

## Chapter 5

# Assessment of Geometric Error on Micromanufactured Surface Features with Profilometers and Microscopes

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**Abstract** With the increasingly widespread adoption of micromanufacturing solutions, and with the production of a growing amount of artifacts defined at the microscopic and sub-microscopic scales, increasingly smaller geometries need to be verified for quality assurance. The study of precision at micro and sub-micro scales is gaining considerable interest: relevant issues pertain how to define allowable geometric error on parts of such small sizes (e.g. semiconductor products, micro electro-mechanical systems - MEMS, other microcomponents) with proper dimensional and geometric tolerances, and how to measure them. This work addresses the specific problem of assessing geometric error associated to *micromanufactured surface features*. Three-dimensional digital microscopes and profilometers for microtopography analysis are increasingly being adopted for such task, due to their suitability to operate at very small scales. However, this raises several challenges, as 3D microscopes and profilometers have been traditionally used in different application domains, and are mainly aimed at the inspection of surface finish; new modes of operation must be identified which take into consideration such peculiarities. Both families of instruments need to be closely investigated, their main constraints and benefits dissected and analyzed to assess their adaptability to the new task of assessing geometric error on micromanufactured surface features.

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