

Press Release

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A GREEN DEAL FOR AVIATION

The SUSTAINair project, led by AIT LKR, aims to make aircraft significantly more climate-friendly by developing lighter, intelligent, and functionally integrated structural and engine components

Ranshofen/Vienna: The European research project SUSTAINair (SUSTAINability increase of lightweight, multifunctional, and intelligent airframe and engine parts) was recently launched. Over the next few years, the LKR Light Metals Competence Centre Ranshofen will be conducting research in a top-class consortium on the development of lightweight, multifunctional, and intelligent structural and engine parts for aircraft. The focus is on the development of new metal and composite materials, their efficient use, innovative joining technologies, the integration of sensors in components and the recycling of materials.

Against the background of climate change, air traffic is increasingly coming under criticism. According to a [recent international study](#) by the International Energy Agency (IEA), aviation contributes about 2.5% of the global CO₂ emissions to man-made climate change. Assuming that aviation remains the fastest growing transport sector despite the slump caused by the Corona crisis, there is an urgent need for action. Thus, aviation must make its active contribution to the goals anchored in the European Green Deal which aims at achieving climate neutrality by 2050.

SUSTAINair's goal is therefore to make the entire value chain more environmentally friendly, being in line with the [European Union's Circular Economy Action Plan](#), and to set new standards for aerospace production. Cross-sector synergies, for example between the automotive sector and aviation, are to be better utilised this way. "Based on the circular economy approach, SUSTAINair is developing a basis for more cost-efficient, low-CO₂-emission operations while combating the increase in resource consumption and waste. This is one of the reasons why SUSTAINair was initiated by the Future Sky research initiative of the Association of European Research Establishments in Aeronautics (EREA)," says LKR expert Rudolf Gradinger who was instrumental in developing the SUSTAINair project idea.

European cooperation led by the AIT Austrian Institute of Technology

SUSTAINair started in January 2021, has a duration of more than three years and a budget of five million euros. The top-class consortium consists of eleven European research and industry partners. The project is coordinated by the LKR Light Metals Competence Centre Ranshofen, which is part of the Center for Low-Emission Transport at the AIT Austrian Institute of Technology.

Jürgen Roither, Research Engineer at the LKR and SUSTAINair project manager: "SUSTAINair addresses all phases of the value chain throughout the circular design of aircraft components, starting with manufacturing, maintenance and repair and ending with assembly and recycling. The expertise and diverse competences of the project partners form the basis for the success of our research work."

Improving the buy-to-fly ratio

The circular economy concept takes the approach of making the most of the potential of existing resources by keeping the materials used in use for as long as possible, thereby increasing their overall value over their life cycle. Aerospace demand for high quality materials is typically accompanied by large amounts of waste during the manufacturing process. This applies to both metal alloys and composite materials. In this context, one speaks of a disadvantageous buy-to-fly ratio; the material utilisation rate is often only 15 to 20%.

However, the novel up- and recycling methods being developed in SUSTAINair for both metal and plastic composites in aerospace can contribute to a significant reduction in waste generated during the manufacturing and end-of-life process. Recycling solutions are being developed for thermoset carbon and glass fibre materials as well as for high-performance thermoplastic composites. As SUSTAINair coordinator Roither explains, the project aims to develop near-net-shape components (components that are manufactured as close as possible in size, mass and shape to the final product) for the aerospace industry in order to reduce the buy-to-fly ratio to almost one. This is stringently required if more material along the value chain is to be used than thrown away. This will be achieved by using recently developed nanoeutectic aluminium alloys at the AIT LKR in combination with advanced die casting technologies. "This kind of processing is considered fast and efficient in the automotive industry. The technology adapted and materials developed as by SUSTAINair will also make the production of aerospace components faster, more efficient and cleaner," says Roither.

Novel components to reduce weight and increase efficiency

SUSTAINair will also use novel metal alloys and composite materials such as carbon fibre-reinforced polymers to reduce the mass of aircraft while increasing their aerodynamic efficiency at the same time. Even minor changes to the materials or the aircraft structure can make a decisive contribution to reducing fuel consumption and thus environmentally harmful emissions.

With this in mind, the project consortium will not only develop novel materials for a flexible wing, but also techniques for integrating sensors into the material of such aircraft components. Monitoring real-time data will, for example, allow operators to adjust maintenance cycles to the actual operating loads encountered, which will simultaneously increase the safety and reliability of aircraft structures and reduce maintenance costs.

A combination of metal and composite materials requires special technological solutions for joining and repair operations as well as for circular approaches concerning the end-of-life process. The concept developed within the scope of SUSTAINair is therefore designed in such a way that innovative techniques are possible along the entire value chain, which then grants the material a longer life overall. The dismantling at the end of the life cycle and upcycling are also taken into account.

On the way to climate-friendly aviation

The COVID 19 crisis has plunged the aviation sector into great uncertainty, with huge drops in passenger numbers and many aircraft having to be taken out of service earlier than expected. Nonetheless, promoting the greening of the aviation industry in the aftermath of the pandemic remains a strategic goal of European governments. "A transition to circular aviation and the associated technological innovations can make a significant contribution to the consolidation of the sector. With SUSTAINair, we want to make aviation more climate friendly as a whole and at the same time provide the industry with the tools it needs to emerge from the crisis," says project manager Jürgen Roither. This is a goal that the AIT is also pursuing in other major European research projects: In the recently launched [SOLIFLY](#) project, for example, multifunctional structural components for aircraft are being developed that serve simultaneously as electrical energy storage. And within the framework of [IMOTHEP](#) and [ORCHESTRA](#), the AIT is also involved in the development of battery technologies and systems for wide-body aircraft that are suitable for aviation - a very decisive step on the way to emission-free aviation.

The SUSTAINair project consortium:

- [AIT Austrian Institute of Technology GmbH / LKR Leichtmetallkompetenzzentrum Ranshofen GmbH](#) (Austria)
- [Netherlands Aerospace Centre - NLR](#) (Netherlands)
- [German Aerospace Center - DLR](#) (Germany)
- [JOANNEUM RESEARCH](#) (Austria)
- [Johannes Kepler University Linz](#) (Austria)
- [Delft University of Technology](#) (Netherlands)
- [AEROCIRCULAR](#) (Belgium)
- [INOCON Technology GmbH](#) (Austria)
- [INVENT GmbH](#) (Germany)
- [Dutch Thermoplastic Components B.V.](#) (Netherlands)
- [RTDS Association](#) (Austria)

Project website: www.sustainair.eu



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#greenaviation
#lightweightdesign

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