SUMMARIES

Krawczyk J., Pacyna J.:

The Role of Metallurgical Defects and Microstructure on Failure Formation in Roll Necks of Cast Iron Rolls

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This work presents the examples of structural reasons for failure of the necks of cast iron rolls. The most common reason for damage of metallurgical roll necks is a presence of shrinkage porosity in their volume. Moreover, a high fraction of ledeburitic cementite can lead to the formation of a continuous net of eutectic carbides, which facilitate cracking. Even very thin net of secondary carbides, formed on the boundaries of former grain of austenite, can significantly facilitate propagation of the crack. Continuous net of ledeburitic cementite, in the case of its precipitation in a form of bands and existence of hardened areas in the alloy matrix can lead to roll neck fracture relatively easy. The use of flake graphite cast iron for metallurgical rolls increases a risk of the fracture of roll neck.

Keywords: *cast iron, mill rolls, shrinkage porosity, ledeburite, secondary cementite, graphite*

Cwudziński A., Jowsa J.:

Numerical Simulation Heat Transfer in the Slab Tundish

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The article presents the results of computer simulations of heat transfer in a slab tundish. The tundish was equipped with a dam with two holes. The authors employed the CFD (Computational Fluid Dynamics) numerical modelling technique to demonstrate the effect of change of steel temperature flow to tundish on the distribution of temperature field. The computer simulations were performed for non-steady conditions. As a result of computations, time characteristics of temperature change and fields of temperature for slab tundish were obtained. Results of simulation were examined through industrial experiment.

Keywords: *tundish, numerical simulation, heat transfer, industrial experiment*

Czarski A.:

Capability Process Assessment in Six Sigma Approach

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Statistical techniques occupy a particular place in the organizational culture Six Sigma that is used in many renowned organizations (Motorola, General Electric, Bombardier, Nokia, Sony, BMW, Philips etc.) in order to achieve in the shortest possible time the highest quality level. In the Six Sigma approach the assessment of a process potential is made relating to client's expectations using long-term and short-term process capability – correspondingly C_p, C_{pk} and P_p, P_{pk}. The basis of such an assessment of process capability is partition of the total process variability into two components: the component independent on time (the same material, operator, tools and process setting) and the component

dependent on time (caused by e.g. changes of raw material, process setting etc.). Such a partition of the variability is necessary, it enables the better understanding of the process and in consequence – its improvement. The aim of research has been the assessment of short-term and long-term capability of the process of drop forgings heat treatment regarding the hardness. The estimation of capability indices C_p, C_{pk} and P_p, P_{pk} as well as the detailed interpretation of the results have been carried out.

Keywords: *quality management, statistical methods, Six Sigma, heat treatment*

Skubisz P., Skowronek T., Sińczak J.:

Microstructure of Magnesium Alloy AZ31 after Low-speed Extrusion

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Direct extrusion of magnesium alloy AZ31 and changes in microstructure resultant from low--speed small-reduction extrusion are presented. The results show possibilities of grain refinement and improvement of mechanical properties associated with limited amount of generated deformation heat in aspect of using as-extruded material as a forging stock.

Keywords: *AZ31 magnesium alloy, direct extrusion, grain size, hardness*

Czarski A., Satora K., Matusiewicz P.:

Statistical Methods in Quality Management – Process Capability Analysis

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Statistical methods belong to the basic quality tools. Among statistical instruments the statistical process control SPC takes particular place. One of the principal tasks of SPC is process capability analysis i.e. the assessment of process potential as for variability regarding expectations defined by specification limits. For capability estimation some indices are used – C_p, C_{pk}, P_p, P_{pk} etc. In this work the way of determining and interpreting capability indices C_p, C_{pk} of so-called first generation in relation to the process of steel forgings production has been presented.

Keywords: *quality management, statistical methods, statistical process control (SPC), process capability analysis*

Karczewski K.:

Modified Single-Zone Model of Radiation Recuperator with Microfinned Surface

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Modified single-zone model of radiation recuperator with microfinned surface were elaborated. In this model the researches of heat transfer and hydraulic resistance microfinned elements were applied. To calculate the recuperator wall temperature weight mean temperature was used. By elaborated model radiation recuperator with microfinned surface to glass furnace were calculated. Single-zone model makes possible the project of small overall dimensions recuperators to industrial furnaces.

Keywords: *recuperator, microfinned surface, heat transfer rate, heat flux, weight mean temperature*