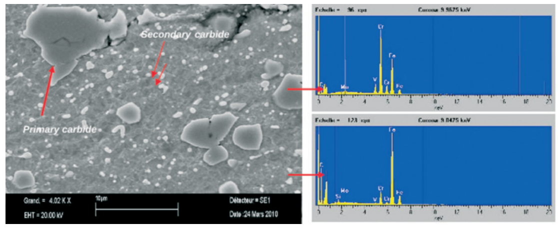
Contents

Manufacturing and processing

Materials



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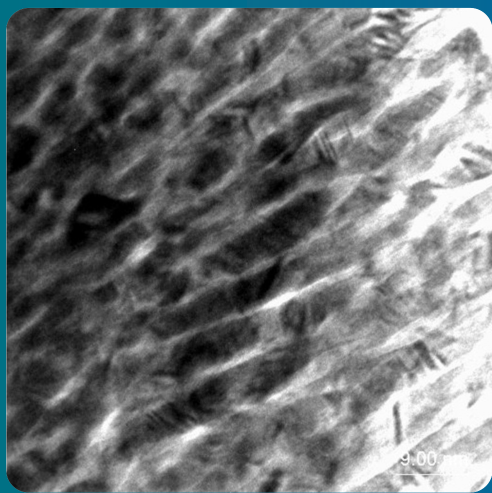
The Manufacturing and processing area is shown in the paper on "Effect of cutting parameters on chip formation in orthogonal cutting-I" by S. Ben Salem, E. Bayraktar, M. Boujelbene and D. Katundi on a **page 7**. The purpose of this paper is to study the chip formation to obtain the optimal cutting conditions and to observe the different chip formation mechanisms. Machining of hardened alloys has some metallurgical and mechanical difficulties even if many successful processes have been increasingly developed. A lot of study has been carried out on this subject, however only with modest progress showing specific results concerning the real efficiency of chip formation. Analysis of machining of a hardened alloy, X160CrMoV12-1 (cold work steel: AISI D2 with a ferritic and cementite matrix and coarse primary carbides), showed that there are relationships between the chip geometry, cutting conditions and the different micrographs under different metallurgical states. The "saw-tooth type chips" geometry has been examined and a specific attention were given to the chip samples that were metallographically processed and observed under scanning electronic microscope (SEM) to determine if white layers are presented. A special detail has been given to the mechanism of chip formation resulting from hard machining process and behaviour of steel at different metallurgical states on the material during the case of annealing and or the case of quench operations.



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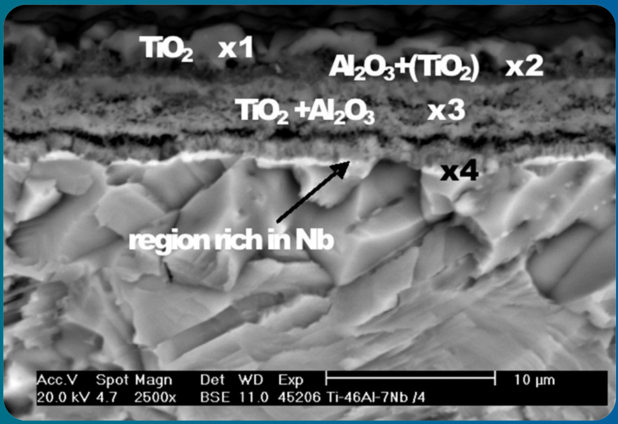
In the paper entitled "Structure of rolled CuTi4 alloy" by J. Konieczny and Z. Rdzawski on a **page 26** the microstructure of the heat treated and cold rolled commercial CuTi4 copper alloy is presented. Decomposition of supersaturated solid solution in that alloy is similar to the alloys produced in laboratory scale. The observed differences in microstructure after supersaturation were related to the presence of undissolved Ti particles and increased segregation of titanium distribution in copper matrix including microareas of individual grains. The mentioned factors influence the mechanism and kinetics of precipitation and subsequently the produced wide ranges of functional properties of the alloy. Cold deformation (50% reduction) of the alloy after supersaturation changes the mechanism and kinetics of precipitation and provides possibilities for production of broader sets of functional properties. It is expected that widening of the cold deformation range should result in more complete characteristics of material properties, suitable for the foreseen applications. Similar effects can be expected after application of cold deformation after ageing. The mentioned factors influence the mechanism and kinetics of precipitation and subsequently the produced wide ranges of functional properties of the Cu-Ti alloys. The elaborated research results present some utilitarian qualities since they can be used in development of process conditions for industrial scale production of strips from CuTi4 alloy of defined properties and operating qualities.



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In the paper entitled “Effect of Al_2O_3 and AlCrN coatings on 950°C cyclic oxidation behaviours of γ-TiAl” by J. Małecka on a **page 40**, the examinations of the intermetalic alloy with Al_2O_3 and AlCrN coatings and its resistance in air at temperatures 950ºC, typical for working conditions of highly loaded parts of gas turbine was introduced. The objectives were achieved using several techniques including conventional metallography, SEM, BSE, EDX and precision measurements of mass loss. The oxides scales and their effects were investigated at temperatures 950ºC. It was stated that the technology of magnetron sputtering used, allowed to deposit the coating that ensured the improvement of high temperature oxidation resistance without interference in mechanical properties of the alloy. Heat resistance of the alloy coated with a protective film of Al_2O_3 and AlCrN is higher than in the initial state alloy. These coatings reduce the oxidation rate and cause the mass growth to be smaller compared to the uncoated alloy. The dominating ingredient of the formed scale is Al_2O_3 as expected, which has a positive impact on increasing heat resistance of the alloy. Despite high oxidation resistance of AlCrN coating, trace elements of rutile can be detected in the scale, which is generated due to ex-core diffusion of titanium. Taking into consideration the presented results it can be concluded that the coating of AlCrN caused the heat resistance of the substrate alloy to increase without interference in its mechanical properties, which can be a foundation for its prospective application.

Properties