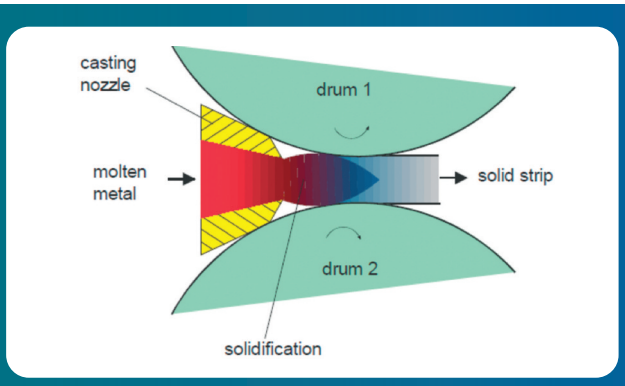
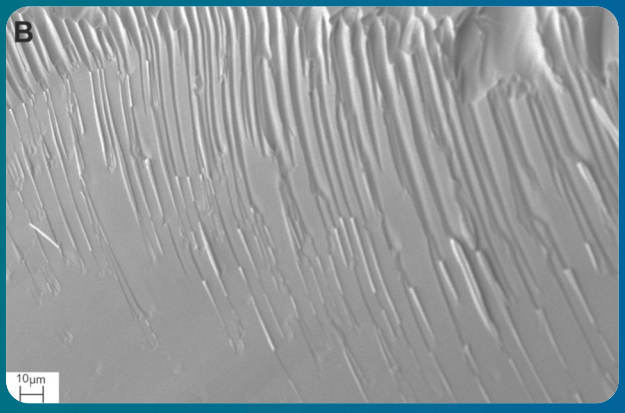
Manufacturing and processing

Materials



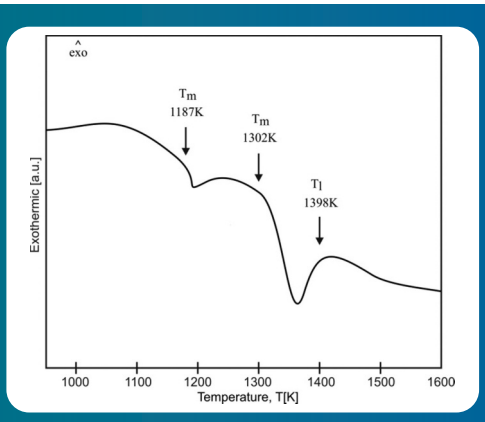
59

The Manufacturing and processing section represented by M. Rosso and I. Peter on "Continuous casting and rolling for the manufacturing of thin Al sheets" on a **page 59** presenting the state-of-the-art and the mechanism of Al continuous casting process and to improve the microstructure of the Al sheets reducing the morphological differences between the surface layer and the core of the considered alloy. The continuous increase of Al-based alloys in different applications involves manufacturing high integrity and superior performance components using cost-effective and safely processes. In this direction the research communities together with manufacturing industries are focusing their attention to develop new and enhanced products using innovative procedures. The central issue is the technological transfer to industry for affordable mass production. Obtaining a fine and homogenous microstructure for Al sheets by reducing the morphological differences between the surface layer and the core of the alloy improved mechanical performances and enhanced workability and machinability has been obtained. High performance end-product make this type of alloy very attractive for packaging material production. The positive effect of the homogenization treatment and rolling on the microstructure has been demonstrated. The homogenized alloy presents improved workability and machinability.



67

In the paper entitled "Structure and density of $Fe_{36}Co_{36}B_{19.2}Si_{4.8}Nb_4$ bulk glassy alloy" by A. Januszka and R. Nowosielski on a **page 67** density measurements of bulk metallic glasses in as-cast state. And a casting method and structure characterization displayed are presented. The XRD and SEM investigations revealed that the studied samples in form of rods were amorphous. Broad diffraction "halo" was observed for every testing piece. Fracture observation confirmed glassy state of samples. Archimedes principle allows calculating density of tested sample. The obtained results confirm the utility of applied investigation methods in the thermal and structure analysis of examined amorphous alloys. Density of metallic glasses is important property which has an influence on specific application of these materials. This materials offer attractive qualities, combining some of the desirable properties of conventional crystalline metals and the formability of conventional oxide glasses. The FeCo-based bulk metallic glasses have attracted great interest for a variety application fields for example electric applications, precision machinery materials or structural materials. Metallic glasses exhibit higher density than their crystalline counterparts and could be applied as a satisfactory structural material.



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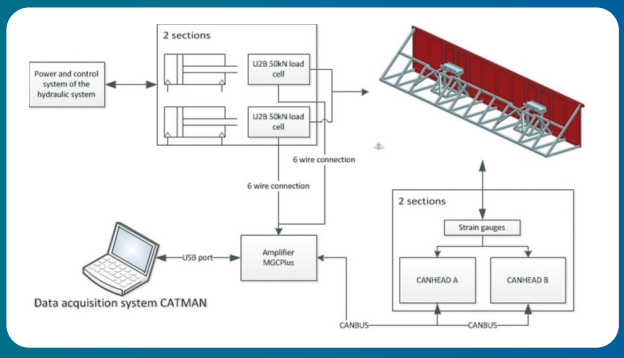
The Materials section represented by W. Pilarczyk on "The study of glass forming ability of Fe-based alloy for welding processes" on a **page 83** describes the thermal analysis and structure of selected Fe-based bulk metallic glasses for welding processes. The studies were performed on Fe-Co-B-Si-Nb alloy in form of plate and rod. Master alloy ingot with compositions of $Fe_{37.44}Co_{34.56}B_{19.2}Si_{4.8}Nb_4$ was prepared by induction melting of pure Fe, Co, B, Si and Nb elements in argon atmosphere. The investigated material was cast in form of plate with thickness 0.5mm and rod with diameter 3mm. The structure analysis of the studied materials in as-cast state was carried out using X-ray diffraction (XRD). The thermal properties: glass transition temperature (T_g), onset crystallization temperature (T_x) and peak crystallization temperature (T_p) of the as-cast alloys were examined by differential scanning calorimetry (DSC) and melting temperature (T_m), liquidus temperature (T_l) by differential thermal analysis (DTA) methods. The parameters of glass forming ability included reduced glass transition temperature (T_{rg}), supercooled liquid region (ΔT_x), α, β, γ, δ and stability (S) were calculated. The Fe-based bulk metallic glasses in form of plate and rod with good glass forming ability were produced by die pressure casting method. The investigation methods revealed that the studied as-cast bulk metallic glasses were amorphous. These materials exhibit good glass-forming ability. The calculated GFA parameters indicated that the slightly best glass-forming ability has $Fe_{37.44}Co_{34.56}B_{19.2}Si_{4.8}Nb_4$ alloy in form of rod. It is confirmed that these parameters could be used to determine glass forming ability of tested amorphous alloy for welding processes. These obtained values of GFA parameters can suggest that studied alloys are suitable materials for further practical application at welding process.



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The paper made by A. Baier M. Majzner on "Application of feature based method in constructing innovative sheathing of railway wagons" on a **page 91** presents the use of composite materials in the construction of freight cars. Particular attention was paid to the use of these materials in the construction of a freight wagon door. It is dangerous when mechanical damage is made to wall panels of a wagon during transport. Improperly distributed transported material can exceed the allowable stress level and thereby damage the lining of the wagon. One possible solution to this problem is replacing steel plates with composite panels which have better mechanical properties and do not cause an increase of the nominal weight of a freight wagon. Composite materials made of 5 mm steel plate and a multilayer laminated panels can be used in the construction of freight cars. Composite panels can be applied in the repair and construction of freight wagon shells. The obtained result shows the possibility of reducing the weight of the whole railway carriage and the price of a wagon repair, eliminating the need to completely remove the shell. Innovative use of composite panels in the repair and construction of structural elements of freight wagons, is new to the Polish scale. Initially DB Schenker Poland, is develops interest in further research and implementation of new technology.

Analysis and modelling