FLEXHYMAN – A FLEXIBLE HYBRID MANUFACTURING SYSTEM

EIT Manufacturing

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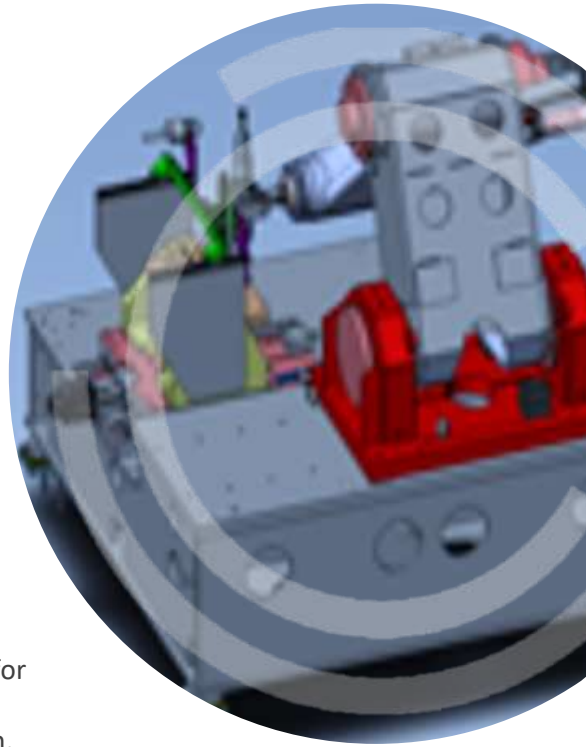

FLEXHYMAN CHALLENGE

The development of Additive Manufacturing Technologies over the last decade has been massive and has established the use of metallic materials in AM processes. However, the technical requirements of the parts regarding tolerances and surface finish values raise the necessity of post-processing through conventional subtractive methods.

The adoption of AM in industries such as aerospace, Oil & Gas and automotive sets the bar high for machine tool builders, which are required to build flexible and scalable hybrid manufacturing systems that can reliably produce net-shaped metal parts.

The main challenge of FlexHyMan project is to deliver a solution that will, on the one hand, incorporate the experience and research of the partners on cutting-edge manufacturing technologies, but, at the same time, correspond to the industrial needs, making it the best solution for specific applications

FLEXHYMAN SOLUTION

A flexible and modular hybrid manufacturing system, incorporating milling, Directed Energy Deposition and 3D scanning in the hybrid workflow.

FLEXHYMAN RESULTS

- Development and integration of a flexible and scalable hybrid manufacturing system based on a robotic platform
- Modelling of milling process, taking into account the actual toolpath that is generated by the CAM system
- Adaptive control strategies for Additive Manufacturing
- Optimized process parameters for milling and AM of high added-value materials (e.g. IN718)
- Development of a cryogenic cooling system for clean machining of hard-to-cut materials
- Development of hybrid manufacturing process planning strategies
- Incorporation of 3D scanning in the hybrid workflow

FLEXHYMAN IMPACTS

- Robust deposition and milling strategies for high added-value materials
- A modular Laser Metal Deposition system, tested in deposition of several high added-value materials, able to be integrated in exiting machine tools and robots.
- Decreased production time for high added-value and complex shaped components
- Process planning methodologies for synergistic exploitation of milling and LMD in a hybrid manufacturing context, based on physical modelling of the processes and experimental validation
- A cryogenic cooling system that will enhance process quality, but most importantly, workspace safety, eliminating toxic oil-based coolants and enabling high performance machining on low machinability alloys
- New best practices in the hybrid-AM manufacturing sector that will be disseminated in an academic and industrial level, paving the road for new research in this field

"This project (20117 - FlexHyMan) has received funding from the European Union's Horizon 2020 research and innovation programme under the grant agreement EIT/EIT Manufacturing/SGA 2020/1"

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