RENISHAW
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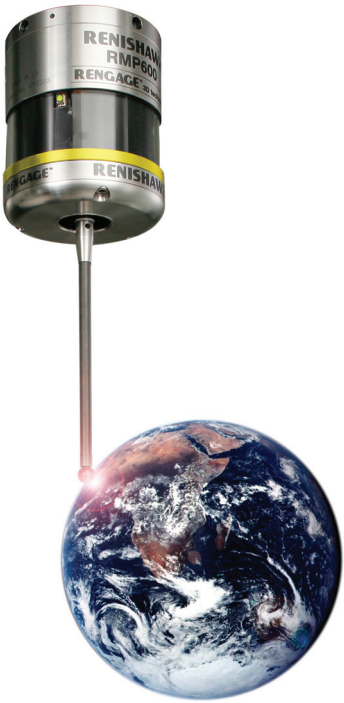
3D measurement solutions

The Earth was never flat...



...nor 2 Dimensional!

A ‘flat Earth’ was widely accepted as fact by many ancient civilizations. In the 4th Century BC Aristotle was one of the first **THINKERS** to propose that Earth is actually a sphere. It was many hundreds of years later, during the Middle Ages, before this theory was generally accepted.

It is now interesting to compare the limited possibilities of a flat Earth with the wealth of opportunities permitted by the **3-dimensional REALITY**.

In REAL 3D Measurement...

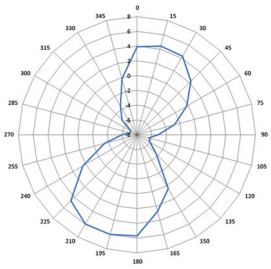
Lobing is a characteristic of all probes. It is caused by bending of the stylus and movement of the probe mechanism before the probe registers contact with a surface. It therefore varies depending upon

1) The length and stiffness of the stylus.

2) The force required to trigger the probe.

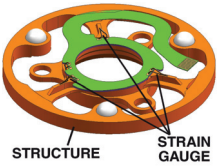
3) The direction of contact with the surface

4) The design of the probe mechanism.



For 2D measurements lobing errors are relatively easy to remove through calibration. However for REAL 3D measurements lobing is much more complex and, for conventional probes, cannot always be calibrated out.

RENGAGE™, the multi award-winning technology developed by Renishaw, uses solid state strain gauges to trigger the probe BEFORE ANY MOVEMENT IN THE PROBE MECHANISM.

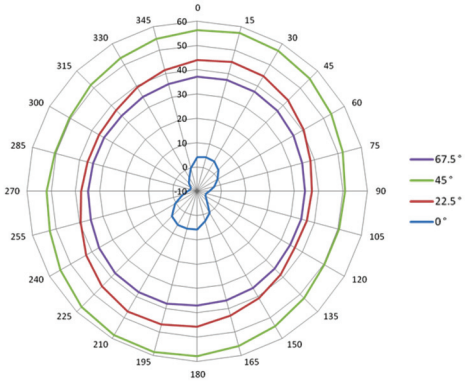


This tried, tested and patented technology, unique to **RENGAGE™**, means lobing is virtually eliminated, providing unparalleled accuracy and probing performance.

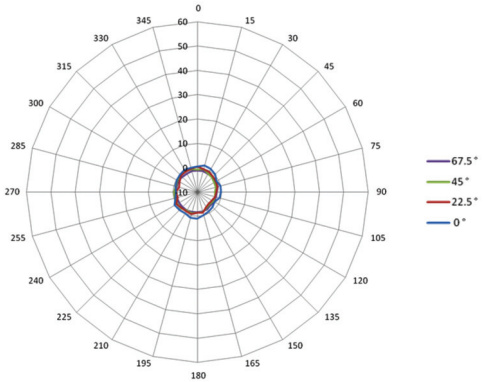
To compare the performance of conventional probes with **RENGAGE™** technology, a 25 mm calibration sphere was probed at 5° increments around XY-planes at 4 different latitudes (0°, 22.5°, 45° and 90°), with all tests using the same stylus and test parameters.

... variation due to lobing is critical!

The first graph is the 3D lobing plot of a ‘conventional’ probe from an alternative brand. **Note that the lobing error in this case is approximately 60 µm.** Removing such a large error through calibration is a hugely time-consuming, complex, and thus expensive process.



The second graph is the 3D lobing plot of Renishaw’s award-winning ultra-compact OMP400 probe featuring **RENGAGE™** technology. **Over all positions the lobing error is <4 µm.** Since they are consistently more accurate and require little or no compensation, **RENGAGE™** probes are a more cost-effective and reliable measurement solution.



RENGAGE™

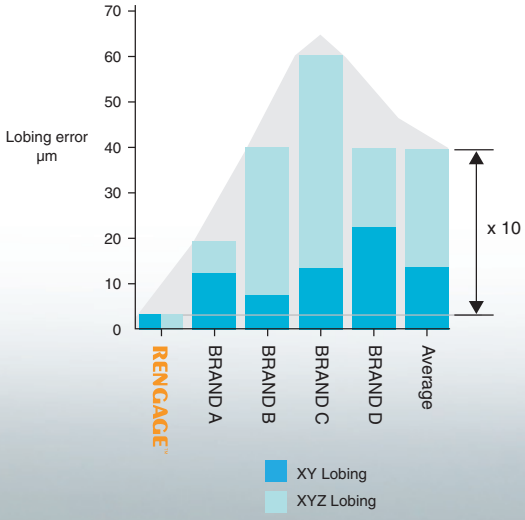
RENGAGE™ sets the standard...

...nothing else comes close!

We tested the 2D and REAL 3D measuring performance of probes from alternative brands to establish their lobing characteristics. The **average** 3D lobing error was found to be 40 µm which is 10x the magnitude of the 3D lobing error of Renishaw's OMP400. This has been independently verified by several machine tool builders.

RENGAGE™ technology performs typically 10x better than alternative brands of probe.

Comparative 3D lobing: RENGAGE™ vs alternative suppliers' probes.



To really appreciate this ratio, consider the 25 mm test sphere scaled up to the size of the Earth. Then errors from alternative brands of probe are more than double the height of Mount Everest!

REALISE the benefits...

...with RENGAGE™

Conventional probes continue to fulfil a valuable role, which is why Renishaw maintains its position as market leader in the design, manufacture and support of these products.

However for numerous applications the significant performance advantages offered by **RENGAGE™** technology provides users with competitive superiority both now and in the future.

RENGAGE™ technology is available with radio transmission in the RMP600, with optical transmission in the ultra-compact OMP400, and in the miniature MP250 offering an unmatched combination of size and accuracy.

Key benefits:

- Unbeatable 3D accuracy and repeatability.
- Reliable in the harshest environments.
- Improved accuracy with long styli.

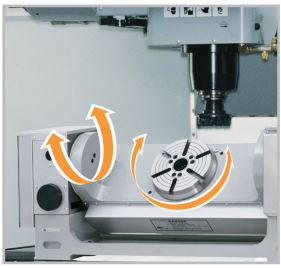
Allowing users to:

- Reduce set-up and calibration times.
- Control processes and improve quality.
- Reduce costs, increase payback and increase profits.
- Be more competitive.

RE-THINK 5-axis set up...

...with AXiSET™

With unrivalled 3-axis capability established, consider the issues for multi-axis machining and the possibilities using **RENGAGE™**.



Critical to multi-axis machining is the controller's ability to accurately interpret the centres of rotation of rotary axes relative to linear axes. Typical factors affecting this include; set-up, collision and wear.

No easy, reliable method existed to analyse and monitor these conditions...

...until now!

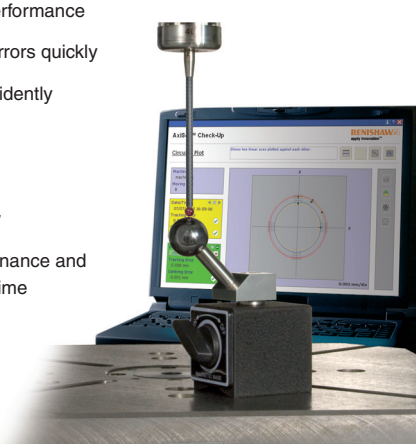
AxiSet™ combines **RENGAGE™** technology with machine specific software to provide fast, accurate and reliable performance data analysis with powerful yet simple reporting.

Tests are performed with a Renishaw spindle mounted **RENGAGE™** probe and table mounted artefact.

Probing macros are used to gather data which can be plotted and reported using Microsoft® Excel® and Word®.

More than simply cost effective, **AxiSet™** is an invaluable asset to credible and accurate multi axis precision machining that will also help to...

- Maintain optimum machine performance
- Measure and correct critical errors quickly
- Machine expensive parts confidently
- Reduce scrap
- Enhance quality systems
- Build reputation and credibility
- Track trends, schedule maintenance and reduce non-productive down time
- Reduce operating costs



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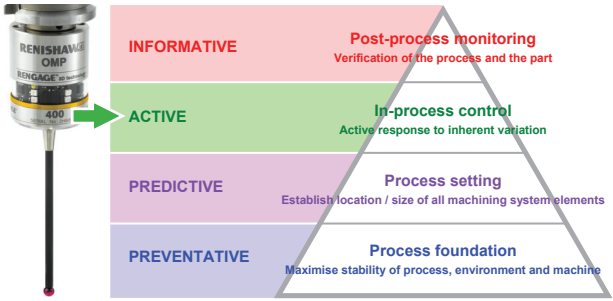
RENGAGE™... RE-DEFINES touch probing

The Productive Process Pyramid™



The **process foundation** layer is about providing stable conditions in which the machine will work. These are preventative controls that reduce the number of sources of variation before machining starts.

The **process setting** layer deals with predictable sources of variation such as the location of the part, the size of tools, and offsets on the machine which could otherwise cause non-conforming components.

The **in-process control** layer tackles sources of variation that are inherent to machining, such as tool wear and temperature variation, providing intelligent feedback to the process as machining progresses.

The **post-process monitoring** layer concerns checking the process and the finished part against their specifications.

Transform your manufacturing performance with help from a Global leader in process control and innovation!

RENISHAW®

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Renishaw plc

New Mills, Wotton-under-Edge,
Gloucestershire GL12 8JR
United Kingdom

T +44 (0) 1453 524524
F +44 (0) 1453 524901
E uk@renishaw.com

www.renishaw.com

For worldwide Renishaw contact information please visit
www.renishaw.com/contact

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