



## **HORIZON-CL4-2021-TWIN-TRANSITION-01-05: Manufacturing technologies for bio-based materials (RIA)**

### **Ideas for the project:**

Waste-free technology for the production of technical structures.

Description: In addition to additive 3D printers using biodegradable PLA plastics, the latest technologies have recently made available promising manufacturing technologies for the production of composites by combining plastics with continuous high-strength fibers. Such a material has isotropic properties in the desired direction, specifically determined in a digital CAD model. The requirement of high strength and stiffness for the intended load of the machine or machinery can be met in an excellent ratio of stiffness to dead weight. This saves material and component weight due to other advantageous properties. In terms of environmental impact, it can be produced with a low waste and emission footprint. Optimizing its strength characteristics using pre-production composite simulations increases these "green properties". We are able to develop products with similar or better mechanical, physical and chemical properties that have a significantly lower environmental footprint, and we can also contribute to research into the mechanical properties of new materials.

### **Infrastructure offered:**

1. Up to date infrastructure for manufacturing and testing of processes and prototypes (see technology at [Home \(tuke.sk\)](#) and [Welcome to the Frontpage! \(tuke.sk\)](#))
2. Test bed with digital twins for optimisation of machining process parameters in real time
3. Laser interferometer Renishaw measurement system
4. Markforged Mark Two, 3D printing from Kevlar or carbon continuous fiber.

### **Projects solved, related to the issue:**

1. Implementation of a Recycled Polypropylene Homopolymer Material for Use in Additive Manufacturing / Jozef Dobránsky ... [et al.] - 2021. In: Sustainability. - Bazilej (Switzerland) : Multidisciplinary Digital Publishing Institute Vol. 13, č. 9 (2021), s. [1-22] [online]. - ISSN 2071-1050 (online)
2. Virtual Training laboratory in Automated and Robotized Manufacturing Systems (Leonardo)
3. Flexible and modular production systems / Jozef Svetlík, Peter Demeč - 1. edition. - Lüdenscheid : RAM-Verlag - 2019. - 150 s. [print]. - ISBN 978-3-942303-93-4. Access: <https://www.ram-verlag.eu/linguistics-qauntitative-linguistics-studies-in-quantitative-linguistics-engineering/contact/>.
4. Establishing the Optimal Density of the Michell Truss Members / Tomáš Stejskal ... [et al.] - 2020. In: Materials. - Basel (Switzerland) : Molecular Diversity Preservation International Vol. 13, č. 17 (2020), s. 1-16 [online]. - ISSN 1996-1944 (online) Access: <https://www.mdpi.com/1996-1944/13/17/3867/htm...>
5. MIDIH "Manufacturing Industry Digital Innovation Hubs" (H2020)

### **Partners in previous research projects:**

Politecnico Milano, University of Strathclyde Glasgow (Advanced Forming Research Centre), Luleå University of Technology, Tomas Bata University, Alma Mater Studiorum - Università di Bologna, École Polytechnique Fédérale de Lausanne, LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE, UNIVERSITAET PASSAU, UNIVERSIDAD DE ZARAGOZA

### **Contacts to industrial partners:**

**Atos, IMR - Irish Manufacturing Research, Nissatech, Minebea, Fortiss , Fraunhofer, Atos, Trialog, AbAcus, Stichting Imec, Mishan, Step of Mind, France Telecom SA, Electricite de France Service National, SIEMENS Business Services GMBH & CO. OHG, TELEFONICA**

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