Procédés additifs: Quelles sont les perspectives?
La vision européenne

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Aim

- You know about the significance of additive manufacturing in the context of international roadmaps.

- We want to support you to take the right strategic decisions in the context of additive manufacturing.
Agenda

- Impact of additive manufacturing on the production and supply chain – the European vision
  - «Global production – local supply chain»

- Standardisation of additive manufacturing

- Roadmaps in the field of additive manufacturing
«Industrial Landscape Vision 2025»

- A foresight study on the production and consumption system in 2025.

- Taking into account relevant drivers and trends...

More Information:
Drivers and trends
«Industrial Landscape Vision 2025»

Changes

**Society**
- Customisation / Personalisation

**Policy**
- International Trade Relations
- Public policy

**Economy**
- Globalisation of markets and production

**Environment**
- Increasing scarcity of resources
- Climate change

**New technologies**
- Key enabling Technologies
- ICT: Internet / Cloud
- Additive Manufacturing
- Advanced Materials
- Artificial intelligence

“Advanced manufacturing has revolutionised the production and consumption system increasing the flexibility of production plants, and enabling personalised manufacturing. Additive manufacturing (3-D printing), assembly technologies, photonics based manufacturing technologies, advanced moulding technologies and advanced robotics have significantly contributed to the development of new products and services, as well as to making the production chain more efficient.”
«Industrial Landscape Vision 2025»

The European vision with support of additive manufacturing

• **Qualified jobs** in Europe
  - Bringing back «qualified production» to Europe

• **New paradigm:** *Sending CAD data instead of parts*
  - Global production – local supply chain
  - local production – global supply chain!

• **Reduction of stockkeeping and related costs**
  - Production on demand
The European vision with support of additive manufacturing

- **Personalisation / customisation**
  - Small series

- **Ressource efficient production**

- **High added value** parts and applications
  - Functional integration
  - Lightweight
  - High performance
  - …
Opportunities of additive manufacturing

→ High added value, customized parts
→ Small series

Source: inspire-irpd
Opportunities of additive manufacturing

«Global production – local supply chain»
Standardisation of AM

International activities

• 2009: Start ASTM Committee F42 on Additive Manufacturing Technologies

• 2011: ISO-TC261 «Additive manufacturing»
  - WG1: Terminology
  - WG2: Methods, processes and materials
  - WG3: Test methods
  - WG4: Data processing

• 2013: Cooperation between ASTM and ISO for the common development of standards for AM
Standardisation of AM

European activities

- 2012–’14: EU-Project SASAM
  Support Action for Standardisation in Additive Manufacturing

- Roadmap und focus for European standardisation in additive manufacturing.
Standardisation of AM

Overview
Conclusions I

• Additive manufacturing is considered as an important tool to reach the goals for future production in Europe (and world-wide).

• To reach the goals, standardisation of AM is key.

• However, many AM-related topics need to be developed
  - Processes
  - Productivity
  - Materials
  - Certification
  - ...
  \[ \rightarrow R&D 	ext{ roadmaps} \]
Roadmap for Standardisation - SASAM

- Certification
- Processes
- Materials
- Product Quality
Other roadmaps on AM

Many national and international roadmaps exist. All are highlighting relevant R&D gaps that need to be solved for future real production.

- **EU** «Strategic Research Agenda»
  - Many european stakeholders, including inspire
  - The objective of the AM-platform is to contribute to a coherent strategy, understanding, development, dissemination and exploitation of AM.
Other roadmaps on AM

- USA «Roadmap for Additive Manufacturing»
  - Result of an expert workshop in 2009
  - Main recommendations are focusing on the following topics
    - Conceptual design methods
    - Process Modelling and Control
    - Materials, Processes and Machines
    - Biomedical Applications
    - Energy and Sustainability Applications
    - Education
    - National Testbed Center
Other roadmaps on AM (Examples)

- **GB** «East Midlands Rapid Manufacturing Strategy – moving towards 2020 »
- **D** «Thinking ahead the Future of Additive Manufacturing»
Roadmaps on AM

Results

• State of the art
  - Limited «AM-production»
  - Only few good, realized business cases
  - Huge potential

- But: Much R&D efforts on all levels needed
  Processes, Materials, Finishing, Standardisation, …
Roadmaps on AM

Results

• All roadmaps are talking about manufacturing

• Defined and quantified R&D topics

• Typical time horizont 5 – 10 years

Realisation

Project funding

- **EU** H2020: One focus is on «Additive Manufacturing»
- **Nationally funded projects:**
  - CH: CTI / SNF
  - Much funding in other countries (D, GB, F, China, Singapore, USA, …)
- **Topic-related platforms**
  - CH: Swiss Additive Manufacturing Group SAMG
  - Europe
    - AM-Platform
    - CECIMO AM Working Group
    - …
Conclusion II

- Additive manufacturing is entering the world of real production, but many topics still need to be developed.

Gardner Hype Cycle (2014)
Conclusion II

- New stakeholders are entering the field of additive manufacturing.
  - Traditional machine tool manufacturers
  - Hybride manufacturing

- The AM-market will grow significantly