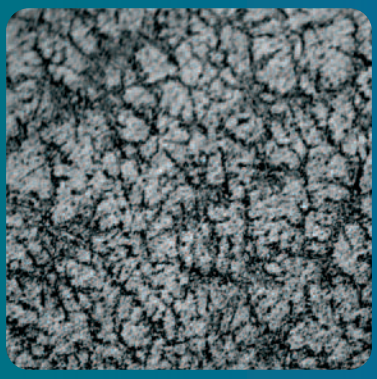
Materials

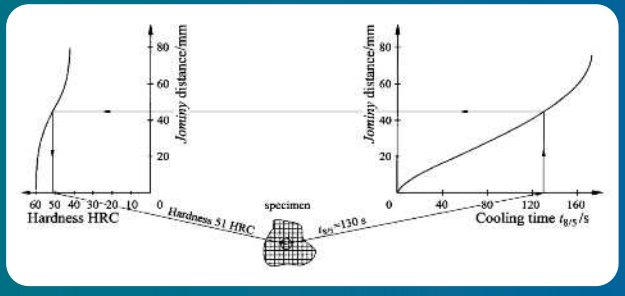
Properties

Analysis and modelling



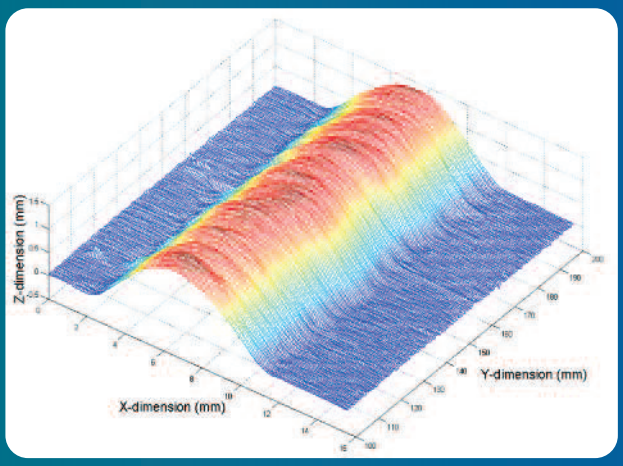
74

In the paper entitled "Effect of MWCNTs content on the characteristics of A356 Nanocomposite" by R. M. Rashad, O. M. Awadallah, A. S. Wifi on a **page 74** the study of the effect of Multiwalled Carbon Nanotubes (MWCNTs) content on the mechanical properties of the A356 hypoeutectic aluminum – silicon based nanocomposite is presented. The semi-solid route stir casting technique is used for composite processing. MWCNTs and aluminum powder are premixed by ball milling and green compacted to form small billets. Al-MWCNTs billets are added to the melt and incorporated by vigorous mechanical stirring. The mechanical and metallurgical properties of the produced composite are characterized by, scanning electron microscopy (SEM), optical microscopy, and tensile testing DIN 50125. MWCNTs are successfully incorporated into the A356 melt up to 1.5 % weight fraction. SEM analysis revealed a uniform dispersion of MWCNTs with good interfacial bonding between the matrix and the MWCNTs. The ultimate tensile strength and elongation of the produced composite are increased by 34% and 250% respectively compared to their corresponding values of monolithic alloy. This work helps in introducing a novel technique in dispersing nano particulates in metal matrix composites. This could be good potential for new developed composites.



81

Authors of the paper entitled "Input physical properties in mathematical model of steel quenching" B. Smoljan, D. Iljkić, L. Pomenić on a **page 81** concerns on temperature dependency of heat transfer for quenchant with Grossmann severity of quenching H=0.35, which are adequate for oil and heat conductivity coefficients calibrated on the base of Crafts-Lamont diagrams. Evaluation of physical properties such as specific heat capacity, heat conductivity coefficient, density, heat transfer coefficient, involved in mathematical model of transient temperature field was done by the inversion method, or by calibrations. Numerical simulation of quenching, with application of calibrated heat transfer data, is a generalized way of simulation and largely applicable in design offices. The mathematical model of steel quenching has been developed to predict the hardness distribution in a specimen with complex geometry. The model is based on the finite volume method. The numerical simulation of quenching is consisted of numerical simulation of transient temperature field change of cooling process and of numerical simulation of hardening. The established mathematical model was applied in computer simulation of hardness distribution in steel shaft. It can be concluded that by a proposed method, hardness in quenched steel specimen can by successfully calculated.



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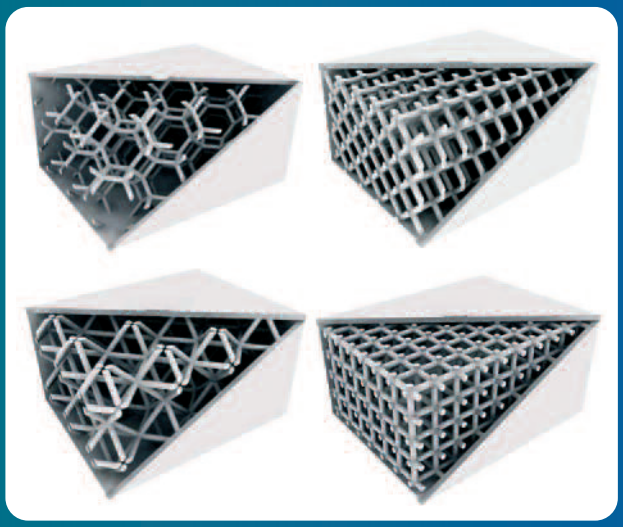
On a **page 87** J. S. Son, I. S. Kim, J. H. Lee, M. H. Park, G. S. Jeon autors of the paper "Development of the intelligent algorithm to control on-line bead height for robotic welding process" focus on the demand to increase productivity and quality, the shortage of skilled labour and strict health and safety requirements that finally led to the development of the robotic welding process to deal with many problems of the welded fabrication. The development of thermo mechanical mechanism in some techniques is not fully understood so to solve this problem the sequential experiment based on a Taguchi method and identified the various problems that result from the robotic GMA welding process is made. To characterize the GMA welding process and establish guidelines for the most effective joint design using multiple regression analysis with the help of a standard statistical package programme, a quadratic model has been developed for on-line control which studies the influence of process parameters on bead height and compares their influences on the bead height to see which one of process parameters is most affecting.



94

"Skeleton castings dynamic load resistance" a paper written by M. Cholewa, J. Szajnar, T. Szuter and presented on a **page 94** shows selected results of research in a field of a new type of cast spatial composite reinforcements. The research concern on properties of cast spatial microlattice structures called skeleton castings. The results of impact test of skeleton casting with octahedron elementary cell were shown. Skeleton castings filled with open pores ceramics was tested under impact loading, with energies from about 500J to about 2800J and velocities accordingly 7.2 m/s to 17.1 m/s. Castings filled with ceramics matrix absorbed almost all the impact energy and proved to be good value in energy absorbing application. It was found out that the energy absorption capacity depends on properties of filling material. Based on conducted research next step will be to make a numerical model. Simulations are crucial for further developing of skeleton casting conception. Its mechanical behaviour depends on base material, geometrical features such as internal topology and face sheet thickness or filling material properties.

Manufacturing and processing