

Interreg
Sudoe



ADDISPACE
European Regional Development Fund

DISSEMINATION REPORT

**Additive Manufacturing
European Forum. AMEF 2018.
AM-motion**

REPORTED BY

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1. EVENT INFO



Agenda

DAY 1: 23rd October 2018

Time	Session name
8:30-9:15	REGISTRATION
9:15-9:35	WELCOME & OPENING Keynote address by: Dr. Peter Dröll- Director, Industrial Technologies, DG for Research and Innovation, European Commission
9:35-9:50	Welcome by AM-Motion initiative and AM-Platform Dr. Paula Queipo, PRODINTEC
An innovative industrial and social renaissance for Europe	
9:50-11:10	Horizon Europe: the next research and innovation framework programme Dr. Jan Ramboer, Advanced Manufacturing Systems and Biotechnologies, European Commission Additive Manufacturing - Technology overview and impact assessment Mr. Bernard Lagerfeld, Roland Berger Enabling mass customization with digital technologies Dr. Alireza Parandian, Head of Global Business Strategy, Materialise
11:10-11:40	Networking coffee break -POSTERs VISIT
Additive Manufacturing industrial challenges <i>To discuss challenges and trends in AM, including upcoming technology and new sectors that starting to adopt these technologies, business models aspects and the implementation path forward</i>	
11:40-13:15	AM industrial strategy in the steel sector Mr. Virgilio Garcia, Global R&D Program Leader -area of Additive Manufacturing , ArcelorMittal We print to drive: Additive Manufacturing at Deutsche Bahn Ms. Stefanie Brickwede, Head of 3D printing, Managing director network Mobility goes Additive, Deutsche Bahn Additive Manufacturing: Qualification of a Special (<i>not-so-special</i>) Process Mr. Vukile Dumani, Principal Qualification and Test Engineer, Oerlikon AM GmbH The European Roadmap for AM market implementation Dr. Margherita Cioffi, Rina Consulting SpA
13:15-15:00	Networking Lunch -POSTER SESSION
Beyond the technological aspects <i>Challenges and opportunities around key aspects that can also become a barrier in AM deployment: availability of an operational workforce, concerns about managing, protecting, and transferring IP and more!</i>	
15:00-16:30	Skills needs and skills addressing for the European AM Industry Dr. Eurico Assunção, Deputy Director, EWF How Standards, Certification and Assurance are needed to bring AM parts to market Mr. Andrew Imrie, Lloyds Register An analysis of the Intellectual Property Implications of the development of industrial 3D Printing Prof. Dinusha Mendis, Bournemouth University
16:30-18:00	Networking Drink-POSTER SESSION

DAY 2: 24th October 2018

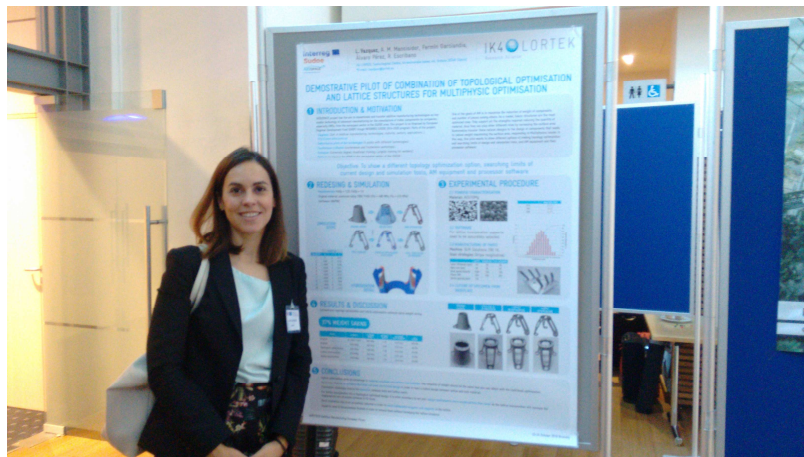
Time	Session name
The international dimension <i>To learn on the initiatives launched and investments done around the world to promote additive manufacturing</i>	
9:00-10:30	The Latest Actions of Technology Research Association for Future Additive Manufacturing (TRAFAM) Prof. Hideki Kyogoku, Faculty of Engineering, Kindai University, Japan. Technology Research Association for Future Additive Manufacturing (TRAFAM), Project Leader
	The International Dimension: AM Strategies in Singapore and the United States Prof. David W. Rosen, Georgia Institute of Technology (USA) and Digital Manufacturing & Design (DManD) Centre (Singapore)
	South Africa's Additive Manufacturing strategy and implementation program Hardus Greyling, Manager Commercialisation and National Programs, CSIR National Laser Centre, South Africa
The regional dimension <i>To know about the EU-regions that have placed AM as one of the key priorities within the regional specialization strategy actions, initiatives and innovation policies</i>	
10:30-11:15	Additive Manufacturing and the importance of the regions Mr. Laurent de Mercey, Smart and Sustainable Growth Unit, DG General for Regional and Urban Policy, European Commission
	The regional approach on AM Mr. Franck Simon, Responsable "Procédés Avancés de Fabrication" and "Ingénierie Des Surfaces", Viameca
	Strategic (inter-)regional collaboration on AM: partnerships, clusters & sme's Coen de Graaf, Project leader "Vanguard Initiative", Brabant Province, The Netherlands.
11:15-11:40	Networking coffee break -POSTERS VISIT
Key AM projects <i>Presentation of key project's results dealing with AM development , including those probing the benefit for society</i>	
11:40-12:45	Industrial view on technology developed in Supreme project Mr. Sebastian Bluemer, Development Engineer Additive Manufacturing, GKN Sinter Metals
	MAESTRO project presentation and contest Dr. Julien Bajolet, Head of Research Additive Manufacturing Program , IPC
	INTEGRADDE: Pilot lines for Additive Manufacturing of metal components Mr. Felix Vidal, Head of Robotics and Control Unit, AIMEN Technology Centre
	MANUELA: Additive Manufacturing using metal pilot line Prof. Lars Nyborg, Director of Chalmers Production Area of Advance, Chalmers University of Technology
12:45-13:00	Closing remarks: Mr Jorgen Tiedje, Head of Unit, Advanced Manufacturing Systems and Biotechnologies, European Commission

2. SHORT NEWS

On 23-24 October 2018 was held a one and half-day event about additive manufacturing to discuss on challenges and key pillars for AM market implementation. The Forum brought together policy makers, industry leaders, small to medium-sized enterprises, as well as universities, research and technology centers and other key stakeholders to network and debate on the economic, social and technical challenges that should be still solved to drive AM

deployment forward and the role that European policies are playing.

The Additive Manufacturing European Forum 2018 is an event organized in the framework of the H2020 initiative “AM-Motion-A strategic approach to increasing Europe’s value proposition for Additive Manufacturing technologies and capabilities”.



3. FEEDBACK TO ADDISPACE PARTNERS

Relevance of the event to the project.

Good opportunity to interchange ideas of how to continue I the path to industrialization of additive manufacturing and to discuss about the challenges and barriers in the near future.

Number and profile of attendants.

80-90 people attended of very various profiles in the framework of additive manufacturing and its development.

Description of partner participation: presentation on official programme, stand, attendance, etc. Attach presentation or materials used.

From LORTEK a poster was shown about the main objectives and work packages of ADDISPACE and the main results obtained by LORTEK of the pilot 4 of WP2.

DEMONSTRATIVE PILOT OF COMBINATION OF TOPOLOGICAL OPTIMISATION AND LATTICE STRUCTURES FOR MULTIPHYSIC OPTIMISATION

1 INTRODUCTION & MOTIVATION

ADDISPACE project has the aim to disseminate and transfer additive manufacturing technologies as key enable technology of advanced manufacturing for the manufacture of metal components by companies, especially SMEs, from the aerospace sector in the SUDOE area. This project is co-financed by European Regional Development Fund (ERDF) through INTERREG SUDOE 2014-2020 program. Parts of the project:

- **Diagnosis** (SoA of Additive manufacturing: technologies, maturity, sectors, applications...)
<http://www.addispace.eu/>
- **Demonstrative pilots of the technologies** (4 pilots with different technologies)
- **Transfer and diffusion** (conferences and transference workshops)
- **Formation** (University degree, Vocational training, Longlife training for workers)
- **Platform** to impulse the MAM in the aerospace sector of the SUDOE

One of the goals of AM is to maximize the reduction of weight of components and number of pieces among others. As a model, bionic structures are the most optimized ones. They support all the strengths required reducing the quantity of material. Also they can play other different roles by increasing the surface area. Bionics transfer these natural designs to the design of components that needs to reduce weight maximizing the surface area, responding to Multiphysics issues. In this way, this pilot wants to show different options of making topology optimization and searching limits of design and simulation tools, and AM equipment and their processor software.

Objective: To show a different topology optimization option, searching limits of current design and simulation tools, AM equipment and processor software.

2 REDESING & SIMULATION

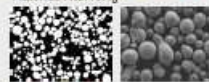
• **Requirements:** $F_{tension} = 121$, $F_{bty} = 1.1$
• **Original material:** aluminum alloy 7050 T7402 ($F_{tu} = 480$ MPa, $F_{ty} = 413$ MPa)
• **Software:** INSPICE



3 EXPERIMENTAL PROCEDURE

2.1 POWDER CHARACTERISATION

Material: AISI10Mg



	ISO 4194:2006
D10	31.25
D50	44.91
D90	63.10

2.2 SOFTWARE

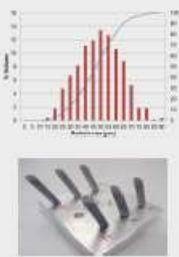
For lattice incorporation supports need to be accurately selected.

2.3 MANUFACTURING OF PARTS

Machine: SLM Solutions 280 HL
Scan strategies: Stripe longitudinal

	Layer 1	Layer 2	Layer 3
Layer thickness (mm)	0.1	0.1	0.1
Spot size (mm)	0.1	0.1	0.1
Scan speed (mm/s)	1000	1000	1000
Power (W)	200	200	200
Hatch spacing (mm)	0.1	0.1	0.1

2.4 CUTTING OF SPECIMEN FROM BASEPLATE



4 RESULTS & DISCUSSION

Conventional topology optimization and hybrid optimization achieved same weight saving.

37% WEIGHT SAVING

MODEL	MATERIAL	MAXIMUM STRESS	DISPLACEMENT	MAXIMUM DRAINAGE COEFFICIENT	% IMPROVEMENT
Original	AL 7050 T7452	100 MPa	1.10	0.45 mm	100.0%
Original	AISI10Mg	100 MPa	0.98	0.47 mm	93.5%
Topological optimization	AISI10Mg	100 MPa	1.20	0.20 mm	61.5%
Lattice incorporation	AISI10Mg	100 MPa	1.20	0.20 mm	74.0%
Hybrid optimization	AISI10Mg	100 MPa	1.20	0.40 mm	83.0%



5 CONCLUSIONS

Hybrid optimization gives an advantage in material reduction and surface maximization. The reduction of weight should be the same that you can obtain with the traditional optimization.

Up to now, there is no software that does not need any manual design in order to have a hybrid design between lattice and bulk material.

Fabrication challenges involve the transition between bulk and lattice zones.

For lattice incorporation into a topological optimized design, it is often necessary to cut your design requirements more conservatively than usual as the lattice incorporation will increase the displacement and strengths between 5-10 times.

Build orientation has to be accurately selected in order to avoid undesirable supports and supports in the lattice.

Results need to be carefully checked in order to ensure the reliability of the lattice structure.

Networking and contacts: relevant contacts made.

Machine manufacturers, AM-motion platform creators,

Findings: main findings of interest for the project.

Different programs are being developed about education, financing programs and certification.

Hybrid manufacturing between conventional and additive manufacturing.

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