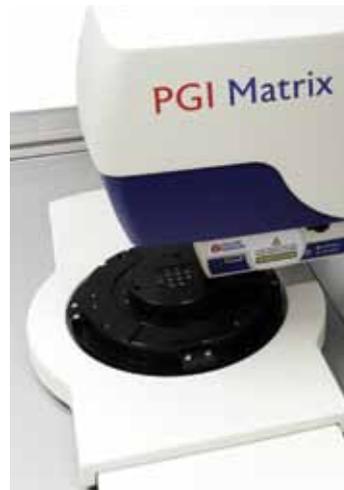
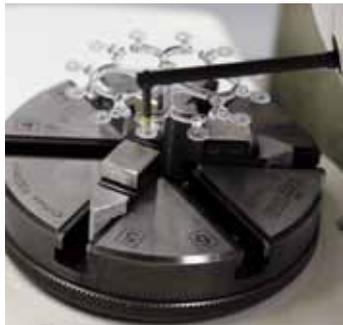


PGI Matrix

A fully automated, fast and accurate system
for precision optics measurement



Talysurf PGI Matrix

Fully automated one-touch optics measurement



- ✓ Easy to program
- ✓ Easy to use
- ✓ Extremely fast
- ✓ Fully automatic
- ✓ Packed with powerful analysis tools to improve your capacity and capability

The most versatile metrology in the industry



Batch testing of multiple parts



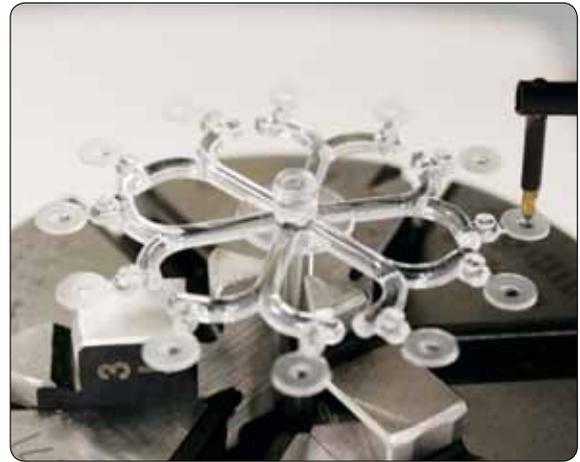
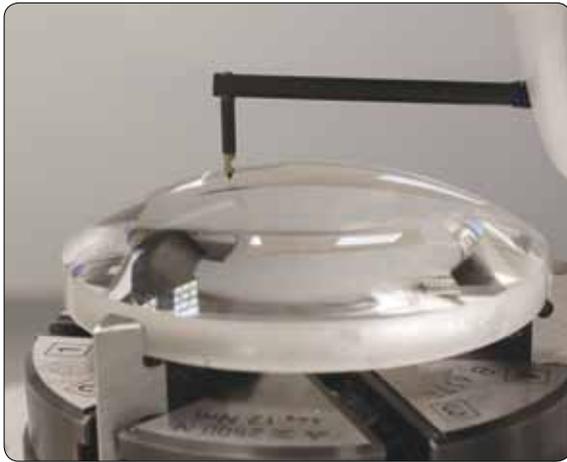
Single components



Moulded lens trees



Large diameter optics



The benefits of Talysurf PGI Matrix

Easy set-up, test and analysis for single or multiple parts make this the perfect tool for fast and accurate testing of optical components

The PGI Matrix offers the renowned accuracy of the PGI coupled with fast, motorized stages and a new software interface designed for ease of use. Loading and programming one lens or a batch of hundreds is made easy and guarantees accurate results with automatic alignment, measurement and even analysis. Automated spike removal and radius optimization help to give the most repeatable results.

Designed for ease of use in the production environment

The new PGI Matrix interface gives fully automated operation, ideal for use on the shop-floor. The software is quick to learn and will provide an easy solution to programming multipart (batch) measurements for high volume applications. Alignment and measurement speeds coupled with quick and useful analysis tools have been streamlined to simplify and automate the complete measurement cycle.

Advanced Software saves production time and increases output

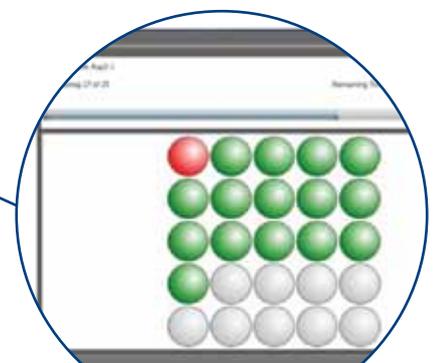
Aspherics Analysis Utility (AAU) software verifies the quality of optics and saves time with instant analysis of form error, radius, slope error, zone depth and spacing. Unique patented technology delivers nanometre level residual form error analysis, and advanced algorithms can extract a sub-micron lens form error from much larger diffractive zone depths. Derived co-efficient functions enable reverse engineering of aspheric and diffractive components, giving feedback to designers of the as-is manufactured lens (with error) to enable adjustment of critical design systems to improve performance.

New features such as automatic spike removal, P-V/ RMS radius optimization, cycle-time calculator and go-no-go indicators enable you to quickly optimize set-up parameters, and automate the measurement and analysis process, in a production environment.

Connection to manufacturing process

Our new X-offset and radius compensation algorithms enable quick feedback to the manufacturing machines to improve process yields. This capability dramatically reduces set-up time for CNC grinding and diamond turning operations, and enables quick compensation for temperature drift issues throughout the day.

PGI Matrix's enhanced capabilities and new software architecture support high speed measurements of mobile device lenses, ophthalmic lenses, medical and fibre optics, high power LEDs.



“We recently upgraded to the latest version of Taylor Hobson AAU software, and the improvements are just what we needed. We have improved reliability and reduced time to test.”

John Franks, Technical Director – IR Optics, Umicore



Easy-to-use interface increases productivity

With automation further reducing operator dependency

A dedicated user-friendly interface is supplied for the specific measurement of optical moulds and lenses. This interface provides an easy method of instrument operation, presenting clear control options to the operator – ideal for production use.

Batches of parts, moulded lens and wafers can be easily programmed and automatically measured and analyzed.

Productivity tool kit

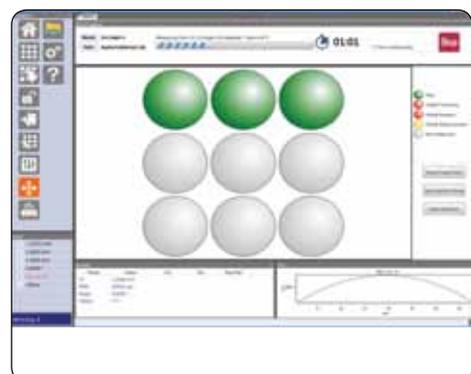
Batch parameters of Pt, RMS, radius and slope error can be set as tolerances. Once set, each part will indicate a pass or fail condition to quickly alert users of yield. Operation of such programmes results in fully automated measurement, analysis and results output.

A sag and slope calculator is provided to allow quick verification of designed optical parameters against those entered to the user interface, while also checking for flanking conditions based on stylus/part combination.

A measurement time calculator is also available to give accurate estimates of measurement cycle times based on current settings. This enables optimization of your measurement process to maximize throughput and level load your measurement to manufacturing cycle.

Typical output results include:

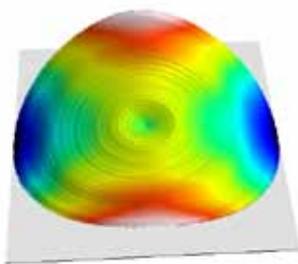
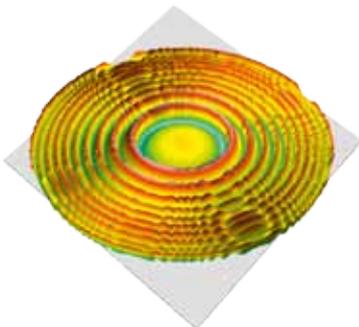
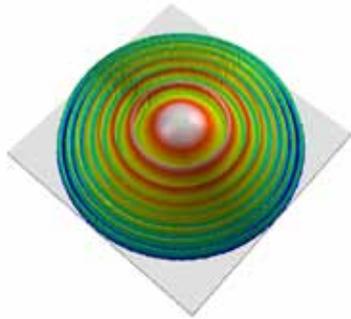
- Profile form and error for each part
- Batch statistics: Standard deviation, average, max/min, number of parts pass/fail
- Estimated cycle times
- Radial average 2D error map for process feedback
- Multi-trace error map and astigmatism analysis
- 3D astigmatic analysis
- 2D and 3D error maps can be linked back to the manufacturing process for process improvement with MRF, Diamond Turning, CNC grinding and polishing.



Powerful new software features

TalyMap analysis software

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

A new analysis workflow makes it easy to trace every step in an analysis document. New steps can be added and existing steps can be fine-tuned or deleted at any time.

Statistics for quality control

The new statistics option makes it possible to track and generate statistics on parameters across multiple measurement data sets.

Multi-language support

It is possible to change the software to work in one of six European languages, Japanese, Chinese, Korean or Brazilian Portuguese.

Quick results

Using the Minidoc function, any sequence of analysis steps can be defined and saved into a Minidoc library, significantly speeding up the preparation of a new report.

Customisation

Add company logos, measurement identity cards, screen notes and illustrations including bitmaps, text blocks and arrows.

Advanced modules

TalyMap advanced modules enhance the functionality of TalyMap by providing additional analysis or presentation capabilities.

“Research units, factories and universities worldwide have made TalyMap their preferred surface analysis software, using it for product development, process improvement, predictive behaviour analysis and routine inspection.”

Software functionality to save time and improve error detection



Aspherics Analysis Utility (AAU)

Expressly designed for aspheric optical components the software fits measurement data to the component design formula, and aligns the resulting error profile with respect to the aspheric axis.

Base radius optimization (PV or rms) to highlight base radius variation in production, allowing users to quickly determine the best-fit radius within a set radius tolerance for the component, which can then be checked against allowable production tolerances.

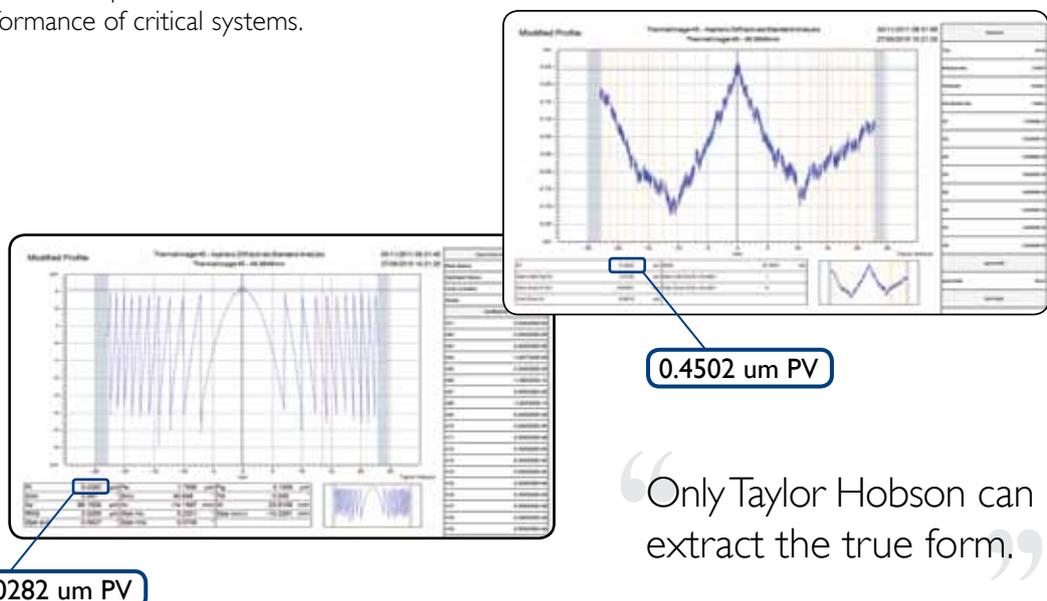
Automatic spike removal can be defined by set width and heights to save time, eliminate user subjectivity and give more repeatable results.

Derived coefficients module for calculation of best fit asphere through a particular measurement. Resulting values can be used in conjunction with optical design software to assess the impact of form deviations on the optical performance of critical systems.

Diffractive analysis

Software for the analysis of diffractive components
An increasing number of applications, particularly in infra-red applications, are making use of asphero-diffractive designs. Diffractive analysis software is written specifically to enable the assessment of these complex surfaces, providing the user with form error and zone parameters.

Diffractive analysis when used in conjunction with the aspheric analysis software, allows the user to examine the underlying form of an asphero-diffractive component. Individual zone results are tabulated and can be output to a CSV file for further analysis. Diffractive polynomial settings can be saved and restored, enabling the user to quickly change between different designs.



“Only Taylor Hobson can extract the true form.”

Measurable benefits of reduced costs and improved manufacturing

Industry leading accuracy for the competitive edge

The new AAU software from Taylor Hobson has increased our capability to manufacture high accuracy Infrared optics with enhanced diffractive analysis capabilities.

Tim Olsen (Director of Engineering) Janos Technology

Reduced costs and improved manufacturing yields

The PGI Matrix's automated measurement and analysis means there is no need for instrument supervision, which reduces labour and training costs. Common mobile phone lenses and commercial optics can be aligned, measured and analyzed automatically, at multiple angles, in under a minute.

Improved utilisation

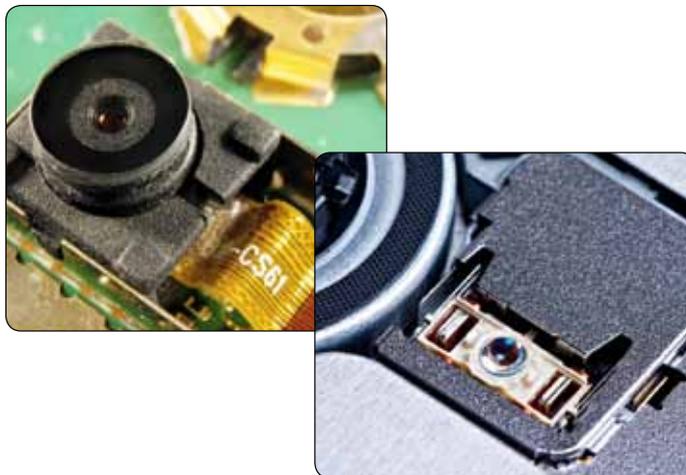
Error Compensation, X-offset and Tool Radius error analysis capabilities give automatic feedback to the manufacturing process, enabling dramatically reduced set-up times and temperature compensation for diamond turning and CNC grinding applications.

Improve your competitiveness

With the PGI Matrix's accuracy and flexibility your products could improve in quality and deliver more repeatable performance. With the option for derived fitting of aspheres and diffractives, the true form derivation you can receive will add valuable feedback to your design team.

Future metrology savings

With high instrument accuracy and versatility you are able to measure new and emerging designs, future-proofing investment. You also have the option to upgrade packages by adding on new functionality, and therefore protect your metrology investment.





Our modular system future-proofs your investment

Adapt with upgrade packages as your company grows

The PGI Matrix offers premium optics metrology packages designed to optimize performance and enhance your manufacturing capability. Its highly versatile modular system gives you future-proofed design that grows with, and adapts to, your changing business needs, as upgrade packages are available to convert PGI Matrix 1 products to PGI Matrix 3 or 5 at a later date.

PGI Matrix 1

This entry level package offers an affordable method to gain the high accuracy measurement performance of our world class PGI gage, with a simplified user interface. This basic, manual system is upgradable to become fully automated with motorized Y and Rotary stages and add-on software packages to improve productivity or add capability (such as Diffractive analysis, reverse engineering, 3D measurement, Machine offset, Batch Statistics, Radius Tolerancing, etc)

PGI Matrix 3

This mid-level system offers the same great measurement performance but with an additional Y-axis and automation package to enable high speed, multiple part testing of an array of lenses. Batch testing includes automatic datum and part alignment cresting before measurement to ensure the highest accuracy 2D testing.

PGI Matrix 5

This fully loaded, premium system offers an easy to use, fully automatic testing capability for single lenses, moulded lens trees, lens arrays and wafer optics. With automatic alignment and the ability to measure any number of radial traces. This system provides a fast, easy to use 2D and 3D measurement capability for a large range of parts and batches.

The productivity tool kit enables a measurement time calculator to help optimize your measurement settings, as well as go-no-go tolerancing for Pt, RMS, Radius and slope error. Batch statistics (standard deviation, max-min results, etc) Automated analysis to reduce total cycle time (automatic spike removal, Pt/ RMS radius optimization with radius tolerancing), X-offset analysis for machine tool corrections.



“The PGI Matrix is a modular system, adaptable to differing budgets and technical needs.”

Three flexible instrument packages

Helping you adapt to changing business needs

Future-proof your investment by adding technology as your markets and needs evolve. These packages will optimize performance and enhance manufacturing capability.

	PGI Matrix 1	PGI Matrix 3	PGI Matrix 5
Basic asphere analysis	✓	✓	✓
Fully automatic operation	●	✓	✓
Y axis	●	✓	✓
Rotary axis	●	●	✓
Productivity tool kit	●	●	✓
Asphere (AAU 1)	●	✓	✓
Derived aspheres (AAU 3)	●	●	✓
Diffractives (AAU 2)	●	●	✓
Derived diffractives (AAU 4)	●	●	●
Vacuum package	●	●	●
TalyMap 3D	●	●	✓

✓ Standard ● Option

Type of optics analysis

	Spherical	Aspheric	Diffractive	Reverse fitting features
AAU 1	✓	✓	✗	✗
AAU 2	✓	✓	✓	✗
AAU 3	✓	✓	✗	✓
AAU 4	✓	✓	✓	✓

Specifications

X-axis (horizontal) performance			
Traverse length - X Max / Min	200 mm / 0.1 mm		
Measuring speeds ¹	0.1 mm/s to 13 mm/s		
Traverse speeds	up to 13 mm/s max		
Data sampling interval in X	0.125 µm over 200 mm length		
Y-axis (horizontal) performance			
Traverse length - Y Max / Min	200 mm / 0.1 mm		
Traverse speeds	160 mm/s max		
Z-axis (column) performance			
Usable height	190 mm		
Positioning speeds	0.25 mm/s to 10 mm/s		
Rotary axis			
Positional accuracy	+/- 0.001°		
Rotational speed	75 °/s		
Gauge			
Nominal measuring range (Z) (traverse set to 0°)	60 mm stylus arm	12.5 mm	
	120 mm stylus arm	25.0 mm	
Resolution	0.8 nm @ 12.5 mm range		
Stylus arm length, tip size, force	60 mm arm, 2 µm radius conisphere diamond stylus, 1 mN force		
System performance ²			
Form error - Pt ³ (ball calibration radius)	Max 100 nm @ 22 mm Typically less than 60 nm @ 22 mm		
Radius measurement uncertainty ⁴	0.1 mm - 80 mm = 1 % - 0.005% of nominal 80 mm - 1000 mm = 0.005 % - 0.1% of nominal 1000 mm - 2000 mm = 0.1% of nominal		
Physical dimensions			
Dimensions L x D x H	1600 mm x 930 mm x 1919 mm		
Weight (main instrument)	350 Kg		
Environment		Electrical supply	
Storage temperature	5 °C to 40 °C	Supply type	Alternating supply, single phase with earth (3-wire system)
Storage humidity	10% to 80% relative, non condensing	Instrument and computer voltage	90V - 130V or 200V-260V (switch selectable)
Operating temperature	18 °C to 22 °C	Frequency	47 Hz to 63 Hz
Temperature gradient	< 2 °C per hour	Supply voltage transients – width	EN 61000 - 4 - 4 : 1995
Operating humidity	45% to 75% relative, non condensing	Power consumption	500 VA
Maximum RMS floor vibration	5.0 µm/s at > 50 Hz	Safety	EN 61010 - 1 : 2001
Laser classification		EMC	EN 61000 - 6 - 4 : 2001 EN 61000 - 6 - 1 : 2001
Class 1 product to EN 60825-1 (2001) Continuous Wave (CW) output < 1 mW Max power for the laser < 50 µW Max power for the product		Measuring capacity	
		Maximum component diameter	200 mm
		Maximum component height	190 mm
		Maximum component weight	10 Kg

- For surface texture measurements, speeds of 0.5 mm/s and less are recommended.
- Using a 60 mm arm with a diamond stylus.
- From a repeat measurement on the calibration artifact over 75% of the gauge range (LS Arc analysis, primary filter $\lambda_s = 0.25$ mm).
- Assumes a calibration artifact of perfect radius.

The above technical data is for measurements taken in a metrology laboratory controlled environment: 20 °C ± 1 °C (68 °F ± 1.8 °F), draft free, and isolated from low frequency floor borne vibration. Uncertainties and maximum permissible errors (MPEs) are at 95% confidence in accordance with recommendations in the ISO Guide to the expression of uncertainty in measurement (GUM:1993). All errors are expressed as MPEs.

Floor plans

System dimensions

(standard system)

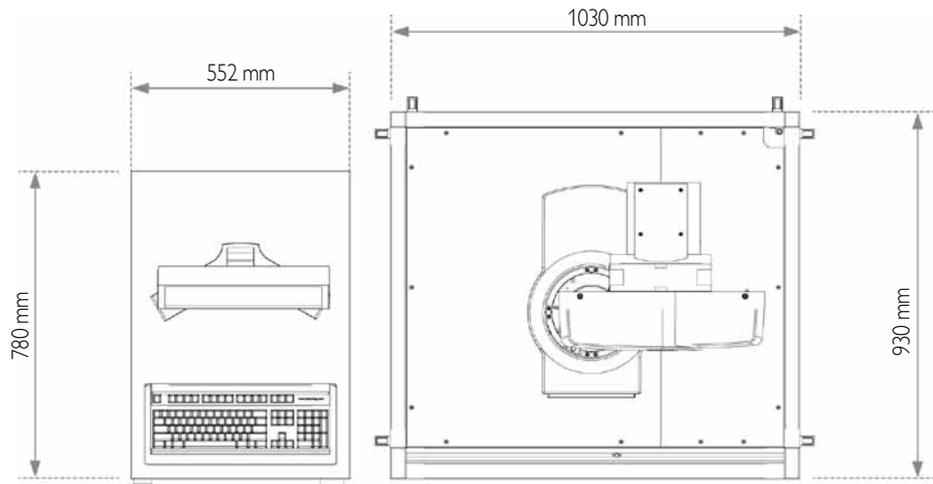
Height: 1919 mm

Width: 1600 mm

Depth: 930 mm

Plan view

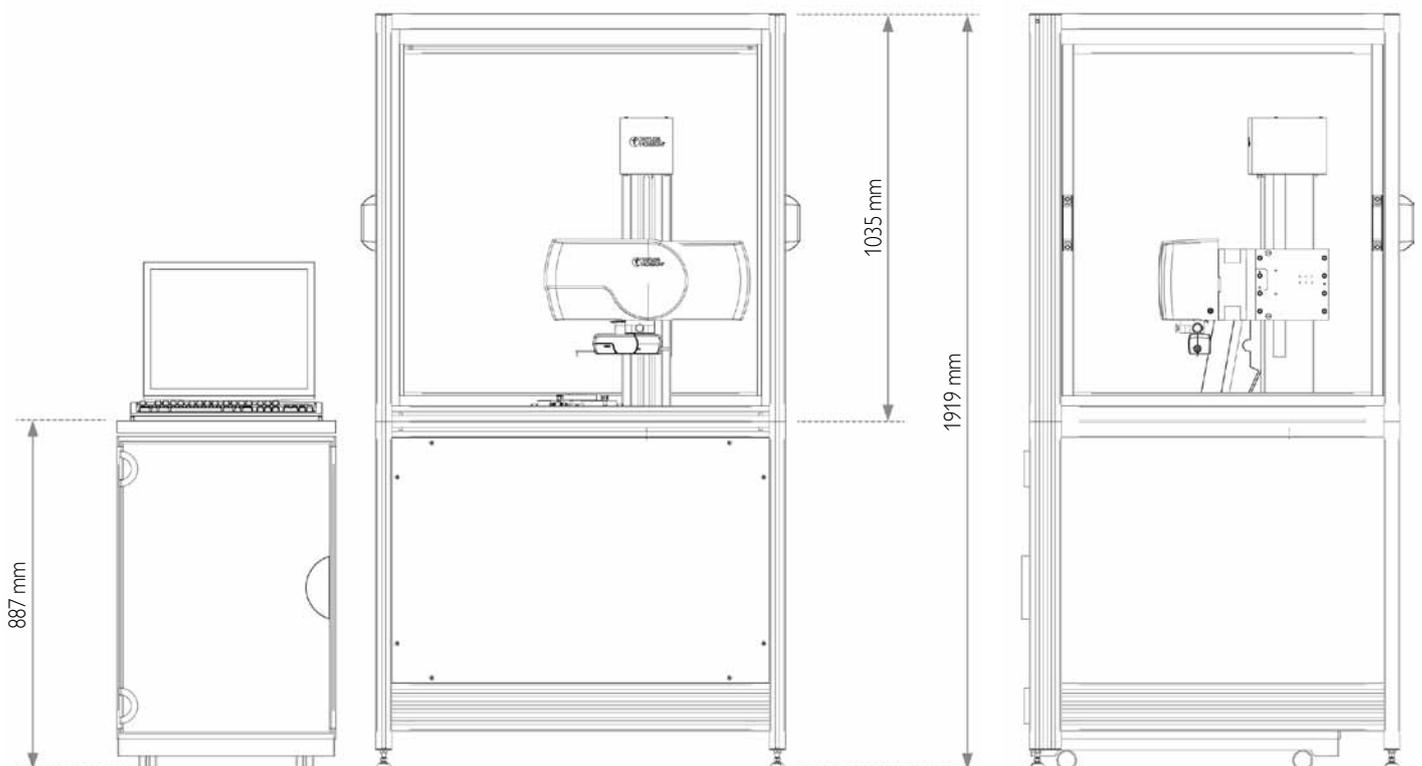
Illustrating floor space needed to accommodate the swivel arm and monitor.



Front elevation

Illustrating typical layout of main system components.

Side elevation



Serving a global market

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

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

Contracted Services from Taylor Hobson

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

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

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

For the above services, contact our Sales Department:
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