Poster-Session

Corrosion Optimisation of Ternary PVD Hard Nitride Coatings

Thomas Ulrich[1], Holger Hoche[1], Peter Polcik[2], Matthias Oechsner[1]

[1]Center for Engineering Materials MPA-IfW, Technical University of Darmstadt, Grafenstraße 2, 64283 Darmstadt, Germany; [2]Plansee Composite Materials GmbH, Siebenbürgerstraße 23, 86983 Lechbruck am See

thomas.ulrich@tu-darmstadt.de

Within the IGF project 20706N, a corrosion resistance of more than 1000 h in the neutral salt spray (NSS) test was achieved by alloying a binary TiN coating with MgGd and a coating thickness of about 4 µm. Furthermore, the TiMgGdN coating showed at least the same wear resistance and mechanical properties as the PVD-TiN coating.
This invention paves the way to establish PVD technology as a competitive and sustainable alternative to galvanic and chemical coatings, as the range of uses for PVD coatings can now be extended to corrosive applications. In addition, with a focus on the REACH regulation, further alternatives to environmentally harmful electroplated chromium coatings should be developed. Therefore, the Mg-Gd alloying concept will be applied for ternary coating systems (e.g. TiAlN, CrAlN, TiCN). Moreover, a substitution of Mg and the use of other rare earths will be investigated. The corrosion optimisation aims to open up further areas of application, e.g. in massive forming, machine and plant technology, energy generation and mobility.