Optimising die casting for electric cars: with innovative aluminium alloys and magnesium

About this project

InDrutec-E

Optimising die casting for electric cars: with innovative aluminium alloys and magnesium

Markets:

Material: Aluminium, Magnesium

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

Optimising die casting for electric cars: with innovative aluminium alloys and magnesium

About this project

Context

Since the beginning of motorised transport, cast components have been an elementary component of vehicle technology. German foundries lead the global market with their highly developed die-cast parts for combustion engines, transmissions and structural components. In order to secure this technological leadership in the face of the electromobility transition, companies must now optimise their materials and processes for use in electric cars. To this end, the project team is utilising various lightweight construction technologies along the value chain. The partners cover the entire automotive production process - from material, component and process development to supply and use in the car.

Purpose

The project partners want to optimise the materials, construction methods and die casting processes so that components can be produced with lower weight, lower costs, improved quality and reduced CO2 emissions. On the one hand, the project team is developing new aluminium die-casting alloys with a high proportion of recycled material, which exhibit the required properties directly after die-casting without any further process steps. These innovative alloys have better mechanical properties, make the components lighter and do not require energy and cost-intensive heat treatment. Compared to conventional aluminium solutions, they make components up to 20 percent lighter, which also saves costs and CO2 emissions in the application.

The researchers also want to develop magnesium die-cast parts for the electric drivetrain. Magnesium is not only lighter than other metals, but also has significantly better damping properties, which are advantageous in the electric drivetrain to reduce disturbing noises.

Optimising die casting for electric cars: with innovative aluminium alloys and magnesium

About this project

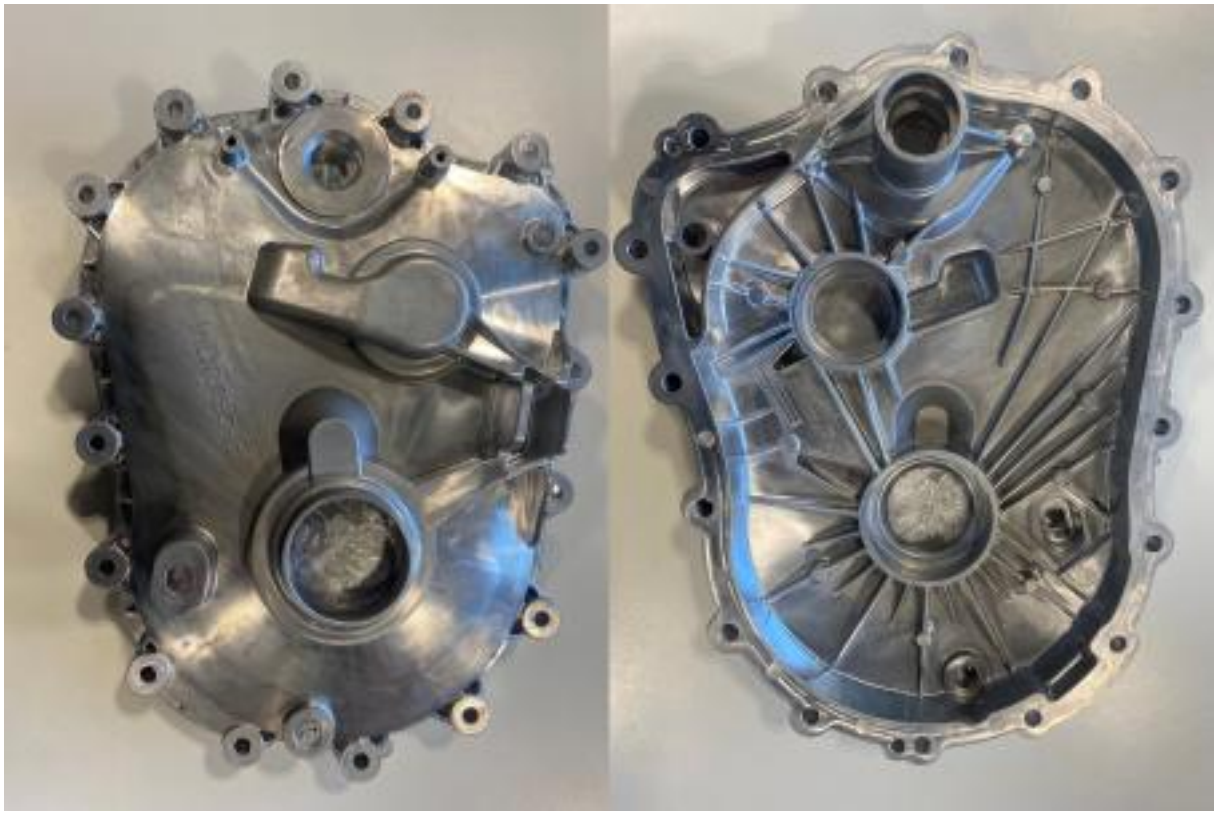
Procedure

For the casting of magnesium components, the project team is endeavouring to raise the component quality in the cold chamber die casting process to the level of today's hot chamber processes by using so-called vacural technology. This makes it possible to produce highly stressed or large magnesium components with low reject rates and very good material properties.

The researchers are combining their findings in the construction of a representative part from the electric drive train. For example, they are developing the bearing cover of a gearbox module, which is ideally suited to demonstrating the improved mechanical properties with its bearing seats and diverse local stiffening ribs. Thermal conductivity and vibration damping also play a major role here. The gearbox cover is developed, manufactured and tested as a variant made of secondary aluminium and magnesium. The application with its material variants is selected so that the research team can transfer the knowledge gained to other components of the electric drivetrain or the vehicle structure.

Optimising die casting for electric cars: with innovative aluminium alloys and magnesium

About this project



Funding duration:

Funding sign:	03LB2004	**Funding amount:**	EUR 1.6 million

Further websites foerderportal.bund.de/foekat/jsp/SucheAction.do?actionMode=view&fkz=03LB2004A - InDrutec-E in the federal funding catalogue

Optimising die casting for electric cars: with innovative aluminium alloys and magnesium

Project coordination

Contact:

Mr Dr. Elmar Beeh

+49 0711 6862-8311

Elmar.Beeh@dlr.de

Organisation:

German Aerospace Centre (DLR)

Pfaffenwaldring 38-40
70569 Stuttgart
Baden-Württemberg
Germany

www.dlr.de/fk

English (EN){{ Projektpartner }}

Lightweighting classification

	Realisation
Offer	
Products Parts and components	✓
Services & consulting	

Optimising die casting for electric cars: with innovative aluminium alloys and magnesium

Lightweighting classification

	Realisation
Field of technology	
Design & layout Lightweight design, Lightweight material construction	✓
Functional integration	
Measuring and testing technology	
Modelling and simulation Life-cycle analysis, Optimisation, Processes, Materials	✓
Plant construction & automation	
Recycling technologies	
Manufacturing process	
Additive manufacturing	
Coating (surface engineering)	
Fibre composite technology	
Forming	
Joining	
Material property alteration	
Primary forming Casting	✓
Processing and separating Grinding	✓
Textile technology	

Optimising die casting for electric cars: with innovative aluminium alloys and magnesium

Lightweighting classification

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