

Method for the production of structured chromium layers for media-contact surfaces

The novel method to form structured chromium layers uses electroplating at constant current density and initiates structure formation through temperature changes. Other than state of the art pulse electroplating, this method minimizes additives, energy consumption and risks. Structured chromium layers produced with the novel method have improved properties. They are very hard and wear resistant like conventional hard chrome. Depending on the parameters of the deposition process their surface topography can be adjusted for repellent - "easy to clean" properties - or vice versa for fluid retention properties as well, properties most needed in functional coatings like media contact surfaces.

BACKGROUND

State of the art galvanisation process in the production of structured chromium layers is characterized by changes in current density or pulse duration and/or the use of various additives to the electrolyte like salts of V, Zr, Bi, Se, Te, sulfonic acids and the like. High costs of a power supply system allowing pulse function, the immanent dampening of high-frequency pulses at high currents [kA] due to inductive resistance and excessive temperature increases during high-current pulse phase are major problems in industrial applications.

TECHNOLOGY

Electroplating is done at constant current density and structure formation is done by temperature changes in a marginal temperature range where two of the metallic morphologies of metallic chromium are coexisting. Using a DC system allows easy installation and simple plant design as well as minimizing power losses. The CrO_3 electrolyte is working with one source of sulphate. Additional additives are not needed. The novel method leads to structured chromium layers with improved properties.

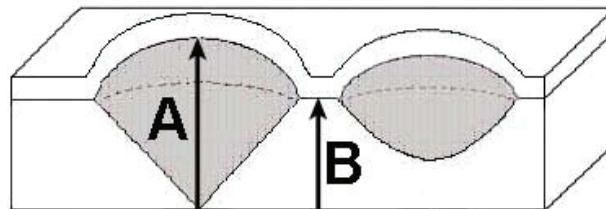


Fig. 1 A schematic representation of a growth of a structural element

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BENEFITS

- Production of structured chromium layers with special hardness, undercut-free and with designed surface topology in a 10 to 50 μm range
- Simple plant design and low investment costs
- Low production costs, minimizing additives and energy consumption
- Minimal risks through controlled temperature bandwidth

POTENTIAL APPLICATIONS

- media contact surfaces
- skin pass rolling of metal strips
- surfaces with high retention capacities like in engine or hydraulic cylinders
- self-cleaning surfaces
- surfaces with minimized wetting behaviour
- moving machine parts with improved tribologic behaviour

REFERENCE:
M049-07

OPTIONS:

- License Agreement
- Development Partnership

KEYWORDS:

Microstructured hard chromium, media contact surfaces, electroplating, functional coating

DEVELOPMENT STATUS:

Industrially applied for printing technology and steel band processing

PATENTS:

AT, EP patents granted

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