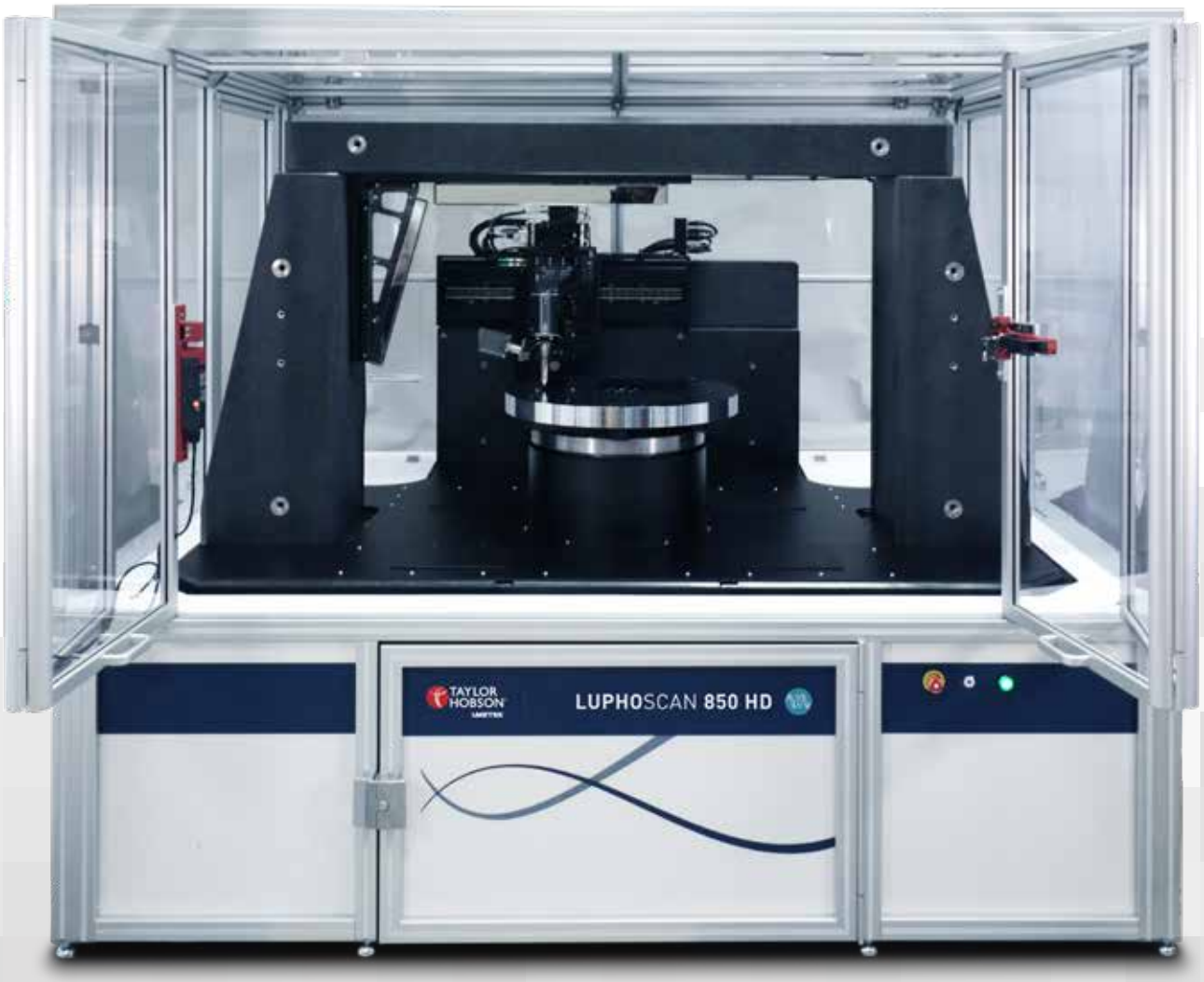
TAYLOR HOBSON®
AMETEK®

# LUPHOSCAN 850 HD

The world's most versatile, non-contact 3D form measurement platform for advanced large diameter optical surfaces



# LUPHOSCAN 850 HD

## Advanced 3D Optics Metrology

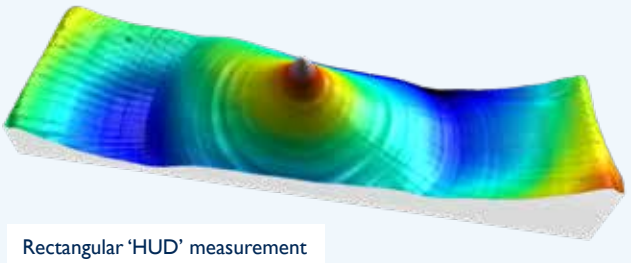
## Accurate measurement of aspheres, diffractives and freeforms up to Ø850 mm

### LUPHOScan: A truly diverse range of non-contact metrology solutions

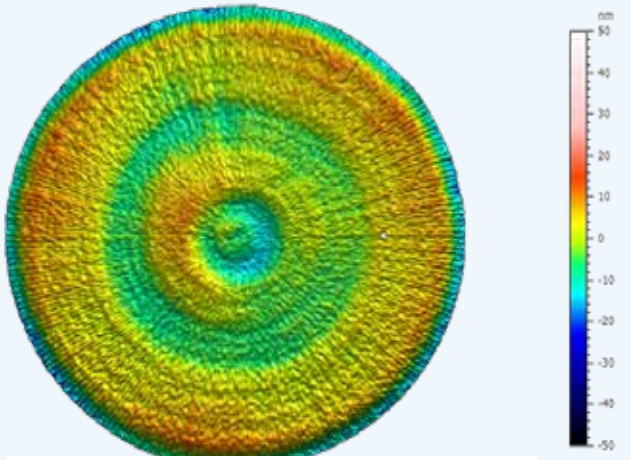
**Taylor Hobson are pushing the boundaries of large optics metrology. Our expert metrologists are delighted to announce the launch of the LUPHOScan 850 HD.**

Built on the foundations of the world renowned LUPHOScan HD platform, the LUPHOScan 850 HD delivers stable non-contact metrology for large complex optics applications.

The instrument has been developed working and listening closely to our many partners in optics manufacturing. Our metrologists understand the importance designing a system that delivers highly accurate, repeatable and reliable measurement data.



Rectangular 'HUD' measurement



190 mm dia. Glass Flat, PV99i 31 nm, spindle load 150 kg

### Results you can trust

#### The LUPHOScan with our forward-thinking innovation delivers true measurement accuracy

**Revolutionary measurement capability**

**Highly accurate**

- Capable of accurate and repeatable form error measurements to < λ/20 (PV99i) and RMS from 5 nm*

**Class-leading measurement flexibility**

- From 5 mm up to 850 mm (dia.) x 210 mm (height)

**High data density**

- Data density up to 6 million data points for accurate analysis of mid-spatials at large diameters

**Freeform measurement**

- Up to ±8 degs for tangential slopes (radial slopes 90 degs)

**Almost every material**

- Transparent, specular, opaque, polished or ground

**Optimised technology for measurement accuracy and reproducibility**

**Granite metrology frame**

- Homogeneous metrology frame ensures accurate compensation for thermal expansion with optimised design to minimise vibration.

**Real time compensation of ambient conditions**

- 4 Temperature and 1 air pressure sensors

**Advanced material design for best stability**

- Bespoke carbon fibre arms designed and optimised to reduce system noise

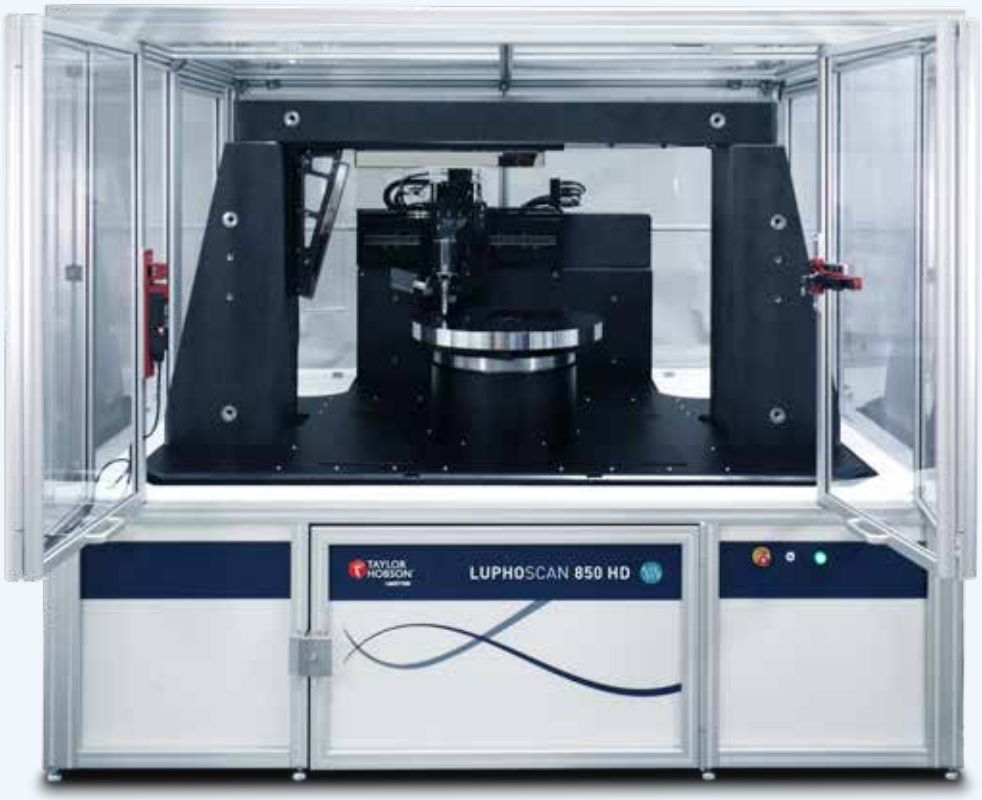
**Automatic centre and level**

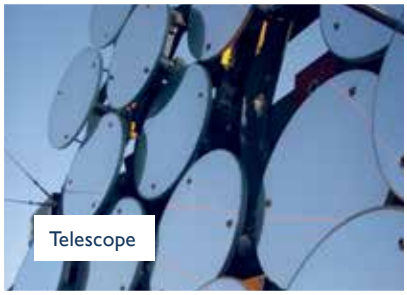
- Consistently accurate results through complete measurement automation



* Part size, geometry and payload dependant.

| Ultra high repeatability | Large work load | Measurement capability | Freeform measurement |
|---|---|---|---|
| 10 nm at 600 mm with 150 kg load (PV99i) | Up to 300 kg | RMS from 5 nm | OAP, Toric, True freeforms |





Telescope


Space applications


Annular mirror

## Measurement principle

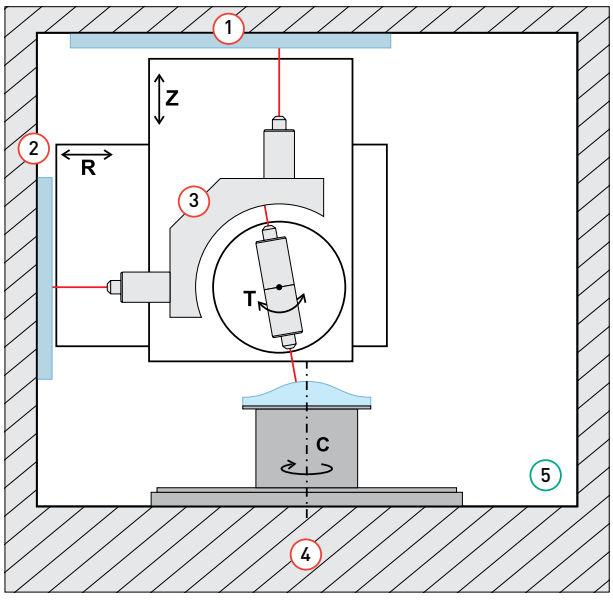
**The probe tracks the form of the surface as the optic rotates, describing a spiral. This technique allows virtually any optical surface form to be measured.**

### Advanced probe technology

- Allows interruption of the probe during measurements without impacting measurement accuracy
- Critical for measurements on interrupted surface such as segmented or rectangular parts

### Reference frame

- Probe stages (R, Z, T)
- Object stage (C)
- Temperature sensors (1-4)
- Air pressure sensor (5)




LUPHOScan 850 HD reference frame

All measurements displayed in the the brochure are examples of what can be achieved. Refer to the specification page for Instrument Performance specification

# LUPHOSCAN 850 HD

## Typical results

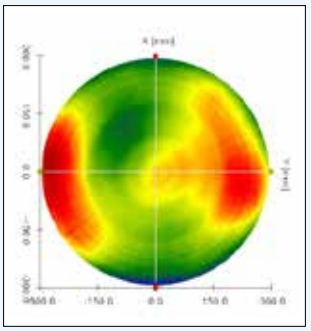
## Study: repeatability and reproducibility

### Repeatability study

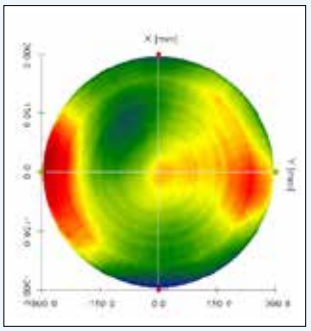
3 repeat measurements at 600 mm diameter on a precision glass flat with 150 kg additional spindle load.

**Repeatability (3σ)**

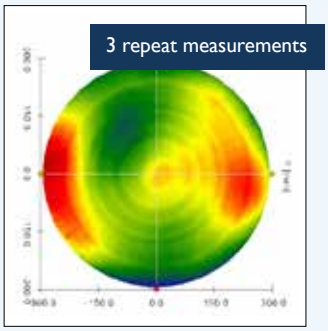
- PV99i – 8 nm
- RMSi – 1 nm
- PWR – 0.033 µm



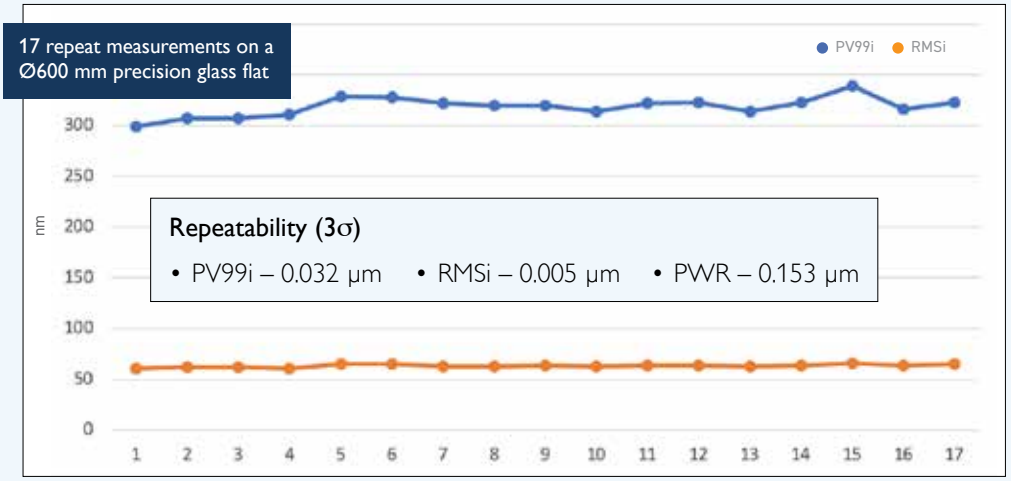
Measurement No. 1



Measurement No. 2



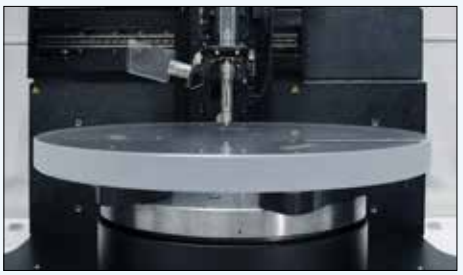

Measurement No. 3




Graph - 17 measurements taken over a 12 hour period without re-calibration (Inc. 150 kg spindle load)

### Long-term repeatability

17 repeat measurements at 600 mm diameter on a precision glass flat with 150 kg additional spindle load.



Measurement of 600 mm precision glass flat

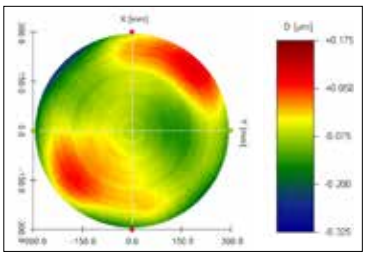
### Reproducibility study

**To demonstrate the accuracy and reproducibility, a Ø600 mm reference flat is measured in two different orientations with and without a 150 kg work load.**

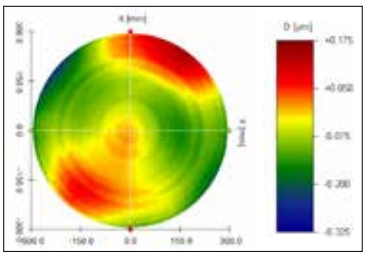
Clearly the form rotates with the system and PV99i remains stable for all orientations.

**Ø600 mm reference flat**

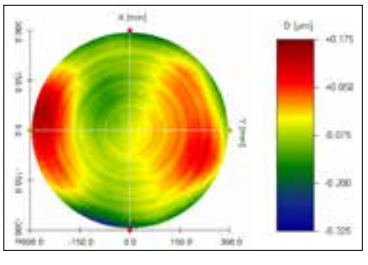
- 0° – 303 nm, 57 nm RMS
- 120° – 335 nm, 58 nm RMS
- 0° with 150 kg – 294 nm, 60 nm RMS
- 120° with 150 kg – 350 nm, 69 nm RMS



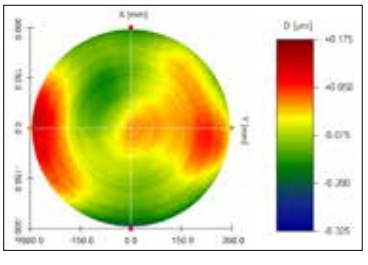
0° Orientation with no load



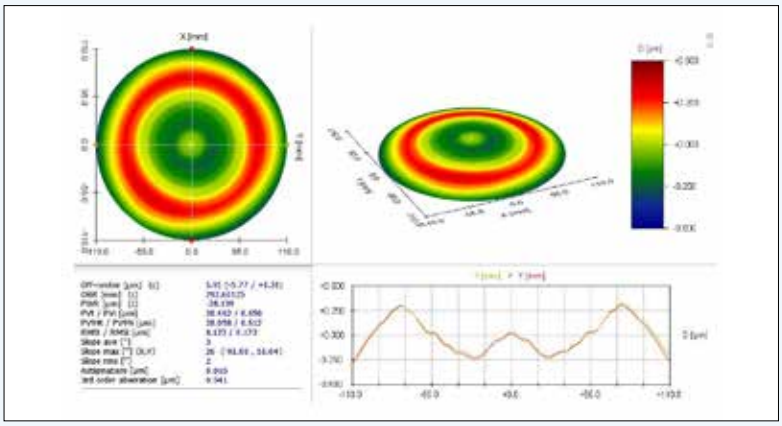
0° Orientation with 150 kg load



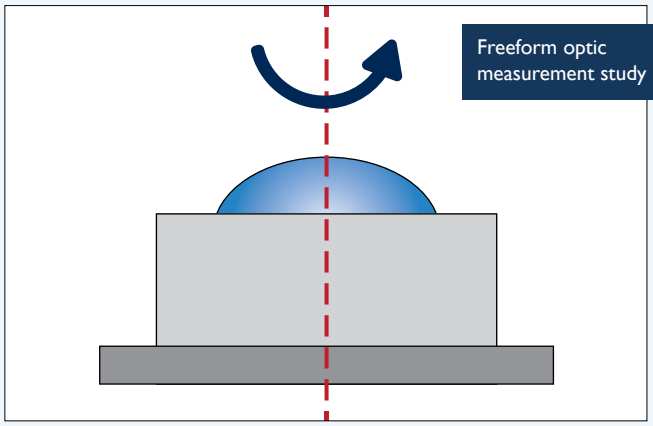
120° Orientation with no load



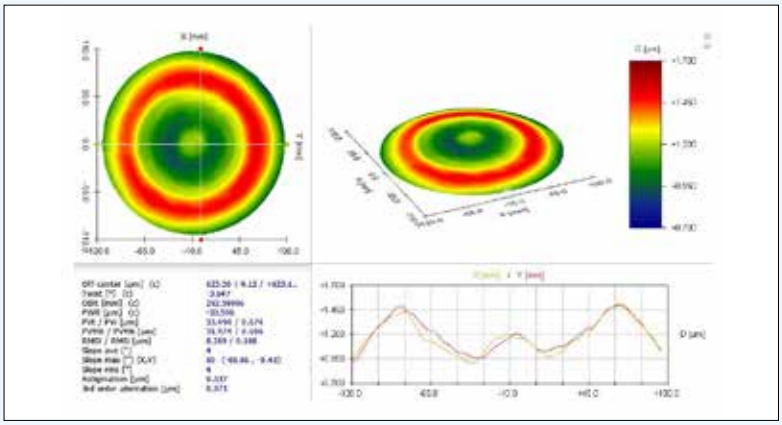
120° Orientation with 150 kg load



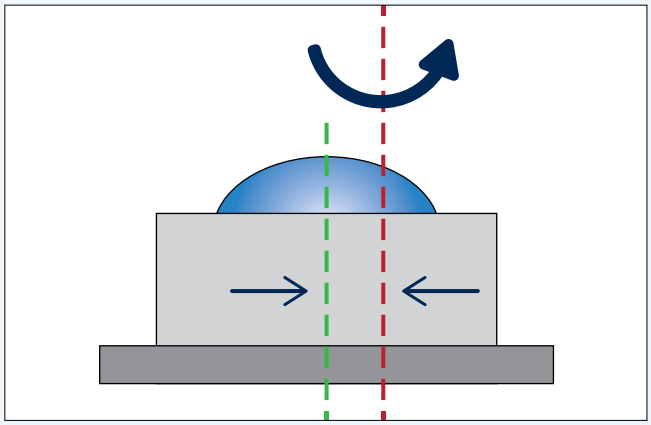
On-axis form error




Test sphere measured conventionally, on axis with spindle



10 mm off-axis form error



Test sphere offset 10 mm to spindle axis to simulate a freeform

## Freeform measurement study

**A large (220 mm) diameter, spherical component is measured on axis, then moved off axis.**

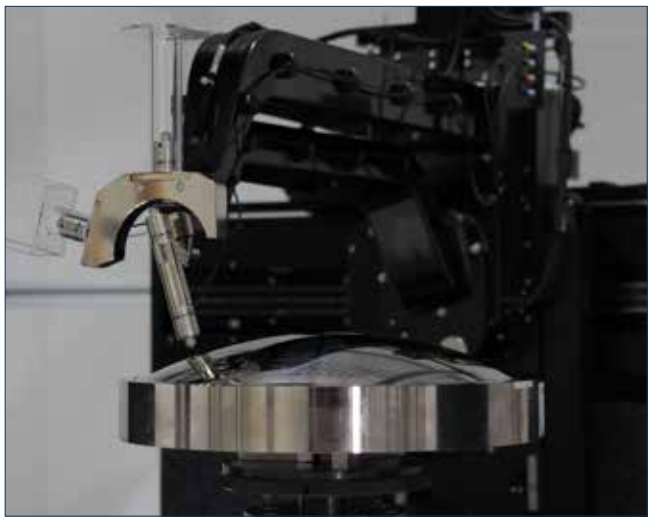
The 10 mm off-axis sphere is representative of a freeform component and allows direct comparison to the known, accurate, conventional spherical measurement.

**On-axis measurement**

- PV99i – 0.612 µm
- RMSi – 0.172 µm

**Off-axis measurement**

- PV99i – 0.623 µm
- RMSi – 0.167 µm



Measurement of 220 mm diameter simulated freeform

## Sales

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

- **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**
Tel: **+44 (0) 116 246 2900**

- **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.

## Metrology Support

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

- **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.

0026 2624



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


**Taylor Hobson UK**
Tel: +44 (0)116 276 3771
taylor-hobson.sales@ametek.com

**Taylor Hobson France**
Tel: +33 130 68 89 30
taylor-hobson.france@ametek.com

**Taylor Hobson Germany**
Tel: +49 6150 543 0
taylor-hobson.germany@ametek.com

**Taylor Hobson Italy**
Tel: +39 02 946 93401
taylor-hobson.italy@ametek.com

**Taylor Hobson India**
Tel: +91 80 6782 3346
taylor-hobson.india@ametek.com

**Taylor Hobson China**
taylor-hobson-china.sales@ametek.com

**Shanghai Office**
Tel: +86 21 5868 5111-110

**Beijing Office**
Tel: +86 10 8526 2111

**Chengdu Office**
Tel: +86 28 8675 8111

**Guangzhou Office**
Tel: +86 20 8363 4768

**Taylor Hobson Japan**
Tel: +81 34400 2400
taylor-hobson.japan@ametek.com

**Taylor Hobson Korea**
Tel: +82 31 888 5225
taylor-hobson.korea@ametek.com

**Taylor Hobson Singapore**
Tel: +65 6484 2388
taylor-hobson.singapore@ametek.com

**Taylor Hobson Thailand**
Tel: +66 2 012 7500
taylor-hobson.thailand@ametek.com

**Taylor Hobson Taiwan**
Tel: +886 3 575 0099 Ext 301
taylor-hobson.taiwan@ametek.com

**Taylor Hobson Mexico**
Tel: +52 442 426 4480
taylor-hobson.mexico@ametek.com

**Taylor Hobson USA**
Tel: +1 630 621 3099
taylor-hobson.usa@ametek.com