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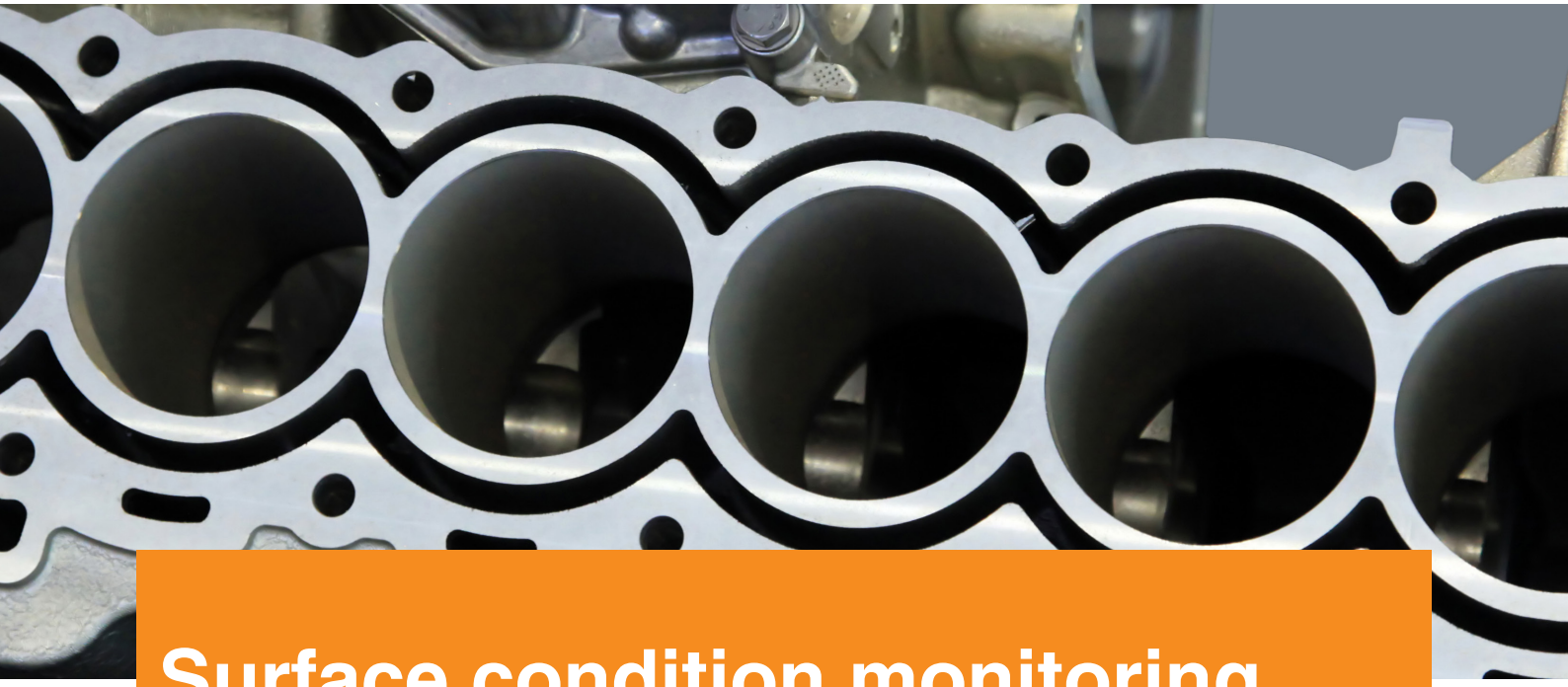


Surface condition monitoring

Scanning capability for CNC machine tools

The Renishaw OSP60 on-machine scanning probe with SPRINT™ technology provides a rapid and highly-accurate solution for a wide range of capabilities. Automated part setting, in-process verification, and adaptive machining, can all benefit from the adoption of on-machine scanning. This capability note looks at using the OSP60 probe to monitor how worn or broken tooling affects the surface condition of a workpiece.

Surface condition errors are frequently responsible for cosmetic and functional failure of components, and can be a significant cause of rework. Early identification and resolution of these errors are therefore critical.

Surface condition monitoring with an OSP60 measures waviness (W_t) values and can detect:

- periodic errors – indicated by a repeating pattern on the workpiece surface, and typically caused by worn tooling, or machine vibration.
- surface peaks – due to chipped, or worn tooling.
- steps on the surface – caused by unexpected differences between cutter dimensions, tool push-off, part deflection (when the workpiece is subjected to cutter forces), or thermal changes in the machine tool.

Surface condition measurement has traditionally involved the use of hand-held sensors, or has required the workpiece to be moved to a dedicated measuring machine. Use of an on-machine solution such as the OSP60 offers several significant user benefits.

Automated on-machine scanning using an OSP60 to capture surface condition data is more reproducible than using hand-held equipment as it eliminates human error. Data collection while the component remains in the machine tool eliminates repeated manual handling and the complexities associated with the transfer, and multiple set-ups required when moving components from machine tools to offline measurement devices. On-machine monitoring ensures that tooling is used for the duration of its useful life. Sister tooling can be called as soon as it is determined necessary, allowing process adjustments to be made before workpieces are machined beyond salvage, particularly important when machining high-value materials. The same probe and stylus configuration used for part setting and on-machine verification can also be used for surface condition monitoring. This can reduce or eliminate the need to invest in costly, dedicated offline inspection equipment and devices.

Waviness parameters calculated by the OSP60 are saved to machine variables allowing them to be analysed and used to control downstream processes. Data can also be exported for analysis in external software packages such as OmniSurf.

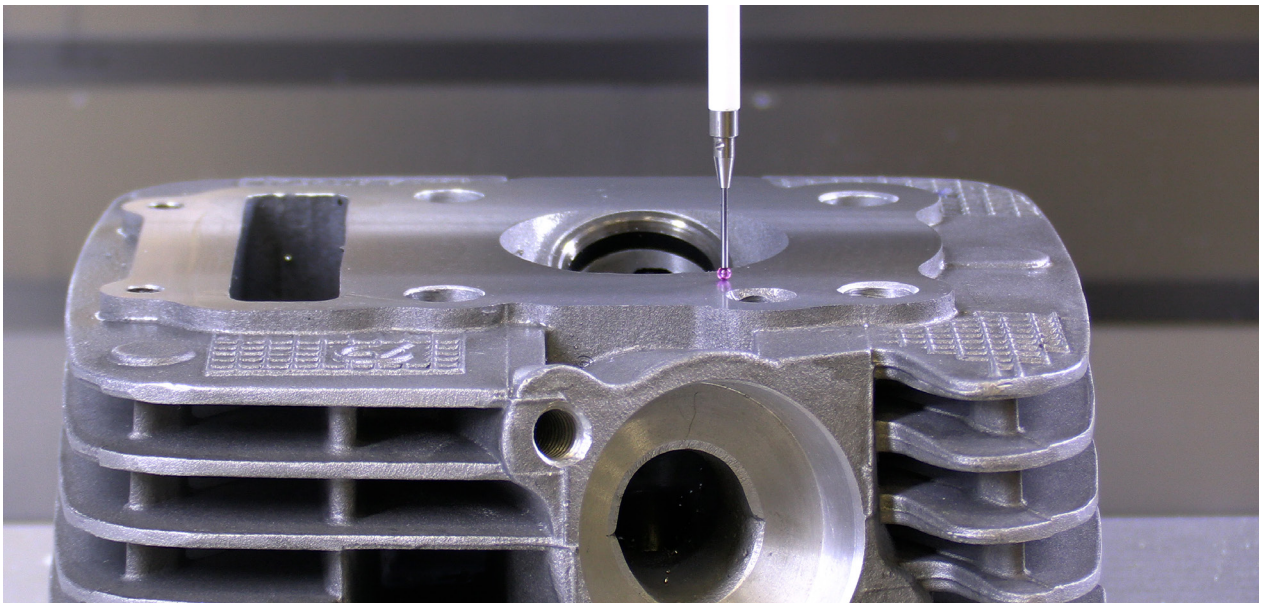
Benefits of on-machine scanning

On-machine scanning is an intelligent, automated, enabling technology that offers numerous operational benefits.

- Significant reductions in part setting, inspection cycle times and scrap.
- Data-dense inspection results. The OSP60 captures up to 1,000 3D data points every second.
- Automated setting and updating of machine parameters.
- Comprehensive feature information including dimensional data, geometric data, positional offset, angular offset and true feature form.
- Perform multiple applications such as part setting, on-machine component verification, surface condition monitoring, and machine performance verification, with a single probe and stylus configuration.
- Absolute confidence in measurement results due to continual communication between the scanning system and machine tool position data.
- Improved manufacturing capability, productivity and process optimisation.
- Complementary software solutions providing application-specific inspection capability.

Adoption of on-machine scanning solutions can introduce game-changing capability for companies in high-value manufacturing sectors. These include aerospace, automotive, consumer electronics, medical, mould and die, and power generation.

The OSP60 is just one of Renishaw's many products that help you to achieve the factory of the future today.



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+44 (0) 1453 524 524 **uk@renishaw.com**

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