PROJECT

OASIS

Optimisation of Friction Stir Welding (FSW) and Laser Beam Welding (LBW) for assembly of structural aircraft parts

Funding: European (Horizon 2020)

Duration: Feb 2018 - Dec 2020

Status: Complete

Total project cost: €1,399,784

EU contribution: €1,399,783

Call for proposal: H2020-CS2-CFP06-2017-01

CORDIS RCN : 213824

Background & policy context:

Riveting is the de facto method for the assembly of aluminium aerostructures, with large commercial aircraft fuselages typically containing 100’000s of rivets. However, riveting is known as a time-consuming, expensive and weight-adding operation. From a design perspective, it also places holes and point loads in a cyclically pressurised structure, subject to long-term fatigue loading and corrosion. Thus, is not an ideal solution for these types of structures.

With developments in precision laser beam welding (LBW) and friction stir welding (FSW), it is now possible to fabricate “rivet less” aluminium aerostructures using welding processes. These new processes produce a lighter weight, distributed load path with the potential for enhanced strength and structural stiffness, ‘no holes’ and a smoother (more aerodynamic) surface. In addition to being more structurally efficient, the new processes are cheaper and reduce inspection & maintenance requirements.

Objectives:

The OASIS project will establish and demonstrate the cost-effectiveness of manufacturing aluminium aircraft structures using the latest developments in LBW and FSW (with appropriate inspection to aerospace standards). The project is led by TWI, who are leaders in both LBW and FSW techniques. Together with 6 other European organisations, we will design, demonstrate and evaluate the suitability of a range of process variants in creating optimised aluminium aircraft structures, including appropriateness for emerging alloys (e.g. 3rd generation Al-Li, 2nd gen Scalmalloy®). ESAB who will offer a commercial route for adoption of suitable processes; as suppliers of both LBW and FSW solutions to the European aerospace supply-chain (and who hold unique FSW IP).

The impact of OASIS will ultimately allow improved design and manufacture of lighter-weight aluminium aircraft structures. This will contribute to the flightpath 2050 goals of reduced fuel burn, superior operating efficiencies and reduced emissions.

Parent Programmes:

H2020-EU.3.4. - Horizon 2020: Smart, Green and Integrated Transport

Institute type: Public institution

Institute name: European Commission

Funding type: Public (EU)

Other programmes: JTI-CS2-2017-CFP06-AIR-01-29 Optimisation of Friction Stir Welding (FSW) and Laser Beam Welding (LBW) for assembly of structural aircraft parts

Lead Organisation:

Twi Limited

Address:
Granta Park Great Abington
Cambridge
CB1 6AL
United Kingdom

EU Contribution: €589,494

Partner Organisations:

ESAB Aktiebolag

Address:
Lindholmsallen 9
40277 Göteborg
Sweden

EU Contribution: €82,806

Geonx Sa

Address:
Route Nationale 5
6041 Gosselies Charleroi
Belgium

EU Contribution: €150,000

Hogskolan Vast

Address:
Hogskolan Vast
461 86 Trollhattan
Sweden

EU Contribution: €182,678

The Queen's University Of Belfast

Address:
University Road Lanyon Building
Belfast
BT7 1NN
United Kingdom

Organisation Website:
http://www.qub.ac.uk

EU Contribution: €99,695

Romaero Sa

Address:
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Romania

EU Contribution: €101,110

Vyzkumny A Zkuebni Letecky Ustav, A.s.

Address:
Beranovych 130

19905 PRAHA - LETNANY
Czech Republic

Organisation Website:
http://www.vzlu.cz

EU Contribution: €194,000

Technologies:

Manufacturing processes
Laser-Arc Hybrid Welding

Development phase: Demonstration/prototyping/Pilot Production

Manufacturing processes
Orbital friction welding process

Development phase: Demonstration/prototyping/Pilot Production

STRIA Roadmaps: Vehicle design and manufacturing

Transport mode: Air transport

Transport sectors: Passenger transport, Freight transport

Transport policies: Other specified

Geo-spatial type: Other