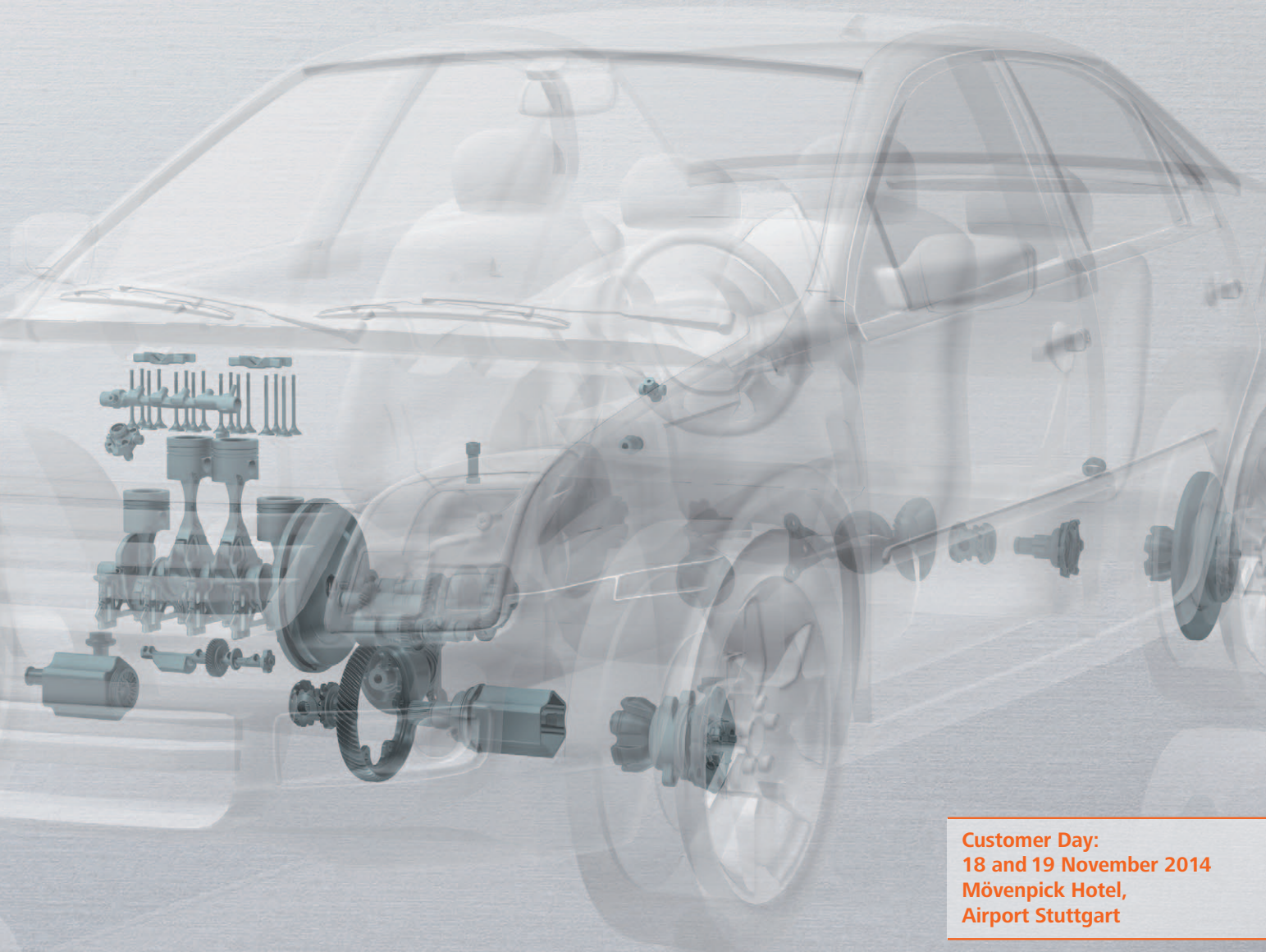




**massiver** LEICHTBAU

# **AUTOMOTIVE**

Lightweight Design with Forging



**Customer Day:**  
18 and 19 November 2014  
Mövenpick Hotel,  
Airport Stuttgart

The lightweight design potential of forged components

# 24 COMPANIES – 399 LIGHTWEIGHT DESIGN IDEAS

## The Lightweight Forging Initiative

15 forging companies and 9 steel manufacturers joined forces in The Lightweight Forging Initiative at the beginning of 2013 under the auspices of the German Forging Association (Industrieverband Massivumformung e. V. – IMU) and the VDEh steel institute.

Without drawing on public funding, the companies are financing the study entitled **“Lightweight Design Potential of Forged Components in Passenger Cars”**, which is being carried out by the automotive engineering research company, Forschungsgesellschaft Kraftfahrwesen mbH Aachen (fka). This institute is analysing which forged steel parts are currently being assembled in cars today and how these may be optimized with respect to lightweight design.

The goal is to achieve weight savings in cars using innovative components made of steel. This is by far the largest pre-competitive joint project of these two industries.

The consortium of steel manufacturers and forging companies is presenting lightweight concepts relating to design, material and production engineering. This represents a unique cooperation between manufacturers and component suppliers in the entire process chain for wire and bar products.

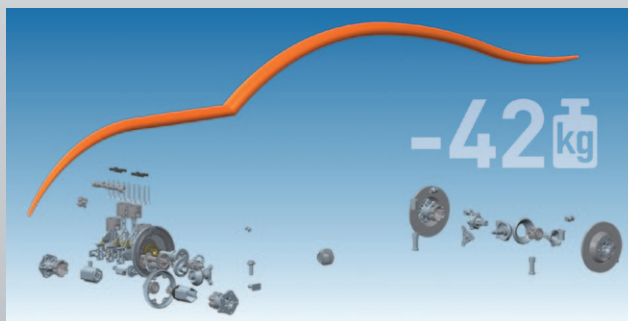
The success of the proposed concepts may be measured in terms of lightweight design, cost and implementation potential.

Information and current events may be found at [www.massiverLEICHTBAU.de](http://www.massiverLEICHTBAU.de)

## Lightweight Design Potential

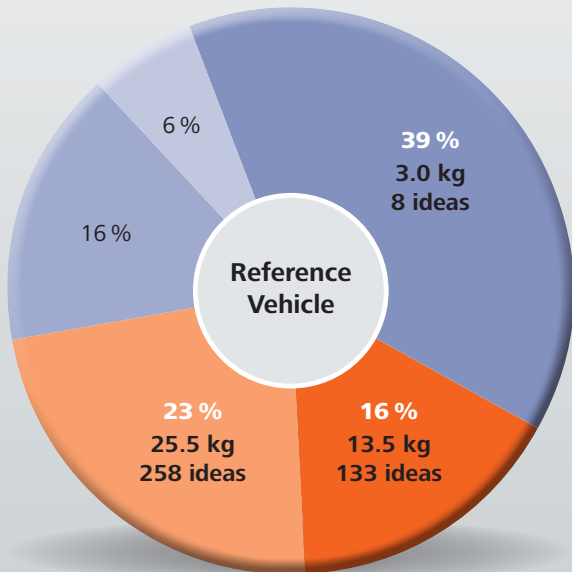
To date, lightweight design has meant weight savings in the car body and solutions based on sheet metal. Yet areas such as the powertrain (fuel injection, engine, transmission, transfer gearbox, input shafts) and the chassis demonstrate an equally high lightweight design potential. This potential is rarely focussed on, and if it is considered, then only with a solution approach at system level, e.g. downsizing.

Lightweight design potential based on material and forging solutions has received little attention so far. However, considerable weight savings can be achieved in vehicle design by using forged steel components. This is shown by the latest research results from the Lightweight Forging Initiative, which reveal that the weight of a middle class vehicle **may be reduced by 42 kilograms** by using state-of-the-art steels and forging technology. Such lightweight design certainly has a broad impact and **can contribute significantly to reducing energy consumption and total CO<sub>2</sub> emissions**.



## Weight Analysis

The reference vehicle used in the study (125 kW / 170 HP, 2.0 Turbo-DI, diesel engine, double-clutch transmission, all-wheel drive) has a total weight of 1,740 kg, of which 838 kg were analysed.



- Interior
- Electronics
- Car body
- Chassis
- Powertrain

## Workshop Overview

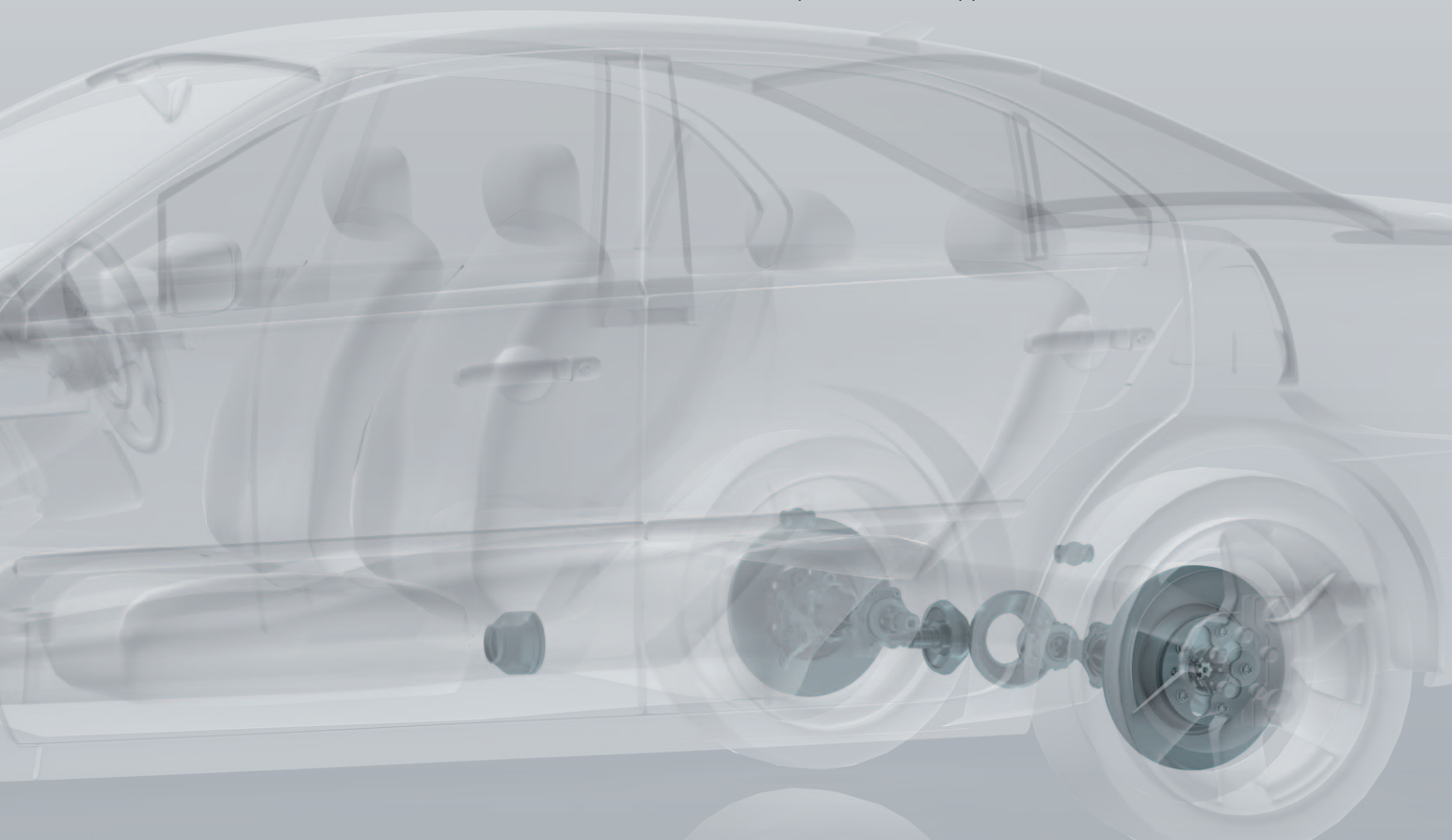
- Three workshops with a total of 65 experts from 30 companies and research institutions
- Analysis of approx. 3,500 parts from the powertrain, chassis and other selected components
- Formulation of 399 lightweight design ideas, which may be subdivided into different lightweight categories
- Main documentation in the benchmarking database

**In total, a feasible lightweight design potential of 42 kg has been identified for the areas under consideration.**

## Outlook

The experts estimate that some ideas will lead to both a reduction in weight as well as a **decrease in costs** (quick wins). Other ideas demonstrate a lightweight design potential which would involve somewhat higher costs and increased development efforts.

The ideas are not intended to represent fully developed solutions. Rather, they should reveal possibilities for weight savings achieved through design, material and production engineering, as well as provide further impetus for new approaches.



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