

IMPROVEMENT OF THE TITANIUM WEAR RESISTANCE BY ELECTRON BEAM REMELTING OF THE PRE-DEPOSITED THERMAL

Goal of the project

Improvement of the exploitation performance of the titanium, especially wear behavior, without influencing its good corrosion resistance.

Short description of the project

Titanium is one of the most promising metals in field of high specific strength engineering. Although it offers attractive mechanical, chemical and physical properties, its surface properties are deficient, possessing poor fretting fatigue resistance and poor wear resistance properties. Thermal spray coatings is one of the most common ways to improve the surface characteristics of the materials being used in a wide range of industries to improve the abrasive, erosive, and sliding wear of machine components.

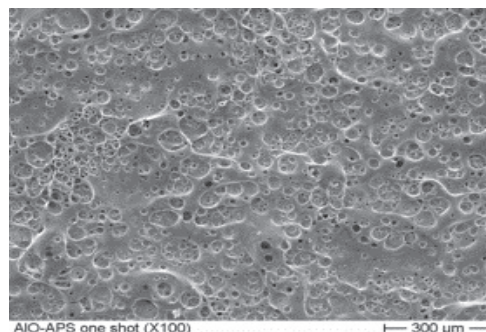
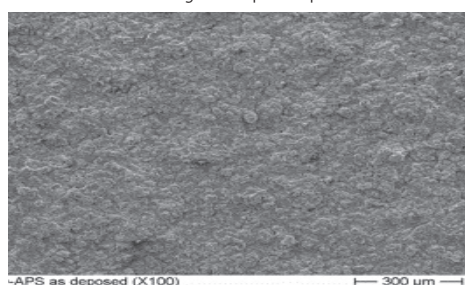
The proposed theme focuses on the improving of the titanium wear resistance by electron beam (EB) remelting of the pre-deposited oxitic powder Al₂O₃-TiO₂ using the high velocity oxygen fuel (HVOF) and atmospheric plasma spraying (APS) methods. The EB treatment may lead to the elimination of porosity, enhancement of the coating strength and chemical homogeneity, and the development of metallurgical bonding at the coating-substrate interface producing strengthened coatings adhesion.

Main activities

1. State of the art and perspectives evaluation in surface coatings technique used as a method in order to improve the wear behavior of the titanium;
2. Development of HVOF and APS sprayed Al₂O₃-TiO₂ coatings on the surface of titanium and their remelting using the electron beam (EB) method;
3. Analysis and characterization of the obtained HVOF sprayed Al₂O₃-TiO₂ coatings before and after the electron beam remelting treatment;
4. Study of the wear and corrosion behavior of the coatings before and after the electron beam remelting;

Results

- Deposition of the Al₂O₃-TiO₂ coatings using the HVOF and APS spraying methods on the surface of a titanium substrate
- Electron beam remelting of the pre-deposited Al₂O₃-TiO₂ coatings



Project implemented by

Politehnica University of Timisoara

Implementation period

02.09.2013-30.09.2016

Applicability and transferability of the results

The results which will be obtained in frame of the project will be transferred to companies in the field of automotive industry and not only. Also they will be presented to national and international conferences and published in scientific journals.

Research Centre

Research Centre for Processing and Characterization of Advanced Materials

Financed through/by

UEFISCDI – Executive Unit For Financing Education Higher Research Development And Innovation

Research team

Ion-Drăgost UTU – Project manager
 Viorel-Aurel SERBAN – senior researcher
 Cosmin CODREAN – senior researcher
 Carmen OPRIS – senior researcher
 Iosif HULKA – postdoc researcher

Contact information

Lecturer Ion-Drăgost UTU, PhD
 Department of Materials and Manufacturing Engineering
 Address: Bv. Mihai Viteazu, No.1, 300222. Timisoara
 Phone: (+40) 256 403 656
 E-mail: dragos.utu@upt.ro