

Title: Holistic approach to lower energy in production - how can design and material selection impact reduce energy consumption?

Problem statement

An important part of the life-cycle of materials is the conversion from a raw state material to the desired design of the end-product. In this section of the life-cycle, typically a lot of energy is consumed, depending on e.g. the number of processing steps or other process parameters like temperature profiles. The definition of the process chain and assembly route is defined by the design of the final product - typically already at very early stages of the product development. The optimisation to be done is therefore complex, since different technical challenges have to be considered simultaneously.

Research question(s)

The question is about low-energy-production requirements and how they can be linked to the design and material selection process already in early development phases. Building up on the analysis of key energy drivers in an exemplary process chains (e.g. carbon fibre reinforced plastics part production), alternative pathways shall be identified and their potential described and presented. What are today's technology blockers? What is the difficulty in mapping energy consumption already in the design phase? How can this be overcome?

Expected type of work

The result of this study will be an assessment report of the status quo including an impact analysis, a visualization of impacts across the supply chain, etc.. Potentials for low energy process chain for high performance aerospace materials will be described. A guidance and methodology will be proposed to connect part design with material & process selection having in mind low energy production processes.



References

- <https://www.airbus.com/en/newsroom/stories/2021-04-this-new-class-of-materials-could-transform-aircraft-design>

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