University of BRISTOL

BINDT/RCNDE Workshop on NDT& SHM Requirements for Wind Turbines

BINDT THE BRITISH INSTITUTE OF NON-DESTRUCTIVE TESTING

RCNDE UK Research Centre in NDE

University of BRISTOL

BINDT/RCNDE Workshop on NDT& SHM Requirements for Wind Turbines

Welcome and Introduction

Prof. Robert Smith, University of Bristol

Director of RCNDE and BINDT Past President

Health and Safety etc

- Tony Fong, ORE Catapult

Welcome and introduction

- BINDT Workshops on NDT Requirements
  - Regulators, insurers, operators, manufacturers and NDT community.
  - Follows four previous NDT requirements workshops:

Programme – Day 1

Session 1 – Understanding the industry Part 1

11.15 Coffee/tea

Session 1 – Understanding the industry Part 2

12:45 LUNCH

Session 2 – Design, failure modes and effect of defects

15:10 Tea/coffee

Session 3 – NDT/SHM/CM experiences from the field Part 1

16:30 CLOSE

Programme – Day 2

Session 3 – NDT/SHM/CM experiences from the field Part 2

10.30 Coffee/tea

Tour of Blyth Wind Turbine Demonstrator

12:30 LUNCH

Session 4 – Potential future NDT and SHM improvements

Session 5 – Breakout session (4 groups of ~10, 15-minute rotation)

15:15 Tea/coffee

Session 6 – Panel session

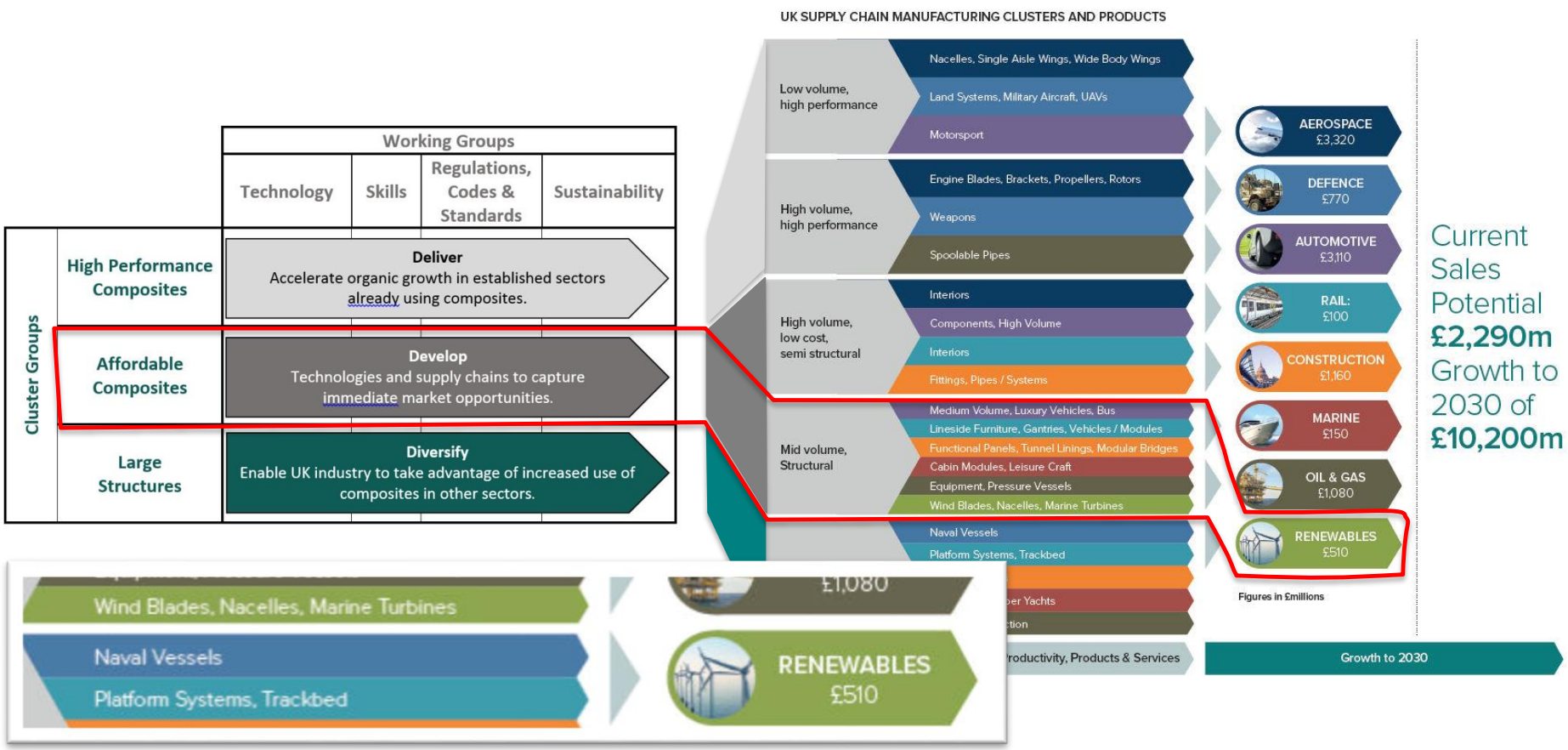
16:30 END of WORKSHOP

UK Composites Strategy 2016

UK Composites – Market Opportunities

UK Composites Strategy 2016

CLF Strategy Delivery



Breakout Groups (of 10 people)

	Breakout stations: 15 minutes at each	**Leader**
1.	Requirements for manufacturers	Peter Thayer, RCNDE
2.	In-service requirements for composite blades	Tony Fong, ORE Catapult
3.	In-service requirements for non-blade structures	Colin Brett, Uniper
4.	Potential for new NDT, CM and SHM.	Richard Freemantle, Wavelength NDT

Requirements

- NDT to life prediction transfer function
  - Operational data too
- Design/cert – unknown unknowns affect design – could bnefit from better information
  - Benefit taken in reduced weigh
  - Assumptions being made about NDT capability
- Wrinkles –
    - if know curvature can predict strength using FE model
    - Need to characterise wrinkles

- Insufficient to look at surface effect.
- Automated screening. – time crucial.
- Remove delay on as many blades as possible.
- Short delay is costly. Worth having better NDT.
- Needing operator input causes delays
- Sensors during manufacture eg Bragg gratings has been tried but could be developed

- Data, machine learning, processing, AI.
  - Filtering data to present relevant info – what is relevant to end user?

- Practicalities of NDT equipment, deployment, logistics.
  - Automated/robotic deployment
  - CM/SHM offers benefits over NDT in-service.
  - Targeted
  - GW.
- Data
  - Identify important specific data
  - Failure modes – need to understand these to know what to monitor

- Identify inspection locations and rank them, defect types.
  - Designers to take on board and specify this.
  - Design to feed through to in-service requiremnts.
- How to measure – what parameters?
  - Establish correlation between parameters and knock-down.
  - May be material dependent, as is the NDT!
- Damage tolerant design.
  - Monitoring and analysis of flawed state – inspection intervals
  - Design – what tolerance is built in?

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- Blade repairs
  - Return to service
  - Best practice guidance