

CUSTOMER SUPPORT SOLUTIONS



LOCAL SUPPORT SERVICES FROM THE GLOBAL METROLOGY EXPERTS

www.taylor-hobson.com

ISSUE 05

World-class support

Local support services from the global metrology experts

Established in 1886, Taylor Hobson is the world leader in surface and form metrology and developed the first roundness and surface finish measuring instruments.

Taylor Hobson is part of the Ultra Precision Technologies Division of AMETEK, Inc. which is a leading global manufacturer of electronic instruments and electromechanical devices with annual sales of more than \$5 billion. AMETEK has over 17,000 colleagues at more than 120 manufacturing locations around the world.

Supporting those operations are more than 100 sales and service locations across the United States and in 30 other countries around the world.

We provide contact and non-contact measurement solutions for the most demanding applications on a global basis, with a worldwide infrastructure to support our clients; we are a truly global ultra precision metrology company.



We are pioneers, continually developing our products to meet the ever-increasing demands of next generation technologies, particularly in optics, bearings, automotive, aerospace, medical and renewable energy technologies.

We know that the performance of your instrument is important to you. It is important to us as well. Taylor Hobson AMECARE agreements are designed to reduce down time and ensure your instrument maintains optimum performance.





Maintaining your instrument delivers results you can trust



The maintenance of your precision metrology equipment requires technological expertise, in-depth knowledge of operator use and measurement principles of our instruments, and specialised diagnostic tools to maintain system performance.

AMECARE Support Agreements from Taylor Hobson are designed to reduce downtime and ensure your instrument maintains optimum performance. All work is carried out by our own accredited service engineers who are dedicated to providing the quality support you need to ensure credibility of measurement results.

- Factory trained in maintenance and calibration procedures
- Use UKAS traceable calibration artifacts
- Trained to resolve instrument issues that can affect operation
- Original replacement parts

Taylor Hobson Support agreements are affordable and flexible, offering cost savings when multiple instruments are serviced at the same time. We are committed to providing world-class support to maintain instrument integrity for as long as you require.

AMECARE BENEFITS

- Protect your hardware investment
- Reduce unscheduled downtime
- Ensure instrument reliability
- Ensure consistent accuracy of measurements
- Extend the life expectancy and productivity
- Peace of mind and insurance against unexpected repair costs

20% discount



SURTRONIC® R-150



20%

AMECARE Agreements

Extended Warraties and Service Agrements

Total Protect Extended Warranty include One Full Service and Calibration visit per year, Labour/Travel for repairs⁽¹⁾, plus replacement of all parts as required, for total peace of mind.

LUPHOScan Assure Support Agreement - Designed specifically for our LUPHOScan Instruments and includes one Full Service and Calibration visit per year, Labour/Travel for repairs⁽¹⁾, plus replacement of selected parts⁽²⁾ as required, including the System Control Electronics, minimising costs in the event of breakdown.

Assure Support Agreement includes one Full Service and Calibration visit per year, plus Labour/Travel for repairs⁽¹⁾, giving faster onsite response and maximising uptime.

Prevent Support Agreement includes one Full Service and Calibration visit per year with Labour/Travel/Parts for repairs at AMECARE discounted rates, ensuring your instrument maintains optimum performance.

PRO Software Maintenance Plan (SMP) available on its own and included as standard on all AMECARE agreements for instruments running Metrology 4.0 software, ensuring your instrument is always up to date with latest software features.

NEW

ISO 17025 Calibration available with AMECARE Agreements

Accurate measurements and tests carried out in compliance with best practices and accredited to ISO/IEC 17025 can limit product failure and down time and help control manufacturing costs.

Use of accredited services can be an invaluable tool in your decisionmaking and risk management. Using an accredited supplier can save time and money. Using an accredited body to carry out an independent evaluation helps demonstrate due diligence in the event of legal action.

For more information on ISO/IEC 17025 calibration, see page 12.

Additional Service Visits should be considered depending on the age of the instrument, who is using the instrument, environmental conditions where the instrument is located and how oftern the instrument is used.

Service and Calibration - We also offer an Annual Service and Calibration visit for customers not wanting commitment of a Service Agreement, based on standard Labour and Travel rates.

This includes older instruments in the obsolete and retirement phase of our Support Policy where a Service Agreement can't be offered. Please speak to your local service team for more information.

All agreements include digital certificate of calibration. Exclusive discounts on labour and travel rates, spares, accessories, training and upgrades are also included on these agreement levels.













World-class support services

Please see available AMECARE support agreement levels

✓ Included as standard • Not available • Optional, at extra cost

| | CARE |
|-------------|----------|
| PERFORMANCI | SERVICES |
| | |

| | | TOTAL PROTECT Extended Warranty | LUPHOS ASSURE Support Agreement | ASSURE Support Agreement | PREVENT Support Agreement | PRO Software Maintenance |
|--|--|--|--|--------------------------------|---------------------------------|---------------------------------------|
| Metrology 4.0 S | oftware updates | \checkmark | \checkmark | \checkmark | \checkmark | \checkmark |
| Inclusive On-site Service Labour & Travel for repairs ⁽¹⁾ | | \checkmark | \checkmark | \checkmark | - | - |
| Inclusive Service Parts for repairs ⁽¹⁾ | | - | \checkmark | - | - | - |
| Selected Servic | e Parts for repairs ^(1, 2) | ~ | - | - | - | - |
| Discounts | Additional Visits | 20% | | | | |
| | Consumables, Styli and Probes | | 20% | 20% | 20% | - |
| | Spare Parts, Accessories, Training & Upgrades | | | | | |
| ISO 17025 Calib | ration with digital certificate ⁽³⁾ | • | - | • | • | - |

Included as standard on all Extended Warranties and Service Agreements

- Pro Maintenance Plan, keeping your instruments Metrology 4.0 Software up to date with latest features and improvements
- 20% Discount for chargeable visits, spares, consumables, training and upgrades
- Remote technical support via TeamViewer
- Prioritised response, Handling and appointment planning,
- One full scheduled Service and Calibration visit per year covering the full Installation and Maintenance Schedule (IMS)
- Taylor Hobson Fully Accredited Service Engineers
- Instrument calibrated using artifacts traceable to ISO standards
- A Digital service calibration certificate for each instrument tested







Enhance your instrument operation

Taylor Hobson are able to provide yearly software maintenance plans (SMP) for instruments operating on our Metrology 4.0 or LUPHOScan software platforms.

Taylor Hobson's Software Maintenance Plans are designed to improve performance, enhance productivity and prolong the life of your instrument. We know that the performance of your instrument is important to you, It's important to us as well.



Our software is constantly evolving to add new features and processes, along with ensuring the latest algorithms are implemented to maintain international standards on quality control. Ensuring you have an active maintenance plan is the most cost-effective way to stay up to date with the latest software version. For the duration of your maintenance period, you are entitled to any update released.



Provided your instrument is connected to the internet, the SMP allows 24/7 access to the Software Centre^{*} area of our website to enable you to download the latest software direct onto your instrument PC, using our Smart Installer. Alternatively, we can send the software via a secure file exchange server or one of our accredited Service Engineers can install the latest software as part of an annual AMECARE Service visit.

The SMP comes with many extra benefits. You will get priority helpdesk support, including access to videos, application notes and the latest product information. Also included, is free access to online group webinars, along with discounts on bespoke training courses. Try new software modules for a limited period to ensure you are getting the most out of your investment. If you decide to purchase a new module, you will receive a discount off list price.

Cost effective

All New instruments include a 1 year subscription to our Software Maintenance Plan, which can be extended each year via our AMECARE support agreements.

Software Maintenance Plans are now included with all AMECARE agreement levels, so you can be sure your instrument and software is always up to date as well as performing to specification.



powered by

| | With SMP | Without SMP | | |
|--|--------------|-----------------|--|--|
| Technical support | | | | |
| Basic technical support | \checkmark | ~ | | |
| Priority Support | \checkmark | - | | |
| Product updates | | | | |
| 24/7 access to Software Centre * | \checkmark | ✓ | | |
| Exclusive previews of upcoming software features and modules | \checkmark | - | | |
| Major software versions as they are released during software maintenance plan (SMP) period | ~ | - | | |
| 30 day software feature trials | \checkmark | - | | |
| Discounts on feature upgrades and Taylor Hobson Advanced Modules (THAM) | ~ | - | | |
| Training | | | | |
| Application notes and software walk through videos | \checkmark | ✓ | | |
| Public webinars | \checkmark | ~ | | |
| Group webinars | \checkmark | - | | |
| Discounts on seminars and bespoke training | \checkmark | - | | |
| Licenses | | | | |
| Replacement of a damaged security dongle | ✓ | Additional cost | | |
| New activation code (in case of new PC) | \checkmark | Additional cost | | |



Additional Services

Instrument software and hardware upgrade solutions

As with all products, over the years components and software can become obsolete, which makes it impossible to support products. Upgrade your instrument to the latest industry standard.

Taylor Hobson has developed upgrades, which are available for most instruments in our range, so that you can continue to rely on your instrument for many years to come with world-class support.

All upgrades include, but are not limited to

- Latest software for the instrument
- New high Specification Windows[®] based PC with 3 Year onsite manufacturer warranty
- Latest electronics and other hardware (where applicable)
- All upgrades are installed by our accredited service engineers

Benefits of upgrading your instrument

- Microsoft supported Windows® 64-bit operating system
- · Network ready for centralised data collection and support activity
- New electronics to ensure peace of mind for the future
- New software, with latest features and ISO standards, compatible with future upgrades



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Instrument relocation support

Whether you are moving to a new site or a new lab on-site, Taylor Hobson Metrology Services can help. Relocations include machine preparation, supervision of loading and unloading, set up at new location, and calibration.

Taylor Hobson can supply brackets, crates and packaging if necessary to ensure the safe delivery of your valuable metrology equipment. Instruments are then tested and calibrated to meet original factory specifications.



Take advantage of our web stores

Taylor Hobson are pleased to offer the option to purchase from our full range of accessories, styli and calibration aertefacts.

Our Online Country Web Stores enables easy to access, no-hassle purchasing with convenient product search and item comparison features.















Styli spares



Taylor Hobson manufactured styli are of the highest quality ensuring measurement integrity and guaranteeing optimum performance.

Benefits include

- Ensures form, fit, and function
- Next day shipping on 99% of standard styli
- Fully tested with test results included
- Stylus config file supplied for correct calibration setup
- Expertise to manufacture styli to meet exact requirements

Taylor Hobson has over 4000 styli designs available to choose from...

There are 3 categories of Styli:

- Standard Recess Ball or 90° 2 μm Diamond stylus as supplied with the instrument as standard.
- **Advanced** Small bore, Minature bore or 60° diamond styli, available to purchase off the shelf with or after instrument sale.
- **Special** Styli, designed and manufactured to customers exact requirements, usually specific to customers components or setup.

Low prices guaranteed

Due to the improvements in stylus manufacture, Taylor Hobson can now offer the 1st stylus at full price and the option to buy one or more of the same type for half price, on all Advanced and Special styli.





UKAS accredited capability

The in-house Taylor Hobson UKAS Laboratory gained accreditation to ISO 17025 (0026) in February 2002, and Testing Laboratory (2624) accreditation in January 2004.

Originally conceived as the British Calibration Service (BCS) in 1966, the Accreditation Body now yields to the internationally recognised title of the United Kingdom Accreditation Service (UKAS).

Confidence in UKAS accredited instrument calibration and tests is authenticated by the concept of Traceability of Measurement, a hierarchical system with direct links to the National Measurement Standards. For full list of items including Uncertainties of Measurement and Schedule of Accreditation, please visit www.UKAS.com

Roundness

The glass hemisphere that is supplied with all roundness measuring systems is a high precision standard used to both calibrate and evaluate the performance of roundness measuring systems spindles or turntables.

Using a multi-step error separation measuring technique, the laboratory calibrates the hemisphere to a resolution of 1 nanometre, with an uncertainty of measurement of ± 5 nm.

The issued certificate includes a polar plot of the profile of the measured plane together with numeric data, which allows the user to accurately ascertain any departures from roundness by comparing the calibrated plot against that obtained on their Talyrond[®] system.

Diameter and Length

The laboratory is currently accredited for the calibration of spheres, plugs, and rings. Compression corrected measuring techniques are used in conjunction with sophisticated control software to achieve uncertainties as low as \pm 0.5 $\mu m.$

Calibration Balls (Inc. CMM Calibration Balls) -

Calibration balls are becoming an ever popular and increasingly used methodology of calibration for various instrumentation used in metrology.

The laboratory has accreditation to calibrate a range of balls from steel to silicon nitride for diameter, roundness and surface texture. All elements critical to the ball's specification and its performance.

Surface texture

The UKAS laboratory is able to traceably calibrate the parameters associated with surface texture, including German and French derivatives.

As described in ISO 5436-2001 - Type A1 (Step Height standards), Type C1-C2 (Spacing Standards), Type D1 (Roughness Measurement Standards) and Type E1-E2 (Profile Coordinate Measurement Standards) can all be calibrated.

Roughness standards are calibrated to an uncertainty for the Ra parameter of \pm 2% + 0.004 µm, which is the lowest currently available from any UK accredited UKAS laboratory outside of the National Physical Laboratory (NPL).

Straightness and Flatness

Straightness - Assessment of the straightness of a Talyrond[®] column, or Talysurf radial arm, can be made using precision cylinders or optical straightedges respectively. The certified straightness of either, which has been obtained using the mechanical reversal technique of error separation, can be compared to that obtained from a measurement using the system in order to verify its geometrical accuracy.

Flatness - Optical flats and straightedges are calibrated using a Zygo GPF phase shifting Interferometer to some of the smallest uncertainties that are commercially available. The on-site calibration of surface table flatness can be calibrated using a Talyvel electronic level in conjunction with analysis software to produce a 3-dimensional plot of the table surface.









Angle

The laboratory is accredited for angular calibration on a range of items used in optical calibration and alignment.

Polygons, prisms and angle gauges - The precision index table is used in conjunction with an autocollimator for the calibration of a polygons, prisms, and angle gauges. Measured errors are tabulated on the UKAS certificate, and by taking account of these errors during its use, a higher accuracy of measurement can be achieved by the user.

Autocollimators - A small angle generator jointly designed by Taylor Hobson and NPL is used in conjunction with Interferometrically calibrated gauge blocks for the calibration of an autocollimator. Both progressive and periodic errors are measured and certified, and knowledge of these errors can enable more precise use of the instrument by the operator.

Clinometers and levels - Block levels, clinometers and electronic levels are calibrated using sophisticated sine lever techniques. A Talyvel electronic level is calibrated using a Taylor Hobson small angle generator, and the user benefits from the ability to compensate for known errors when using the instrument.

Telescopes and collimators - The line of sight and displacement errors of a Micro Alignment Telescope are assessed using an optical wedge and fixed and variable focus collimators. Deviations are recorded on the UKAS certificate, providing the means for more accurate measurement. Micrometer and focussing accuracies are also verified using traceably calibrated scales and artifacts.

Index and rotary tables - Various techniques are used for the calibration of rotary devices, and uncertainties can be as low as $\pm~0.3$ seconds of arc.

Best Measurement Capability (Uncertainty ±)

| Roundness Standards | ± 0.005 μm |
|-------------------------------------|--|
| Surface Texture | 2% + 0.004 µm |
| Step Height Standards | 0.004 µm |
| Straightness | 0.10 µm |
| Diameter and Length | 0.5 µm |
| Polygons, Prisms, & Angle Gauges | 0.5 seconds of arc |
| Autocollimators | 0.2 seconds of arc |
| Clinometers | 1.0 seconds of arc |
| Block Levels | 2.0 seconds of arc |
| Electronic Levels | 1.0 seconds of arc |
| Alignment Telescopes | 2.0 seconds (Infinity) and 10.0 m (Line of Sight) |
| Collimators | 1.0 seconds of arc |
| Optical Flatness | 0.05 µm |
| Surface Tables | 1.5 + (0.8 X Diagonal in meters) |
| Rotary Tables | 1.0 seconds of arc |
| Index Tables | 0.3 seconds of arc |

Our laboratory also has Accreditation for on-site instrument calibration and measurement facilities in order to verify the linear and geometric accuracies of Taylor Hobson and third party measurement systems.

The uncertainties quoted for these calibrations will be dependent upon the actual environment in which the calibration is performed, which would be monitored prior to and for the duration of the on-site calibration.







Contract Measurement

Expand your capabilities without capital investment

Contracted inspection services from Taylor Hobson is an excellent way to maintain quality where capital investment may not available for new equipment.

The measurement of Roundness, Dimension and Surface Roughness is of critical importance in both the manufacture and the function of a wide variety of engineered components.

Customers may send both small one-off and multiple batch contracts of golden parts, manufactured components, prototypes or component failures for measurement.

The level of reporting and results output will be to a pre-agreed standard giving the user the ability to match requirements and delivery to budgets and timescales.

UKAS Measurements - certified, traceable laboratory inspection

Our world renowned calibration laboratory is also authorised to perform Test Measurements to UKAS standards that are fully supported by UKAS Traceable Certification.

The Taylor Hobson UKAS laboratory can provide measurement using the same instrumentation and metrology experts that are used to certify calibration standards and artifacts.

Unbeatable benefits

Whatever their individual reasons for using our inspection services, all of our customers benefit in many similar ways.



Access to expert metrologists



Authoritative, unbiased reports

Meeting the ever-increasing demands of next generation technologies



Cost effectiveness

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Measurement of parts by skilled technicians using industry leading instruments









Inspection services



Services available

- Measurement of standards traceable back to National Standards
- A wide variety of roundness ($\pm 0.005 \ \mu m$) and surface finish ($\pm 2\% + 0.004 \mu m$) standards are calibrated to a best uncertainty
- Lowest calibration uncertainty currently available from any UK accredited UKAS laboratory outside of the National Physical Laboratory (NPL)
- Measurement of magnification standards to a best uncertainty of $\pm 0.10 \ \mu m$
- Measurements for parameters such as roundness, concentricity, straightness, cylindricity and coaxiality

Non-Contact contract measurement

- LUPHOScan HD Ultra-precision 3D form measurement of optical surfaces up to Ø600 mm
- Up to 90° object slopes ideal for measuring steep, small and large aspheres
- Measurement flexibility Segmented surfaces, annular optics, rectangular surfaces, surfaces with diffractive structures, axicons, etc.





Batch production inspection

Many of our customers are fully capable of measuring production parts with their own resources; they turn to us for assistance in special circumstances.

- Equipment breakdown
- Short-term production increase
- 100% inspection of parts due to end user audit or rejection



Consultancy services

Taylor Hobson's technical expertise in measurement and years of experience solving measurement problems enable us to assist you with the optimisation of your industrial processes.

NEW

Our calibration equipment and facilities allow the certification of your products and services in accordance with your regulatory compliance requirements.

Taylor Hobson boast extensive geographical coverage and responsiveness that is unique and unmatched by its competitors thanks to extensive and specialised network of metrology facilities.

An excellent investment for your business

Instrument training - Without question, the benefits of training are exponentially greater than the cost

When your operators, inspectors and engineers are well versed in the theory and application of metrology they are more confident, more efficient, better informed and less likely to make mistakes.

Develop your team; increase knowledge and improve processes with advanced training

Confident

All members of your quality team should be able to discuss inspection requirements and measurement results with your suppliers and customers and be able to do so with authority, confidence and earned respect.

Efficient

Well-trained staff can develop new procedures, implement new inspection programs and monitor critical manufacturing processes.

Informed

Your quality team needs to be informed and aware of improved inspection methods, revised inspection standards and newly introduced analysis parameters.

Correct

Most important, the people responsible for assuring the quality of your product will be more likely to avoid or detect mistakes before they can cost you unnecessary expense and loss of credibility.

Access to our core knowledge base

Our instructors are professional metrologists. On a daily basis they solve the most demanding application problems and have compiled an extraordinarily diverse knowledge base.

Individual, personalised, practical and hands-on

Training programs are limited to just three people so that all will come away with knowledge and handson experience that they can immediately put to use. Attendees are encouraged to bring along components that need to be measured so that they will leave Taylor Hobson with detailed, practical inspection procedures for those components.

It's like getting a brand new instrument

Unlock the full capability of your instrument:

- Learn the correct use of filters
- Select the most appropriate parameters
- Do your current work faster and more efficiently
- Take on new work with confidence and ease

Training details

Location and Instructors

Courses can be held at your site or our Centre of Excellence conveniently located in Leicester, UK.

We cover theory "classroom style" in our modern lecture theatre. You will also have daily access to our world class metrology instruments for practical application and real world experience.

Our instructors are Metrology Engineers who have many years experience in finding solutions and solving real measurement problems.

Materials

Everything needed is provided. All courses include a notes folder, Taylor Hobson's Surface Finish or Roundness Guides, and a USB drive with the same PowerPoint Presentations that are used in the Training sessions.

Duration

Courses are one or two days in length. Training sessions run from 9am until 4pm with 30 minutes for a light buffet lunch and two 20 minute coffee breaks.

Special requests

We are also able to customise our Training Programs to suit the specific requirements or individual needs. This can be product or application specific, delivering greater efficiency within your manufacturing process.

Metrology theory training - Local training and support from the global metrology experts

Taylor Hobson instructors are experienced, professional metrologists. Classroom presentations are dynamic, informative and supported with real world application examples.

Surface finish metrology topics

- Why measure Surface Finish?
- Measurement methods
- Instrument datums
- Reproducing the surface
- Stylus Tip geometry and effects
- Surface finish terminology
- Form, Waviness and Roughness
- Form Measurement
- Parameters definitions and applications
- Material Ratio Curve (Bearing Area)
- Filters methods and effects
- Calibration Methods
- Introduction to 3D Measurement
- Introduction to Aspherics
- Drawing Indication





Q. What is surface texture?

A. All surfaces have texture in the form of a series of peaks and valleys that vary in height and spacing according to the way the surface was produced.

For example, surfaces produced by cutting tools tend to have a defined cutting direction and uniform spacing whilst those produced by grinding have random lay and spacing.



Typical Roughness Profile

Roundness metrology topics

- Why measure Roundness?
- Measurement methods
- Reference circles
- Eccentricity and Run-out
- Filters methods and effects
- Flatness measurement
- Straightness measurement
- Cylindricity measurement
- Harmonics analysis
- Magnification interpretation of graphs
- Measurement sources of error
- Measurement of Interrupted surfaces
- Slope analysis / DFTC
- Kinematic mounting
- 3D mapping



Q. What is roundness?

A. If all points of a circular cross section are equidistant to a common center; the component is round within that circular cross section. In metrology a reference circle is fitted to a measured circle; out-of-roundness is calculated as the peak to valley departure from the reference circle.



Least Squares Circle Reference



Sales

Email: taylor-hobson.sales@ametek.com +44 (0) 116 276 3771 Tel·

- Design Engineering Special purpose and dedicated metrology systems for demanding applications.
- Precision Manufacturing Contract machining services for high precision applications and industries.

Service

Email: taylor-hobson.service@ametek.com +44 (0) 116 246 2900 Tel·

- Preventative Maintenance Protect your metrology investment with an AMECare support agreement.
- **Upgrades –** Carried out by Taylor Hobson accredited service engineers and include installation and calibration to ensure your system runs at peak performance.

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Metrology Support

Email: taylor-hobson.cofe@ametek.com +44 (0) 116 276 3779 Tel·

 Contract Measurement – A cost effective option to capital expenditure, simply send in first article or production components for measurement.

Measurement of your parts is carried out 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 & Testing Certification for artifacts or instruments in our laboratory or at customer's site.



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World-Class Global Support | www.taylor-hobson.com





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