



HORIZON-CL4-2021-RESILIENCE-01-12: Safe- and sustainable-by-design metallic coatings and engineered surfaces (RIA)

Ideas for the project:

HEU calls are aimed to transform the industry toward the efficient use of existing resources and raw materials. Renovation technologies can help to significantly extend material lifecycle, to restore the geometric shape and dimensions of the functional surfaces of the components, as well as to increase their wear resistance. Moreover, development new layers gives the possibility to change the properties of the surface, adapt it to new operating conditions, or to give the surface completely new properties and thus give the product a new added value. Reducing the content of heavy elements in coatings while improving environmental requirements.

Our ideas for the project:

Development of new additional materials for the formation of highly resistant coatings for hard tribocorrosive conditions to increase the service life and ensure the sustainable use of components. Development and testing of coatings with the effect of thermal barrier, and coatings without toxic elements. Designing innovative strategies to improve the recyclability and reuse of products at the end of their life using advanced renewable technologies and materials.

Previous solutions: increasing the service life of mobile crane wheels, continuous steel casting rollers, sliding liners of supports for pontoon bridge, molds for high-pressure die casting of aluminum, strain gauge rollers, BOF converter hood in steel production, functional surfaces of earthworking and agricultural machinery. The use of natural waste materials for the process of cleaning and roughening metal surfaces before coating application, to replace metallic, energy-consuming-by-production abrasives with respect to ecodesign.

Experience and infrastructure offered:

1. Up to date infrastructure for testing of chemical, microstructural, mechanical, corrosion, tribological properties and surface integrity of coatings and layers
2. Surface engineering data collection and its evaluation
3. Advanced monitoring techniques for corrosion properties of materials and coatings (EIS, electrochemical noise)

Projects solved, related to the issue:

1. The utilization of innovative technology for repair functional surfaces of mold casting dies for castings in automotive industry (national research grant), see Brezinová J., Viňáš J., Maruschak P.O., Guzanová A., Draganovská D., Vraběl M.: Sustainable renovation within metallurgical production, Lüdenscheid: RAM, Verlag, 2017, 215 p. ISBN 978-3-942303-58-3.
2. Several national projects focused on design of wear resistant surface layers made by various hard surfacing technology and HVOF thermal spray technology combined with PVD duplex thin films.
3. Several national projects focused on application of progressive technologies in restoration of functional surfaces of products, see Brezinová J. et al, Selected Properties of Hardfacing Layers Created by PTA Technology, <https://www.mdpi.com/2075-4701/11/1/134>, or Brezinová J. et al, Application of Cold Metal Transfer Welding for High Pressure Die Casting Mold Restoration, <https://www.mdpi.com/2075-4701/9/11/1232>, or Brezinová J. et al, Microstructure, wear behavior and corrosion resistance of WC-FeCrAl and WC-WB-Co coatings, <http://www.mdpi.com/2075-4701/8/6/399>.

Partners in previous research projects:

University of Pardubice, Czech Technical University in Prague, Ternopil Ivan Puluj National Technical University, Rzeszów University of Technology, University of Miskolc, University of Novi Sad, Cracow University of Technology

Contacts to industrial partners:

GETRAG FORD Transmissions, Magna P, VW Slovakia, Oerlikon, Minebea, MASAM, Welding, CHARVÁT STROJÁRNE, Křížik, Marelli, WISTA, Tatravagónka, Energyco, Askozvar

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