SIGNASTIR - Developments of an in-process quality assurance system for friction stir welding

The SIGNASTIR project will develop an effective in-process quality assurance system for the inspection of friction stir welds predominantly used in the manufacture of aluminium rolling stock and marine vessels. The SIGNASTIR system will determine the unique and holistic weld quality 'signature'. There is currently no capable inspection system available on the market either as a stand-alone unit or integrated with a welding machine to perform this task. Welding is an enabling manufacturing technology for joining materials, which directly affects cost, safety and reliability and therefore has significant economic impact. Production and supply of flawed or defective welds is unacceptable and may result in unsafe products of low structural integrity.

To overcome the technical barriers to development of such an inspection system an SME partnership will require the services of research and technology-providing organisations to deliver precompetitive research leading to the development of the product.

Project objective

There is a need for a low cost welding method which can overcome the limitations of conventional fusion welding techniques. Friction stir welding has many economic, environmental and safety advantages over conventional welding but is a relatively new development and potential users require added confidence to make the initial capital investment required. The full benefit of the friction stir welding process can only be achieved through application where weld quality is guaranteed to be correct each and every time.

The SIGNASTIR project aims to demonstrate and characterise the capabilities of non-contact inspection of friction stir welds in aluminium alloys, between the thicknesses of 4-20mm, at elevated temperatures up to 400°C immediately after welding through the following objectives:

- To specify, design and assemble prototype inspection hardware and software capable of inspecting friction stir welds in real time, at a travel speed of 500mm/min.
- To produce software and hardware that presents the inspection system output in an easily interpretable format to the welding machine operator allowing defects to be identified.
- To create hardware that will enable the use of the inspection system with 90% of existing commercial friction stir welding equipment.
- To create a methodology and concept designs which will allow use and integration of the inspection system with 95% of new build friction stir welding equipment for feedback control.

When developed, the SIGNASTIR system will give European manufacturers added confidence in their welded products and reduce costly off-line inspection of production parts.

For further information, please visit the project website at **www.signastir.eu**.

This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under Grant agreement number 262150.

SIGNASTIR