Beyond Surface Roughness: From Millimeter to Nano Scale
Can We Predict Surface Behavior?

Tuesday, November 2nd, 2021 | 13:00 GMT | 14:00 CET

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Join us and our special guest speaker Prof Maxence Bigerelle, CNRS, University of Valenciennes, France, for this virtual workshop on Surface Metrology.

Surface texture plays a key role in product development and the manufacturing industry. It affects the performance and reliability of a wide range of products ranging from automobile components to consumer electronics, photovoltaics, and space applications. Roughness is the most commonly used parameter to characterize surface texture. The exact analysis of surface roughness is integral in optimizing manufacturing processes and improving product quality.

The focus of this workshop is to provide an overview of the most important parameters for measuring surface roughness (height, spacing and hybrid), key industrial standards, e.g., ISO 25178, and the importance of scale when choosing a method of analysis.

Our guest speaker Prof Maxence Bigerelle, a renowned expert in the field of surface roughness and functional impact, will talk on multiscale analysis, the importance of scale in process monitoring, and the most relevant roughness parameters.

The workshop will include talks and live demos on performing surface roughness measurements from the nanometer to the micron and millimeter scale.

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14:00   Introduction
Emmanuel Paris, Sale Manager EMEA

14:05   Measuring Surface Roughness: ISO25178 Parameters Overview, Rules for Success
Dr Mickael Febvre, Applications Manager Bruker Nano,

14:25   Live Demo: Measuring Roughness from the Micron to Millimeter Scale
Featuring Bruker's ContourX-500 Optical Profilometer
Dr Vishal Panchal, Application Scientist

14:40   Selecting the Relevant Scales of Topography
Prof Maxence Bigerelle, CNRS, University of Valenciennes, France

15:10   Live Demo: Measuring Roughness on the Nanometer Scale
Featuring Bruker's Dimension XR AFM
Dr Vishal Panchal

15:25   Q&A

15:30   Closing

Please don't hesitate to contact us at productinfo.emea@bruker.com if you have any questions.

Innovation with Integrity

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Talk abstract

Selecting the Relevant Scales of Topography
Prof Maxence Bigerelle, LAMIH UMR CNRS, University of Valenciennes, France

In many engineering industrial applications, the precise characterization of surface roughness is of paramount importance because of its considerable influence on the functionality of manufactured products. As a result of the increasing interest of science and industry, a proliferation of roughness parameters, possibly running into hundreds, has been triggered to describe the different kinds of surface morphology with regard to specific functions, properties, or applications, as well as the characterization of material degradation as a result of different mechanisms.

In spite of the proliferation of such parameters, termed by Whitehouse as "parameter rash", there is still no complete comprehensive overview on the relevance of these roughness parameters. Moreover, it is difficult to choose one (pertinent) parameter rather than another one. In our opinion, the main objective of methodology is to determine, quantitatively and objectively, the most relevant roughness parameters. This includes the functional property of the manufactured surface morphology. Moreover, multiscale analysis should be employed to evaluate the most appropriate scale that should be used for process monitoring. For these reasons, this talk will cover the most important methodologies for characterizing the morphological properties of a surface in relation to its physical properties. An expert system was established to quantify the relevance of roughness parameters for the characterization of the functionalities of surfaces at all scales, including fractal aspects of the surface for isotropic or anisotropic surfaces. The developed computational system includes a recently developed powerful statistical technique called the "bootstrap method" that can be applied to different studies.

Maxence Bigerelle is Professor at the University of Valenciennes at LAMIH UMR CNRS 8201. He is an Engineer in Computer Science and did his PhD on Mechanics and the Ability to Direct Research in Physical Science. He joined the R&D department at Arcelor and then moved to Arts et Métiers School (UMR CNRS UMR 8207), after which he joined to the University of Compiègne where he headed the Materials Department (52 people, UMR CNRS 5253). He then moved to the LAMIH where he currently directs the Mechanical Department (120 people) and the Morpho-Mechanical Research Axis (27 people).

Prof Bigerelle is author of over 150 international publications. His research activities concern the characterization of rough surfaces and the study of their physical properties in order to increase their functionalities (optical, mechanical, chemical, tribological, biological, sensory ...) as a result of their structure. He currently leads the Carnot Institutes 'Surfaces Structuring Challenge', which brings together almost a hundred laboratories and technology transfer organizations. He is the leader of the GDR CNRS SurfTopo, a research group that gathers together laboratories and industrial companies working on the advancement of surface topography.