



UK FORUM FOR ENGINEERING STRUCTURAL INTEGRITY

Structural Integrity of Additive Manufactured Components

Venue: Granta Centre, TWI Ltd, Granta Park, Great Abington, Cambridge CB21 6AL
Date: 2 March 2017

Background

Additive Manufacturing, also known as 3D printing, is the name for describing the manufacturing technologies that build 3D objects by adding layer-upon-layer of material.

Additive Manufacturing (AM) represents a step change in the flexibility of production, allowing businesses to design and make better products, enter new markets and develop new business models, react more quickly to changing demands, and explore the possibilities of digital manufacturing.

Additive manufacturing can be performed with virtually any metal, but the most commonly used include aluminium, titanium alloys, stainless steel, nickel and cobalt-chrome. Each material brings its own challenges.

Considering that the majority of these materials can be processed using different methods such as laser metal deposition, selective laser melting, arc processes and cold spray, the microstructure and consequently build direction dependent material properties of additive manufactured components exhibit a wider variance compared to the properties of components manufactured by classical welding techniques. Additionally, each AM process creates a unique metallurgical structure, requiring a specific heat treatment to obtain the desired final component properties. The choice of optimal parameters for post-processing techniques poses another challenge affecting the integrity of the final component manufactured by AM.

Understanding residual stress states and the evolution of residual stresses during the build of additive manufactured parts is also essential to ensure safety. Considerable research effort has been devoted to engineering of tailored residual stress fields but the control of distortion and residual stresses is very strongly linked with the process and subject of various on-going research programmes.

Additive manufacturing is certainly being used more widely in various industries but not yet heavily used for production. There is considerable research and development work aimed at trying to perfect and understand the various additive manufacturing techniques, examine the relationships between the powder-process-properties-performance, and explore the manufacture of a complex, integrated system. There are still many questions that need to be addressed before additive manufacturing can be utilized in a production mode for critical, load bearing applications.

In order to address issues like these for companies considering additive manufacturing in critical engineering applications, FESI will be holding a one-day workshop dedicated to the structural integrity of additive manufactured components. Delegates will be invited to participate in a discussion to identify challenges and express their view on the methods to ensure high integrity in safety-critical structures expected to bear loads. At the end of the workshop FESI would summarise the gaps in knowledge and possible ways that these could be addressed.

Who Should Attend

This workshop will be of interest to Engineers and Scientists who wish to learn about recent developments in Structural Integrity of Additive Manufacture Components.

Workshop Fees

Workshop fees are: £170 (£204 inc. VAT) for Non-FESI members and £130 (£156 inc. VAT) for FESI members (i.e. individual members and employees of Corporate Members of FESI) and £60 (£72 inc. VAT) for Students.

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Programme

- 09.30 Additive Manufacturing Landscape in the World**
Robert Scudamore, TWI Ltd
- 10.00 Additive Manufacturing – Applications, Limitations and Achieving Certification**
Amelia Stead, Lloyds Register
- 10.30 State of the Art on Large Scale Wire Additive Manufacturing**
Filomeno Martina, Cranfield University
- 11.00 COFFEE BREAK**
- 11.30 Understanding Residual Stress Profile and Its Control in Additive Built Structures**
Supriyo Ganguly and Filomeno Martina, Cranfield University
- 12.00 Manufacture and Properties of Low Alloy and Stainless Steel Wire Plus Arc Additive Manufactured Components**
Adrian Addison, TWI Ltd
- 12.30 LUNCH**
- 13.30 Maximising the Structural Integrity of Laser+Powder-based Additive Manufacturing**
Miren Aristizabal and Moataz Attallah, Birmingham University
- 14.00 Melt Atomisation for Additive Manufacturing**
Dirk Aderhold and Tom Williamson , Atomising Systems
- 14.30 COFFEE BREAK**
- 15.00 Hot Cracking during Laser Metal Deposition**
Hongbiao Dong , Leicester University
- 15.30 Addressing the Integrity Challenges in Additively Manufactured Components**
Tat-Hean Gan, TWI Ltd
- 16.00 Wrap up discussion**
- 16.30 Finish**

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Structural Integrity of Additive Manufactured Components

DELEGATE DETAILS

Title First Name Last Name

CONTACT DETAILS

Contact Name (if different from above):

Co./Org. Name:

Address:

Post Code:

Tel: Fax:

E-mail Address:

Authorised Signature: Date:

PRICES

Registration price includes lunch, morning and afternoon refreshments and workbook

- Cost per delegate: £170 + VAT (£204)
- Cost per member: £130 + VAT (£156)
- Student rate: £60 + VAT (£72)

Please tick all appropriate boxes

PAYMENT DETAILS

I enclose a cheque for: £ made payable to FESI Ltd

Please invoice my Co./Org. [for UK only] – Purchase Order Number:
 (£10 + VAT admin charge will be added)

Our VAT No.:

Credit Card no. (Visa/Mastercard only):

Cardholder Name: 3 digit security number: Expiry date:

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Cardholder Signature:

SEND COMPLETED FORM TO

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