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Nanotechnology & Smart Materials 2018: Nanotechnology based solutions for enhanced products and processes in existing industrial manufacturing plants - Cristina Elizetxea - TECNALIA, Spain

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Introduction: Key Enabling Technologies (KETs) provide the basis for innovation in a range of products across all industrial sectors. However, one of the major weaknesses of Europe with regards to them lies in the difficulty of translating its knowledge base into marketable goods and services. IZADI-NANO2INDUSTRY Project takes this challenge and, proposing different solutions based on KETs such as nanotechnology, advanced materials and manufacturing, contributes to overcome the barriers that nanomaterials are facing to get introduced in the market.

Methods: conventional materials and injection moulding, casting and coating manufacturing processes are improved by nanotechnology and combined in three innovative PILOTS at different existing production plants: TRIBONANO Pilot: nanostructured powders for metallic cermet coatings and thermal spray technology for solid state deposition HARDCAST Pilot: nano-reinforcements added and dispersed via master-pellets in a new, low cost and safe gravity casting process ESTCRATCH Pilot: nanoreinforced thermoplastic based on masterbatches and inserts with nanotextured surfaces for injection moulds.

Results: new performance-enhanced components for the construction and agricultural machinery sector and the automotive one are produced at industrial scale, reaching TRIBONANO Pilot: nanostructured coatings with improved ductility, toughness and sinterability, increased strength and resistance; metallic parts (valve plate of hydraulic motor) with increased mechanical efficiency; subsequent reduction of fuel consumption and CO2 emissions. HARDCAST Pilot: nano-added material with 30% increased tensile properties maintaining ductility in comparison with standard ductile cast iron one; possibility for lightweight concepts and subsequent consumption/emission reduction; reduction of the component (swash plate of hydraulic motor) production phases and of the related costs ESTCRATCH Pilot: PMMA with improved scratch resistance more than 140% compared to standard one, low colour variation of the material; reduction of parts' (b-pillar) production phases and costs, greener manufacturing process, improved recyclability of the parts.

Discussion: Proposing technological solutions with minimum necessary changes to existing production lines and able to reduce production phases and costs can improve the acceptance of KETs by the industrial sector, so overcoming that innovation gap identified as the European 'Valley of Death' This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 686165.

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