



# Solutions Solutions Solutions

Improve part quality and accuracy and increase the efficiency of your CNC machine centre

# Probes for CNC machine tools

## Solutions ...

### Pocket guide contents

This pocket guide provides a complete overview of Renishaw's focus products for CNC machine tools and helps you to better understand the benefits that probing can bring to your business.

**Reduce set times by up to 90% when using Renishaw's innovative solutions**



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# Why probe?

**Time is money. Time spent manually setting work piece positions and inspecting finished product is better invested in machining.**

Renishaw's probing systems eliminate costly machine down-time and the scrapping of components associated with manual setting and inspection. Your machines are only profitable when they are producing good parts.

## **Do you have unprofitable downtime?**

Why are most of your machines **idle** for hours?

**Simple.** Many companies are still setting tools and parts **manually**, and inspecting parts **remote** from the machine – both result in an expensive piece of equipment lying idle.

## **REDUCE downtime and scrap – INCREASE your uptime and accuracy**

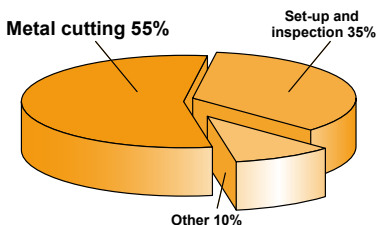
Manual tool-setting, job set-up and inspection are time consuming, and prone to operator errors. Probing eliminates the need for tool presetters, expensive fixtures and manual setting with dial indicators. Probing is fast and reliable, and machine offsets can be automatically adjusted.

The probing software automatically compensates for tool length and diameter, work piece position and dimensional errors. Powerful software packages are available from Renishaw using easily programmable macros for tool setting, workpiece set-up and measurement. These probing cycles, viewed as industry-standard, are simply incorporated into part programs and automatically called with standard machine codes.

Renishaw probes are used by companies worldwide to increase productivity and improve part quality. They can be specified as standard equipment from most leading manufacturers. Simple installation allows probes to be retrofitted to machines already installed.

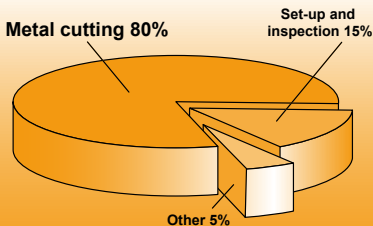
## How much time do you spend manually setting your CNC machining centre?

Typical available production time **WITHOUT** probing systems



## Cut that time by up to 90% with probing **AND** cut more metal

Typical available production time **WITH** probing systems



# Expected **benefits** from using Renishaw probe systems

Renishaw probe systems provide an **innovative solution** to improve the efficiency of your machine tools

**Save time. Reduce scrap. Stay competitive.**



## **Component set-up**

Probing eliminates the need for expensive fixtures and manual setting with dial indicators.

Probes are spindle mounted on machining centres and turret mounted on turning centres giving the following-benefits:

- Reduced machine downtime
- Automatic fixture, part alignment and rotary axis set-up
- Elimination of manual setting errors
- Reduced scrap
- Increased productivity and batch size flexibility



## **Component inspection**

Spindle and turret-mounted probes can also be used for in-cycle gauging and 1st-off inspection - manual gauging relies on operator skill or the removal of parts to a CMM. This is not always practical.

Benefits of inspection probing include:

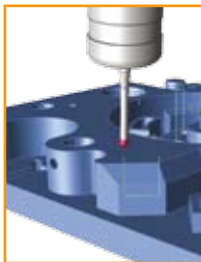
- In-cycle part measurement with automatic offset correction
- Increased confidence in unmanned machining
- First-off inspection with automatic offset update
- Reduced machine downtime awaiting 1st-off results



## Tool setting and broken tool detection

Using slip gauges and entering offset data manually takes time and is prone to operator error. Tool setting probes are easily installed on machining centres and CNC turning centres allowing automated operation with the following benefits:

- Significant time savings with reduced machine downtime
- Accurate tool length and diameter measurement
- Automatic tool offset calculation and correction
- Elimination of manual setting errors
- In-cycle tool breakage detection

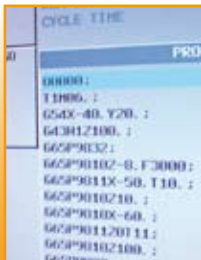


## Powerful PC-based probing software

Graphical CAM programming of parts makes programming faster and improves the quality. Renishaw's PC-based software brings those benefits to your probing as well. Powerful software for in-process control, and 3D verification will allow you to revolutionise the way you think about probing on machines.

**Productivity+™** - for in-process control  
(See page 21)

**Renishaw OMV** - for on-machine verification  
(See page 23)



## Macro probing software

Renishaw's macro software supports your probing application with a powerful set of commands. It is available on a broad range of machine tool controllers.



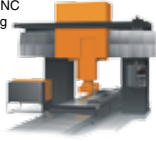

**EasyProbe** software provides simple job set-up routines, allowing your operators to concentrate on your product.





**Inspection Plus** is a comprehensive macro suite for inspection probing, including in-cycle updates and reporting options.

**Tool setting** software supports Renishaw's non-contact lasers, tool recognition systems, and contact tool-setters, with a range of functions for accurate measurement and broken tool detection.

# Product/Application guide

This guide will help you **identify which probes** are most suited to your application

Type of machine	Machine Size	Component set-up and inspection solutions	Tool setting solutions	
			Broken tool detection and tool setting	Broken tool detection
Vertical CNC machining centres 	Compact	OMP40-2/OMP400	OTS/TS27R/NC4	TRS2
	Small	OMP40-2/OMP400	OTS/TS27R/NC4	TRS2
	Medium	OMP60/RMP60/RMP600	OTS/TS27R/NC4	TRS2
	Large	RMP60/RMP600	TS27R/NC4	TRS2
Horizontal CNC machining centres 	Compact	OMP40-2/OMP400	OTS/NC4	TRS2
	Small	OMP40-2/OMP400	OTS/NC4	TRS2
	Medium	OMP60/RMP60/RMP600	OTS/NC4	TRS2
	Large	RMP60/RMP600	NC4	TRS2
Gantry CNC machining centre 	All	RMP60/RMP600	TS27R	NC4/TRS2
Manual machines 	All	Job contact probe (JCP)	N/A	N/A

Type of machine	Machine Size	Component set-up and inspection solutions	Tool setting solutions	
			Broken tool detection and tool setting	Broken tool detection
CNC lathes 	Small	LP2/LP2H	HPXX Arms	
	Medium	LP2/LP2H	HPXX Arms	
	Large	LP2/LP2H	HPXX Arms	
CNC Mill/Turn centre 	Small	OMP40-2/OMP400 RMP60/RMP600	HPXX Arms /NC4	TRS2
	Medium	OMP60/RMP60/ RMP600	HPXX Arms /NC4	TRS2
	Large	RMP60/RMP600	HPXX Arms /NC4	TRS2
CNC grinders 	Small	MP250 LP2/LP2LF	NC4	N/A
	Medium	MP250 LP2/LP2LF	NC4	N/A
	Large	MP250 LP2/LP2LF	NC4	N/A
PCB drilling and routing machines 	N/A	N/A	NCPCB	NCPCB

# Technology centre

Breakthrough solutions are at the heart of Renishaw's business strategy, which is captured by the phrase '**apply innovation**'.

The innovative product design is a result of unparalleled investment into R&D, allowing Renishaw to offer you **market leading solutions** to help your business.



## Industry leading transmission systems

**Modulated optical transmission** is used for all new generation 'OMP' probes, providing the highest level of resistance to light interference.

**Frequency hopping spread spectrum (FHSS)** is a unique transmission system that does not use a dedicated radio channel. Instead, the probe and receiver 'hop' together through a sequence of frequencies, enabling multiple probe systems and other industrial equipment to coexist, with negligible chance of interference.



## Industry specific solutions

**Ultra compact probe products** are a breakthrough for the growing number of small to medium sized machining centres which previously have been unable to benefit from probing systems.

For these applications Renishaw has developed the **OMP40-2** and **OMP400** ultra compact probes and the **OMI2-C**, a cigar-sized receiver with modulated optical transmission, compact enough to fit into the machine tool spindle head. Both products are ideal for compact machining centres where space is limited.



### Industry leading performance

**RENGAGE™ strain gauge technology** brings unrivalled 3D measurement performance and repeatability and is used in the OMP400 and RMP600 probes.

**MicroHole™** and **PassiveSeal™** are used on Renishaw's NC4 non-contact system providing unique environmental protection from the harsh machining environment. This ensures IPX8 protection 100% of the time.

**Toolwise™ technology** is used on Renishaw's new TRS2 non-contact broken tool detection system and can distinguish between the tool and coolant or swarf.



### Custom product design service

**Custom solutions** can be developed by Renishaw's experienced 'Specials' design team. Please contact your local Renishaw office if you have an unusual or specific application as standard products can be adapted to provide a custom solution.

# New products

## Twin probe system

Renishaw's new twin probe optical signal transmission system uses a single optical receiver for tool setting probe and spindle-mounted inspection probe installations, offering fast integration and a cable-free machine environment. The system is easily integrated on a wide range of machining centres and CNC milling machines, offering users automated on-machine tool setting, tool breakage detection, part set-up and part verification capability.

A typical twin probe system will comprise Renishaw's new OMI-2T interface, OTS tool setter and OMP40-2 inspection probe, but other compatible spindle-mounted touch probes with modulated optical transmission may also be used.

The cableless OTS design provides no restrictions on table movement, and offers users broken tool detection and rapid measurement of tool length and diameter and is particularly suitable for machines with twin pallets or rotary tables, which historically have proven challenging for installations of hard-wired tool setters.

The OMI-2T incorporates Renishaw's new modulated optical transmission, which has been designed to offer the highest levels of resistance to light interference and enables the use of two probes sequentially.

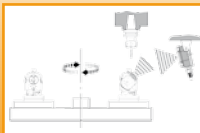
The OMP40-2 is an upgrade to the original award-winning OMP40 touch probe. It meets the demand for probing on small machining centres and the growing family of high-speed machines fitted with small HSK and small taper spindles.

## Different probe combinations

Flexible twin probe system configurations, using one receiver and two probes, can provide an easily integrated solution for most on-machine inspection applications.



OMP400 and OTS



Two OTS on dual pallet



OMP60 and OMP40-2  
twin spindle

## TRS2 non-contact broken tool detection system

The Renishaw TRS2 tool recognition system is a cost-effective solution for reliable, rapid broken tool detection on a wide range of machine tools and solid centre tool types, eliminating the problems caused by broken tools in terms of scrap, re-work and downtime. Using Renishaw's unique ToolWise™ technology, tools as small as 0.2 mm\* diameter can be checked at 300 mm range. With tools typically spending 1 second in the laser beam, the TRS2 is also suitable for use in high volume production environments and for low, medium and high speed spindle machines.

Set-up is simple with dedicated Renishaw software. Tools can be detected at distances of between 0.3 metres and 2.0 metres.\*

The TRS2 is suitable for a wide range of machines, although it is optimised for use at distances of up to 1.0 metre. It has the ability to work at a range of spindle speeds, (200, 1000 and 5000 RPM) enabling the detection of a larger number of tool types in a wider range of applications. For instance, gun drill applications are now possible and for high speed spindle machines, valuable time waiting for spindle deceleration is minimised.

The TRS2 uses the unique tool recognition electronics within the ToolWise™ technology to determine whether a tool is present by analysing the reflected light pattern from the rotating tool. Random light patterns created by coolant and metal chips are ignored, reducing the chance of not detecting a broken tool due to coolant blocking the beam.

\* Depending on the tool surface finish, machine environment and installation.



# New products

## RMP600 high accuracy inspection probe

The Renishaw RMP600 is a compact, high-accuracy touch probe with radio signal transmission, offering all the benefits of automated job set-up, plus the ability to measure complex 3D part geometries on all sizes of machining centres. With a robust construction, proven solid-state electronics and interference-free signal transmission, the RMP600 touch probe is also suited to the harshest of machine environments.

Using Renishaw's patented RENGAGE™ strain gauge technology, the RMP600 touch probe is able to achieve sub-micron 3D probe performance on contoured surfaces, even with long styli.



The RENGAGE™ technology combines a patented sensing mechanism and advanced electronics, giving the RMP600 a uniform triggering characteristic in all touch vectors.

The RMP600 touch probe uses Renishaw's proven frequency hopping spread spectrum (FHSS) transmission. Unlike conventional radio transmission systems, the RMP600's FHSS transmission system does not use a dedicated radio channel. Instead, the probe and receiver (RMI) 'hop' together through a sequence of frequencies, transmitted over long distances, enabling multiple probe systems and other industrial equipment to coexist in confidence.

The Renishaw RMP600 touch probe offers an unrivalled combination of size, accuracy, reliability and robustness and, for the first time, allows high accuracy probing on large machining centres or other machines where line-of-sight problems affect optical signal transmission.

## **MP250 high accuracy, ultra compact inspection probe for Grinding machines**

The Renishaw MP250 is an ultra compact touch probe for grinding machines, that sets new standards for the precision measurement of 3D part geometries, whilst offering all the standard probing benefits of reduced set-up times, reduced scrap and improved process control. With robust construction and proven solid-state electronics, the MP250 is suited to the harshest of machine environments.

Using Renishaw's patented RENGAGE™ strain gauge technology, the MP250 is able to achieve far greater levels of accuracy than standard mechanical probes. This allows sub-micron 3D probe performance on a range of applications which demand high precision measurement, such as contoured surfaces like gear teeth or cutting tools.

The RENGAGE™ technology combines a patented sensing mechanism and advanced electronics, giving the MP250 a uniform triggering characteristic in all touch vectors. The result is significantly less stylus bending and pre-travel variation when taking measurement points, which gives users improved repeatability and accuracy in all probing directions and reduced probe calibration times compared to standard probes.



# Component set-up and inspection solutions

## Probe systems for MACHINING CENTRES



**OMP40-2 with OMI-2T**  
**Ultra-compact probe**

- Ultra compact design - Ø40 mm x 50 mm in length
- Probe transmits through a full 360° at 90° angle to the spindle with a range of over 4 m
- Uses standard-sized ½ AA batteries and offers industry leading continuous-use battery life of over 140 hours
- Ideal for use in small and compact machining centres, where space is at a premium
- Suitable for use with Renishaw's twin probe system. See page 9



**OMP400 with OMI-2T**  
**Ultra compact high-accuracy probe**

- Ultra compact design - Ø40 mm x 50 mm in length
- Extremely repeatable strain gauge technology
- Can use stylus lengths up to 200 mm
- Excellent 3D performance which allows probing of contoured surfaces whilst maintaining very high accuracy
- Ideal for use in medium, small and compact machining centres where tight machining tolerances are required



**OMP60 with OMI-2/ OMI-2T**  
**State-of-the-art modulated optical transmission**

- Compact size - Ø63 mm x 76 mm in length
- Probe transmits through 360° at 90° angle to the spindle with a range of over 6 m
- User selectable switch-on/ switch-off methods
- Simple probe configuration via Renishaw Triggerlogic™



**MP700 with OMI**  
**High accuracy**  
**measurement**

- Ø62 mm x 117 mm in length
- Superior 3D measurement performance probe repeatability of 0.25 µm (2σ)
- Stylus ball diameter as small as Ø0.25 mm and a maximum stylus length of 200 mm can be used
- Probe transmits through 360° at 70° or 35° angle to the spindle with a range of over 3 m



**RMP60 with RMI**  
**Radio transmission**  
**system**

- Compact size - Ø63 mm x 76 mm in length
- 2.4 GHz radio transmission, allows single system for world-wide use
- Simple setting - no channel selection required
- Spherical transmission pattern with 15 m range
- RMP60 and RMI systems allow multiple probes to be used, interference free, with one receiver



**RMP600 with RMI**  
**High accuracy radio**  
**transmission probe**

- Compact size - Ø63 mm x 76 mm in length
- 2.4 GHz radio transmission, allows single system for world-wide use
- Superior 3D measurement performance probe repeatability of 0.25 µm (2σ)
- Simple setting - no channel selection required
- Spherical transmission pattern with 15 m range
- Ideal for machines of all sizes
- For more information see page 12

# Component set-up and inspection solutions

## Inspection probes for GRINDING/TURNING CENTRES



### MP250

#### High accuracy, high performance compact probe

- Highly repeatable operation  $0.25 \mu\text{m } 2\sigma$
- Compact design -  $\text{Ø}25 \text{ mm} \times 40.5 \text{ mm}$  in length
- Three-axis, high performance inspection probe
- 5-way sensing for maximum flexibility
- Support a wide range of inspection styli
- Large overtravel for added probe protection
- Can be used in conjunction with M16 thread, for LT extension bars and adaptors
- Hard-wired transmission interface



### LP2 and LP2H

#### High performance compact probe

- Compact design -  $\text{Ø}25 \text{ mm} \times 40.8 \text{ mm}$  in length
- Three-axis, high performance inspection probe
- 5-way sensing for maximum flexibility
- Support a wide range of inspection styli
- Large overtravel for added probe protection
- Highly repeatable operation  $1 \mu\text{m } 2\sigma$  (LP2) and  $2 \mu\text{m } 2\sigma$  (LP2H)
- Can be used in conjunction with MA4 90° adaptor and LPE extension bar

The LP2H has a higher spring force, allowing the use of larger styli and giving greater resistance to machine vibration.

Both probes are fitted to the 'LTO' family of optical transmission systems.

With a standard M4 stylus mount, a wide range of styli can be fitted to suit most common applications.

## Optical transmission systems for LP2 and LP2H probes



**LTO2S**  
Turret face mounting

- Compact design - Ø62 mm x 128 mm in length
- Simple installation and low maintenance
- Full diagnostic feedback on system status
- Robust design sealed to IPX8
- Easy access to battery compartment permits in-situ exchange without the need for recalibration



**LTO2T and LTO3T**  
Parallel shank mounting

- Compact design - Ø62 mm x 91 mm in length
- Shank size - Ø25.4 mm x 80 mm
- Uses the same swarf resistant steel front design as LTO2S, specifically designed with an integral parallel shank mounting.
- LTO3T offers extended battery life for high usage conditions



**LTO2**  
Smaller size shank mounting

- Compact design - Ø50 mm x 73 mm in length
- Flexibility of mounting options
- Easy to retrofit
- Range of extension bars/adaptors and styli available for special applications
- Visible LEDs for full diagnostic feedback on system status
- Robust and reliable, sealed to IPX8

# Tool setting and broken tool detection solutions

## Tool checking probes for MACHINING CENTRES



### NC4 separate (modular) Non-contact tool setting and broken tool detection

- Compact design is ideal for machines previously unsuitable for large non-contact systems
- Precise tool length and tool diameter measurement
- Only 1 M-code required
- Specified repeatability  $\pm 1.0 \mu\text{m}$  ( $2\sigma$ ) at 1 m separation. Typical repeatability of  $\pm 0.1 \mu\text{m}$  ( $2\sigma$ )\*
- NC4 measures and detects tools of  $\text{Ø}0.03 \text{ mm}^*$  or larger

\* Dependent on separation and mounting



### NC4 fixed (compact)

The fixed NC4 systems offer increased accuracy and simpler installation, ideal for retrofitting in the field.



### TS27R Contact tool setting and broken tool detection

- The standard tool setting probe for machining centres
- Compact table mounting
- Precise tool length and diameter measurement
- Rotating tools can be checked without wear to the tool or stylus
- Stylus protected by a weak link, preventing probe damage in the event of a collision



### OTS

#### Optical contact tool setting and broken tool detection

- Cableless tool setting probe for machining centres
- Ideal for machines with twin pallets or rotary tables
- Precise tool length and diameter measurement
- Rotating tools can be checked without wear to the tool or stylus
- Stylus protected by a weak link, preventing probe damage in the event of a collision
- Suitable for use with Renishaw's twin probe system. See page 9



### TRS2

#### High speed broken tool detection

- Single-sided tool recognition
- Ultra quick detection - the tool is typically in laser beam for 1 second
- Detects tools as small as  $\varnothing 0.2$  mm
- Ability to detect tools from 0.3 m to 2 m away
- Easy installation and no alignment is necessary
- Saves table space
- For more information see page 11



The NC4 system is protected from the harsh machining environment by Renishaw's patented **MicroHole™** and **PassiveSeal™** technologies.

# Tool setting and broken tool detection solutions

## Arm probe systems for **TURNING CENTRES**



The high precision (HP) arm series provide cost-effective tool setting for all turning centres.

### HPRA

#### High precision removable arm

- Removable arm with highly repeatable mounting
- Available in a wide range of sizes to suit most requirements
- Uses the robust RP3 probe, allowing setting on 'Y' axis machines
- Bi-colour LED for continuous feedback on system status
- Uses minimal machine space when stored
- Retrofittable to existing machines



The HPRA is a 'plug-in' arm which is manually located in the machine when tool setting is performed, and then removed once the process is completed.

HPRA uses an innovative patented rotary device which automatically locks the arm into a kinematic location, with no additional adjustment or locking device required.

This enables the probe's stylus to be re-located to within  $5\ \mu\text{m}$  ( $2\sigma$ ).



**HPPA**  
**High precision**  
**pull-down arm**

- Manually operated pull-down arm with highly repeatable operation
- Available in a range of standard configurations - customised sizes can be specified
- Long-life rotary device durability
- Low thermal growth steel arm
- Uses robust RP3 probe
- Bi-colour LED for continuous feedback on system status
- Uses minimal machine space when stored



**HPMA**  
**High precision**  
**motorised arm**

- Fully automatic arm with highly repeatable positioning
- Rapid actuation
- Full program control of tool setting and broken tool detection
- Available in a range of standard configurations - customised sizes can be specified
- Bi-colour LED for continuous feedback on system status



# PC-based software solutions for machining centres

## Productivity+™ suite



Measured Circle Circle1	
<b>Feature Definition</b>	
Measurement Type	Circle
Centre (P)	0
Diameter (D)	40
Inside/Outside Flag	Inside
Use stock allowance	No
<b>Toolpath</b>	
Engage Depth (E)	0
Start Angle (a)	0
End Angle (e)	0
<b>Toolpath (Advanced)</b>	
Toolpath Type	Macro
Use Retract Height	No
<b>Macro Hole Settings (Advanced)</b>	
Output points	No
<b>Tolerance (Advanced)</b>	
Position Tolerance	< 0.01
Radius Tolerance	< 0.01

### Productivity+™ GibbsCAM® Plug-in

For GibbsCAM users.

The Productivity+ GibbsCAM plug-in merges the creation of probing cycles with the creation of metal cutting tool paths, within the Virtual Gibbs package.

### Productivity+™ Active Editor Pro

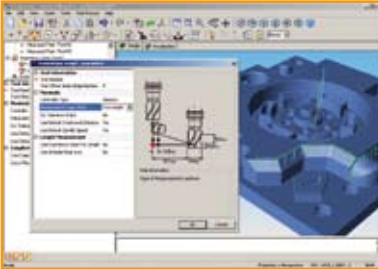
Design probing cycles from the CAD model using **solid model** feature selection.

Renishaw's Active Editor Pro is the all-in-one, independent solution for producing probing cycles remotely from the machine, via a CAD interface.

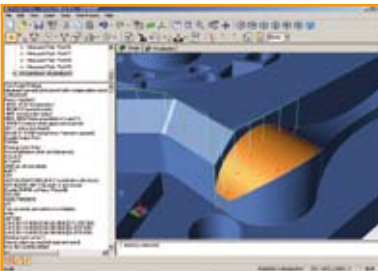
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**Productivity+™ allows you to easily add probing routines into cutting programs with *closed loop process control* for lights out machining .**



Active Editor Pro (above) offers powerful solutions

- Off-line programming - no machine down time
- In-office simulation - detect program errors before you run the machine
- Point-and-click programming directly from solid model
- Program a variety of machine controllers from the same Productivity+ program

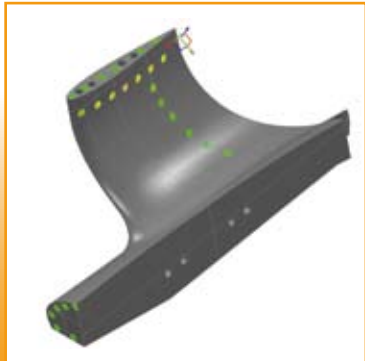
# PC-based software solutions for machining centres

## Renishaw OMV - On Machine Verification



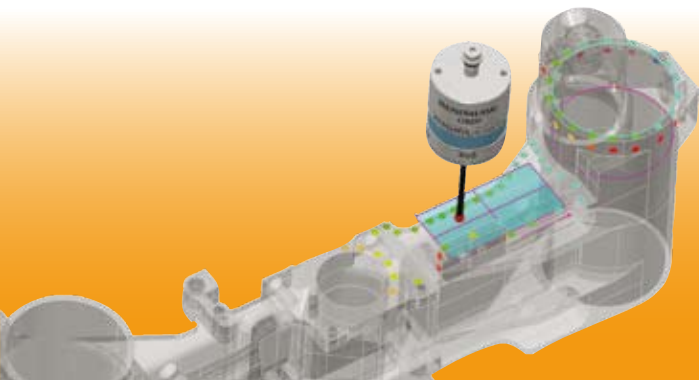
### Renishaw OMV Powerful PC based 3D verification software

- Easy to use PC-based software for 3 and 5-axis machines
- Simply create probing routines to measure geometric and free-form features direct from the CAD model
- Save time and minimise the risk of scrap by verifying complex parts on the machine
- Live data capture to PC during probing for instant feedback on component quality
- Configurable reporting - many different report styles allows you to highlight essential features in the best way





**Renishaw OMV allows you to work with your machine tool for verification of complex parts - simply create probing routines to measure geometric and free-form features.**



# Supporting macro probing software solutions

## Probing packages available

		Fanuc 0-18A 21/30-32M	Fanuc 0-21 30-32T	Mazak	Mitsubishi Meldas	Yasnac	Fadal	Okuma OSP/U	Haas	Siemens 800 series	Siemens 802 81CD/84CD	Selca	GE2000
<b>Machining centres</b>	EasyProbe	●			●	●			●		●		
	Inspection	●		●	●	●	●		●	●		●	●
	Inspection Plus	●		●	●	●		●	●		●		
	Tool setting (contact)	●		●	●	●	●	●	●	●	●	●	●
	Tool setting (non-contact)	●		●	●	●	●	●	●		●	●	
	GibbsCAM Plug-in	●		●	●	●			●		●		
	Active Editor Pro	●		●	●	●			●		●		
	Renishaw OMV	●		●	●	●		●	●		●	●	
<b>Turning centres</b>	Inspection		●	●	●	●			●	●	●		
	Tool setting		●	●					●	●	●		
	3-axis tool setting		●										
<b>Mill turns</b>	Inspection plus			●									
	Tool setting (non-contact)			●									

### EasyProbe

#### Minimal programming skill required

- Software for machining centres
- Simple and fast job set-up and measuring routines
- For operators with minimal programming skill

### Inspection

#### For use by an operator or part programmer

- Software for machining centres and turning centres
- Basic inspection / job setup software
- Set work offsets
- Update tool offsets
- Print inspection results \*
- Suitable for use by an operator or part programmer
- Additional packages available to enhance and extend the capabilities of the standard inspection software.

Toshiba Tosnuc	Acramatic A2100	Heidenhain	Num	Traub	Hitachi- Seicos	OSAI series 10	Makino	Mori Seiki	Andron	Fidia	Brother	Hurco	Nakamura	Dorson
●		●	●		●	●	●	●			●			
●			●		●		●	●			●			
		●	●		●	●	●	●			●			
	●	●			●		●	●		●	●	●		
				●	●			●						
				●										
													●	●

**Renishaw has developed probing software for all probing applications on a broad range of machine tool controllers.**

### Inspection Plus

**For an extended range of program cycles**

- Software for machining centres
- A totally integrated package
- Vector and angle measure options
- Print options \*
- Extended range of cycles
- SPC cycle
- 1-touch or 2-touch probing
- Tool offset compensation by percentage of error
- Output data stored in an accessible variable stack

### Tool setting

**For contact and non-contact probes**

- Rotating tool setting software for machining centres - for TS27R probe
- Non-contact tool setting software is preferred for applications using delicate tools, and other applications where the probe must not obstruct the machine's working envelope

\* where this control option is available

# QC10 ballbar automated circularity test



**The QC10 system offers you a fast and effective method for checking the accuracy of machines. The software will help you to improve the accuracy of the machine**

- Checking the machine accuracy
- Meeting the production tolerance
- Comparison and classification of different machines according to aptitude for corresponding production tolerances
- Documentation of the machines condition
- Condition-based service and maintenance

### **Accurate**

QC10 ballbar system is laser-calibrated, to maintain best results. When used with the Zerodur® calibrator, the QC10 ballbar measures the absolute radius of a tool path. The QC10 ballbar system provides you with a quick and effective solution to evaluate machine performance, and helps you to improve it through targeted maintenance.

### **Quick**

Renishaw's QC10 ballbar offers you the perfect solution. A quick 10 minute test is all that is required to assess the performance of your machine.

### **Who can benefit?**

- End users
- Distributors
- OEMs
- Service companies

### **Where can you benefit?**

- Production
- Maintenance
- Engineering
- Management
- Quality
- Sales and Marketing



# Styli and accessories



**When precision counts, insist on genuine Renishaw styli.**

- Comprehensive standard range available for fast delivery
- Custom design service available to suit exact customer requirements

**To maintain accuracy at the point of contact we recommend that you:**

### **Keep styli short**

The more that a stylus bends or deflects, the lower the accuracy. Probing with the minimum stylus length for your application is the best option.

### **Minimise joints**

Every time you join styli and extensions, you introduce potential bending and deflection points. Try, wherever possible, to keep to the minimum number of pieces for your application.

### **Keep the ball as large as possible**

There are two reasons for this, firstly, it maximises your ball/stem clearance thereby reducing the chances for false triggers caused by 'shanking out' on the stylus stem; secondly, the larger ball reduces the effect of the surface finish of the component being inspected.

**Renishaw has used its expertise in probe and stylus design to develop a comprehensive range of CMM and machine tool styli to offer the greatest possible precision.**

**The genuine Renishaw stylus range comprises several types:**

**Star, disc and straight styli, short and long, extensions, complete stylus kits and crash protection devices.**

**If you cannot achieve your objectives using our extensive range of standard products, Renishaw's Styli and Custom Products Division offers a unique service by providing customers with a total solution for their probing needs for CMM, machine tool or scanning applications.**

