



DEVELOPMENT OF A COMPREHENSIVE AND EFFICIENT SYSTEM FOR ADDITIVE MANUFACTURE BY LASER WITH MULTI-DIRECTIONAL WIRE DEPOSITION

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The main objective of the D3SFILA project is the development of a robust and modular multidirectional wire deposition system for Additive Manufacturing (AM) by Laser, which allows complex parts to be manufactured, guaranteeing the robustness of the process, regardless of the material and deposition strategy, as well as the metallurgical quality of the manufactured component.

In this sense, of all the AM technologies applicable to metals, Powder Bed Fusion with laser is the one that has experienced a greater degree of industrial implementation in recent years, mainly because it allows the manufacture of parts with geometry and designs that are difficult to achieve by traditional manufacturing methods, with great geometric precision and in a controlled environment. However, it has significant limitations, such as the size of the part to be manufactured and a relatively low processing speed. On the other end, Additive Manufacturing by Direct Deposition of Energy (DED), and in particular the additive manufacturing by laser with deposition of wire (WLAM_Wire Laser Additive Manufacturing) is quite interesting, especially in the manufacture of components of medium-large size, required largely by the aeronautical sector, but also maritime, metalworking, toolmaking and other sectors.

The D3SFILA project arises from the business opportunity detected in the field of Additive Manufacturing of large components and, in particular, in the manufacture of high value added components for different industrial sectors through the WLAM technique.

Currently there are only two laser head manufacturers that offer specific equipment for FA by laser with wire feed. In both cases it is multidirectional coaxial heads that allow material to be deposited in any processing direction, which is a great advantage when it comes to increasing flexibility in the manufacture of parts. However, these are very complex heads from the optical point of view. This complexity requires working with laser sources of medium-high beam quality, results in a considerably high cost of the head as well as more complex maintenance, making the process more expensive. Also, most of

the AM facilities for DED by laser are growing up upon existing laser welding or cutting facilities, which is why an incremental development for WLAM, based on existing laser heads is quite relevant.

In this context, within the framework of the project, the following technological challenges will be addressed:

- The development of an integrated wire deposition system, which aims to ensure the viability of the laser manufacturing process with wire supply through a robust, compact and low cost system. The contribution system developed in the D3SFILA project will allow the manufacture of parts through multidirectional movements, with the same flowrate as the current coaxial heads, but at significantly lower cost given the incremental development over existing equipment. In addition, a gaseous diffusion system will be developed that will allow to maintain the flow of gas regardless of the direction of processing, in addition to controlling the cooling of the solidified zone to maintain its properties and avoid oxidation.
- The development of optimal wire deposition manufacturing strategies implemented in the offline programming of WLAM processes. For this purpose a low cost CAM solution such as SprutCAM will be worked upon in the project.
- The validation of the two previous developments through the manufacture of three demonstrators defined by two consortium companies.

D3SFILA CONSORTIUM

In order to face this ambitious challenge, a multisectorial consortium of five Galician companies has been consolidated, with the necessary skills and knowledge to cover all the activities of the project:



VIGOSYSTEMS will be the coordinator of the project and its main role will be the development of the modular wire deposition system.

ROBOTING will be the partner in charge of the deposition strategies module optimized for WLAM.

HYDRACORTE, as a service provider based on laser technology, will be the partner in charge of the implementation of the solution developed in the project in its facilities.

FUNDICIONES REY will have the role of final user of the technology and will proceed to the definition of requirements and validation of one of the demonstrators proposed in the project.

INTAF PROMECAN will have the role of final user of the technology and will proceed to the definition of requirements and validation of two of the demonstrators proposed in the project.

With the aim of promoting innovative activity within companies, strengthening its international leadership capacity and improving its competitive position, the consortium will count on the support of the AIMEN technology center, with extensive experience in the development of new advanced manufacturing processes, and particularly in those related to Additive Manufacturing.

PROJECT FUNDING

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