Reusing aluminium scrap in cars: Focus on recycling and material sorting

About this project

Green-AL-Light

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Markets:

Material: Aluminium

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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

Context

Sustainable lightweight materials are crucial to reducing the environmental impact of mobility and increasing resource efficiency in the industry. Manufacturers are increasingly using aluminium, especially in highly stressed components such as axle components, wheels, body structures or high-voltage battery housings, as it is significantly lighter than steel, for example, and can therefore significantly reduce CO2 emissions during the use phase. However, aluminium production is not only expensive, but also releases a lot of CO2.

One sustainable option is to recycle aluminium. The use of secondary aluminium is not only sustainable, it also pays off for companies. By analysing and optimising the digitalised process chain, the researchers are increasing cost efficiency, for example by adjusting the alloy composition or the forming processes. In this way, lightweight components based on secondary aluminium can be brought into widespread industrial use, for example in mid-range vehicles or aircraft.

Purpose

In the Green-AL-Light research project, a broad-based consortium is investigating how aluminium from car scrap can be recycled and reused. To this end, the project partners are looking at the entire process chain, starting with the recycling of the cars and the sorting of the end-of-life (EoL) scrap materials. This is followed by the development and testing of new secondary wrought alloys, casting of the alloys with the highest possible secondary aluminium content, processing into components by extrusion and / or forging and testing for use in cars. To ensure that the holistic analysis is successful, the scientists are building up the individual steps in a cross-location and digitally networked manner. They cover all stages of the process chain. The interdisciplinary team aims to demonstrate that EoL material can also be used for highly stressed aluminium components and can be used cost-effectively.

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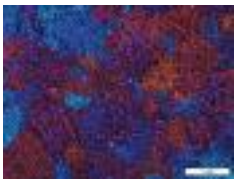
Procedure

In order for the secondary aluminium to be reused, the EoL scrap must be reliably separated by type and alloy. To this end, the project team is further developing the sorting technology using the laser-induced breakdown spectroscopy (LIBS) process. Among other things, the project partners are investigating whether, and if so, in what quantity, previously undesirable by-elements are contained in the recycled material. This enables them to subsequently adapt and optimise the composition of the alloy.

By reusing EoL scrap in high-quality aluminium alloys, the material cycle is closed. This conserves resources and reduces CO2 emissions. Using the example of an aluminium forged wheel from Audi, the project partners calculate a potential saving of at least half the CO2 compared to a wheel made from primary aluminium. In addition, the increased use of secondary aluminium results in less waste that is problematic to dispose of, such as red mud.



Funding duration:

Funding sign:	03LB3038	**Funding amount:**	EUR 1.9 million

Further websites

www.green-al-light.de/de/pub/home - Project website in German language

foerderportal.bund.de/foekat/jsp/SucheAction.do?actionMode=view&fkz=03LB3038A - Green-Al-Light in the federal funding catalogue

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Lightweighting classification

	Realisation
Offer	
Products Parts and components	✓
Services & consulting	
Field of technology	
Design & layout	
Functional integration	
Measuring and testing technology Materials analysis	✓
Modelling and simulation Processes, Materials	✓
Plant construction & automation Automation technology	✓
Recycling technologies Recycling	✓
Manufacturing process	
Additive manufacturing	
Coating (surface engineering)	
Fibre composite technology	
Forming Forging, Extrusion moulding	✓
Joining	
Material property alteration	
Primary forming	
Processing and separating	
Textile technology	

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Lightweighting classification

	Realisation
Material	
Biogenic materials	
Cellular materials (foam materials)	
Composites	
Fibres	
Functional materials	
Metals Aluminium	✓
Plastics	
Structural ceramics	
(Technical) textiles	