

RADICLE – Development of Adaptive Closed Loop Control of Laser Welding

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With the drive to Industry 4.0, adopters of companies using laser welding are being increasingly asked to provide greater process monitoring and to use data logging/process knowledge to ensure process stability and defect minimisation. This EU Horizon 2020 funded project examined the challenges in developing and then applying adaptive, multi-sensor closed loop control to the laser welding of a number of key industrial materials.

The project examined the functionality and limitations of a number of sensors types and the complexity of associated data capture and interrogation when used to teach a machine learning system. The fundamental limitations of applying real-time process correction system have been laid out and the ensuing implications have then been used to direct the further development of the overall system.

New process tools have also been developed and tested in this project which has incorporated new functionality, configurable by industry end users to suit their specific materials and applications.

New sensor arrays have been developed and integrated in the demonstration processing tool. Advanced signal processing has exposed additional process information within the complex signals emitted during laser welding. This includes detection of defects within welds which has not been possible using traditional process monitoring techniques.

This paper will summarise progress in developing the system and the challenges remaining to develop a production solution.