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# *Optical Measurement Systems for Industrial Inspection V*

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*Editors*

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# Introduction

Fabrication and metrology are essential components in industrial design and production engineering. Because of their outstanding advantages in comparison to conventional tactile measuring instruments, optical methods are playing an increasing role in measurement and testing for sophisticated production processes. However, the continued miniaturisation in micro and nanotechnologies and the increasing demands on the quality of industrial products present optical researchers with new challenges. What is required are measurement and inspection techniques that are very fast, robust, high-resolution, and of reasonable cost compared to the value of the products being investigated.

Optical methods combine the classical concepts of geometrical optics, interference and diffraction with the technological progress in optical system design. New light sources, beam shaping and guiding components, spatial light modulators, smart digital imaging systems, and microprocessors enable an extremely high degree of flexibility, processing speed, accuracy and measurement repeatability. Thanks to these innovative techniques, the efficiency and ease of use of optical sensors can contribute significantly to the productivity and profitability of manufacturing processes.

In continuation of the 1999, 2001, 2003, and 2005 Munich conference series (see Proc. SPIE Vol. 3824, Vol. 4398, Vol. 5144, Vol. 5856) this conference was developed to provide again an international forum for presenting the latest advances in the field of optical measurement systems for industrial inspection. Because of the growing role of optical principles and sensors for industrial inspection the call for papers distributed in September 2006 was very successful. About 180 abstracts were submitted to the organizers – again a remarkable growth in comparison to the last conference.

This volume contains 144 papers to be presented at the 2007 conference. The layout of the volume follows the presentation order and is divided into the 6 main topics of the conference:

- Advanced Sensor Solutions: Optical Sensors; Algorithms; Phase Retrieval
- Shape Measurement: Interferometry; Wavefront Sensing; Inspection of Nano, Micro, and Macro Structures
- Displacement and Strain Measurement: Static Displacements; Dynamic Displacements
- Non-Destructive Testing
- Applications

All presented posters are assigned to their particular topic.

It is evident from discussions at past events that this type of conference is of great interest to both the academic and the industrial communities. In addition, participants can immediately compare the state-of-the-art methods presented in the conference with the commercial implementations of these ideas and systems that are on display at the collocated exhibition Laser 2007.

There are many people whom we would like to thank for the success of this conference. First, we would like to express our sincere gratitude to the conference committee for their effort and continued support throughout the conference. We also thank all authors and especially the distinguished invited speakers, D. Psaltis, École Polytechnique Fédérale de Lausanne (Switzerland); R. A. Leitgeb, École Polytechnique Fédérale de Lausanne (Switzerland); P. Seitz, Swiss Center For Electronics and Microtechnology (Switzerland); C. Dunn, Texas Instruments, Inc. (USA); G. Jäger, Technische Universität Ilmenau (Germany); R. J. Pryputniewicz, Worcester Polytechnic Institute (USA); and C. von Kopylow, Bremer Insitut für Angewandte Strahltechnik (Germany) for their excellent and stimulating lectures on *Liquid Optics, Optical Coherence Tomography, Photon Noise Influence in Optical Metrology, Properties of DMDs, High-Precision Measuring and Positioning Systems, Micro and Nano-Scale Metrology,* and *Laser Ultrasound,* respectively. Thanks are also due to the SPIE staff for their excellent cooperation during the organization of the conference and the publication of these proceedings.

**Wolfgang Osten**
**Christophe Gorecki**
**Erik L. Novak**