



## High-priority product: In-line metrology

Designation of multi-material multi-functional product:	<i>3D In-line metrology sensor for multi-material and multi-functional miniaturized parts</i>
General description of product (3 – 4 sentences):	<i>For in-line areal 3D metrology small and robust measurement systems are needed. Even though the current system available does have a good measurement performance it is in many cases too large to be readily integrated into a production machine. Furthermore, the harsh environmental conditions inside of a production machine require extensive protection measures for the current sensor system. In terms of handling the sensor it would be advantageous to have a system without cable connections so that it can be handled like a tool in a tool changer.</i>
Multi-materials needed/required:	<i>The new sensor system will have to be built of components exhibiting high stiffness combined with a low temperature expansion coefficient. Especially the drive train for the z-movement of the optical unit and the optical unit itself have to exhibit a degree of thermal stability. This can probably be achieved best by a combination of metal and glass with a low thermal expansion coefficient.</i>
Multi-functionality needed/required:	<i>The sensor has to incorporate optical components as well as high-precision mechanics and electronics. The sensor will be used to characterize technical surfaces for roughness and waviness measurements as well as the measurements of 3D micro-geometries. Micro-geometries can include the measurement of distances, radii, step-heights, etc.</i>
Expected improvement:	<i>We expect a reduction in size by a factor of 3 compared to the current sensor system. Additionally, the data transmission should be done wireless. Power-supply via a rechargeable battery. The whole sensor system should be designed in a sealed housing to withstand possible contamination from within the production machine.</i>
Bottlenecks to overcome for reaching the expected improvement	<i>The new sensor will require:</i> <ol style="list-style-type: none"> <li><i>1. A new optics design to reduce the required length of the sensor.</i></li> <li><i>2. Redesigned mechanical components for the z-travel unit to reduce the space requirements.</i></li> <li><i>3. Integrated electronics for data pre-processing and wireless transmission.</i></li> </ol>
Functional requirements:	<i>Footprint of new sensor should be roughly (height x width x depth): 80 x 50 x 50 mm<sup>3</sup>; Wireless data transmission; Power supply by rechargeable battery;</i>
Technical sketch of product (if applicable):	<i>Currently available sensor head</i>

