Title (en)

AMORPHOUS OR GLASSY ALLOY SURFACED ROLLS FOR THE CONTINUOUS CASTING OF METAL STRIP

Title (de)

ROLLEN MIT AMORPHER ODER GLASIGER LEGIERUNGSOBERFLÄCHE ZUM KONTINUIERLICHEN GIESSEN VON METALLBÄNDERN

Title (fr)

CYLINDRES REVETUS EN SURFACE D'UN ALLIAGE AMORPHE OU NON CRISTALLIN POUR LA COULEE CONTINUE DE BANDE METALLIQUE

Publication

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Application

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Abstract (en)

[origin: WO9855251A1] Twin roll casting has been applied with some success to non-ferrous metals, which solidify rapidly on cooling. The same, however, is not true for ferrous metals, as it has not been possible to achieve sufficiently rapid and even cooling of metal over the casting surfaces of the rolls. This problem has been overcome by utilising a metallic surface for the rolls, which has a high affinity for the molten steel of the casting pool and a melting temperature greater than the temperature of the casting surface. The molten steel produces extremely good wetting of the casting surface of the roll, resulting in a wetting angle of the molten steel on the casting surface of less than 40 DEG . Preferably, this wetting angle is less than 20 DEG and the casting surface has an Arithmetic Mean Roughness Value (Ra) of less than 10 microns. These desirable properties on the roll surface are achieved by selecting an at least partially amorphous alloy of two constituents. Preferably, the alloy is a fully amorphous alloy of the nickel-phosphorus systemcontaining about 10 % phosphorus and the balance nickel, which may be applied by eletroless coating. This roll surface prevents the build-up of iron oxide on the casting surfaces of the rolls, which build-up interferes with the uniform conduction of heat away from the molten steel, resulting in simultaneous solidification of the delta and gamma iron phases (0.01-0.18 %C), which causes a surface defect, known as "crocodile-skin". The net effect of utilising this amorphous alloy for the surface of the casting roll is a superior and uniform conduction of heat away from the molten steel, rapid transformation of the steel's microstructure into the wholly austenitic (gamma) region, exhibited by fine prior austenite grain boundaries conforming to dendritic grain boundaries and absence of "crocodile-skin" surface defects on the cast strip.

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