IK4 TEKNIKER
Research Alliance

Press release

Technological innovation to develop laser equipment and components

- *Advanced manufacturing is nowadays one of the main strategic actions for sectors demanding high added value components that can achieve high levels of performance in terms of accuracy*
- *In order to meet these demands, the IK4-TEKNIKER technology centre provides an extensive technological offer based on laser technology called the "Laser for Manufacturing Lab"*
- *This initiative, recently presented by the Basque technology centre at the Machine Tool Biennial, encompasses manufacturing processes, equipment and component design, additive manufacturing and inspection and measurement.*

(Eibar, Basque Country. 23 October, 2018).- The incorporation of cutting-edge technologies and the application of advanced manufacturing processes represent a strategic action for sectors such as biomedicine, renewables or automotive. Sectors that demand high added value components that can offer high levels of accuracy and comply with strict safety standards.

In this context, and with a view to meeting these demands, the IK4-TEKNIKER Basque technology centre now has a complete technological offer in the field of laser manufacturing called the "Laser for Manufacturing Lab" that covers the design and manufacture of high-added value equipment and components by means of laser technology.

The "Laser for Manufacturing Lab", geared towards providing a comprehensive offer addressing the processing of materials, the production of components, the use of laser for inspection and measurement and laser-based additive manufacturing, is the value proposal for laser manufacturing that the Basque technology centre presented at the last edition of the Machine Tool Biennial.

Simulation of equipment and components

In the overall process encompassing the design of a component or a piece of equipment, simulation is an especially relevant initial stage. “As a function of the modelling process involved, there are two types of simulation: optical and finite elements (FEM)” simulation, says David Gómez, the director of the Laser for Manufacturing Lab at IK4-TEKNIKER.

According to this expert, and as regards optical simulation, in which both laser radiation is modelled according to its interaction with different optical components, IK4-TEKNIKER has designed and simulated a medium-power laser diode system and a head for wire LMD (Laser Metal Deposition).

As far as finite element simulation (FEM) is concerned, modelling and simulation are performed by means of different numerical techniques such as finite elements, finite volumes or analytical methods. Gomez says, “in this type of simulation, the optimisation of manufacturing technologies based on laser technologies is used to guide and supplement laboratory trials and avoid costly trial and error processes".

Some of the examples developed by IK4-TEKNIKER in this field are, among others, the optimisation of conventional and remote quenching processes for steel, including microstructural and mechanical features; the calculation of residual stresses and distortions in additive manufacturing processes or the optimisation of metal-metal and metal-polymer hybrid welding processes.

Design and manufacture of equipment

The “Laser for Manufacturing Lab” offers unique equipment, integration in industrial processes and focuses on the sector's current trends with regard to the development of high throughput technologies.

As regards developing unique laser equipment adapted to solutions demanded by customers when there is no standard solution available on the market, the technology centre has designed and manufactured additive manufacturing equipment using wire LMD geared towards manufacturing large metallic structures (maximum 1900 x 900 x 800 mm^3).

IK4-TEKNIKER has also fully developed laser welding equipment (both the mechatronics and the high-power laser) to weld polymers or dissimilar polymer-metal joins.

But in addition to incorporating these unique pieces of equipment to the customer's production processes, the “Laser for Manufacturing Lab” is fully aware of the current trends in the laser market and consequently offers its experience in terms of optimised equipment to achieve high throughput. (Which is, basically a significant improvement of X2, X5, X10 in u speed compared to commercial equipment without diminishing end quality).

In this regard, the technology centre has developed micro-drilling equipment for large surface areas in aeronautical applications in which drilling speeds make it feasible to develop hybrid laminar flow control structures (or HLFC).

Design and manufacture of smart components

In addition to design, the “Laser for Manufacturing Lab” delivers solutions to manufacture smart components to be fitted onto proprietary or commercial systems.

In this regard, the technology centre plays an outstanding role with regard to manufacturing heads, nozzles and mountings used to develop different laser processes and also addresses the integration of components to achieve accurate monitoring and control of laser processes.

Experts at the technology centre, moreover, are developing components so that laser beams can be shaped, converted and delivered. The integration of these components on laser equipment has given rise to the optimisation or development of new processes.

In short, the implementation of new processes and the need to develop new materials and meet new requirements require a global solution addressing all of these capabilities via an individual collaborator which happens to be the value proposal from the “Laser for Manufacturing Lab”, a complete technological offer by means of which IK4-TEKNIKER intends to reach out more and better to the industry and solve specific advanced production needs thanks to the possibilities offered by laser technology.

Concerning IK4-TEKNIKER

With more than 35 years of experience in applied technology research that has been be transferred to companies, IK4-TEKNIKER has achieved a high degree of specialisation in four major areas (Advanced Manufacturing, Surface Engineering, Product Engineering and ICTs).

This means that its cutting edge know-how has been made available to customers to meet their requirements.

Further information

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