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SYNTECS
SUSTAINABLY AND DIGITALLY DRIVEN HIERARCHICAL LASER TEXTURING FOR COMPLEX SURFACES

SYNTECS PRESS RELEASE

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SYNTECS brings together a consortium of industry leader, academic and research organisations that are at the forefront of laser-based processing. SYNTECS is designed to tackle the multiple challenges experienced with current chemical and mechanical surface treatments.

The overall aim of SYNTECS is to develop and demonstrate a digital and green laser texturing approach to generating complex multifunctional surfaces. A machine platform will be developed (TRL6), that enables interchangeable Direct Laser Writing (DLW), Direct Laser Interference Patterning (DLIP) and Laser Induced Periodic Surface Structuring (LIPSS), with a multi-axis motion stage for processing complex geometries and an inline monitoring and control system.

The combined system will streamline the generation of hierarchical surface textures, i.e. textures which combine at least two significantly different sized features. The surface multi-functionality enabled by these hierarchical textures will be demonstrated in three industrial case studies: an injection moulding tool, representive orthopaedic implant geometries and a complex shaped vapour chamber.

Surface textures and texturing processes for these demonstrators will be designed using a Design for Surface Engineering software module, which will incorporate Life Cycle Analysis guidance combined with predictive performance modelling to enable sustainable-by-design decision making.

SYNTECS will demonstrate that hierarchical laser surface texturing provides a highly efficient and flexible route to replacing multiple (typically chemical and mechanical) energy and resources intensive surface treatments steps with a single, digitally controlled, chemical- and waste-free process.

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The project will deliver:

· Reduced time and cost of surface processing
· Enhanced final product performance compared to state-of-the-art products
· Extended product lifetime leading to decreased resource use
· A strengthened global position for European manufacturing

The SYNTECS project is driven by sustainability and digitalisation principles to ensure maximum efficiency and productivity, and aims to increase the uptake and industrialisation of the technology among European manufacturers.

These principles are achieved by modifying surface chemistry and surface topography, requiring multiple surface treatment processes which can be inefficient, inflexible, environmentally damaging and non-transferable. However, laser surface texturing techniques provide an alternative technology to achieve functional surfaces. Currently, the full potential of the technology is limited due to the scanning technology and digital architecture used.

Laser texturing has a wide range of applications in sectors such as aerospace, medical, food and drink, power generation and tooling. The SYNTECS project is focusing on specific end-use applications including low friction and anti-bacterial properties through injection moulding processes for the automotive industry, improved adhesion for medical implants as well as enhanced thermal efficiency for graphics processing units.

Partners

The consortium consists of world class research organisations including Fraunhofer IWS and Fraunhofer IML (Germany), the University of Birmingham (UK), Centre Technique Industriel de la Plasturgie et des Composites – IPC (France), IST-ID (Portugal), Manufacturing Technology Center (UK) and the European Federation for Welding, Joining and Cutting (Belgium). Bringing their technology expertise are Laser Engineering Applications SA - LASEA (Belgium), Fusion Bionic (Germany), 3 Drivers (Portugal) and Iconiq Innovation Ltd (UK). End users providing application case studies in the automotive, medical, and electronics sectors are Centro Ricerche Fiat - CRF (Italy), Farplas Otomotiv Anonim Sirketi (Türkiye), Depuy Synthes (Ireland), and European Thermodynamics Limited (UK).

About the **SYNTECS Project**
www.syntecs-laser.eu