

# The Effects of Digitising Parameters on Noise in Point Cloud Data: An Investigative Study on a Freeform Model

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**Abstract:** *In the computer aided design (CAD) industry data acquisition is a rather tedious and time consuming process. It requires a high degree of skill due to adjustments needed to obtain a Non-uniform rational B-spline (NURBS) model from the digitised data. This paper provides a solution for the reduction of noise in point cloud data through the manipulation of digitisation parameters. Experiments were performed using the ShapeGrabber®AI310 laser scanner to evaluate three parameters that contributed to noise generation in the point cloud data. The three selected parameters were environmental light, laser intensity and object reflectivity. Evaluation of the point cloud data was then carried out using 3D and 2D comparisons and Geometric Dimensioning and Tolerance (GD&T) analysis. The study found that laser intensity has the most significant effect in the generation of noise in the point cloud data, whereas environmental light has the least effect of the three parameters examined. The methodology proposed in this research will assist designers and practitioners in improving both the efficiency and effectiveness of design and manufacturing operations.*

**Keywords:** *Reverse Engineering, Inspection, 3D Digitisation, Freeform Model, Noise, Parameters*