

PTB · Postfach 3345 · 38023 Braunschweig · Germany

To
Dagmar Auerbach
EURAMET Programme Manager

via email

PTB
Dr. Harald Bosse, Head of Div. 5
Bundesallee 100
38116 Braunschweig
Germany
email: harald.bosse@ptb.de
phone: +49 531 592 5010
Date: 2020-11-30

AdvManuNet (EMPIR 19NET01):

Feedback on European Partnership on Metrology Calls 2021: orientation pages (your email: Oct.1)

Dear Dagmar,

With this letter we respond to your email to EMN Chairs/developing EMN coordinators from Oct. 1.

We are developing the EMN “Support for a European Metrology Network on advanced manufacturing” which aims to address the metrology issues of relevance today and in future for advanced manufacturing in Europe. We have identified and will focus on 13 key industry sectors, however, the stakeholder dialogue is not yet fully developed because the JNP was only started in June 2020. The identified key industry sectors for the JNP/EMN on advanced manufacturing are listed at the end of this letter for your information.

Based on preliminary consultations with stakeholders we can summarise their areas of interest as:

- Develop approaches towards zero-defect and zero-waste manufacturing processes, e.g. through online process monitoring
- Achieve enhanced sustainability in manufacturing, e.g. through advanced additive manufacturing and laser-based technologies
- Develop green and sustainable advanced materials produced in reliable manufacturing process chains for use in different application areas
- Develop enhanced methods for spatio-temporal control of functional interfaces (down to the nanoscale) on or within components needed for energy generation or storage devices, such as photovoltaic elements or advanced batteries, including their manufacturing processes
- Develop advanced methods and tools for manufacturing of green nano-electronic devices
- Develop advanced methods for the manufacturing of high quality components with complex functional surfaces for different application areas, including optical products and systems
- Achieve reliable manufacturing processes of larger components used under harsh condition such as in wind energy systems with a view on re-powering and re-cycling aspects
- Develop highly reliable, rapid reconfigurable production process chains including smart work piece handling in full production lines towards resilient and circular manufacturing targets
- Exploit the full potential of artificial intelligence (AI) for sustainable and agile manufacturing including the use of AI enhanced robotics system for smart manufacturing

- Autonomous vehicles are developed as an integral part of future smart mobility infrastructures; the manufacturing, integration, synchronization and validation aspects of all necessary elements of future autonomous vehicles need to be addressed

These areas align with the following objectives of the scope of the **EU's Green Deal** for call 2021

- Mobilising industry for a clean and circular economy
- Supplying clean, affordable and secure energy
- Accelerating the shift to sustainable and smart mobility

and therefore we encourage PRTs to address metrology needs in the following areas:

- Develop advanced in-line and non-destructive metrology methods for reliable defect detection and characterization (size, shape, material, internal stresses) to support zero defect manufacturing targets
- Develop advanced (in-line) metrology methods to support additive manufacturing and laser-based manufacturing technologies targeting enhanced sustainability through reduced material waste and efficient component designs
- Develop new and advanced characterization methods for reliable determination of functionally relevant parameters (dimensional (incl. internal), mechanical, ...) of advanced materials
- Develop advanced metrology methods for spatio-temporal characterization of functional nanostructured interfaces applied within energy generation or storage devices
- Develop enhanced metrology methods and tools for characterization of complex 3D nanostructure patterns on larger substrates necessary for manufacturing green ICs
- Develop new multi-scale metrology approaches for quality control of complex functional surfaces
- Develop enhanced metrology methods and tools for characterization of components with ultra-precise or complex surfaces or composition including those used in optical products and systems
- Support sustainable large component manufacturing with enhanced large volume metrology such as for wind turbine blades
- Support rapidly re-configurable production processes through digital twins of decisive production line elements including models for their accuracy determination targeting at maximum reliability
- Develop methods for validation of algorithms based on artificial intelligence (AI) used in measurement and manufacturing tools to exploit their potential *and* to guarantee their function
- Develop test systems for metrological characterization of all sensors and measurement devices integrated in autonomous vehicles for reliable relative movement and object recognition in relevant traffic scenarios

The stakeholder areas of interest also align with the scope of the **EU's NRM** for call 2021 and therefore we encourage PRTs to address metrology needs in the following areas:

- Perform pre-normative research work towards standardisation of AI in manufacturing
- Address open pre-normative research issues necessary for harmonization of descriptions of functionally important parameters of complex functional surfaces over different length scales

Please do not hesitate to contact me in case of open questions!

Best regards,



JNP AdvManuNet Coordinator

List of key industry sectors (KIS) most relevant for JNP AdvManuNet

The following 13 KIS were identified to be most relevant to develop a continuous stakeholder dialogue to address metrology issues in **advanced manufacturing**. The KIS were discussed and identified based on the EU classification of [22 industry sectors](#), the EU descriptions of key enabling technologies ([KET](#), from 2009 and updated in [2018](#)) and a preliminary analysis of existing and future metrology demands in the different industry sectors.

It should be noted, however, that the focus in the different KIS is on *manufacturing challenges* of related components and systems.

- 01) Metrology Equipment & Service
- 02) Machine Tools & Robotics
- 03) Digitalized and integrated manufacturing systems
- 04) Energy generation, transmission & storage
- 05) Advanced Materials & Processing
- 06) Nano- & Microelectronics
- 07) Nano- & Microtechnology
- 08) Optics and photonics
- 09) Land and sea-based mobility
- 10) Aerospace
- 11) Complex Infrastructure & Civil Engineering
- 12) Life Science Technology
- 13) Defense & Security