

## Title (en)

Process for protecting a steel substrate or an aluminium alloy substrate against corrosion, permitting to provide it with good tribological properties, and resulting substrate

## Title (de)

Verfahren zum Schutz eines Stahlsubstrates oder eines Aluminiumlegierungssubstrates gegen die Korrosion, das erlaubt gute tribologische Eigenschaften aufzutragen und so erhaltenes Substrat

## Title (fr)

Procédé de protection d'un substrat en acier ou alliage d'aluminium contre la corrosion permettant de lui conférer des propriétés tribologiques, et substrat obtenu

## Publication

**EP 1365046 A1 20031126 (FR)**

## Application

**EP 03352010 A 20030514**

## Priority

FR 0206042 A 20020516

## Abstract (en)

Corrosion protection of a steel or aluminum sheet and imparting predetermined tribological properties involves depositing a composite coating of thickness above 3 microns on the substrate. The coating comprises at least one single-phase zinc-nickel (Zn-Ni) matrix containing dispersed particles selected according to the desired tribological properties. The Ni content of the matrix is 12-20%. Preferred Features: In order to impart tribological properties of hardness and resistance to abrasion and wear to the substrate, the dispersed particles are ceramic particles of hardness higher than that of the matrix. The average size D50 of the ceramic particles is 0.01-5 microns. The ceramic particles are selected from carbides, especially silicon carbide (SiC), and oxides, especially alumina (Al<sub>2</sub>O<sub>3</sub>) or zirconia (ZrO<sub>2</sub>). In order to impart tribological properties of lubrication to the substrate, the dispersed particles are organic polymer particles or mineral particles possessing lubricating properties. The average size D50 of the organic polymer particles is 0.01-5 microns. The organic polymer particles are polytetrafluoroethylene (PTFE) particles. The mineral particles are selected from sulfides, oxides, nitrides, in particular molybdenum disulfide (MoS<sub>2</sub>), and boron nitride (BN). In order to impart tribological properties of hardness, resistance to abrasion and wear, and lubrication to the substrate, the dispersed particles comprise ceramic particles of hardness higher than that of the matrix, and organic polymer particles or mineral particles possessing lubricating properties. The thickness of the Zn-Ni matrix is preferably 5-30 microns. The amount of the particles dispersed in the matrix is 1-20 volume %. Independent claims are given for a steel or aluminum alloy substrate having a coating obtained by the above process.

## Abstract (fr)

L'invention concerne un procédé de protection d'un substrat en acier ou alliage d'aluminium contre la corrosion, permettant de conférer audit substrat des propriétés tribologiques prédéterminées. Ce procédé est du type dans lequel on dépose sur le substrat un revêtement composite d'épaisseur supérieure à 3 microns formé, d'une part, d'au moins une matrice en alliage de zinc-nickel Zn-Ni adhérent audit substrat, d'autre part, de particules dispersées dans la matrice. Le procédé de l'invention se caractérise en ce que le revêtement composite est réalisé avec au moins une matrice en un alliage monphasé Zn-Ni dans lequel la teneur massique en nickel est sensiblement comprise entre 12% et 20%, les particules dispersées dans ladite matrice étant choisies de nature adaptée aux propriétés tribologiques recherchées.

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- [X] US 4908279 A 19900313 - YUSUKE HIROSE [JP], et al
- [X] EP 0174019 A1 19860312 - NIPPON STEEL CORP [JP]
- [A] DE 3333121 A1 19850328 - FRIEBE & REININGHAUS AHC [DE]
- [A] GB 2273109 A 19940608 - FORD MOTOR CO [GB]
- [X] DATABASE WPI Section Ch Week 198648, Derwent World Patents Index; Class M14, AN 1986-316392, XP002228114
- [A] DATABASE WPI Section Ch Week 199348, Derwent World Patents Index; Class M14, AN 1993-383577, XP002228115
- [A] PATENT ABSTRACTS OF JAPAN vol. 1995, no. 11 26 December 1995 (1995-12-26)

## Cited by

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