TNO and TU/e HTSC partners in the AMSYSTEMS Center

MULTI-CENTRE, MULTI-MATERIAL ADDITIVE MANUFACTURING

The strategic partnership agreement for additive manufacturing (AM) signed this spring by TU/e and TNO has been named the AMSYSTEMS Center (Additive Manufacturing Systems Center). In contrast to other AM knowledge centres, this new centre will focus mainly on the development and research of production equipment for smart, personalised and multi-material products. The centre also intends to establish a new TU/e professorship and research group.

Eindhoven University of Technology (TU/e) and TNO, the Netherlands Organisation for applied scientific research, intend to develop the AMSYSTEMS Center into a leading European knowledge centre in the field of systems for AM. It will undertake fundamental and applied research to develop innovations that are ultimately brought to market by the affiliated companies or spin-offs that emerge. Katja Pahnke, Managing Director of TU/e High Tech Systems Center (HTSC), and Erwin Meinders, Director Additive Manufacturing TNO, are the initiators and since June this year have been joint executive directors of the AMSYSTEMS Center.

The partners want the AMSYSTEMS Center to enable the development of high-tech systems that focus mainly on producing integrated and smart electronics, personalised medical products, printed food as well as pharmaceutical and high-tech products. Examples include complete implants, prostheses, dental bridgework, smart electronics like the E-pill, smart connectors and integrated or spare parts for high-tech equipment that can be printed on the spot as and when needed.

Strategic collaboration

“The strategic collaboration with the HTSC sees the high-tech mechatronics knowledge of TU/e and the industrial AM knowledge of TNO come together in a joint and unique knowledge proposition for industry”, Erwin Meinders says. “The added value of the partnership is evident in the proposition that has been realised. We have established a Smart Industry Fieldlab MultiM3D, with more than ten industrial partners, we have been awarded a Future Fund investment for an AM pilot line, and have started up a Ph.D. programme along with a number of public-private research programmes.”

The centre will also be training the experts and scientists that are needed for the emerging 3D-printing industry, in part through the establishment of a new “Systems Mechatronics for Advanced Manufacturing” TU/e professorship and research group. The recruitment process for the new professorial position has already begun. The aim is that within four years some 25 Ph.D. students will be doing research and more than 50 full-time employees will be working at the center. Currently, seven Ph.D. positions...
have been defined and at TNO some 40 researchers are engaged in this area.

**Ph.D. research**

One of the doctoral students who has begun within the centre is Thomas Hafkamp. Following his TU/e Master at the department of Mechanical Engineering (specialising in Control Systems Technology, graduating in the design principles group), he started his Ph.D. research for the AMSYSTEMS Center on 1 March 2016. "AM equipment has to be scaled up to larger product formats and higher product quality if the needs of high-tech industry are to be met. To be able to achieve this we have to investigate modelling, measurement and control in industrial AM processes", Thomas Hafkamp explains.

“The AMSYSTEMS Center has come up with three Ph.D. assignments for the additive production of high-grade ceramic products, each concentrated on one of these three aspects”, Hafkamp continues. “My research is geared to the control side of the print process and the aim of my research is to develop new equipment concepts and integrated control architectures.”

The challenge faced by Thomas Hafkamp in his research is the simultaneous scaling up of the three characteristics of AM equipment: from its current small format to industrial scale, to boost the product quality and reproducibility, and to increase production speed. "To further develop AM technology new concepts need to be generated on the basis of a holistic, systematic approach that is able to tackle these challenges (scalability, quality, productivity) at one and the same time," he clarifies.

**Cross-fertilisation**

The collaboration between TNO and HTSC is already very noticeable and will become ever more evident, according to Hafkamp. “Given the powerful multidisciplinary nature of AM, there is plenty of potential for cross-fertilisation between and perhaps even within the two organisations. It’s something I already see happening during the regular meetings of the AMSYSTEMS Center.”

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7 December 2016: The next generation of 3D printing

The AMSYSTEMS Center will be working very closely with industry; the plan is to enable some tens of industrial partners to participate in research programmes in the coming years. To encourage new collaborations the centre is organising ‘The next generation of 3D-printing’ on 7 December this year in the TNO building on the TU/e campus in Eindhoven, the Netherlands. The event will kick off with the opening of the Fieldlab Multi-Material 3D Printing (MultiM3D), a joint initiative of TNO and TU/e HTSC. The MultiM3D Fieldlab is a co-creation platform and network for stakeholders in the multi-material AM value chain.

At the halfway point of the day the AMSYSTEMS Center business relations will be given insight into the various possibilities that AM offers, like integrated and smart electronics, personalised medical products, printed food, and pharmaceutical and high-tech products. Lab tours and fascinating keynotes by René Gurka (BigRep) and Daan Kersten (Additive Industries) are also on the programme. The most recent AM developments can be found at the technology market. The latest demos and studies will also be presented and 3D-printed products will be on display.

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**INFORMATION**

[WWW.TUE.NL/HTSC](http://WWW.TUE.NL/HTSC)  
[WWW.TNO.NL/ADDITIVEMANUFACTURING](http://WWW.TNO.NL/ADDITIVEMANUFACTURING)