# Technique to improve high precision and nanotechnology surface measurement

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(Phys.org) —A University of Warwick scientist has conceived a new method to improve the measurement of the surfaces of components essential for use in high-precision and nanotechnology applications.

With the requirement for ever higher performance of smaller and smaller parts, emphasis is having to be placed on their surfaces in order to produce high-value products.

Two emerging consequences are the use of patterns and structures on surfaces, and complex forms, all of which have to be rigorously controlled in order to optimise such areas as lubrication, adhesion and optical performance.

Key to these improvements is the measurement of these surfaces in order to manufacture to high precision with a minimum of defects - a big problem for traditional measuring techniques.

A new idea conceived by Professor David Whitehouse of the School of Engineering promises to be a first step towards addressing these new measurement problems.

He has devised a technique based on Gaussian filtering, but having a new mathematical stratagem which is described in the Proceedings of the Royal Society. The technique is similar to image analysis except that it takes into account geometry rather than just intensity variations.

He said: "his technique enhances the sharp features which are inherently present on high-tech structured surfaces such as edges, grooves and boundaries in a way which enables their detailed geometry and position to be better determined than previous methods. It can also facilitate the detection and characterization of defects on the surfaces."

Structured and free form surface applications over a wide range of sizes, for example in the optical, semiconductor, turbine and in nanotechnology could, if the method realises its potential, benefit directly.

**More information:** Whitehouse D J. Theoretical enhancement of the Gaussian filtering of engineering surfaces, *Proc. R. Soc. A*, 2013 Vol. 469, No 2158, 20130184. rspa.royalsocietypublishing.or … 58/20130184.abstract

Provided by University of Warwick