooling.

11 **Ultra software**

Powerful analysis software for all parameters. Unique user interface tailored to the needs of the operation.
Established in 1886, Taylor Hobson is the world leader in surface and form metrology and developed the first roundness and surface finish measuring instruments.

www.taylor-hobson.com

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• Preventative maintenance – protect your metrology investment with an AMECare support agreement.

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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.

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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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