SPATIALLY RESOLVED DETERMINATION OF SOIL LAYER THICKNESS ON SURFACES OF 3D PARTS BY MEASURING THE FLUORESCENCE INTENSITY

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Abstract

The spatially resolved measurement of the soil layer thickness on surfaces is a precondition for quantitative cleanability tests of 3D parts which are important for the investigation, optimization and validation of spray cleaning systems.

In this paper a photogrammetric analysis method is investigated which uses the luminescence intensity as an amount for the layer thickness of a luminescent test soil. The luminescence signal is emitted by a tracer that is admixed to the layer substance and excited with a UV lamp. By using 3d parts various factors influence the measured brightness from which it shall be concluded on the layer thickness. In this paper the influences of these parameters are determined and subsequently they are mathematically described.

An experimental set up in which each parameter can be varied independently from the others was built to survey these parameters. The influence of the tracer was also regarded - water-soluble fluorescein and non-water-soluble zinc sulfide crystals were investigated. Afterwards the mathematical descriptions were combined in one formula. With that and a calibration it was possible to compute the layer thickness out of the measured local brightness and the corresponding parameters by the knowledge of geometrical data.

This procedure was verified in an experimental environment and checked for its suitability. Finally, the method was tested for the application to curved surfaces.

***Key words**: Surface hygiene, Cleanability, Soil, Layer thickness, Cleaning test, Fluorescence.*