
Editorial

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Biographical notes: Janez Grum is a Professor of Materials Science at the Faculty of Mechanical Engineering, University of Ljubljana, Slovenia. He is also the Founder and Editor-in-Chief of a new journal, the *International Journal of Microstructure and Materials Properties (IJMMP)*. He is the Editor of six NDT conference proceedings, five ASM, Marcel Dekker and Taylor & Francis book chapters and five books with several reprints. He has also published more than 200 refereed journal papers on heat treatment and surface engineering, laser materials processing and materials testing, including non-destructive testing.

Aleš Hančič, PhD, is currently Managing Director of the Slovenian Tool and Die Development Centre TECOS. In the recent year he has also been employed at the Faculty of Mechanical Engineering, University of Ljubljana as a research and teaching assistant and as a research associate lecturer at the College of Polymer Technology in Slovenj Gradec, where he is also in the process for the election of Assistant Professor. He was editor of one conference proceedings and of one technical newspaper. He has published more than 50 scientific and technical papers on metal and non-metal material forming, sensoric and nano-materials.

The first part of this special issue of the *International Journal of Microstructure and Materials Properties* comprises four extended papers presented at *9th International Conference on Industrial Tools and Material Processing Technologies (ICIT&MPT)* held in April 2014 in Ljubljana. Papers are discussing respected fields of toolmaking, material processing and production technologies, together with experts in all supporting activities that are essential for a successful operation of a tool shop.

The following papers have been included in this issue:

Rosso et al. overviewed heat treatment and surface engineering, influences of surface finishing on hot – work tool steel. Die casting is characterised by harsh conditions for the die which has to resist to all the damaging mechanisms proposed and molten aluminium alloy is a potential corrosive environment for steel. Periodical heating and cooling cycles caused by the contact with a solidifying alloy on one side and a cooling system on the other side, can lead to thermal fatigue damaging of the die. In this paper the relation

between the surface finishing of a hot – work tool steel used in die casting industry and its damaging mechanism during service was considered and studied.

Ocaña et al. presented numerical modelling and experimental implementation of laser shock microforming of thin metal sheets. Continuous and long-pulse lasers have been extensively used for the forming of metal. Manufacturing of micro-mechanical systems, the applicability of such type of lasers is limited by the long relaxation time of the thermal fields responsible for the forming phenomena. Continuous and long-pulse lasers have been extensively used for the forming of metal sheets for macroscopic mechanical applications. However, for the manufacturing of micro-mechanical systems (MMS), the applicability of such type of lasers is limited by the long relaxation time of the thermal fields responsible for the forming phenomena

Zenker presented state of the art combined surface heat treatment. Thermal electron beam technologies, thermochemical surface treatments, and numerous variants of physical and chemical vapour deposition hard coatings are used to treat a wide spectrum of different tools and highly loaded components, and have, to some extent, become successful industrial applications. This paper presents a survey of the history of the development and the state of the art of material scientific investigations, as well as the technical state of the art in this field. In connection with different examples of combinations of surface treatments, both the technological options and limiting factors are discussed. Examples of industrial application are demonstrated, and a forecast for advanced fields of application for these innovative combined surface technologies is provided.

Petrič et al studied electrical resistivity measurements of Al-cast alloys during solidification process. The aim of this paper was the selection of proper electrodes material regarding four-probe technique for the electrical resistivity measurements of Al–Si cast alloys. The most significant problem for electrodes is oxidation during measurements causing high contact resistance and providing incorrect results. Various materials were tested and aluminium electrodes chosen. Resistivity of Al–Si alloys is increasing with Si content. Grain refinement has any effect on electrical resistivity. Modification of beta phase causes decrease of electrical resistivity.

All papers have been reviewed according to journal procedures and standards. We sincerely thank all authors for their valuable contributions and having observed all reviewers comments and suggestions. My thanks also go to all reviewers for their effort in reviewing papers. Our great thanks are due also to our co-worker Mr. Franc Ravnik, BSc, who took care of the coordination among the reviewers and the authors and prepared the papers for publication.

We sincerely hope that the papers published will be a useful source of information for engineers and researchers at their professional work in fields of toolmaking, material processing and production technologies.