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Selected materialographical photo
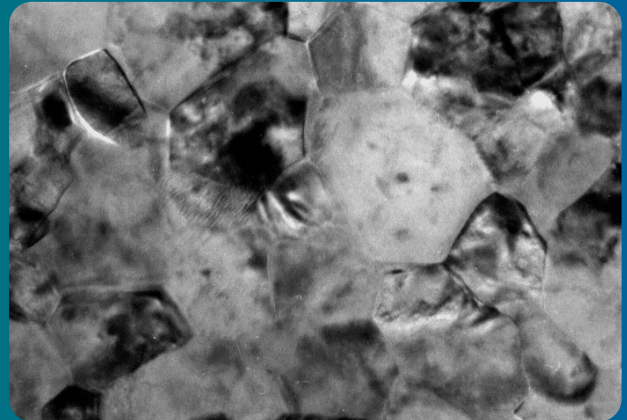
In the research paper entitled "Improvement of tool materials by deposition of gradient and multilayers coatings" by L.A. Dobrzański, K. Gołombek, J. Mikuła and D. Pakuła on a **page 86** the results of the study of multilayer and gradient TiN+(Ti,Al,Si)N+TiN nanocrystalline coatings deposited in the PVD method on sintered tool materials carried out in order to improve the tool cutting properties is presented. It has been demonstrated that deposition of the multilayer or gradient coatings with the PVD (Cathodic Arc Evaporation) or CVD process on tools made from nitride, oxide ceramics and cermets results in the increase of coatings' hardness and improvement of their adhesion to the substrate, in comparison with the multiple-layer coatings deposited using the PVD/CVD methods on the same substrate materials, deciding improvement of the working properties of cutting tools coated with the TiN+gradient or multi(Ti,Al,Si)N+TiN system coatings, compared with coatings developed on the same sintered tool materials, but uncoated or coated with simple coatings. Researches on the TEM of thin foils from coatings (gradient and multilayer) confirm that according to the original assumptions, coatings containing the TiN (PVD) type phases were deposited onto the nitride, oxide ceramics and cermets substrates.


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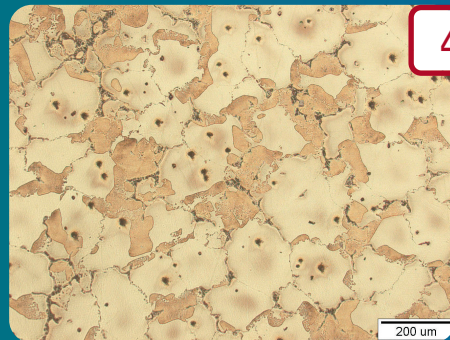
The paper written by L.A. Dobrzański, T. Tański and L. Čížek on "Influence of Al addition on microstructure of die casting magnesium alloys" on a **page 49** shows the structure and properties of the MCMgAl9Zn1 magnesium cast alloy as-cast state and after heat treatment. The analysis of the thin foils after the ageing process has confirmed that the structure of magnesium cast alloy consists of the solid solution $\alpha - Mg$ (matrix) of the secondary phase $\beta - Mg_{17}Al_{12}$ evenly located in the structure. The structure creates agglomerates in the form of needle precipitations, partially coherent with the matrix placed mostly at the grain boundaries. The undertaken examinations aim at defining the influence of a chemical composition and precipitation processes on the structure and casting magnesium alloy properties in its as-cast state and after heat treatment with a different content of alloy components.
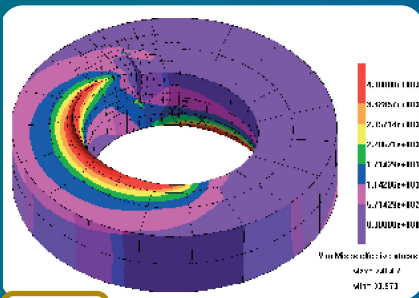
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Authors: R. Citarella and A. Soprano in the paper entitled "Some SIF's evaluations by Dual BEM for 3D cracked plates" on a **page 64** presents a numerical assessment of 3D crack problems with linear and non-linear loading conditions. SIF's on a circular quadrant crack and a rectangular through crack, initiated from a hole, has been evaluated with reference to single and two hole plates undergoing different linear and non-linear loading conditions. Such complex geometric and loading condition is worked out very efficiently and accurately by DBEM that is strongly recommended for this kind of application in alternative to FEM. The proposed methodology will enable a significant reduction of the experimental effort.
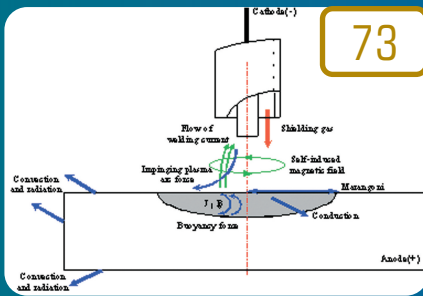
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The research paper entitled "Development of a mathematical model to study on variation of shielding gas in GTA welding" by I.S. Kim, J.S. Son, H.J. Kim and B.A. Chin on a **page 73** shows technology which alternately supplies the different kinds of shielding gases in weld zone. In this study, welding characteristics under variation of alternate supply method of shielding gases in austenite stainless steel using a GTA welding process have been investigated and found the relationship between different types of shielding gas and shielding gas supply. The computed results showed that the developed computational models are very adequate to predict in the weld pool and bead geometry, and the technique of alternate supply of shielding gas should be useful to increase higher productivity, cost savings and better quality in arc welding.
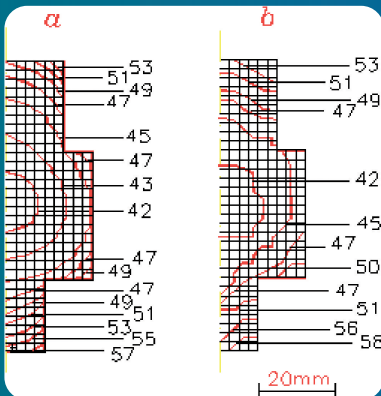
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The paper entitled "Computer simulation of mechanical properties, stresses and strains of quenched steel specimen" presented by B. Smoljan on a **page 81** shows the basis of control volume method the algorithm for prediction of hardness distribution, residual stresses and strains in quenched steel specimens with complex geometries. The mathematical model of steel hardening is consisted of numerical calculation of temperature field change in process of cooling, and of numerical simulation of hardness. The hardness has been predicted by the conversion of calculated time of cooling from 800ºC to 500ºC to hardness results, using the Jominy hardenability curve. The established model of steel quenching could be successful in the practice of heat treatment.

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