SYNTECS

syntecs-laser.eu

HORIZON-CL4-2022-TWIN-TRANSITION-01-02

SUSTAINABLY AND DIGITALLY DRIVEN HIERARCHICAL LASER TEXTURING FOR COMPLEX SURFACES

SYNTECS aims 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. SYNTECS demonstrators will be designed using a **Design for Surface Engineering software module**, which will incorporate **LCA guidance** combined with predictive performance modelling to enable sustainable-by-design decision making.

OBJECTIVES

Develop and validate a flexible Laser Surface Texturing optical module, compatible with interchangeable short-pulse and ultra-short pulse laser sources.

Integrate technology modules into a TRL6 modular machine platform with 300x300 mm processing stage and 7-axis control.

Develop and validate an inline monitoring and control system that enables processing of freeform/3D geometries and surface characterization with automatic pulse-to-pulse corrective control of laser beam parameters and machine working position.

Develop and demonstrate hierarchical Laser Surface Texturing processes for improved surface (multi-)functionality of 3 industrial components.

Develop a Design for Surface Engineering module with embedded LCA for sustainable-by-design decision making, and to reduce the time and cost of developing functional surface designs compared to typical design cycles by at least 50%.

Innovate UK

Co-funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Commission. Neither the European Union nor the European Commission can be held responsible for them.
This project has received partially funding from the European Union's Horizon Europe research and innovation programme under grant agreement No 101091514 and from Innovate UK programme.

INNOVATIONS

SYNTECS will develop an innovative DSE module through a combination of empirical and physical modelling techniques to create an ML framework linking hierarchical surface textures and process parameters to functional and multi-functional performance parameters. The three processing technologies will be combined in a single, stable machine platform for the first-time, allowing users to access hierarchical texturing without purchasing multiple machines (estimated selling price of industrialised machine: €800k, vs >€1.5M to acquire the multiple processing technologies in separate machines). The modular design of the machine platform will enable customers to customise the system (e.g. laser source) based on specific needs (e.g. material to be processed) to avoid unnecessary capital expense.

Below, you can find the **SYNTECS Case Studies** that the project are currently working on:

Complex shaped copper vapour chamber (VC):

Stainless steel mould inserts for modular mould tools:

Representative orthopaedic implant geometries:

Meet **OUR** Consortium

EWF · CRF Centro Ricerche Fiat · European Thermodynamics Limited · Fraunhofer IWS · University of Birmingham

Fraunhofer IML · LASEA · DePuy Synthes · IST-ID · 3drivers Quadrante · mtc Manufacturing Technology Centre

IPC · Fusion Bionic · Iconiq Innovation · farplas · Stellantis

Innovate UK

Co-funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Commission. Neither the European Union nor the European Commission can be held responsible for them.
This project has received partially funding from the European Union's Horizon Europe research and innovation programme under grant agreement No 101091514 and from Innovate UK programme.