RENISHAW
apply innovation™

Products to control processes, improve quality and raise productivity

CMM and machine tool probe systems

Cut time and cost of inspection, transform setting operations

Performance measurement systems

Quick checking and comprehensive calibration of machines

Position encoders

Comprehensive range of position feedback systems

Renishaw's product range

Probe systems for CNC machine tools

Reduce set times by up to 90% and improve your process control

Calibration systems

Laser interferometer and automated ballbar systems for performance measurement and calibration of machines

Probe systems for CMMs

Improve your inspection capability and efficiency

Position encoders

Encoder systems for high accuracy position feedback in linear, rotary and planar applications

Styli

Styli for inspection and tool setting probes

Spectroscopy

Spectroscopy systems for non-destructive material analysis in laboratory and process environments

Custom products

Customised solutions for your applications

The Renishaw Group, service and support

The Renishaw Group

Renishaw supplies cost effective solutions for co-ordinate measuring machines (CMMs), CNC machine tools and manufacturing automation systems to a wide range of industries and research fields. Renishaw's core philosophies include:

- **Commitment to innovation in products and processes**
- **Growth through sustained investment (over 15% of annual turnover) in research and engineering**
- **Global network of Group companies together with a network of Distributors provide customer support wherever it is needed**

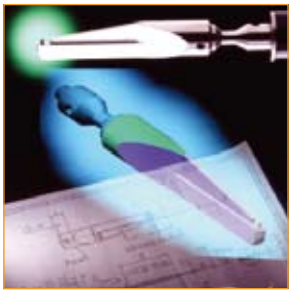
Customer Repair Centre, Woodchester, UK

Service Centre, Renishaw Inc, USA

Product repair and support

Renishaw has a high commitment to customer care. Should any problem arise, a core team of skilled technicians, based in the UK and at the Group's subsidiary companies around the world, is ready to provide service or perform test and re-calibration, as may be required.

Custom product undergoing final test



Custom stylus, for cutter profile scanning

Customised solutions for your applications

The custom design team has years of specialised experience, encompassing design, engineering, production and marketing, ensuring a comprehensive and cost-effective service.

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Probe systems for CNC machine tools

Reduce set times by up to 90% and improve your process control

Time is money, and time spent manually setting work-piece position, setting tools and inspecting finished products is better invested in machining. Renishaw's probing systems cut almost all costly machine down-time and eliminate scrap components associated with manual inspection and setting.

Renishaw's probing systems are used by companies worldwide to increase productivity and improve part quality. They can be specified as standard equipment from most leading manufacturers. Ease of fitting allows probes to be retrofitted to machines already installed.

Tool setting probes for machining centres and CNC lathes

Tool size and condition are important variables in any machining process. The challenge is to identify the size of tools before cutting the first part in a batch. Once machining is in progress, you need to be sure that the tools that you are using are intact and in good condition.

High speed tool setting and checking on the machine tool reduces set-up time and minimises scrap.

- **Renishaw's range of tool setting arms for CNC lathes with integral touch-trigger probes provides manual and automatic options for lathe users**
- **TRS2 - Single-sided non-contact tool breakage detection system, containing unique tool recognition technology that can distinguish between the tool or coolant and swarf**
- **NC4 laser tool setting – rapid length and diameter measurement at normal cutting speeds, tool breakage detection at rapid feed rates, measure tools as small as ø0.2 mm**

Inspection and work-piece setting probes for machining centres and CNC lathes

Renishaw supplies a comprehensive range of spindle mounted probes for machining centres and turret-mounted probes for CNC lathes.

- **Cut non-productive setting time**
- **Eliminate scrap due to inconsistent setting**
- **Accurately detect components after machining, and reduce off-line inspection downtime**

Probe software

Powerful PC software packages are available from Renishaw, allowing users to make the most of their probe hardware to perform inspection and process control on the machine tool.

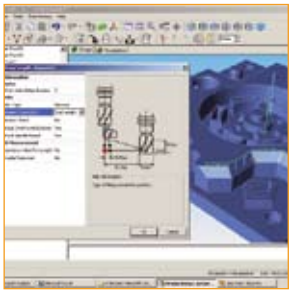
Productivity+™ can be used to develop powerful process control routines for spindle probes, and contact or non-contact laser probes. It includes tool setting, tool breakage detection, part set-up, part inspection and probe qualification, in an intuitive Graphical User Interface (GUI). The probing cycle can also be run as a simulation on the PC, picking up any errors before it even reaches the machine's controller and giving you increased confidence in your programming.

Renishaw OMV is a 3D verification package, ideal for manufacturers of complex parts such as mould tools. It produces simple and enlightening reports, and plots data back onto the CAD model using powerful CMM-style algorithms.

TRS2– broken tool detection system

OMP40-2 – ultra compact spindle probe for setting and inspection

NC4 Compact – non-contact laser tool setting



Productivity+™ Active Editor Pro - advanced design of process control and probing strategies via a CAD interface

Performance measurement and calibration systems

QC10 ballbar – fast machine tool performance testing

XL-80 interferometric laser system - comprehensive assessment and calibration

QuickView™ software

LS350 (patented) – easy laser system set-up

Laser and ballbar systems for performance measurement and calibration of machines

The demands on modern industry to meet ever tighter tolerances, and the requirements of international quality standards, mean that the performance of manufacturing machinery has never been more important. To meet this demand, Renishaw produces measurement systems accepted worldwide as the industry standard to assess, monitor and improve machine performance. Machine productivity is increased, downtime reduced and scrap minimised.

These systems combine the best available mechanical, electronic and optical technologies and have been designed for easy use, flexibility and portability. Systems normally reserved for research laboratories and standards rooms can now be used directly on the shop floor.

QC10 ballbar system

A quick 10 minute test is all that is required to assess the performance of most machines:

- **Pinpoint specific machine faults**
- **Reduce scrap**
- **Develop predictive maintenance programs**
- **Increase machine uptime and productivity**
- **Comply with ISO 9001:2000, ASME and other key machine tool performance standards.**

The test is simple to set up and run and the latest software allows trend analysis and preset warnings at the click of a mouse.

QC10 ballbar system is used by thousands of companies worldwide over more than 15 years, from global OEMs to owner/operator service companies.

QuickView™ and QuickViewXL™ software

QuickView™ and QuickViewXL™ are intuitive and easy-to-use software packages that provide real time, graphical views of Renishaw's XL-80 and ML10 laser measurement data sampled at up to 50 kHz*, with no need to save data before analysis, as data is displayed live on screen.

**XL-80 only (ML10 5 kHz maximum)*

New XL-80 laser system

The ultimate in portable comprehensive accuracy assessment and calibration of machine tools, CMMs and other positioning systems. Improve performance through targeting maintenance and correct linear positioning errors using error compensation.

- **The most accurate system of its type - ± 0.5 ppm is maintained throughout the operating range**
- **High accuracy environmental compensation for ambient air temperature, pressure and humidity**
- **Readings can be taken up to 50 kHz, with a maximum linear measurement speed of 4 m/s and a linear resolution of 1 nm, even at maximum speed**
- **Quick, easy, safe alignments with a tripod mounted laser system**
- **Portability – a complete linear system in its case weighs around 12 kg, and just over 16 kg with optional angular optics, accessories and a Renishaw QC10 ballbar kit**
- **Error compensation software – linking with most machine controllers**
- **Optics designed for the shop-floor user; light durable optical components with fast thermal acclimatisation**
- **Long range measurement – linear measurements up to 80 m**
- **Rotary axis calibration – fully automatic**
- **Conformance to international standards**

Performance measurement software

Easy-to-use software makes machine performance testing quick and easy. Results are analysed to a range of internationally recognised standards as well as a comprehensive 'Renishaw' analysis.

- **Ballbar 5 HPS software and upgrade kit for QC10 users**
- **LaserXL™ and Laser10 packages for XL-80 and ML10 users**
- **Linear error compensation software kits (used with LaserXL™ and Laser10)**

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Probe systems for co-ordinate measuring machines (CMMs)

Manual heads

A manual head gives a manual CMM the added capability of probe reorientation, allowing the probe to address the surface at the best angle to get the most accurate result. Choose from a range of indexing or infinite positioning heads:

- **The manually indexable head (MIH) is positionally repeatable in 720 positions**
- **The MH20i incorporates the TP20 kinematic mount with 2-axis repeatable indexing**
- **The RTP20 probe head offers automated indexing, which allows the integral TP20 probe to be moved to 168 repeatable positions.**

Motorised heads

Motorised heads maximise probing efficiency and give 3-axis CMMs a 5-axis capability.

- **PH10M, PH10MQ and PH10T allow fast automatic indexing without re-datuming**
- **Can be used with Renishaw's autochange systems, which allow rapid automatic exchange of multiple probe combinations**
- **REVO™ five-axis scanning head (see opposite)**

Touch-trigger probe systems

The TP20 probe system is ideal for complex part measurement, where a range of stylus configurations is needed to access all features on the part.

Modules offering a range of trigger forces allow the probe performance to be accurately matched to the measurement in hand. A set of probe extensions is also available, as is a 6-way module. TP20 systems are easily retrofitted and compatible with existing touch trigger probe interfaces.

Scanning probe systems

A range of solutions is available, suitable for all sizes and configurations of CMM

- **The SP25M 25 mm diameter scanning probe enables scanning and touch-trigger probing in a single probe system**
- **The SP80 quill-mounted scanning probe provides class-leading performance with long styli**
- **The SP600 offers high-performance inspection, digitising and profile scanning**

Renishaw's scanning solutions

Renishaw offers the following scanning functions:

Renscan3™ traditional 3-axis CMM scanning whereby the 3 linear axes of the CMM are simultaneously driven to maintain probe contact with the part. Both 'unknown part' (with 2D and 3D scanning) and 'known part' adaptive scanning methods are supported.

The revolutionary new **Renscan5™** uses a dynamic 2-axis scanning head to provide 5-axis synchronised scanning. The most significant advance in CMM technology for 20 years, Renscan5™ is a new enabling technology that will allow highly accurate, ultra high-speed 5-axis scanning measurement on CMMs.

REVO™ is a revolutionary servo scanning head probing system incorporating Renscan5™ technology, which makes it possible to accurately measure at speeds of up to 500 mm/second, and virtually eliminates the measurement errors normally associated with scanning at speed on existing 3-axis scanning systems. A 5-axis system achieves this by allowing the lighter measuring head to perform most of the motion during inspection routines, minimising the dynamic errors caused when moving the larger mass of a CMM's structure.

REVO™ – servo scanning head probing system

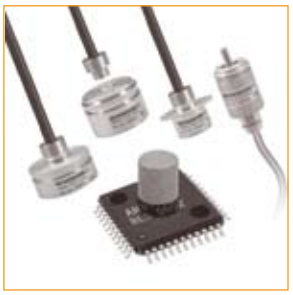
SP25M scanning probe – rapid and continuous data capture

PH10M – fast automatic indexing

TP20 – modular probe system with a range of stylus configurations

Position encoders

Optical linear and angle encoders



Magnetic rotary encoders

Encoder systems for high accuracy position feedback

Renishaw offers a complete range of high speed optical linear encoders, precision optical angle encoders, robust magnetic rotary encoders, high precision laser interferometers and an extensive selection of encoder accessories.

Renishaw's optical encoder systems are based on an innovative non-contact optical arrangement which provides zero mechanical hysteresis and excellent metrology, yet can withstand a variety of contaminants such as dust, light oils and scratches without compromising the signal's integrity. This ensures customers' machines run reliably with little or no maintenance.

In addition to these benefits, Renishaw's encoders have an established reputation for being easy to install and set-up. Scale is available in many lengths with special formula self-adhesive backing, removing the need for drilling and tapping, saving time and money. All optical readhead and interface combinations feature a patented set-up LED which speeds installation and removes the need for complex set-up equipment or oscilloscopes.

Renishaw's encoder systems are used in all sectors of industrial automation such as semiconductor, electronics, medical, scanning, printing, scientific research, space research, photography, specialist machine tools, including precision metrology and motion systems.

Renishaw's range of innovative encoder systems include:

- **New! SiGNUM™ RSLM high accuracy stainless steel scale - total accuracy better than ±4 µm over 5 m**
- **RG2 20 µm and RG4 40 µm optical linear encoders – resolutions to 10 nm and accuracy to ±3 µm/m**
- **SiGNUM™ REXM, RESM and the RESR optical angle encoder - angular resolutions to 0.0038 arc second and total installed accuracy to ±1 arc second**
- **Magnetic rotary encoders – resolutions to 13-bit (8,192 counts per revolution)**
- **Encoder accessories – interpolators/ interfaces, scale applicators, extension cables, custom solutions etc.**

RLD10–X3–DI

RLE laser encoder

RLE fibre optic laser encoder

The RLE system is a unique, advanced homodyne laser interferometer system, specifically designed for position feedback applications. Each RLE system consists of an RLU laser unit connected via a fibre optic "umbilical" to up to two RLD10 detector heads.

The RLU laser unit is the heart of the RLE system containing the HeNe laser tube, system electronics and fibre optic launch. The fibre optic launch simplifies installation complexity, reducing alignment requirements to a minimum of two components per axis.

Integral within the RLD10 is the interferometer and multi-channel fringe detection system. Detector heads are available for linear, planar (X, Y) and differential applications.

Position output signals from the system are directly available in differential digital RS422 format and/or 1 Vpp analogue sine / cosine formats.

Digital output signals provide direct resolutions to 10 nanometres. For enhanced resolutions, an RGE interpolator or RPI20 parallel interface can be incorporated into the system providing resolutions to 0.39 nanometres and 38.6 picometres respectively.

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Styli and spectroscopy

Styli for inspection and tool setting probes

A stylus is that part of the probe which makes contact with the component, enabling the probe to produce its output signal.

The type and size of stylus to be used is dictated by the feature to be measured. In all cases, maximum rigidity and sphericity of the stylus tip are essential. Renishaw's vast range of styli have superior performance due to excellent ball roundness, location, thread fits and overall design.

Renishaw has also introduced more than 300 high precision M5 styli and adaptors to enable all users of Zeiss machines to benefit from Renishaw's high precision specifications. The range is compatible with Zeiss analogue probe systems without probe changing, measuring heads with probe changers, dynamic probe heads, and M2 and M3 styli for Zeiss RST probes.

Renishaw's range of styli for CMM, CNC machine tool, portable measuring arms and scanning applications include:

- **Ruby ball styli**
- **Silicon nitride ball styli**
- **Zirconia ball styli**
- **Pointer styli**
- **Tool datuming styli**
- **Star styli**
- **Cylinder styli**
- **Custom design styli**
- **Disc styli**
- **Ceramic hollow ball styli**
- **Stylus extensions**

Styli for every application

Spectroscopy systems for non-destructive material analysis

Renishaw manufactures a wide range of spectroscopy products, including Raman microscopes, compact process monitoring spectrometers, diode lasers, and cooled CCD detectors, both for end-user and OEM applications. These enable information about chemical structure and physical condition to be extracted from both bulk and microscopic material.

A series of combined-technique systems are also available; these combine the analytical power of Raman spectroscopy with other techniques such as scanning electron microscopy, scanning probe microscopy, and confocal laser scanning microscopy.

Renishaw's spectroscopy systems are used in many application areas, including:

- **Biology**
- **Chemistry**
- **Art restoration**
- **Gemmology and mineralogy**
- **Nanotechnology**
- **Protective coatings**
- **Catalysis**
- **Materials science**
- **Pharmaceuticals**
- **Polymers**
- **Semiconductors and superconductors**

inVia Raman microscope

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Renishaw applies innovation to provide solutions to your problems

Renishaw is an established world leader in metrology, providing high performance, cost-effective solutions for measurement and increased productivity. A worldwide network of subsidiary companies and distributors provides exceptional service and support for its customers.

Renishaw designs, develops and manufactures products which conform to ISO 9001 standards.

Renishaw provides innovative solutions using the following products:

- **Probe systems for inspection on CMMs (co-ordinate measuring machines).**
- **Systems for job set-up, tool setting and inspection on machine tools.**
- **Scanning, digitising and dental systems.**
- **Laser and automated ballbar systems for performance measurement and calibration of machines.**
- **Encoder systems for high accuracy position feedback.**
- **Spectroscopy systems for non-destructive material analysis in laboratory and process environments.**
- **Styli for inspection and tool setting probes.**
- **Customised solutions for your applications.**

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Printed in England 0808 Part No. H-3000-3010-05-A