ANNUAL COMBILASER PROJECT NEWSLETTER

The European Horizon 2020-funded COMBILASER project is entering into its second year. In this time in the project's life, the COMBILASER consortium takes a look back at the intensive work done and all the achieved progress and see the implications for the project's future.

The European COMBILASER research consortium has been working hard in the first year of the COMBILASER project. The crucial work packages (WPs) have already started and first progress is already visible.

PROJECT AMBITION

The ambition of the COMBILASER project is to combine:

- innovative monitoring techniques and their fusion with non-contact NDT techniques (laser ultrasonic and active thermography) with
- active control techniques with the self-learning module can be considered as a pioneering and ground breaking approach.

In doing so the COMBILASER consortium hopes to establish a great development leap forward in terms of a pioneering approach that combines all aspects of defect avoidance in welding and cladding processes into an integral or holistic concept.

The vision of the partners of the COMBILASER project is to create a solution that will with its use-cases serve as a model for different branches of European industry (automotive, aeronautic /aerospace, railway, electronics, capital goods etc.) on how to address the ever more demanding standards in the industry when manufacturing products using laser welding / laser melting or cladding processes.

PROJECT OBJECTIVE

The objective of COMBILASER project is the minimization of defects appearance in laser based manufacturing fulfilling the zero-failure manufacturing approach. For that purpose, the combination of these two worlds (monitoring data vs detected defects by NDT) through a self-learning system (SLS) -human-centric system- will be developed. The subjective operator will be turned into objective decisions making use of frameworks that mimic human cognition (i.e. incremental learning, learning by examples…). This will enable a real and automatic self-adaptive feed back to the laser manufacturing systems and its quality improvement.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 636902

PROJECT GENERAL INFORMATION

START DATE OF PROJECT:	1 January 2015
FINISH DATE OF THE PROJECT:	31 December 2017
DURATION:	36 months
TOTAL ESTIMATED PROJECT COSTS:	3.439.420,00 EUR
WEBSITE:	www.combilaser.eu

PROJECT PARTNERS

The COMBILASER project is composed of 12 partners from 7 different European countries: Slovenia, Spain, Germany, Austria, UK, France and Finland. More partner info at: http://www.combilaser.eu/project-partners/

HIDRIA AET	
LORTEK S COOP	
LASER ZENTRUM HANNOVER	
RESEARCH CENTER FOR NON-DESTRUCTIVE TESTING	
THE UNIVERSITY OF SHEFFIELD	
LASERLINE	
ORKLI	
TALLERES MECÁNICOS COMAS	
MONDRAGON ASSEMBLY	
4D	
CAVITAR	
SIEVA	

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PROJECT RESULTS THUS FAR

The COMBILASER project has been designed with the following 8 WPs (Work Packages): WP1 – Project Specification, WP2 – Monitoring techniques development, WP3 – NDT techniques development, WP4 – Self-learning system development, WP5 – Integration of defined system on laser based manufacturing processes, WP6 – Validation and demonstration of the integral solution, WP7 – Dissemination and Exploitation and WP8 – Project Management.

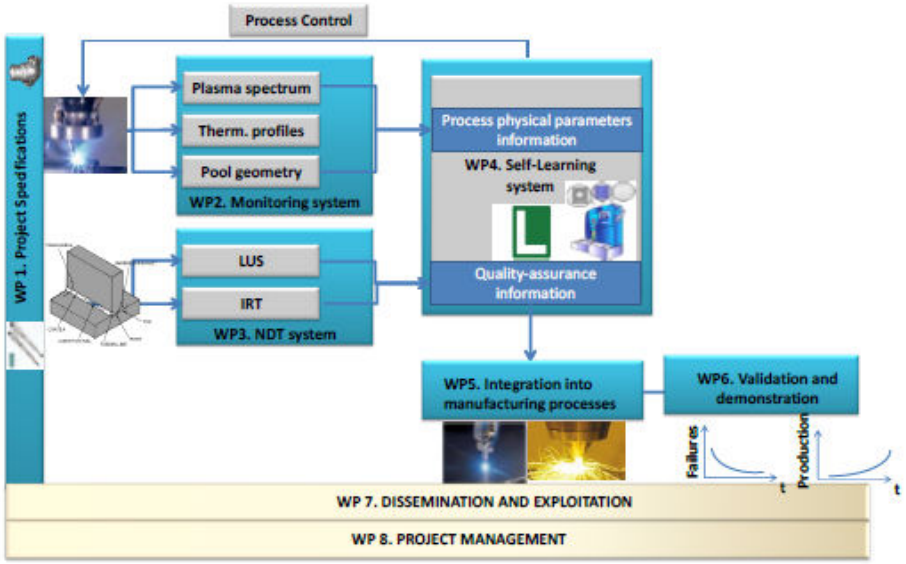

Figure: COMBILASER project PERT diagram

Activities undertaken within the first year of the project included completion of WP1 - Project Specification - and beginning of work in WP2, WP3 , WP4 and WP 7 *(see full descriptions above)*, undertaking the development of monitoring, Non-Destructive Testing processes and Self-learning System.

The COMBILASER project consortium thus far already achieved important milestones and deliverables (D; concrete real-world results) which will enable successful continuation of the project and bring it to the next solution-implementation oriented stage in this year and validation stage which is to be followed next year.

Achieved results in the first project year are:

- *D1.1. – Project Specification document*
- *D2.1 – Melt pool monitoring system*
- *D2.2 – Spectral monitoring system*
- *D2.3 – Thermographic monitoring system*
- *D4.1. –Definition of the Self-Learning-System*
- *D7.1 – Project website launched*
- *D7.2 – Initial PDER*
- *D8.1. – 9-month progress report*

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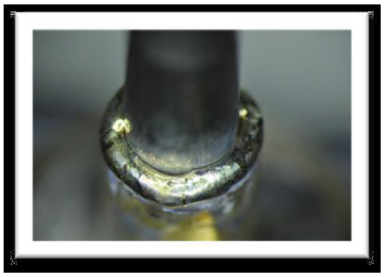
TESTING ACTIVITIES CARRIED OUT

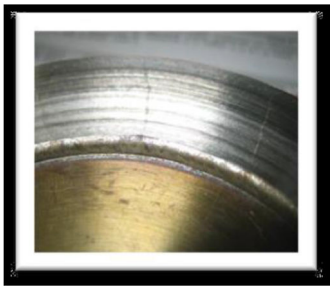
In WP2 - Monitoring techniques development, led by Laser Zentrum Hannover, consortium partners set up the monitoring techniques that were then used for three industrial use-cases (automotive, capital/white goods, oil&gas industry). Activities included implementation of melt pool monitoring system (provided by Cavitar) and spectral monitoring system (provided by 4D).In the case of the ORKLI UC a special configuration was needed and for that purpose, a rotational stage was manufactured by Mondragón Assembly.

Examples of some defects studied and used by the COMBILASER industrial partners:

HIDRIA AET glow plus use-case *(automotive)*

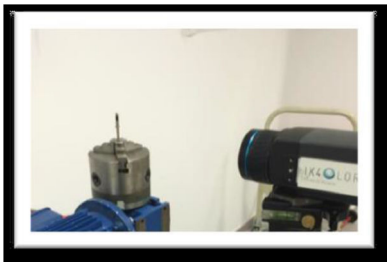


ORKLI flame sensor use-case *(capital & white goods)*

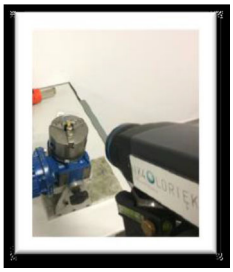


TMC valve use-case *(oil & gas industry)*

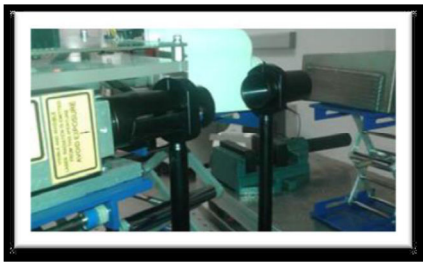
WP3 - NDT techniques development; this WP's goal is to design a state-of-the-art NDT technique for laser welding and laser cladding. Extensive activities in this field included the work in field of active thermography and laser ultrasonic, done by Recendt and LORTEK.



HIDRIA AET use-case set-up in LZH



ORKLI use-case setup in LORTEK



TMC use-case setup in LORTEK

Progress was also made in activities within WP4 - Self-learning system development – led by the University of Sheffield. The project partner developed a feature selection sequence, modelling structure and work has begun on optimization/control sequence.

Project's management and dissemination activities were running smooth. Consortium partners presented the COMBILASER project on different fairs and conferences among them Schweisstec 2015 in Stuttgart, MESIC 2015 in Barcelona, Laser World of Photonics 2015 in Munich, International Symposium on Laser Ultrasonics and Advanced Sensing 2015 in Linz, AM Platform Meeting in Turin.

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Laser World of Photonics 2015	AM Platform Meeting	Symposium on Laser Ultrasonics and Advanced Sensing 2015

COMBILASER project consortium also successfully presented the project to the interested public. Numerous activities were started within the WP7 – Dissemination and Exploitation. The tasks that were taken over by SIEVA included launching of a project website (www.combilaser.eu), project flyer, project poster and constant updates on the project via project website (project news, project press releases; available via http://www.combilaser.eu/publications/).

Project website

Project flyer

Project poster

IMPLICATIONS FOR THE FUTURE

Project results thus far have met the partners' expectations and the consortium is firmly focused on upcoming activities in the project's second year which will also include the very difficult and important WP5 - Integration of defined system on laser based manufacturing processes. Successful integration of the developed solutions into a holistic laser welding/cladding and its successful optimization and tailoring the final solutions for each industrial use-case will at the end determine the success of the COMBILASER project and the consortium partners have no doubts that they will succeed. The COMBILASER project also has important implications for upcoming **Factories of the Future** Horizon 2020 calls and has also shown great potential for cooperation with other running FoF calls from field of photonics and laser technologies.

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FOR MORE INFORMATION

go to www.combilaser.eu or contact any of the COMBILASER project representatives

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