

European initiative: MICROMAN – European Training Network on “Process Fingerprint for Zero-defect Net-shape Micromanufacturing

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The continuous trend towards miniaturization and multi-functionality embedded in products and processes calls for an ever increasing innovation in process technology and manufacturing metrology research and development.

Post-process (i.e. off-line) metrology has for long time been the bottleneck of large-scale industrial implementation of micro-manufacturing technologies in industry. It is of critical importance to reduce the off-line metrology effort, since metrology can take up to 25-35% of total production time in micro-manufacturing. To solve this fundamental challenge, the European collaborative research network MICROMAN has been established within the H2020 framework program with the purpose to investigate, implement and validate the so-called ‘**Product/Process Manufacturing Fingerprint**’ concept.

(1) **Product Manufacturing Fingerprint.** Each manufacturing step/process results in a unique dimensional outcome, a surface topography and a form error on the produced component, which is called the “manufacturing product fingerprint”. By controlling a specific and sensitive feature of the produced micro component, it is the objective of MICROMAN to optimize and ensure the conformance to specifications of all critical/functional tolerances in the component.

(2) **Process Manufacturing Fingerprint.** In order to maintain the manufactured products complying with specifications, selected process parameters particularly influencing product precision and accuracy will be monitored. Effective process monitoring will control the presence of particular ‘Process Manufacturing Fingerprint’ on these variables which are measured by sensors. This will allow for real-time process control aiming at zero-defect micro manufacturing.

By integrating both **Product and Process Manufacturing Fingerprint** concepts the metrology effort will be highly reduced and product quality increased, with obvious improvement of the production yield. MICROMAN aims at reducing the off-line metrology effort by at least 40-50% ensuring at same time zero-defect micro manufacturing processes.

In this context, and based on a multidisciplinary pool of knowledge, the MICROMAN ETN aims at establishing a European research training platform to enable a holistic approach to precision micro manufacturing. A number of 23 academic/research and industry partners with multidisciplinary and complementary expertise will set a highly competitive European research-based training programme for the development and validation of process fingerprint for zero-defect net-shape micro manufacturing.

In this talk, the project structure, the research goals and preliminary results on the fingerprint concept applied to selected micro manufacturing processes will be presented.

Keywords: micro manufacturing, product/process metrology, zero-defect manufacturing

Category: new research projects