How the Circular Economy really makes a difference: Trustworthy multi-stakeholder approaches to use Digital Twins for sustainable manufacturing

Special Session Code: TBD

This proposal is endorsed by TC51 Manufacturing Plant Control

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Abstract:

Circular economy is seen as one of the biggest enablers for a carbon neutral economy. The questions that result from this claim show that the status quo of the term circular economy is not as circular as it appears to be. Material flows are not yet led in circles. Reality shows that common practices in the area of recycling technically are considered as downcycling. So what is needed to close the loop and bring materials into a circular treatment? To achieve this, diverse information about a product is required: Ingredients, compounds, technical possibilities of recycling, reusability of recyclates, laws and regulations and many more.

This information shows that circularity does not begin at the end of a product’s lifecycle but in product engineering. Therefore, it is important that information is available to multiple stakeholders. But information should not be only collected in a static model of a so called “Digital Twin” but exist as a trustworthy Digital Product Passport with various requirements: The allocation of writing and reading rights, tracking of changes during the use of a product or the record of carbon footprint data. These are just a few examples that show properties which lead to a more sustainable and circular economy of manufactured products. Due to their dynamic characteristics those properties seem to exceed the requirements in the current discussions on political levels. A further role plays the choice of widely usable data formats or the concept of a data space as the place to exchange data or Product Passports.

This session aims to introduce, match and discuss different approaches and requirements from research and standardization as well as technical enablers for more sustainable production through the use of data in all phases of a product lifecycle by multiple stakeholders.

Topics may include, but are not limited to:

- Information modelling for sustainable manufacturing and the product lifecycle
- Digital Twins in the context of the Circular Economy
- Information access for multiple stakeholders in the Circular Economy
- Addressing privacy concerns in the Circular Economy
Addressing security concerns in the Circular Economy

Interoperability issues in sustainable manufacturing

Incentivising stakeholders to share information in the Circular Economy

Facilitating the use of R strategies via Digital Twins

Data Spaces for the Circular Economy

Leveraging data from Digital Twins for sustainability

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Manuscript Preparation

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Upon submission, make sure to use the Special Session code: TBD

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