Editorial

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Here we have the second issue of the new journal titled *International Journal of Microstructure and Material Properties* (IJMMP). It is common to the papers in the present issue that they report on research of aluminium alloys and iron-base alloys.

As to aluminium alloys, Torres, R. et al. are treating a microstructure analysis and mechanical properties of low pressure cast engine blocks made from heat-treatable aluminium alloy Al-Si-Cu type A319. Srinivasan, A. et al. studied the influence of a pouring temperature on the microstructure and the mechanical properties of Al-7Si-0.3Mg aluminium casting alloy using the low pressure casting method. The results obtained are compared with gravity casting. Dasgupta, R. et al. are dealing with a metal matrix composite of Al-Cu alloy Al-2014 in different ageing conditions. The alloy in the different ageing states was dispersion-hardened with SiC particles and its abrasive-wear resistance was studied.

Grum J. is treating different hardening processes for steel 42CrMo4 in terms of residual stresses and dynamic strength. Different conditions of induction surface hardening were studied and the results obtained are compared with the data stated in the references for various surface cold-hardening techniques such as shot peening and roller burnishing. With the different surface hardening processes for steel, an analysis of residual stresses after induction hardening and grinding was accomplished. Because of the tensile stresses due to grinding and thermal effects and plastic deformation of a material in the thin surface layer the loading capacity of the surface layer will be considerably reduced. It is important to take this into account in the final machining of hardened surfaces.

The next two papers by Arimot, K. et al. in Wang, Y. et al. were presented at the 1st *International Conference on Distortion Engineering – IDE* taking place in Bremen (Germany) in 2005. The topic of the Conference was very up-to-date since it treated the distortion of machine parts or tool parts after machining and heat treatment. The control of distortion of machine parts in the manufacture of exacting parts is a great challenge to engineers since a product price can be essentially affected. The transition from the empirical control of distortion to the scientific management supported by research involves additionally studies of mechanisms and causes of distortion occurrence. By now the practice has shown that by considering Distortion Engineering much higher quality of products can be achieved with a frequently lower cost price of a product. A description of physical conditions in a material during a manufacturing process/treatment permits efficient modelling and simulations of different conditions in the material so that both engineers and researchers may get a better insight into the causes of distortion.

The results obtained with various models intended for different applications make it easier to understand various phenomena in a material in the course of its treatment. This permits to researchers and engineers to accomplish efficient optimisation of manufacturing processes and easier control of distortion of machine parts, to ensure a desired residual stress profile in the surface layer. Thus in 2001 a Collaborative Research

Centre within the German Research Community at the University of Bremen was founded. Distortion Engineering represents management of the entire chain of manufacturing processes for individual machine parts in order to identify the source of distortion, which permits better optimisation of a technology. Special thanks are due to Dr. Thomas Lübben who authorised the publication of the two papers concerned. Arimoto, K. et al. are treating distortion of water-quenched cylinders by computer simulation in terms of temperature volume fraction of individual phase, internal stress and residual stress. Wang, Y. et al. developed a physical model for monitoring a microstructure and thermo-mechanical conditions during tempering of 80Mn Cr5 steel.

Sokovič, M. et al. are treating the improvement of die-casting tools by a nitriding process, i.e. plasma nitriding + (PVD) CrN coating, supported by the microstructure and micro-chemical analyses.

I thank the reviewers of the papers submitted and the authors, who prepared the papers in their final form.