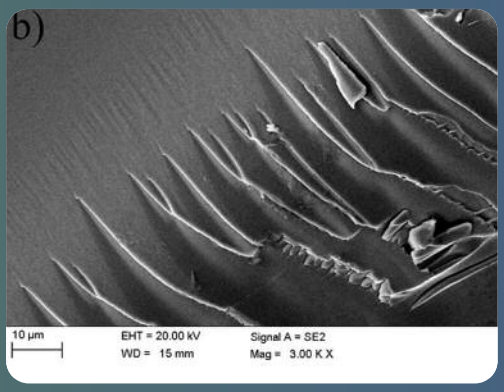
Contents

Materials

Properties

Selected materialographical photo



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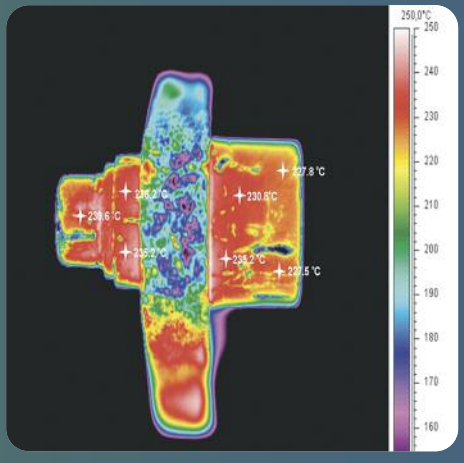
The research paper made by S. Lesz, S. Griner and R. Nowosielski on "Influence of geometry of rapidly solidified rods on properties of Fe-Co-based alloy" on a **page 16** describes the influence of geometry of rapid solidified rods on properties (structure, fracture morphology, microhardness) of $Fe_{36}Co_{36}B_{19}Si_5Nb_4$ alloy. The following experimental techniques were used: differential thermal analysis (DTA), scanning electron microscopy (SEM), light microscopy (LM), X-ray diffraction (XRD) method, Vickers microhardness. Changes of mechanical properties (microhardness) and different fracture morphology of rapidly solidified rods were presented. The rapidly solidified bulk alloys have been commercialized in magnetic application and high strength materials. Success in this area will result in the increasing importance bulk alloys in engineering.



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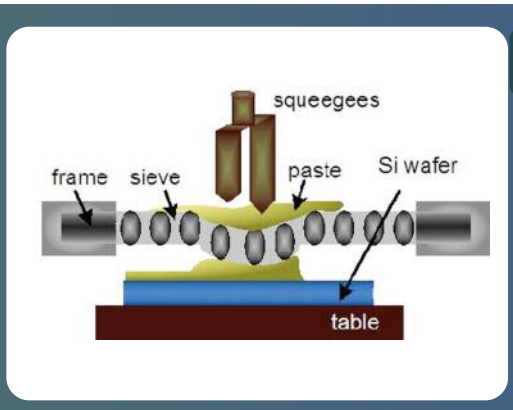
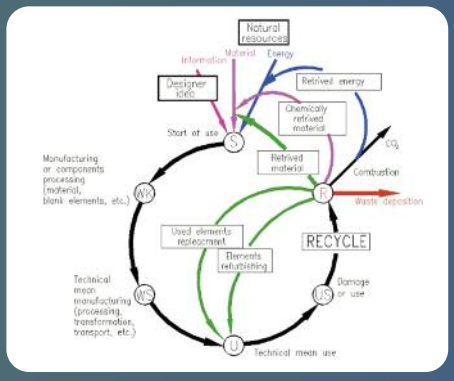
The paper entitled "Thermography in plastics welding processes assessment" by M. Rojek, J. Stabik and G. Muzia on a **page 40** demonstrates the possibilities of thermovision technique to evaluate temperature distribution on heating tools surfaces of plastics welding machines and temperature distribution on heated surfaces of welded parts. The quality of ready welds is essentially dependent on uniform heating of welded parts. Achieved results shown that thermography may be applied as a tool to quick temperature distribution evaluation on heating elements and welded parts. The originality of the research comprises in evaluation of relation between temperature distribution on heating elements and temperature distribution on welded parts heated with given tools. Achieved results showed that thermography may be applied in industrial practice to test heating elements of plastics welding machines. Also welded parts may be scanned with this methodology.



The paper written by L.A. Dobrzański, M. Musztyfaga, A. Drygała and P. Panek on "Investigation of the screen printed contacts of silicon solar cells using Transmission Line Model" on a **page 57** informs how to improve the quality of the screen printed contacts of silicon solar cells. This means forming front side grid in order to decrease contact resistance. This work presents a conventional analysis of a screen printing process for contact formation in the crystalline silicon solar cells. The seed layer was created using silver pasts by the screen printed metallisation. These contact structures were investigated using SEM to gain a better understanding of the obtained electrical parameters. The contact resistance of the screen-printed metallisation depends not only on the kind of applied paste and firing conditions, but is also strongly influenced by the surface morphology of the silicon substrate. The effect of co-firing different pasts (especially a past, which was prepared using silver nano-powder) on electrical properties of silicon wafers.

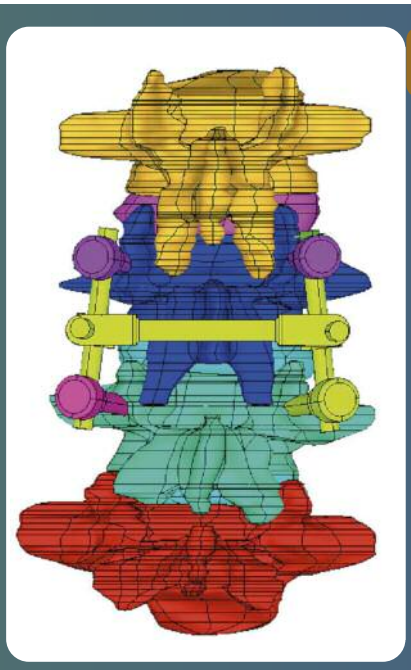


The Analysis and modelling area section represented by P. Gendarz and W. Janik on "Refurbishing technologies of hydraulic actuators applied in mining industry" on a **page 104** informs that the future design and manufacturing processes should be oriented to refurbish and overhaul, such as mining machines, hydraulics, military industry, heavy industry products, etc. This paper shows method which can improve indirectly profitability also in environment protection area. For last twenty years no development in area of patents were noticed. That came with increase of consumption strategy progressed by producers. A presented method solves issues of materials raise in prices and relatively short time of maintenance and service time period. New workstations in industry can be created with the application of the method. Mining industry after possible initiate refurbishing methods, can extend exploit time of exerted machines. Simultaneously producers of mining machines and equipment, after bringing in design for refurbishing strategy in to production, can enhance economical profits from maintenance and service time prolongation. Preparation of overhaul documentation for families of constructions, should be computer aided with use of prepared dedicated software. Time need to prepare refurbishing technology, can be considerably reduced.

Methodology of research

Analysis and modelling

Manufacturing and processing



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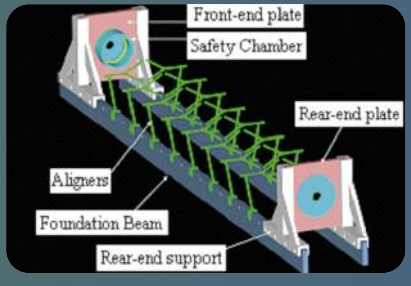
The research paper made by M. Kiel, J. Marciniak, M. Basiaga, J. Szewczenko, W. Kuś, G. Kokot and T. Wadek on "Numerical and experimental analysis of spine's transpedicular stabilizer" on a **page 124** describes the numerical and experimental analysis of spine's transpedicular stabilizer on a lumbar part of spine. The result of the analysis was determination of displacements of the stabilizers' elements. To define numerical characteristics of the lumbar spine – transpedicular spine stabilizer system, the finite element method was applied. Geometrical models of a lumbar part of a spine and a transpedicular stabilizer were discretized by SOLID95 element. The boundary conditions imitating phenomena in a real system with appropriate accuracy were established. The experimental analysis was carried out for spine's transpedicular stabilizers which were implanted on a lumbar part of a pig spine. The analysis was realised by means of testing machine MTS Insight with the use of videoextensometer. Numerical and experimental analysis were carried out for a stabilizer made of stainless steel Cr-Ni-Mo. A system was loaded by uniaxial compression with forces from 50 N to 1600 N. Both results of numerical and experimental analysis showed a correct selection of mechanical properties of metallic biomaterial which were used to made the proposed type of a transpedicular stabilizer.



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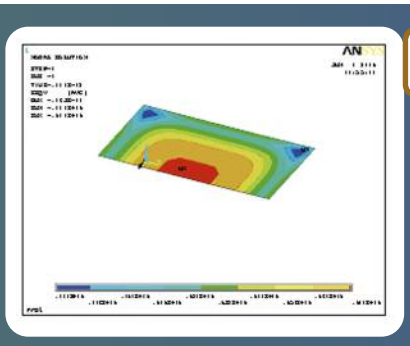
The paper entitled "Experimental and numerical investigation of expandable tubular structural integrity for well applications" by T. Pervez on a **page 147** informs that in recent years, solid expandable tubular technology has already made significant inroads in replacing conventional telescopic oil wells. It allows design and realisation of slim wells, accessing difficult and ultra-deep reservoirs, well remediation, zonal isolation, drilling of directional and horizontal wells, etc. The ever-increasing energy demand has forced researchers to search for new and cheaper solutions for oil and gas production. The recent development of solid expandable tubulars (SETs) has resulted in design of slim oil and gas wells. The large plastic deformation experienced by the tubular under down-hole environment may result in premature and unexpected failures. The objective of this research is to investigate the structural integrity of SET for well applications to avoid such failures. SET is an emerging technology for oil and gas industry. The current findings are very valuable for researchers and well engineers to design slim wells and enhance the productivity of older wells.



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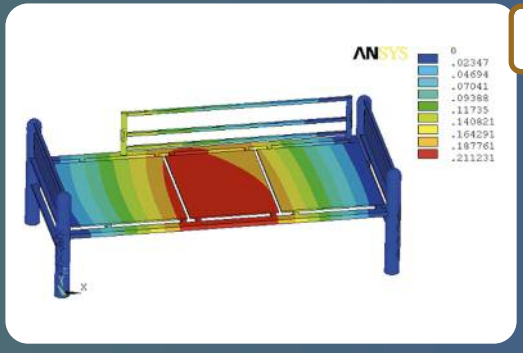
The paper written by A. Śliwa, J. Mikuła and L.A. Dobrzański on "FEM application for modelling of PVD coatings properties" on a **page 164** presents information about determining the internal stresses of composite tool materials with the use of finite element method (FEM). The chemical composition of the investigated materials' core corresponds 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) coatings. It was confirmed that using of the finite element method in stresses modelling occurring in advanced composite materials can be a way for reducing the investigation costs. In order to reach this purpose, in the paper a simplified model of composite materials with division on zones with established physical and mechanical properties was used. Results reached in this way satisfy and in a slight degree differ from results reached by an experimental method. Computer aided numerical analysis gives the possibility to select the optimal parameters for coatings covering in PVD process determining the stresses in coatings, employing the finite element method using the ANSYS software.



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The Analysis and modelling section represented by B. Ziębowicz, A. Ziębowicz and J. Szkodny on "FEM used in improvement of quality of medical devices" on a **page 172** presents the biomechanical characteristics of the medical bed made of carbon steel and an assessment of its stability. To define the biomechanical characteristics of the bed design, the finite element method was applied. Additionally, the risk analysis was conducted according to the directives of ISO 14971 standard. The obtained results can be useful in the designing process (modification of requirements regarding design and construction, as well as materials used in the production of the device, and reduction of risk as far as possible to the patient). They prove that 3D geometrical analysis works quite well for assistive medical devices design. The analyses showed the difference in displacements, strains and stresses in the characteristic points depending on the selected loading. That also helped to determine maximal loading causing the exceeding of the yield stress of the bed's components.

Industrial management and organisation