mepnet

METAL PRINTING NETWORK

The Innovation Network for
Additive Series Manufacturing

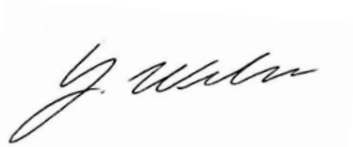
Dear Sir or Madam,

The field of aerospace, one of the leading industrial sectors in Europe, requires continuous further development of modern manufacturing technologies due to long-term planning periods. The demands of the future-oriented market for resource-conserving production at a rate of high productivity and maximum quality require constant technological advances within this branch of industry.

New, topologically optimized design principles allow for component geometries that enable unforeseen weight and cost advantages in the aircraft structure and systems. This, on the other hand, is where conventional manufacturing methods reach their limits.

Additive manufacturing (AM) is a layering technique that can be used for polymers as well as for all types of metal including titanium, aluminum and steel. A component is created layer by layer that enables the economic manufacture of components with a highly complex structure even in small quantities, since all types of equipment or forms can be omitted for this process. The resulting cost benefits are obvious.

The location of Varel (Premium AEROTEC GmbH) is being developed to a competence center for additively manufactured structural components. Our goal is to take the next steps in AM industrialization along the entire added value chain together with the best partners.



Gerd Weber
Premium AEROTEC GmbH, Head of Plant Varel / Bremen

We are looking forward to your participation!

Titanium is widely applied in the aerospace industry. Its excellent corrosion resistance and optimal mechanical properties speak for themselves.

Because of the high cost of titanium and the inability to further process it, great efforts are being made to find alternative manufacturing methods in order to reduce costs.

Additive manufacturing allows for structural components to be "printed", which leads to a decentralization of the production process. This leads to saving logistics and storage costs. In addition, the printing process can, for the most part, take place on location.

THE STARTING POSITION

Turning Point: Alternative Manufacturing Methods.

THE VISION

Strategic Alignment of the Network.

Titanium components are conventionally milled from one whole piece. In order to achieve a higher performance from machines and tools, it is necessary to apply cooling agents during processing. The milled titanium shavings are normally not recycled for aircraft construction since the cooling agents and lubricants used during the milling process soil the material too much. Currently, the shavings only find use in the production of paint or as alloy components.

Finding a method for recycling titanium shavings would be a turning point in the manufacture of titanium. The milling of whole titanium pieces normally results in up to 95% shavings. The unrecyclable share of powder in AM technology is only about 5%.

In the innovation network „mepnet – Metal Printing Network“ all partners work together along the entire added value chain and contribute their individual competencies for the development and evaluation of technical solutions.

Regarding the entire process, there are a number of unresolved issues and development requirements for additive manufacturing as well as for the upstream and downstream production processes. There are also drawbacks with the availability of cost-effective materials (recycling of titanium shavings), process reliability as well as plant productivity at acceptable costs. Also, the non-continuous automation of the production process chain as well as data protection pose additional challenges.

BIONIC STRUCTURES AND APPROPRIATE AM DESIGN

Implementing bionic structures and achieving desired characteristics in aircraft construction such as multifunctionality, modular and hierarchical setups, adaptive and non-toxic properties, etc. are still in their infancy. Which components come into question for a bionic structure under AM design, what requirements arise as a result in the manufacturing process and whether the implemented components meet the stringent guidelines and legislation of the aircraft industry are issues that require clarification.

ONLINE PROCESS MONITORING / QUALITY ASSURANCE

The major objective of online process monitoring is to develop forward-looking process regulations that enable a timely intervention in the production process at only marginal failure rates.

In addition, standardized quality criteria to guarantee reproducibility as well as batch purity for additive manufactured components do not exist yet.

THE PROJECT INITIATIVES

Technological Background of the Network.

AUTOMATED PROCESSING OF ADDITIVE MANUFACTURED COMPONENTS

After the AM process, the manufactured components are manually taken out of the printers. They are cleared of any remaining powder or irregularities. Robots could be used here to equip the system and to rework the additive manufactured components.

RECYCLING CONCEPTS

The greatest technological challenges in the area of recycling consist of achieving a pure downcycling, i.e. the reapplication of scrap titanium in the form of powder for the manufacture of new, highest quality components by means of AM.

PLANNING INDUSTRIAL FACTORY LAYOUTS

The technical and technological challenges of the additive series manufacturing of structural components for aircraft construction, the associated requirements, framework conditions and proposed solutions have a considerable influence on future industrial factory layouts.


toolcraft

THE PARTNERSHIP

Benefit from an Active Community.

MEPNET PARTNERS...

... are innovation drivers and

- work together on ideas and projects
- define development strategies
- initiate innovation and government funded projects
- place emphasis on proactive sales and project work
- create new market openings and business potential

... benefit from

- participation in state, federal and EU funding programs
- organization and implementation of specialized events and workshops
- strategic connections to relevant networks and partners
- effective representation of interests in politics, associations and committees
- joint PR and marketing activities
- participation in joint fair booths, specialized events, etc.

COORDINATION OFFICE

Would you like to contribute to the innovative future of Additive Manufacturing (AM)? Do you have questions, innovative ideas or suggestions?

Then please contact us.

Innovation Network „mepnet – Metal Printing Network“
c/o innos – Sperlich GmbH | Aeropark 1 | 26316 Varel | Germany
Tel.: +49 4451 91845 305 | Fax: +49 551 496 01 49
info@mep-network.com | www.mep-network.com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METAL PRINTING NETWORK

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