# Reducing emissions in car production: with digital twins and recycled aluminum

## About this project

### S3-ALU

### Reducing emissions in car production: with digital twins and recycled aluminum

**Markets:**

**Material:** Aluminium

This project is funded by the Technology Transfer Programme Leichtbau (TTP LB) of the Federal Ministry of Economics and Climate Action.

Technology Transfer Program Leichtbau

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## About this project

### Context

The automotive industry is facing the challenge of making its production more climate-friendly. Aluminum in particular contributes significantly to the CO2 footprint of cars due to its energy-intensive manufacturing process. In order to reduce emissions, recycled aluminum - so-called secondary aluminum - will be increasingly used in the future. Compared to primary aluminum - i.e. aluminum produced directly from the raw material for the first time - significantly less energy is required in the production of secondary aluminum. The researchers in the S3-ALU project want to exploit this savings potential.

### Purpose

The aim of the project participants is to replace primary aluminum in automotive production with secondary aluminum without losing the advantageous properties of the material. They want to use simulations to evaluate the quality and sustainability of the recycled materials. The use of secondary aluminum is intended to significantly reduce the CO2 footprint per vehicle and promote sustainable lightweight construction.

### Procedure

The researchers are developing and using a digital twin to model different compositions of recycled aluminum. The virtual representation depicts the properties of the recycled aluminum and evaluates the suitability of the available aluminum scrap of different qualities for material production. Thanks to the digital twin, the project partners can test different material variants in a time and resource-saving manner without having to carry out numerous physical experiments. This allows them to determine how high the proportion of recycled aluminum can be without compromising the material quality. In addition, the components can also be evaluated in terms of their carbon footprint.

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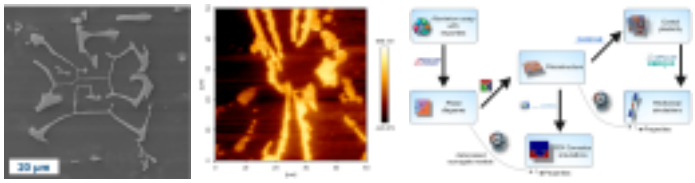

**Funding duration:**

**Project partner:**

MAX-PLANCK-INSTITUT FÜR EISENFORSCHUNG GmbH

access

VOLKSWAGEN AKTIENGESELLSCHAFT

BODE

| | | | |
|---|---|---|---|
| **Funding sign:** | 03LB3091 | **Funding amount:** | EUR 1.9 million |

**Further websites**

foerderportal.bund.de/foekat/jsp/SucheAction.do?actionMode=view&fkz=03LB3091A - S3-Alu in the federal funding catalog

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## Project coordination

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## Lightweighting classification

| | Realisation |
|---|---|
| **Offer** | |
| **Products**<br>Parts and components, Semi-finished parts | ✓ |
| *Services & consulting* | |

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## Lightweighting classification

| | Realisation |
|---|---|
| **Field of technology** | |
| *Design & layout* | |
| **Functional integration**<br>Sensor technology | ✓ |
| **Measuring and testing technology**<br>Materials analysis | ✓ |
| **Modelling and simulation**<br>Optimisation, Processes, Materials, Others (Digital twin) | ✓ |
| *Plant construction & automation* | |
| **Recycling technologies**<br>Recycling | ✓ |
| **Manufacturing process** | |
| *Additive manufacturing* | |
| *Coating (surface engineering)* | |
| *Fibre composite technology* | |
| *Forming* | |
| *Joining* | |
| *Material property alteration* | |
| **Primary forming**<br>Casting | ✓ |
| *Processing and separating* | |
| *Textile technology* | |

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## Lightweighting classification

| | Realisation |
|---|---|
| **Material** | |
| *Biogenic materials* | |
| *Cellular materials (foam materials)* | |
| *Composites* | |
| *Fibres* | |
| *Functional materials* | |
| **Metals**<br>Aluminium | ✓ |
| *Plastics* | |
| *Structural ceramics* | |
| *(Technical) textiles* | |