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Entwicklung und Charakterisierung einer optischen Messzelle für die Feinstaubfraktion PM 2.5 unter Berücksichtigung der Anforderung zur vollautomatischen Fertigung für den Automotive-Zulieferbereich.

ABSTRACT - Masterthesis

PM concentrations in the air increases worldwide and threaten the health of Millions of people. Nowadays, the mortality rate has increased blatantly in consequence of the growing dust pollution. The particle size measurement is regarding the variation of the composition, size and number of particles in the air not easy to implement, however, possible with the use of different measurement principles. The demand to use a suitable particle measuring system in vehicles is increasing. For this reason, suppliers of car manufacturers have made it their task to develop auto motive equitable systems of this type.

In this work, an optical measuring cell for the detection of particulate matter in terms of the fraction PM 2.5 is developed and characterized for the automotive sector at Hella Fahrzeugkomponenten. For this purpose, specific requirements for the particulate matter sensor must be defined with the customer as well as a technology research be carried out on existing particle measurement systems. To select a suitable technology, an evaluation matrix is used. It turns out that the principle of scattered light measurement is the best technology to implement for detecting particles as automotive sensor.

Based on the obtained knowledge a concept of an optical measurement cell accrues, which must be precisely defined as to the geometry, operation function and components. Subsequently, a prototype is built and tested to confirm the functionality of the optical measuring cell. An initial testing has shown that the functionality could not be confirmed due to different errors and factors.