

RENISHAW 
OMP40-2

Standard-accuracy machine tool probes

On-machine probing solutions

Why probe?

Despite advancements in CNC machine performance, the set-up of tools and workpieces often remains a manual process. This impacts throughput, quality, and ultimately profitability. Renishaw equipment can fully automate these steps and enable in-process control.

How a probe works

Increase throughput from your existing assets

If your machines are overloaded then you could face a sizeable capital investment to make up the shortfall, a large sub-contract bill, or even have to turn away profitable work. What if you could extract more throughput from your machines?

- Defer capital expenditure
- Reduce your sub-contract and overtime bills
- Pursue additional business

Increase automation, reduce human intervention

Are high labour costs from machine operation and shop support affecting your competitiveness? Could reducing these costs improve your manufacturing efficiency?

- Automate manual setting and measurement processes
- Reduce direct labour costs
- Redeploy staff into proactive engineering roles

Reduce rework, concessions and scrap

Scrapping and reworking parts is non-productive. How would minimising waste from scrapped parts and reducing rework improve your delivery times and profitability?

- Improve conformance and consistency
- Lower unit costs
- Have consistently shorter lead times

Enhance your capability and take on more work

Are increasing customer demands and regulations challenging your current capabilities? Could you benefit from a cost-effective enhancement of your machining and inspection processes?

- Offer your customers state-of-the-art capabilities
- Take on more complex work
- Meet customer demands for traceability

Reduce your total cost of ownership

Are the costs of outdated, inflexible metrology equipment affecting your business? What impact would reducing the total cost of ownership have on your bottom line?

- Make your machines more productive
- Eliminate expensive, inflexible custom gauges
- Reduce calibration and maintenance costs

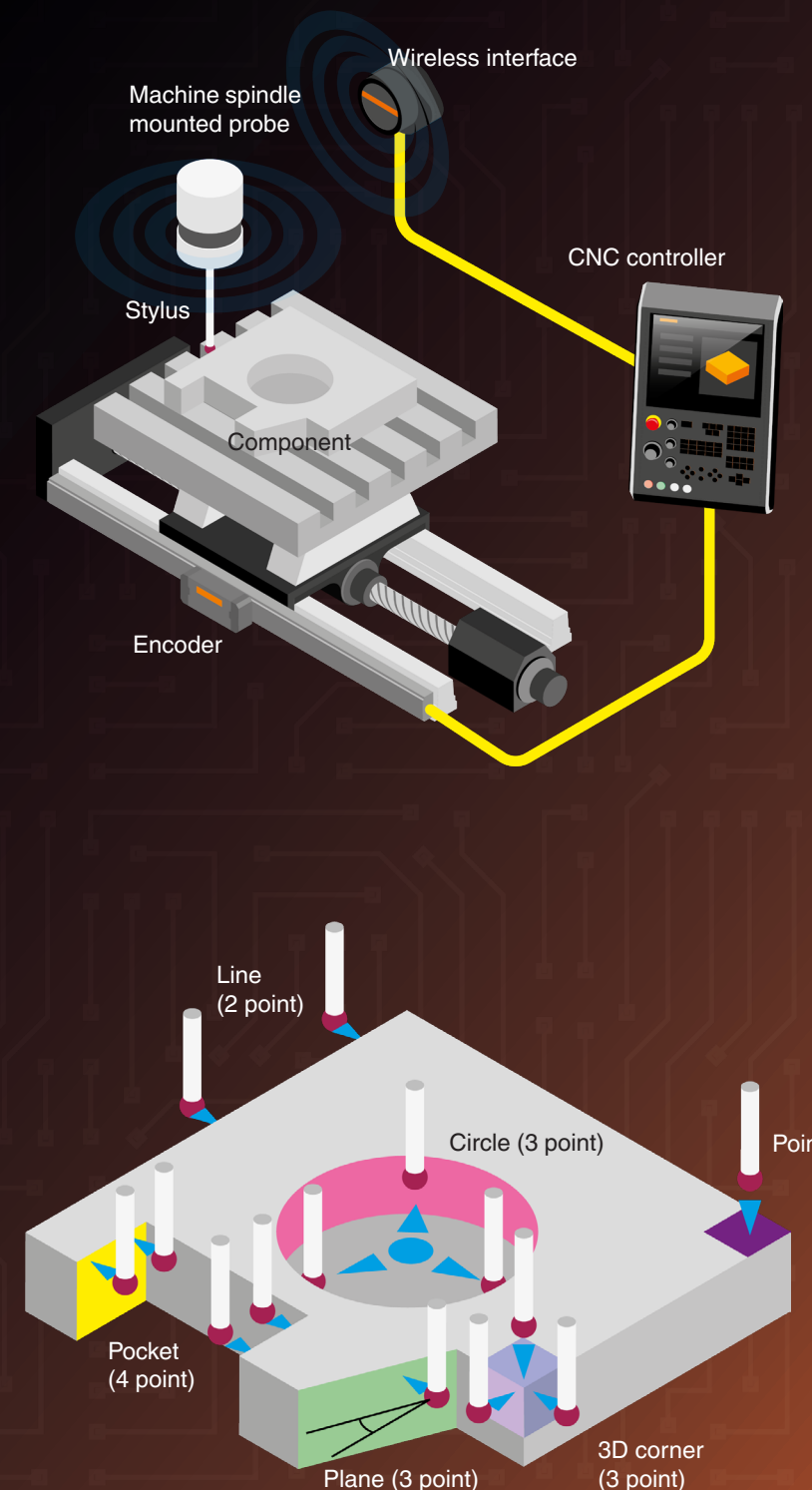
Touch-trigger probes

Machine mounted probes are often referred to as touch-trigger probes because they use switches that are triggered upon contact between the probe's stylus and the component being measured or set. Switching is highly repeatable.

When triggered, the probe signals the machine tool controller via an interface (almost simultaneously). The machine tool controller automatically captures the machine tool position via its encoders (feedback system).

With a co-ordinate point captured, the machine moves the probe on to trigger at a different location. When multiple points are found, shapes and features take form. The minimum number of points needed to measure each type of feature (shown right) is based on each feature's known degrees of freedom.

Measurement is taken by substituting a feature on the component with its theoretical equivalent; for example, a circle or 3D corner. The comparison between the actual and the expected dimension, measures deviation and enables accurate, detailed inspection and if required, automated off-setting and correction.



Maximise machining time

Kinematic resistive machine tool probes

Time spent manually setting and inspecting workpieces is valuable machining time wasted. With automated probing, you can speed up part set-up times and simplify in-process inspection.

Our standard-accuracy touch probes use a kinematic design, proven over five decades. The mechanism enables measurement repeatability of $1.00\text{ }\mu\text{m } 2\sigma$, helping you to set and inspect components accurately and reliably.

From simple edge detection through to part alignment and on-machine gauging, this technology is available in all of Renishaw's miniature, ultra-compact and compact designs.



“ Before we invested in the cell, deburring wasn't a nice job for anybody, so there was always a queue of parts waiting. But now, using the Flexmill robotised system with Renishaw's RMP60 probe, any operator is willing to do the job, so there isn't a queue and the lead time is more consistent and predictable.

Flexmill (Finland)

Technologies explained

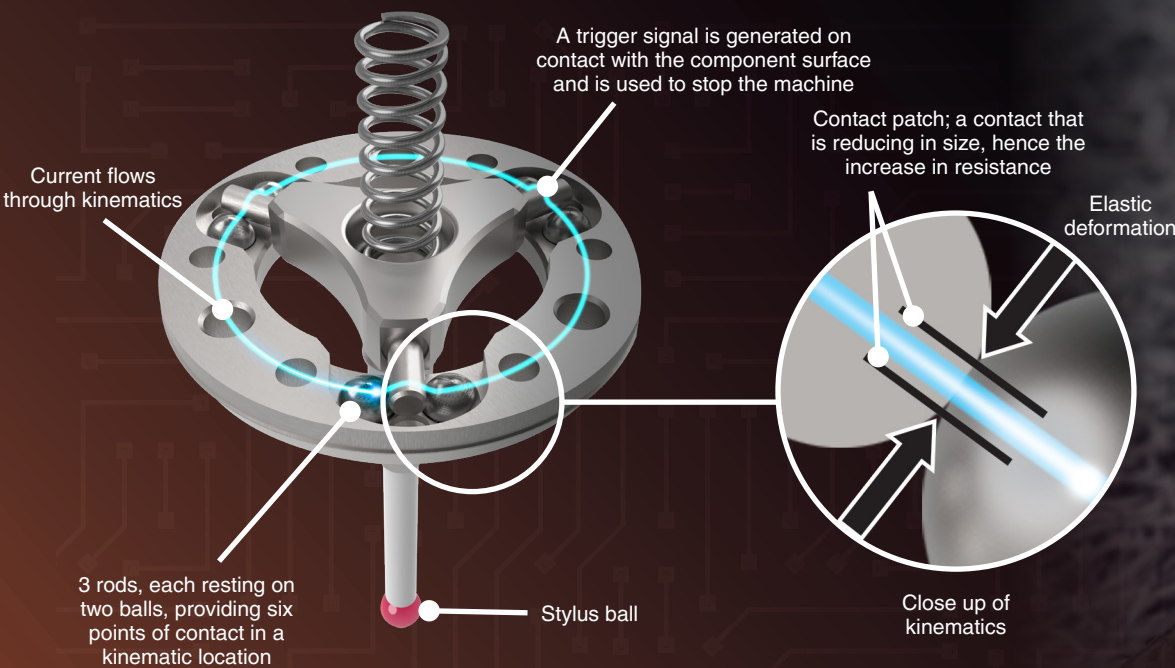
Kinematic resistive

Three equally spaced rods rest on six tungsten carbide balls, providing six points of contact in a kinematic location. An electrical circuit is formed through these contacts. The mechanism is spring loaded which allows deflection when the probe stylus makes contact with the part. This also allows the probe to reseat in the same position within 1 μm when in free space (not in contact).

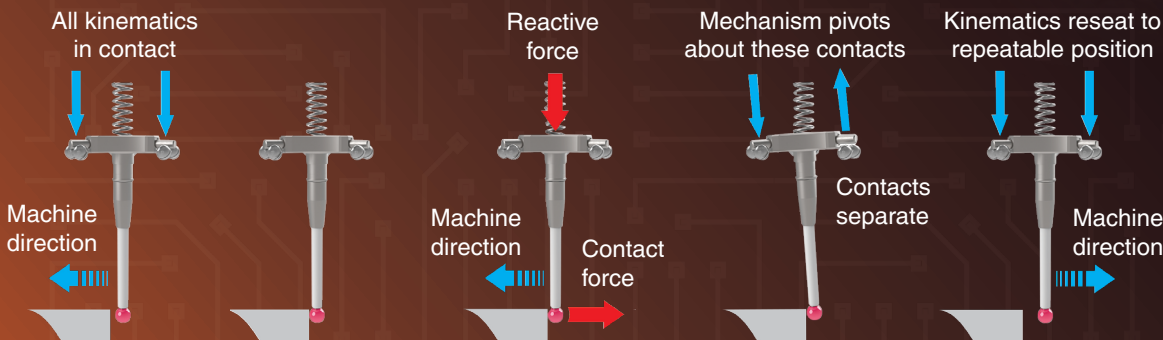
Under load of the spring, contact patches are created through which the current can flow. Reactive forces in the probe mechanism cause some contact patches to reduce which increases resistance of those elements.

On making contact with the workpiece (touch), the variable force on the contact patch is measured as a change in electrical resistance. When a defined threshold is reached, a probe output is triggered.

Kinematics probe design



Based on the kinematic principle, the stages in trigger generation are shown below. Repeatable reseating of the mechanism is critical to this process and fundamental to reliable metrology.



“ I can't believe it took us this long to realise how valuable probing is in our work environment. Now that we can see how user-friendly and accurate the OMP40-2 is, it would be hard to convince us to use anything else.

Hammond Engineering (Australia)

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Transmission technology to suit your needs

Probes and CNC controllers communicate bidirectionally. The passage of these signals is handled by a transmission system, the choice of which depends on the probe, the machine type and application.

Renishaw probes use three main types of transmission systems: optical and radio (both of which are wireless), and hard-wired (connected directly to the machine tool controller via a cable).

Optical transmission

These probes are designed for small to large machine tools where there is line-of-sight between the probe and receiver. Transmitting at a distance up to six metres, optical transmission is a secure, robust, and well-proven transmission method.

The OMP40-2, OMP60 and OLP40 optical probes are an effective and highly repeatable touch probe for your manufacturing operations.

Safe, reliable and efficient transmission

Renishaw's optical transmission systems use infrared technology to transmit information between the probe and the interface (or receiver). Optimised technology operates amidst other light sources and rejects external light interference, ensuring reliable communication.

Hard-wired

Probes designed for abrasive particle-laden environments which can withstand high vibration usually associated with grinding and lathe operations.

Renishaw's LP2 probe features a stylus spring force which is adjustable for different applications.

Simple transmission

The probe sustains superior performance even when subjected to the high vibration often experienced during grinding operations. If machine vibration is a problem, the probe can be switched to a more vibration resistant configuration. If you require a quicker probe response time, lower-latency configurations are also available.



Radio transmission

Probes designed for large machines or installations where the spindle probe is not necessarily within line-of-sight of the receiver and can operate at a range of up to fifteen metres.

The RMP40, RMP60 and RLP40 probes are Renishaw's range of radio transmission probes, offering exceptional reliability and are a trusted choice for many customers.

Resistance to radio interference

With increased use of automation and wireless communication, radio interference can be a problem in modern factories.

Renishaw's radio transmission probes continue to work automatically as other devices using Wi-Fi, Bluetooth® and microwaves enter the same environment. Industry-proven frequency-hopping spread spectrum (FHSS) technology enables devices to jump from channel to channel while maintaining synchronisation. Operating within the recognised 2.4 GHz frequency band, these radio systems are compliant with radio regulations in all major markets.

Transmission comparison chart

	Transmission type			Compatible interfaces	Operating range
	Optical	Radio	Hard-wired		
OMP40-2	●			OMI-2, OMI-2T, OMI-2H, OMI-2C or OMM-2 / OMM-2C with OSI	Up to 5 m (16.4 ft)
OLP40	●				
OMP60	●				Up to 6 m (19.7 ft)
RMP40		●		RMI-QE	Up to 15 m (49.2 ft)
RLP40		●			
RMP60		●			
LP2			●	HSI, MI 8-4, FS1i or FS2i	N/A

This is the standard

Proven performance

Renishaw's standard-accuracy touch probes use a kinematic resistive design, proven over five decades. The mechanism enables measurement repeatability of 1.00 μm 2 σ , allowing you to set and inspect components accurately and reliably. Other benefits include:

- Reduced machine downtime
- Automatic part set-up
- Elimination of manual setting errors
- Reduced scrap
- Automatic in-cycle part measurement with automatic offset correction

Robust design

Constructed from high grade materials, all Renishaw probes are robust and reliable in the harshest environments withstanding shock, vibration, temperature extremes and even continual liquid immersion.

Precision styli

The stylus is the first link with the workpiece. Successful measuring performance is highly dependent on the ability of the probe's stylus to access a feature and then maintain accuracy at the point of contact. At Renishaw we have used our expertise in probe and stylus design to develop a comprehensive range of styli for machine tool probes to offer you the greatest possible precision.

Performance comparison chart					
	Stylus trigger force (typical minimum)		Repeatability (2 σ)	Battery type	Recommended styli
	XY plane	+Z direction			
OMP40-2	0.50 N 51 gf (1.80 ozf)	5.85 N 597 gf (21.04 ozf)	1.00 μm	½ AA	Ceramic, lengths 50 mm (1.97 in) to 150 mm (5.91 in)
OLP40	0.40 N 41 gf (1.44 ozf)	5.30 N 540 gf (19.06 ozf)	1.00 μm	½ AA	
OMP60	0.75 N 76 gf (2.70 ozf)	5.30 N 540 gf (19.06 ozf)	1.00 μm	AA	
RMP40	0.50 N 51 gf (1.80 ozf)	5.85 N 597 gf (21.04 ozf)	1.00 μm	½ AA	
RLP40	0.60 N 61 gf (2.15 ozf)	6.23 N 635 gf (22.41 ozf)	1.00 μm	½ AA	
RMP60	0.75 N 76 gf (2.70 ozf)	5.30 N 540 gf (19.06 ozf)	1.00 μm	AA	
LP2	0.50 N 51 gf (1.80 ozf)	5.85 N 597 gf (21.04 ozf)	1.00 μm	N/A	50 mm (1.97 in) to 100 mm (3.94 in) stylus material depends on application

Probe specifications



		OMP40-2	OLP40	OMP60
Principal application		Workpiece inspection and job set-up on small to large machining centres and multi-tasking machines		
Transmission type		360° infrared optical transmission		
Compatible interfaces		OMI-2, OMI-2T, OMI-2H, OMI-2C or OMM-2 / OMM-2C with OSI		
Operating range		Up to 5 m (16.4 ft)	Up to 5 m (16.4 ft)	Up to 6 m (19.7 ft)
Battery life	Standby life	1500 days maximum	1500 days maximum	1767 days maximum
	Continuous use	1350 hours maximum	1350 hours maximum	690 hours maximum



		RMP40	RLP40	RMP60
Principal application		Workpiece inspection and job set-up on multi-tasking machines, machining centres and gantry machining centres		
Transmission type		Frequency-hopping spread spectrum (FHSS) radio		
Compatible interfaces		RMI-QE		
Operating range		Up to 15 m (49.2 ft)		
Battery life	Standby life	82 months maximum	82 months maximum	101 months maximum
	Continuous use	2560 hours maximum	2560 hours maximum	4870 hours maximum



		LP2
Principal application		Workpiece inspection and job set-up on all sizes of lathes, machining centres and CNC grinders
Transmission type		Hard-wired or in conjunction with optical, or radio transceiver modules
Compatible interfaces	Hard-wired	HSI, MI 8-4, FS1i or FS2i
	Optical	OMI-2 or OSI / OMM-2 (only when mounted to OMP60/40M)
	Radio	RMI-Q or RMI-QE (only when mounted to RMP60/40M)

Powerful probing software

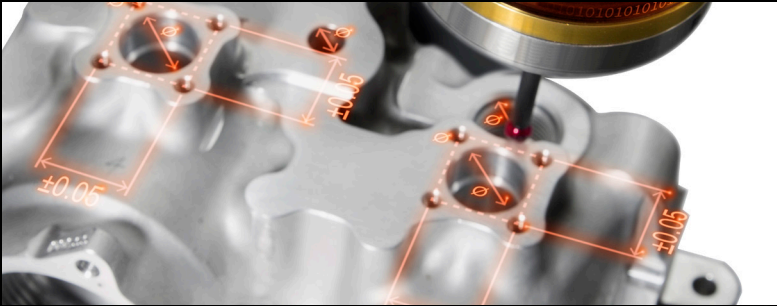
A comprehensive range of software applications with diverse programming, analysis, and reporting options.

From traditional macro-based solutions to graphical CAD/CAM-style applications, the choice of programming, analysis, and reporting options makes on-machine probing an easily accessible solution irrespective of your experience level.

Inspection Plus

Inspection Plus is the industry standard macro package for machine tools, offering solutions for part setting, inspection and in-process measurement.

Compatible with all major machine tool controller platforms, this machine-resident package is simple to program.



GoProbe app

The GoProbe smartphone app creates a probing or tool setting routine with just a few quick taps. Select the required cycle and populate the data entry fields. The result is a single-line command that is entered into the CNC controller.



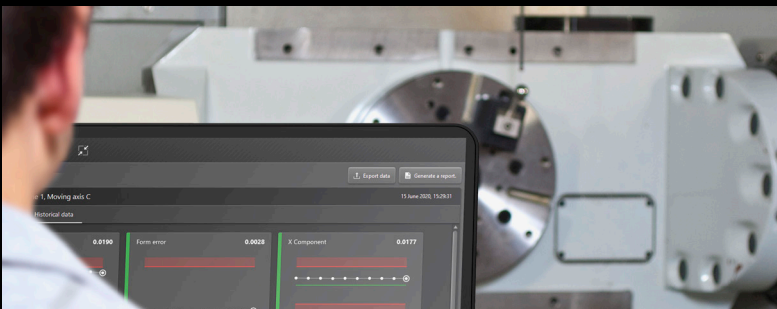
Set and Inspect

Set and Inspect is an intuitive, on-machine probing app for machine tool users who require an easy-to-use probing solution. Use the app to easily create probing and tool setting routines. These routines can be manually run, run as single cycles or executed as fully automated probing routines. Set and Inspect can upload probing routines to the CNC controller automatically.



AxiSet™ Check-Up

A cost-effective solution for checking the alignment and positioning performance of rotary axes. In just a few minutes, you can identify poor machine alignments and geometry in your multi-axis machining centers and multitasking mill-turn machines. This helps reduce extended process setting times and non-conforming parts.



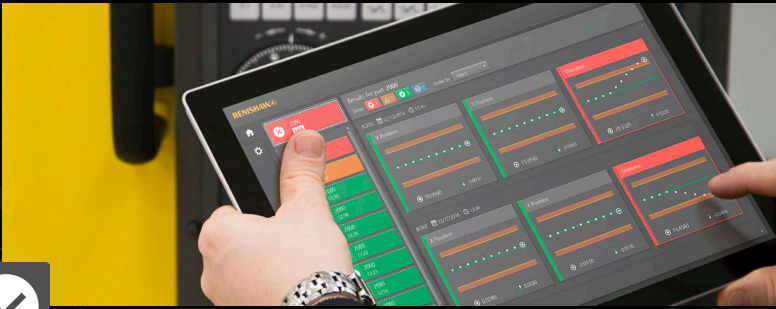
Probe Setup app

The Probe Setup app helps you easily customise your Renishaw probe settings. New Opti-Logic™ technology uses pulses of light to send and receive probe settings from a smartphone to a machine tool probe, simplifying the configuration process.



Reporter

Reporter is an on-machine app designed to display measurement data and production trends quickly and easily. You can view live and historical measurement results as well as non-contact tool setting macro routines. The app is installed onto a Windows®-based CNC controller or a Windows tablet connected to the controller via Ethernet.



Renishaw Central

Renishaw Central is a smart manufacturing data platform that collects and presents process and metrology data from the shop floor. It connects to measurement devices across the manufacturing process and provides invaluable insights. Manufacturers can use these insights to analyse, identify, predict, and correct process errors before they occur.



The Productive Process Pyramid™

Tackle process variation at source, and reap the rewards

The higher the degree of human involvement in the manufacturing process, the higher the risk of error. Automated in-process measurement using Renishaw probes can help eliminate the risk. Renishaw probes facilitate the following controls for enhanced management of production processes, leading to an increase in profits.

For further details regarding the benefits of all levels of process control within the Productive Process Pyramid™, visit www.renishaw.com/processcontrol.

Post-process monitoring

Analyse and report on measurement data obtained.

- Determine surface condition characteristics.
- Rapid, traceable reporting of part conformance to specification.
- Reduce off-machine inspection time and costs.

In-process control

Automated, on-machine component verification.

- Compensate for environmental and machine conditions.
- Implement adaptive machining processes.
- Reduce non-productive time and scrap.

Process setting

Automated on-machine part setting eliminates costly fixtures and manual setting operations.

- Automatically update machine offsets for accurate positioning and alignment.
- Introduce new processes quickly and respond to new customer needs.
- Faster set-up, improved quality, and reduced scrap.

Process foundation

Determine machine capability before manufacturing.

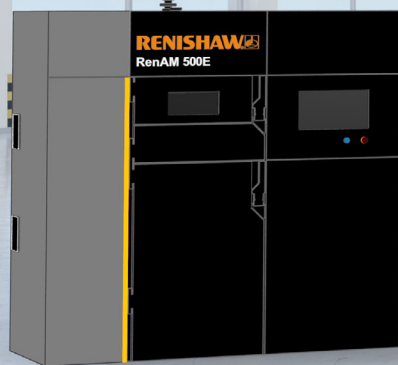
- Benchmark machine performance.
- Schedule in-cycle checks as part of the production process.
- Reduce machine downtime.

Renishaw's manufacturing solutions

Renishaw produces metrology and manufacturing equipment used in machine shops around the world.

We develop systems for manufacturers and users of CNC machine tools that are designed to maximise machine performance. Automating the set-up and process control activities ensures high-quality, highly productive manufacturing, across all industrial sectors.

Our experience, flexibility, knowledge and close working relationships with machine tool builders ensures that our latest – and even custom-designed – technologies are easily integrated into new machine designs. These technologies can also be used during the manufacturing and commissioning of new machine tools to make machines the best they can be.



Metal 3D printing

For more information, visit
www.renishaw.com/am



Machine tool probes for component setting and inspection

For more information, visit
www.renishaw.com/machinetoolprobes



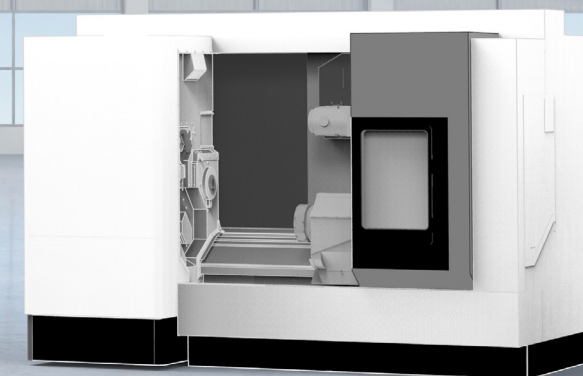
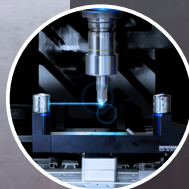
3D touch-trigger tool setters and broken tool detection

For more information, visit
www.renishaw.com/tool-setting



High-accuracy laser tool setting systems

For more information, visit
www.renishaw.com/nc4



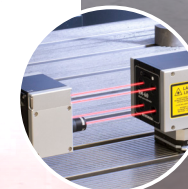
Tool setting arms for lathes and grinding machines

For more information, visit
www.renishaw.com/tool-setters-arms



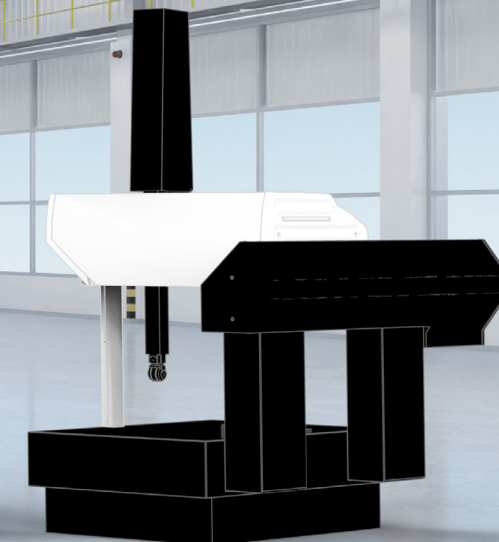
Machine calibration and optimisation

For more information, visit
www.renishaw.com/calibration



Encoders for position and motion control

For more information, visit
www.renishaw.com/encoders



CMM inspection machines

For more information, visit
www.renishaw.com/agility



Multi-sensor 5-axis measurement system

For more information, visit
www.renishaw.com/revo



Shop floor gauging

For more information, visit
www.renishaw.com/equator



The Renishaw advantage

At Renishaw, we have an excellent reputation for delivering strong support to our customers through a global network of service and support offices.



“ The Renishaw RMP60 system has shortened make-ready time dramatically and brought guaranteed precision and quality control to the chassis production process, whilst all but eliminating the possibility of costly errors

JCB (UK) ”

Applying innovation since 1973

Renishaw is one of the world's leading engineering and scientific technology companies, with expertise in precision measurement and healthcare.

Our worldwide network of subsidiary companies and distributors provides dedicated global customer support, wherever you are.

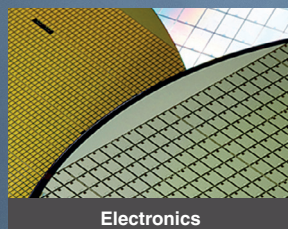
Our principal markets include:



Aerospace



Automotive



Electronics



Energy



Heavy industry



Medical and healthcare



Precision manufacturing



Scientific

www.renishaw.com/machinetoolprobes



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