The SAFEJOINT Project is part-funded by the European Commission (EC) FP7 Programme

Newsletter 5

FEBRUARY 2015

SAFEJOINT FINAL CONFERENCE

The SAFEJOINT project will be combining its final Conference with the ICEAF IV, 4th International Conference of Engineering Against Failure being held on 24-26 June 2015 - Skiathos island, Greece. The scope of the Conference is to attract interdisciplinary work dedicated to the design against and prevention of engineering failure. Presentations are expected to cover a number of different technological areas including Aeronautics, Construction, Automotive, Bioengineering, Recycling, etc.

SAFEJOINT will have a dedicated session about joining of dissimilar materials, where the findings of the project will be presented as well as the latest developments from around Europe and internationally, the progress and outcomes of the project and how the technologies developed are being exploited.

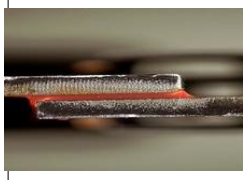
The aim of the SAFEJOINT session is to disseminate the knowledge generated from the SAFEJOINT project to industry and academia, encourage industry to adopt the techniques developed and keep industry markets engaged and informed on the project outcomes. The session will also serve to ensure there is continuous awareness of the project activities and also feedback on the market uptake of the project outcomes.

To register your place at the Conference please go to the ICEAF website:

http://ltsm.mead.upatras.gr/lab/lang_en/conference/view/6

Further information about the contribution of SAFEJOINT to the event will be reported through this project newsletter and the website.

Inside Edition 5:



Keep up with the latest news about SAFEJOINT at: www.safejoint.net /news

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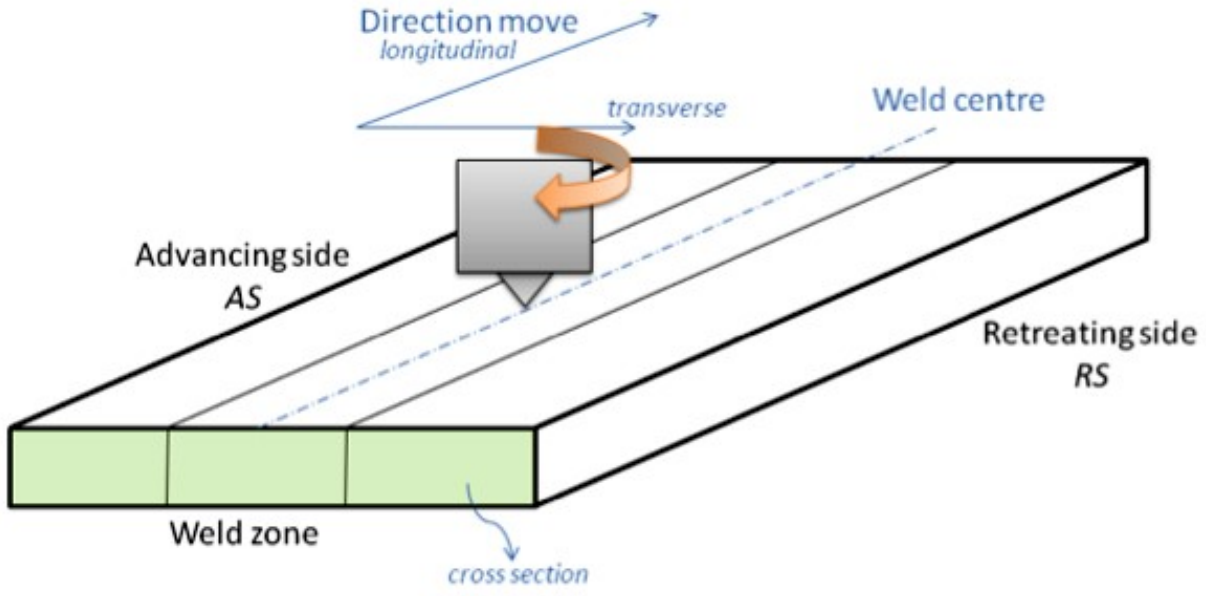
PROMISING RESULT IN THE PROJECT

The main objective of SAFEJOINT was to determine the optimum process conditions in order to manufacture metal/metal joints by the incorporation of fillers (SiC, TiC and CNTs) in the weld nugget as reinforcing materials. The lightweight aluminium alloys AA 6082 T6 and AA 5083 H111 were selected as parent metals to be welded with friction stir welding. Welding takes place as a non-consumable rotating tool travels down the joint line of metal plates shown below. The tool consists of a specially designed pin and an appropriate shoulder, which plays a major role in the heat input and as a result in the quality of the welds and their mechanical properties. This technique avoids most of the drawbacks of fusion welding such as porosity, inclusions and solidification cracks, as no melting of the material occurs. Main FSW advantage is the low welding temperature eliminating common problems of conventional welding processes.



Geometry of FSW process, also indicating the tool transverse direction and cross section region

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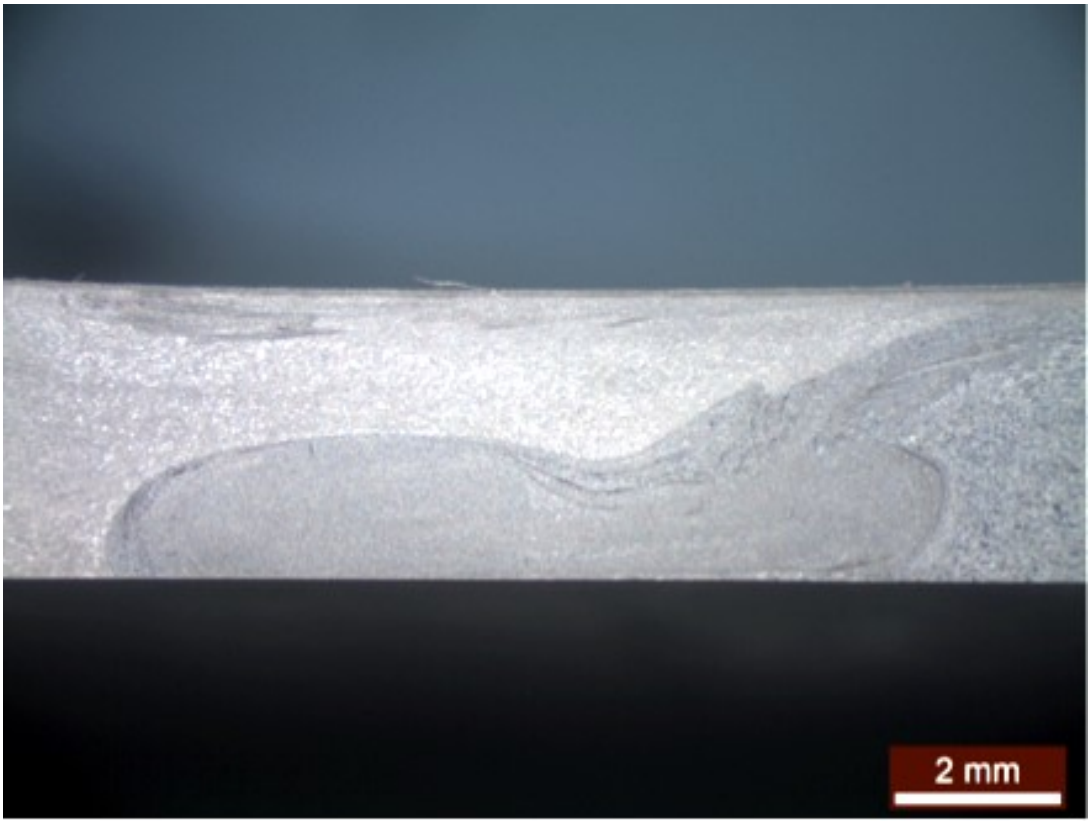
PROMISING RESULT IN THE PROJECT

The tasks performed comprised:

Identification of important process parameters (rotational speed and number of passes), through Taguchi optimization

Determination of optimum parameters of dissimilar friction stir welding of AA5083 to AA6082 reinforced with SiC, TiC and CNTs nanoparticles, together with corrosion inhibitors.

The achievement for the SAFEJOINT project is the result that is the uniform distribution of nanoparticles in the weld region and enhancement of mechanical and anticorrosive properties of the weld. The figures below show the uniform nanoparticle distribution and enhancement of mechanical properties, after incorporation of nanoparticles in weld region (SAFEJOINT results).



Uniform nanoparticles distribution and enhancement of mechanical properties, after incorporation of nanoparticles in the weld region (SAFEJOINT results)

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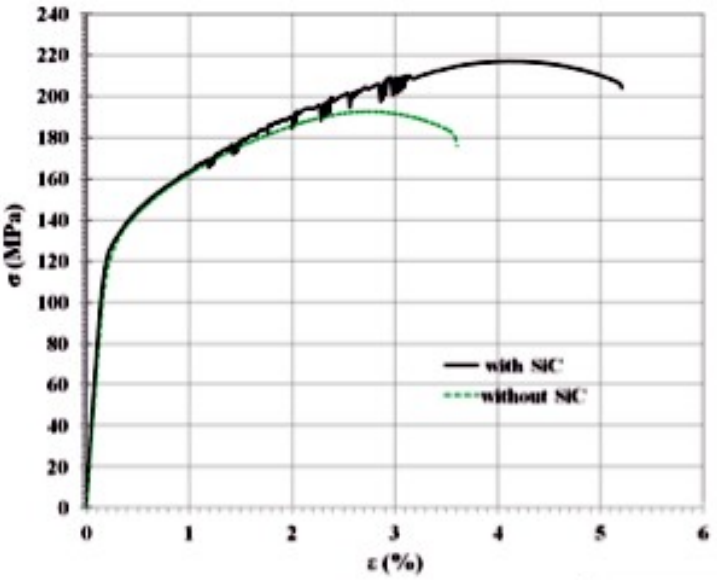
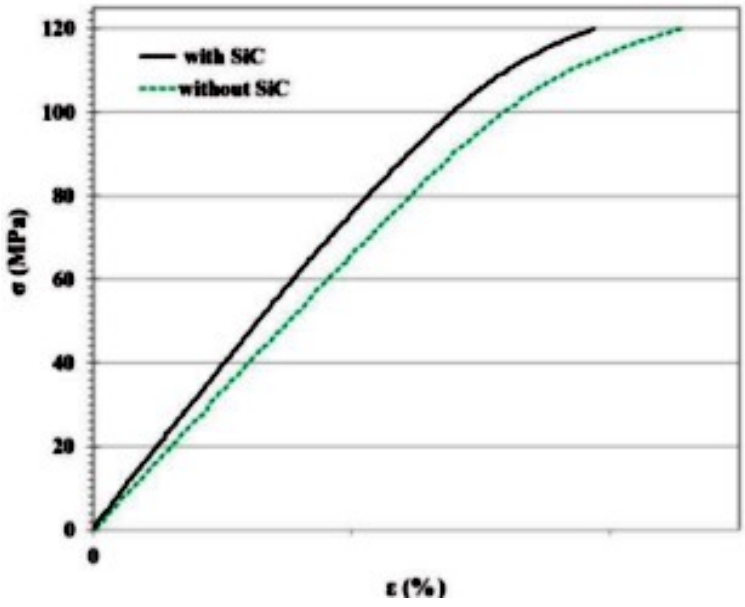
PROMISING RESULT IN THE PROJECT





Uniform nanoparticle distribution and enhancement of mechanical properties, after incorporation of nanoparticles in weld region (SAFEJOINT results).

The incorporation of CeMo nanocontainers loaded with corrosion inhibitors in the weld region (SW-CeMo) exhibited the highest absolute total impedance value, clearly denoting that the incorporation of CeMo loaded nanocontainers during the FSW process enhances the anticorrosive properties of the final product.

For further information about these results please contact Costas Charitidis at
charitidis@chemeng.ntua.gr

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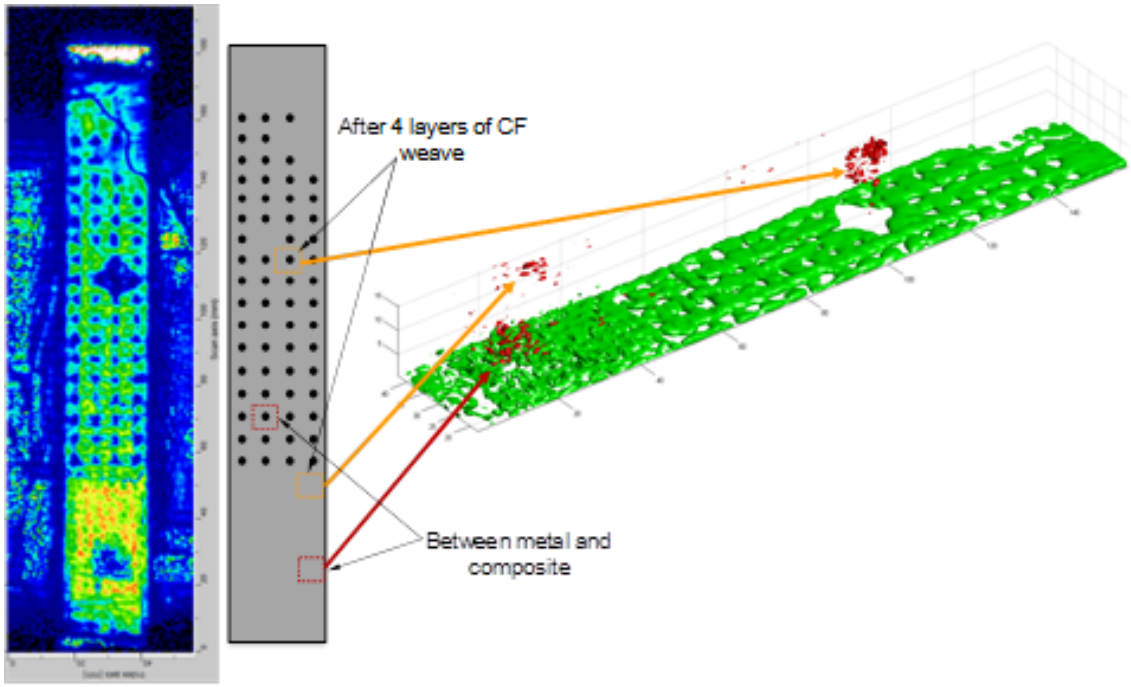
NDE OF TITANIUM/CFRP JOINT



The success of a dissimilar material joint design relies also to the ability to effectively inspect non destructively (NDE) the joint quality both during manufacture and in-service. Within the SAFEJOINT project NDE has been a fundamental activity and techniques have been developed that can adequately detect defects or lack of adhesion at the joint interface. The results so far have been very encouraging and work is currently underway to determine the "effective" resolution of defect detection (i.e. the trade-off between cost and time for inspection to severity or importance of defect size).

Interested in this?

For further information about these results please contact Dr George Kotsikos at
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