Workshop on NDT/SHM Requirements for Aerospace Composites

DAY 1 – Tuesday 9 February 2016

09:00-09:30 Registration

09:30 Session 1: Introduction – Chair: Prof Robert Smith, University of Bristol (UoB)

1a. 09:30-09:40 Workshop objectives – Prof Robert Smith, UoB

1b. 09:40-10:20 Certification of civil composite structures based on detectable damage thresholds – overview and critical NDT detectability thresholds – Dr Simon Waite, EASA

1c. 10:20-10:40 Damage tolerance and defect growth in composite aerostructures – Prof Phil Irving, Cranfield University

10:40-11:10 Tea/coffee

1d. 11:10-11:30 Composite structures: basic principles and issues – Dr Barbara Gordon, UoB

1e. 11:30-11:50 Civil composite aerostructure designs – Prof Ian Lane / Dr Martin Gaitonde, Airbus

1f. 11:50-12:10 Aero-engine composite designs – Dr Tim Barden, Rolls-Royce plc

12:10-12:50 Lunch

12:50 Session 2: Opportunities for benefit from NDT

2a. 12:50-13:10 Opportunities for benefit from NDT – Dr Barbara Gordon, UoB

2b. 13:10-13:30 Design for manufacture: NDT opportunities – Prof Kevin Potter, UoB

2c. 13:30-14:00 Discussion in breakout groups (each group discusses all topics)

- Identify opportunities for benefit from new NDT

2d. 14:00-14:15 Breakout de-brief. Log and define the opportunities

2e. 14:15-14:45 Panel discussion: What does success look like?

Panel members: Dr Tim Barden (Chair), Prof Martin Gaitonde, Prof Ian Lane, Prof Phil Irving, Dr Simon Waite, Dr Barbara Gordon and Prof Kevin Potter

Scribe: Prof Robert Smith

14:45-15:00 Tea/coffee

15:00 Session 3: Adhesive-bonded joint inspection requirements

3a. 15:00-15:10 Introduction – Successful NDT of adhesive joints? – Prof Robert Smith, UoB

3b. 15:10-15:30 The kissing disbond – avoidance and detection – Jeff Kapp, 3M

3c. 15:30-15:50 Assessment and criticality of defects and damage in adhesively-bonded composite structures – Dr Bill Broughton, NPL

3d. 15:50-16:10 Analysis of kissing disbonds in metallic joints – Prof Felicity Guild, Imperial College

3e. 16:10-16:30 Bonded joints in military composite aircraft – Dr Amir Rezai and Dr Brett Hemmingway, BAE Systems

3f. 16:30-17:00 Panel discussion: What does kissing disbond NDT success look like?

Panel members: Prof Robert Smith (Chair), Dr Simon Waite, Dr Bill Broughton, Jeff Kapp, Prof Felicity Guild and Dr Amir Rezai

Scribe: Dr Barbara Gordon

DAY 2 – Wednesday 10 February 2016

09:30 Session 4: 3D characterisation and materials modelling. Chair: Prof Robert Smith, UoB

4a. 09:30-09:40 Introduction – Successful 3D characterisation of composites? – Prof Robert Smith UoB

4b. 09:40-10:00 NDT requirements, or what is needed to define them? – Speaker TBA

4d. 10:00-10:20 Current status of modelling of defects and failure in composites – Prof Stephen Hallett

4d. 10:20-10:40 Current 3D characterisation and importance of metrics – Prof Robert Smith UoB

4e. 10:20-10:45 Discussion in breakout groups

- What are the requirements for NDT measurements?
- Maximum practical run time for materials models?
- Most important measurements?
- Required accuracy of fibre-tow angle measurements?
- Links to FE models for concession/disposition?
- Porosity
  - Do we need it on a sub-ply basis or per-ply, and what lateral resolution?
  - Link to models.

4f. 10:45-11:00 De-brief from breakouts

11:00-11:30 Tea/coffee

4g. 11:30-12:30 Panel Discussion: What does 3D non-destructive characterisation success look like?

Panel members: Prof Robert Smith (Chair), Prof Stephen Hallett, Dr Barbara Gordon and Prof Ian Lane

Scribe: Dr Martin Mienczakowski

12:30-13:15 Lunch

13:20 Session 5: SHM requirements – Chair: Prof Peter Foote, Cranfield University

5a. 13:20-13:30 Introduction – Successful SHM for composites? – Prof Peter Foote, Cranfield University

5b. 13:30-13:50 Certification requirements for SHM – Hesham Azzam, Hahnspring Ltd

5c. 13:50-14:10 Technique validation for SHM – Dr Matthieu Gresil, University of Manchester

5d. 14:10-14:30 Future military aircraft requirements for SHM – Steve Massam, BAE Systems

5e. 14:30-14:50 Progress and current status of SHM qualification for aero-composites – Prof Peter Foote, Cranfield University

14:50-15:20 Balcony tour of National Composites Centre

15:20-15:40 Tea/coffee

5f. 15:45-16:30 Panel discussion: What does structural health monitoring success look like?

Panel members: Prof Peter Foote (Chair), Hesham Azzam, Steve Massam, Dr Matthieu Gresil and Prof Ian Lane

Scribe: Prof Robert Smith.