

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 oxidic 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.

Project implemented by

Politehnica University of Timișoara

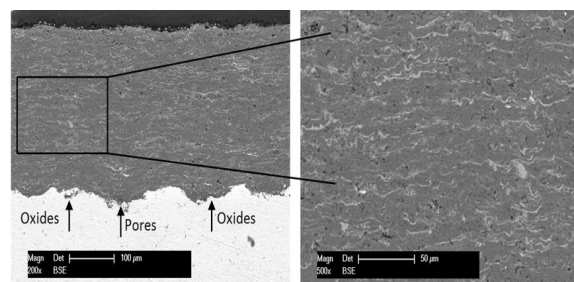
Implementation period

02.09.2013-30.09.2016

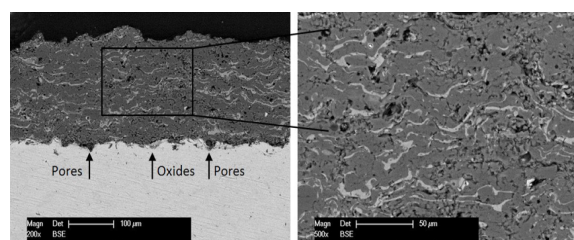
Main activities

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



a) SEM micrographs of the deposited Al₂O₃-TiO₂ coatings using HVOF



b) spraying process

Results

For the third stage of the project it has been obtained the following results:

- characterization of the predeposited Al₂O₃-TiO₂ coatings using the HVOF and APS spraying processes before and after the electron beam remelting treatment;

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. A
- Iso 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

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Research team

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