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Materials

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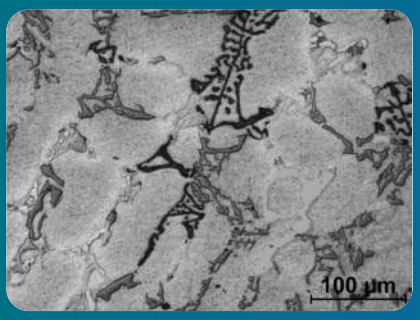
Selected materialographical photo



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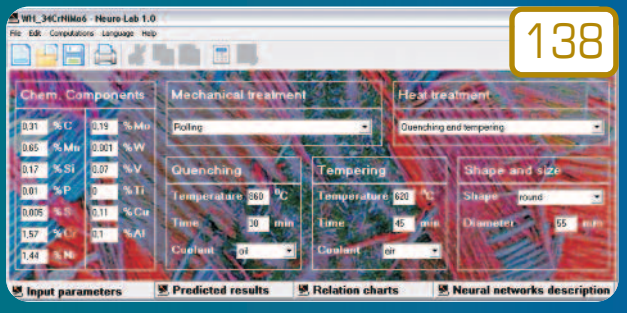
The paper entitled "Development of textile-reinforced carbon fibre aluminium composites manufactured with gas pressure infiltration methods" by W. Hufenbach, M. Gude, A. Czulak, J. Śleziona, A. Dolata-Grosz and M. Dyzia on a **page 177** shows potential of textile-reinforced carbon fibre aluminium composite with advantage of the lightweight construction of structural components subjected to thermo-mechanical stress.
Load-adapted CF/Al-MMC, due to the relatively high stiffness and strength of the metal matrix, allows for the introduction of extremely high forces, thereby enabling a much better exploitation of the existing lightweight construction potential of this material in comparison to other composite materials. Constantly rising demands on extremely stressed lightweight structures, particularly in traffic engineering as well as in machine building and plant engineering, increasingly require the use of endless fibre-reinforced composite materials which, due to their selectively adaptable characteristics profiles, are clearly superior to conventional monolithic materials. The manufacture of specimens of the carbon fibre-reinforced aluminium was realised with the aid of an advanced differential gas pressure infiltration technique, which was developed at ILK, TU Dresden.



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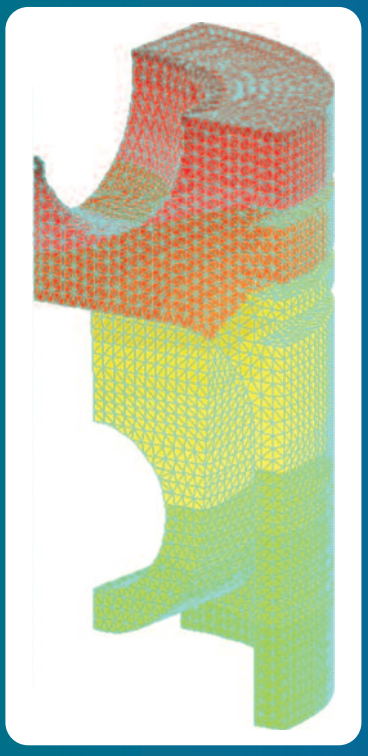
The Analysis and modelling section represented by L.A. Dobrzański and R. Honysz on "Computer modelling system of the chemical composition and treatment parameters influence on mechanical properties of structural steels" on a **page 138** presents the Neuro-Lab. It is an original programme, which use algorithms of artificial intelligence for structural steels mechanical properties estimation. On the basis of chemical composition, parameters of heat and mechanical treatment and elements geometrical shape and size this programme has the ability to calculate the mechanical properties of examined steel and introduce them as raw data or influence charts. It is possible also to examine the dependence among the selected steel property and chosen input parameters, which describes this property. The ability of the mechanical properties estimation of the ready, or foreseen to the use, material is unusually valuable for manufacturers and constructors. This signifies the fulfilment of customer's quality requirements as well as measurable financial advantages for material manufacturers. The presented programme can be an effective replacement of the real experimental methods of properties determination in laboratory examinations. It can be applied as the enlargement of experimental work. It is possible also to investigate models coming from new steel species, that were not produced yet.



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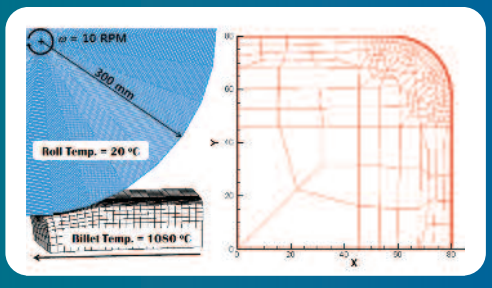
In the research paper entitled "The influence of the engine load on value and temperature distribution in the piston of the turbocharged Diesel engine" by P. Gustof and A. Hornik on a **page 146** the determination of the temperature distribution in the piston in initial phase of the work of the turbocharged Diesel engine is presented. The computations presented the possibility of use of the mathematical models of the combustion processes and the heat transfer on individual surfaces of the piston used by the variable values of the boundary conditions and temperature of the working medium in initial time of the work engine. The results of numeric calculations of the heat loads of the piston displayed the possibility of the use of the original two-zone combustion model and finite elements method to the analysis of values and temporary temperature distribution on individual surfaces of the piston. The results of calculations of the temperature distribution in the piston of the turbocharged Diesel engine in dependence from the engine loads were received by means of the two – zone combustion model and the finite element method.



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Authors: H.C. Lee, J.S. Choi, K.H. Jung and Y.T. Im in the paper entitled "Application of element deletion method for numerical analyses of cracking" on a **page 154** present a numerical algorithm to simulate cracking and its evolution for machining, shearing and multi-pass hot bar rolling processes. The developed element deletion algorithm was simple to be applied for simulating cracking and shearing patterns for the processes applied. Cockcroft-Latham and specific plastic work fracture criteria were reasonable in predicting the internal and external crack, respectively. By expanding the current approach to determine a processing map for extrusion the processing condition to prevent Chevron cracking can be determined easily and utilized in industry. Also, the current investigation can be easily expanded to other process design and control. Numerical algorithm based on the element deletion method was developed and implemented to the existing finite element programme to examine the processes including cracking phenomenon. The applicability to utilize a critical damage factor for the fracture criteria based on the instability was evaluated.

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