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# Investigation on the effect of sampling on areal texture parameters

L. Pagani[1], X. Jiang[1], and P. J. Scott[1]

[1] *EPSRC Future Metrology Hub, School of Computing and Engineering, University of Huddersfield, Huddersfield, HD13DH, UK*

**Abstract**

Due to the high resolution of modern measurement devices, point clouds are usually characterized by a large amount of data. Handling such large amount of data requires long processing time. A mesh decimation is usually performed to reduce the number of points in order to maintain the critical points able to describe the features of the mesh. The decimation process may produce anisotropic meshes. In this paper the estimation of some areal roughness parameters as a function of the number of the decimated points and the estimation of the form surface is investigated.

***Keywords:*** Areal texture parameters; Sampling; Freeform surface characterisation

## 1 Introduction

Areal texture parameters were first introduced in Dong *et al.* [10] to characterize the wear of a manufactured surface. They were primarily used to link a product to its functionality. Measurements were performed with stylus instruments and optical devices able to store the point clouds in a regularly spaced grid. This layout allows the use of statistical and imaged based techniques to compute the areal parameters as defined in ISO 25178-2 [15]. An usual area map can contain $1024 \times 1024$ points or more.

Nowadays measurement devices allow the acquisition of points that cannot be described either by a regular grid or by an areal surface. Some examples could be X-ray Computed Tomography (CT), structured light scanner and microscopes able to reconstruct a complete 3D object (such as the Alicona focus variation instrument [7]). The measurement output is usually represented by a triangular mesh. This surface representation is used because it is a simple model able to handle every surface with good accuracy.

If a large area has to be measured with good approximation, optical devices can perform a stitching of multiple point clouds. Since in a single acquisition about one million of points is acquired, during the stitching process the number of measured points rapidly increase. This huge amount of data can lead to slow parameters estimation process and the memory needed to store the dataset increase. In order to handle all this information a decimation is usually performed.