

Tailoring laser welding for complex applications

Adaptarea sudării cu fascicul laser pentru aplicații complexe

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Abstract

The increase worldwide use of combined cycle power generation plant using natural gas as fuel is leading to a demand for more efficient pipeline installations in particular by using large diameter pipelines over long distances. This has led to an increased demand to improve the productivity of pipeline girth welding.

Laser welding is an example of an innovative technology that has been tried to achieve this goal. Several projects are being developed on laser hybrid welding but other approaches are also possible for improvement of the performance of laser welding.

The present paper addresses a project, Tailorweld, in which the improvement of laser welding is achieved by developing and demonstrating an innovative laser welding system, that uses simple and robust diffractive optical elements (DOEs), which will increase the flexibility and simplify the application of laser welding.

The paper focus the development of a retro-fittable DOE laser welding head module, suitable for new or existing laser beam welding systems, built in process monitoring for optimum performance and quality assurance for end-users . This will allow for joining of dissimilar materials, with an energy distribution tailored to match the different thermophysical properties of the materials and also welding of phase-sensitive materials (e.g. duplex stainless steels, pipeline steels) with an in-process pre-/post- weld heat treatment.

A positive outcome of the project will allow moving ahead with the testing of DOEs in hybrid laser welding for pipeline girth installations

Keywords

Laser Welding, optical element, diffraction optics, sensitive materials