

ETN TC3 Session

Material Degradation, Repair Technologies & Manufacturing

Additive Manufacturing

28 March 2019, Pau













Chaired by John OakeyProfessor of Energy Technology

Cranfield University



Agenda

- 1. AM-Motion benefits and trends of AM in Europe
 Paula Queipo, External Relations Director, Prodintec
- 2. ETN AM research roadmap

 Ferenc Pankotai, Manager Combustion Engineering and AM, Solar Turbines
- 3. 3D Printing a Pump Impeller Specification, Testing and Acceptance Criteria Jan de Roos, Senior Rotating Equipment Engineer, Shell
- 4. ETN AM Benchmarking Initiative
 Steve Nardone, Project Manager Metal Additive Manufacturing, ENGIE
- 5. ETN AM Equipment Database

 Valentin Moens, Technical Project Officer, ETN



Additive Manufacturing WG

ETNGl@bal Objectives

- Exchange knowledge and experiences focusing on the added value that AM could generate
 - ✓ Short delivery time
 - ✓ Efficiency increase by optimised design (DfAM)
 - ✓ Delivery of obsolete or "urgent" parts to shorten maintenance outages and overhauls
- Cooperate on additive manufacturing practices

Activities

- ETN AM equipment and process database;
- AM product quality and control
 - ETN best practices booklet: "Best practices for defects detection in additive manufactured components in the energy sector";
 - Case study on AM product quality and control;
- AM research roadmap
 - ETN Roadmap
 - Cooperation with the AM European Forum











ETN AM Research Roadmap

- ➤ Not enough focus on the AM in the energy sector in the current roadmaps: AMSC (2018), CAMM (2015), DoD (2016)
- ETN AM roadmap
 - Push for research fundings
 - High impact on EU research programmes
- Useful for the industry
 - Vision of the AM in the turbomachinery industry for the next 5-10 years
- Stability of the process is crucial to users
 - Standardisation
 - Alignment of different technologies and supply chains



ETN AM Research Roadmap

Design

Current design

Future design

Analysis Software

Integrated software packages

Knowledge management

Modelling to optimise design/support

Design by platform standardization

Life cycle costs

Material

Modelling / simulation

Multi materials

HSE

Optimise powders for AM (chemistry) and morphology

Knowledge of powder characterization

Component inspection and life prediction

Process

Modelling / Simulation

Hybrid machines

Data handlings

Data security

Production

Modelling / Simulation

Q.A. in situ

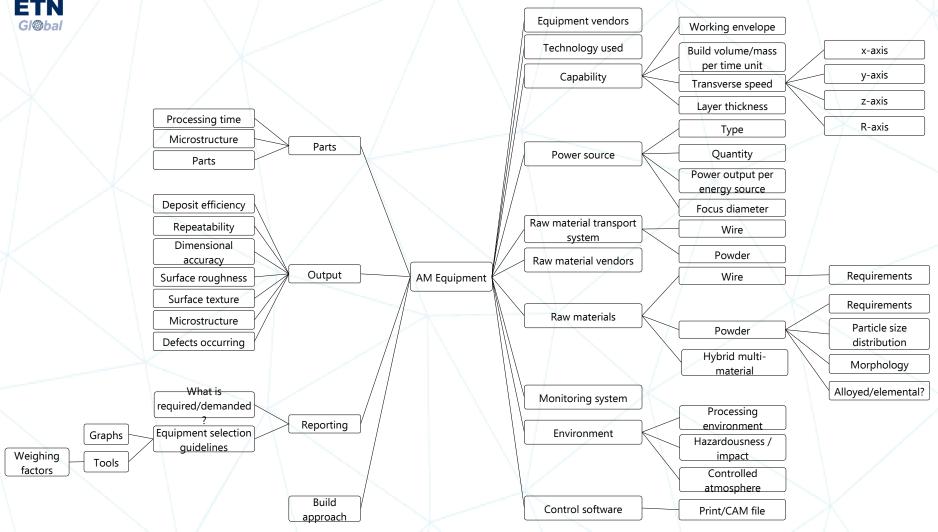


ETN AM Equipment Database

- Database
 - Machine/equipment and their parameters
 - Property of manufactured components
- Already contains the main manufacturers and describes their processes
 - Parameters of interest?
 - Focus on energy, movement, or additional items...?



ETN AM Equipment Database







Network with Users Worldwide

Access to **GT Experts**

Access to experts from the whole GT value chain

Projects

Participate in international and cross-functional projects Standardisation, Best Practice

Guidelines, Feasibility Studies, R&D Projects and more



High Level User Meetings

Take part in the yearly High Level User Meeting to discuss issues of strategic importance to the GT market, with both O&G and Power Generation industries



ETN Gl@bal

Enginespecific Meetings

Participate in ETN and GTUsers.com User Group Meetings on specific engines



Educational Courses

Tailor-made courses in areas of importance to the Users, given by selected experts from the R&D and industry community





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