



Materials

- 7. A case based reasoning aluminum thermal analysis platform for the prediction of W319 Al cast component characteristics
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- 18. Cold worked high alloy ultra-high strength steels with aged martensite structure
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Properties

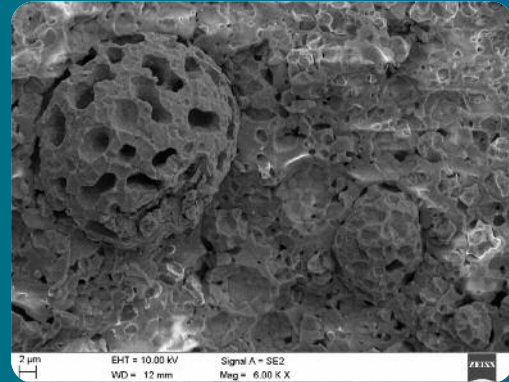
- 25. Plasma nitriding as a prevention method against hydrogen degradation of steel
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Analysis and modelling

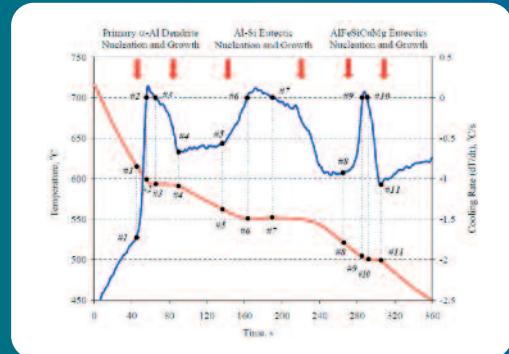
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Selected materialographical photo



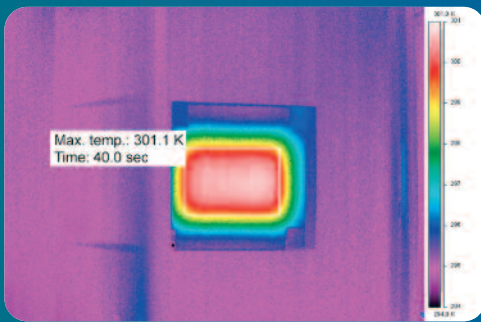
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The paper from Manufacturing and processing area made by G. Matula, T. Jardiel, B. Levenfeld and A. Várez on "Application of powder injection moulding and extrusion process to manufacturing of Ni-YSZ anodes" on a **page 87** describes the investigation of the Ni-YSZ cermets for anode supported solid oxide fuel cells (SOFC) prepared by extrusion or powder injection moulding process, sintered and reduced of NiO-YSZ. The proposed technological solutions for fabricating anodes as tubes or flat shapes will make connecting the cells into packets possible which will allow increasing the cell power. The presented investigation results confirm purposefulness of employing injection moulding or extrusion for fabrication of fuel cells anodes. These two methods are used for manufacturing elements of devices in a mass scale. Significant interest in fuel cells and rapid development of their production which should take place in the close future may be the reason for searching the inexpensive technological solutions in the manufacturing process of the cells.



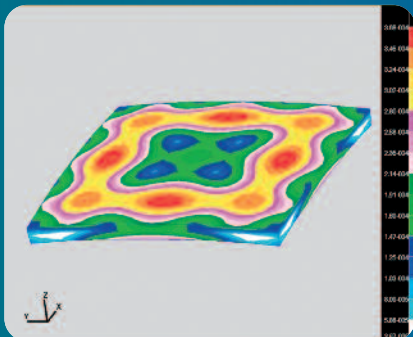
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The Materials section represented by G. Pelayo, J.H. Sokolowski and R. Lashkari on "A Case Based Reasoning aluminum thermal analysis platform for the prediction of W319 Al cast component characteristics" on a **page 7** presents the research on the development of the Aluminum Thermal Analysis Technology Platform (AITAP) utilizing a Case Based Reasoning (CBR) Caspian shell for interpretation of industrial cooling curves and predicting alloy and cast component characteristics. CBR being a branch of Artificial Intelligence (AI) that solves problems based on understanding and adaptation of previous experiences is suitable for interpretation of the AITAP results since this is a knowledge intensive activity which requires a fair amount of experience. Industrial trials confirmed the technical capabilities of the AITAP/CBR Platform for the on-line quality control and prediction of 319 melt characteristics and the aluminum engine block's (Cosworth casting process) engineering specifications. The integrated AITAP and CBR system was found to be useful for the prediction of melt thermal characteristics, cast component mechanical and structural properties. An automated AITAP Platform integrated with a CBR system is a new Quality Control concept in the area of the aluminum automotive casting.



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In the paper entitled "The application of transient thermography for the thermal characterisation of carbon fibre/epoxy composites" by G. Wróbel, Z. Rdzawski, G. Muzia and S. Pawlak on a **page 49** the evaluation the local fibre content in carbon fibre/epoxy composites using transient thermography is presented. The experiments have been performed using transient thermography to obtain the thermograms for carbon/epoxy specimens with different carbon fibre content. From obtained thermograms the thermal diffusivity values were determined and compared for each specimen and correlated with carbon content. The composites were two times tested using two different heating conditions to check the conformity of determined diffusivity values. The originality of present investigation is in application of transient thermography for local fibre content evaluation in polymer composite materials. The method should be of interest for the industrial quality control applications and is of great importance for composite products with high failure-free requirements. The results obtained from present experiment would be of great importance in the industrial applications to obtain first estimate of carbon fibre content in fibre reinforced composite materials.



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Authors: A. Śliwa, J. Mikuła, K. Gołombek and L.A. Dobrzański in the paper entitled "FEM modelling of internal stresses in PVD coated FGM" on a **page 71** presents the problem of determining the internal stresses of composite gradient tool materials with the use of finite element method (FEM). The chemical composition of the investigated materials' core is corresponding to the M2 high-speed steel and was reinforced with the WC and TiC type hard carbide phases with the growing portions of these phases in the outward direction from the core to the surface. Such composed material was sintered, heat treated and deposited appropriately with (Ti,Al)N or Ti(C,N) gradient coatings. The presented model meets the initial criteria, which gives ground to the assumption about its usability for determining the stresses in coatings, employing the finite element method using the PATRAN software. The computer simulation results correlate with the experimental results. Nowadays the computer simulation is very popular and it is based on the finite element method, which allows to understand better the interdependence between parameters of process and choosing optimal solution. The possibility of application faster and faster calculation machines and coming into being many software make possible the creation of more precise models and more adequate ones to reality.

65. Experimental and numerical study of damage initiation mechanism in elastomeric composites
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71. FEM modelling of internal stresses in PVD coated FGM
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