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(57) Abstract :

Solid state deposition (SSD) of an alloy surface layer on a substrate without melting the substrate is disclosed. At least one aluminium rod having holes at one end and which are filled with magnesium and zinc pins is used to deposit a layer of aluminum-magnesium-zinc alloy on a substrate of aluminium. Due to the friction between the aluminium substrate and the rotating aluminum rod that contains magnesium and zinc pins heat is generated which melts the magnesium and zinc pins to form aluminium-magnesium-zinc alloy. The plasticized Aluminum-magnesium-zinc material is transferred from the rotating rod to the aluminium substrate and forms a strong metallurgical bonding with mechanical mixing of the material at the interface of the coated layer and the substrate. During the entire process the aluminium substrate and the rotating rod do not undergo melting and stay within the solid state.

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Abstract:

Solid state deposition (SSD) of an alloy surface layer on a substrate without melting the substrate is disclosed. At least one aluminium rod having holes at one end and whi filled with magnesium and zinc pins is used to deposit a layer of aluminum-magnesium-zinc alloy on a substrate of aluminium. Due to the friction between the aluminium substrate and the rotating aluminum rod that contains magnesium and zinc pins heat is generated which melts the magnesium and zinc pins to form aluminium-magnesi alloy. The plasticized Aluminum-magnesium-zinc material is transferred from the rotating rod to the aluminium substrate and forms a strong metallurgical bonding with mechanical mixing of the material at the interface of the coated layer and the substrate. During the entire process the aluminium substrate and the rotating rod do not ur melting and stay within the solid state.

Complete Specification

Claims:1. We claim, producing surface alloy layer on a metallic substrate by solid state deposition method comprising:
Processing at least one substrate of pure aluminium to provide a surface alloy coating layer without melting the substrate by using an aluminium rod which contains a minimum of two or more than two holes at one end of the rod which are filled with magnesium and zinc pins in 1:1 Wt.% ratio.
2. The method of claim 1 where in the chemical composition of aluminium rod is with 99.5% Al and remaining being any impurity elements by Wt.%. The chemical composition of magnesium pin is with 99.5% Mg and remaining being any impurity elements by Wt.%. The chemical composition of zinc pin is with 99.5% Zn and remain being any impurity elements by Wt.%.
3. The method of claim 1 where in the sample of substrate can be a minimum of 100 mm length, 50 mm width and 5 mm thickness and the sample of aluminium rod c be a minimum of 25 mm diameter with 100 mm length and the holes at one end can be drilled with minimum of 2 mm diameter and 20 mm length.
4. The method of claim 1 where in a thin polyethylene sheet with a minimum of thickness 100 μm is used to close the holes filled with magnesium and zinc and is evaporated during the process due to the heat generated between the aluminium rod and the substrate.
5. The method of claim 1 where in the aluminium rod consisting of magnesium and zinc pins is rotated and brought to touch the surface of pure aluminium substrate applying a load ranging from 5kN to 10kN for 15 s.
6. The method of claim 1 where in the substrate and the rotating aluminium rods both stay within the solid state.
7. The method of claim 1 where in heat is generated due to friction between the aluminium rod and the aluminium substrate by which the magnesium and zinc pins fi in the holes of aluminium rod undergo melting and aluminium-magnesium-zinc alloy is formed during the transfer of material from the rotating rod to the substrate

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