



Introduction to the Special Section of the 14th IMEKO TC10 Workshop on Technical Diagnostics

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Section: EDITORIAL

Citation: Lorenzo Ciani, Marcontonio Catelani, Introduction to the Special Section of the 14th IMEKO TC10 Workshop on Technical Diagnostics, Acta IMEKO, vol. 5, no. 4, article 1, December 2016, identifier: IMEKO-ACTA-05 (2016)-04-01

Section Editor: Paul Regtien, Measurement Science Consultancy, The Netherlands

Received December 22, 2016; **In final form** December 22, 2016; **Published** December 2016

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Dear Reader,

in the first part of this issue, ACTA IMEKO publishes ten papers that were originally presented at the 14th IMEKO TC10 Workshop on Technical Diagnostics in Milan (Italy) and that are here presented in their extended versions. Technical diagnostics is taking in the years an increasingly important role. Behind this, the fact that in high-tech industry and in different fields of application it is mandatory to fulfil the requirements related to diagnostics, reliability, maintainability and logistic support as well as risk and safety assessment. The capability to monitor and diagnose a component, a system, an equipment or an industrial plant – in general term, an item – with the aim to verify its functions represents the starting point for more complex RAMS (Reliability, Availability, Maintainability and Safety) evaluations and assessment. The 14th IMEKO TC10 Workshop was held at the Politecnico di Milano, Italy, on June 27-28, 2016. The preparation of the technical program was particularly challenging since 95 abstracts were received from all over the world and the final program hosted 39 oral and 42 poster papers scheduled over two days.

The first paper by Giulio D'Emilia, David Di Gasbarro and Emanuela Natale describes a methodology for continuous checking of the settings of a low-cost vision system for automatic geometrical measurement of welding embedded on components of complicated shape. The method aims to check the holding of optimal measuring conditions by using a machine learning approach for the vision system: based on a such methodology single images can be used to check the settings, therefore allowing a continuous and on-line monitoring of the optical measuring system capabilities.

The second paper by Christian Schlegel, Holger Kahmann and Rolf Kumme aims to propose a solution for a traceable torque calibration of nacelles by using transfer torque transducers which are calibrated in special standard calibration machines which are traced to the SI. In this context, a calibration of up to 1.1 MN·m of such a transducer was realized.

The third paper is the result of an international collaboration among researchers from National Research University of Information Technologies, Mechanics and Optics, Saint-Petersburg (Russia), Ilmenau University of Technology, Ilmenau, (Germany) and Society for Production Engineering and Development (Germany). This research showed the successful results of using a computer vision approach for roughness assessment of a metal surface with help of different texture features extracted from 2D images. Such method of non-contact quality control gives a possibility to detect parts with certain defects in a fast and reliable way and can increase the outcome of good products.

The fourth paper in this issue is another international collaboration between Politecnico di Milano (Italy), National Research Council CNR-IFN, Milan (Italy), Bauman Moscow State Technical University (BMSTU)- Centre for Photonics and Infrared Technology, Moscow, (Russia) and Swansea University, Swansea, (Wales-UK). The paper deals with the development and characterization of a novel fiber-pumped single-mode Yb,Er:glass microchip laser. Single-frequency output power up to 8 mW was observed with a laser slope efficiency of ~10 % and a laser threshold as low as 30 mW.

The fifth contribution by Philippe Chiquet et al. proposes to investigate the effect of short pulsed Program/Erase signals on the functioning of Flash memory transistors. A novel experimental setup used to replace standard electric signals with short pulses is described and measurement results showing the benefits of programming and erasing non-volatile memories with short pulses are presented.

The sixth paper by Alberto Lavatelli, Emanuele Zappa investigates and discusses what are the main limitations of vision based modal analysis in comparison with the classic transducer based application, with particular focus on isolating the main sources of uncertainty in dynamic contexts. The experiments demonstrated that the frequency response measurement bias is present also in real situations, with good statistical significance.

The seventh paper by Zsolt János Viharos et al. introduces a methodology to define production trend classes and also the results to serve with trend prognosis in a given manufacturing situation. The proposed solution is applicable to realize production control inside the tolerance limits to proactively avoid the production process going outside from the given upper and lower tolerance limits. The proposed approach was developed and validated by using real data.

The eighth paper by Micaela Caserza Magro et al. presents a roadmap towards the Condition Based Maintenance of a fleet of railway vehicles. The paper associates to each maintenance policy its benefits and its requirements in terms of technological infrastructure and operating costs. Bombardier Transportation Italy, that supports this research, started this roadmap a few years ago, for moving from a reactive maintenance policy to a proactive policy.

The ninth contribution by Tommaso Addabbo et al. takes into consideration the most common suggested standards used in designing radar based railway level crossing surveillance systems and introduces new general concepts which demystify the use of such standards in actual applications. This paper illustrates the roadmap to be followed in general when

designing such monitoring systems, to minimize the risk due to object misdetection occurring on barrier closure when exploiting radar technology.

Finally, the tenth paper in this issue is authored by Mohamed Khalil, Christian Laurano, Giacomo Leone and Michele Zaroni analyses the impact of the outages occurred to the Italian Overhead Transmission Lines (OHTLs) from 2008 to 2015 is carried out. A new simple and effective reliability index, namely the Severity Factor, is introduced with the aim to drive the prioritization of the failure causes and the enhancement of the maintenance activities. The proposed methodology, thanks to the introduction of the Severity Factor, is a useful and effective tool for the identification of the transmission network criticalities and the enhancement of the related maintenance activities.

Let me take this occasion to remind everyone the next *15th IMEKO TC10 Workshop on Technical Diagnostics – “Technical Diagnostics in Cyber-Physical Era”* that will be held in Budapest, Hungary, on June 5-6, 2017 and I am pleased to invite you to attend the conference.

The Workshop is a forum for advancing knowledge and exchange ideas on methods, principles, instruments and tools, standards and industrial applications on Technical Diagnostics as well as their diffusion across the scientific community. Participants have an excellent opportunity to meet top specialists from industry and academia all over the world and to enhance their international co-operation. The program will feature industry leading keynote speakers and selected presentations. All details about IMEKO TC10 workshop are available on the conference website:

<http://www.imekotc10-2017.sztaki.hu/>

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