CASE STUDY

Bruker's 3D Optical Metrology technology drives optimisation of process control and new product development in Additive Manufacturing. Uniquely, we exploit both interferometry proven for fast repeatable metrology on the smooth microstructure finishes and new focus variation algorithms for highest speed measurement of shape, form and roughness.

Contour 3D Optical Profiler Case Study
Failure Analysis in 3D Printed lab-on-chip components

Bruker's Contour Optical Profilers were used to optimise additive manufacturing processes and quality control of PEEK 3D printed parts used for lab-on-chip devices. Figure 1 compares the layer to layer morphology changes between correctly performing and defective parts. Roughness parameter "Sal" quantified the texture uniformity between failed and passed parts. "Sal" is the auto-correlation length and is a measure of the distance over the surface for the new location to have minimal correlation with the original location. "Sal" quantifies the average layer to layer periodicity in the Additive Manufacturing process, emphasizing the process deviation in layer to layer spacing. The NOK (failed) part clearly shows fusion/merging between layers which indicates too high processing temperature. The OK (passed) part exhibits a regular uniform pattern.

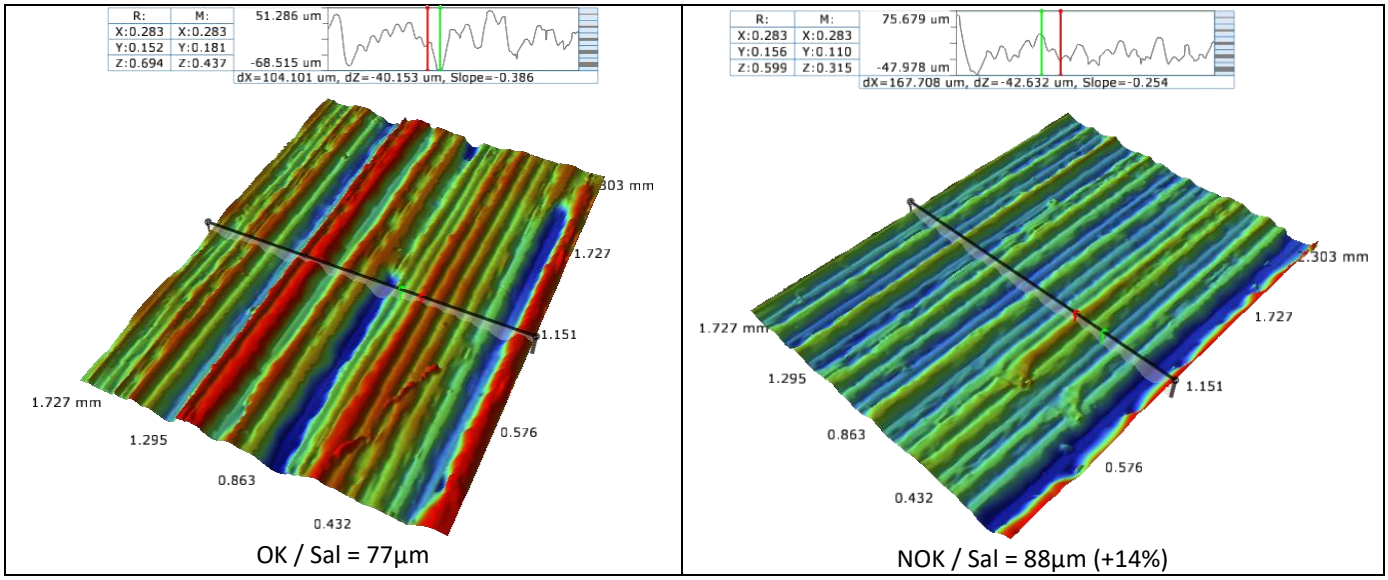

Figure 1: 3D morphology Comparison of 3D printed PEEK lab-on chip components

Parts Courtesy Denis Dowling, University College Dublin

In summary, Bruker's Contour platforms have a unique portfolio of complimentary 3D Optical metrology techniques combined with comprehensive automated analysis and databasing. The use of advanced S analysis "Sal" parameter enabled immediate identification of layer to layer issues with Additive Manufacturing processes. Other S parameters can be used to characterize device properties such as fluid retention in surface pores (Svi parameter) and the total surface exposed to liquid or gas (Str).

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