

Presseinformation

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InCar highlights for the body: Systems for weight reduction

InCar offers innovative solutions for the autobody that can be implemented quickly with available materials. Cost and weight reductions are central to the new concepts. Most of the solutions are either cost-neutral or involve very attractive lightweighting costs. And the environment benefits as well, because lighter cars consume less fuel and cause fewer emissions.

Enhanced hot stamping: Tailored tempering for B-pillars

Tailored tempering is an enhancement of the hot stamping process, which produces parts with different local strength and elongation properties. The InCar developers used the technology to manufacture prototype B-pillars. These crash-relevant parts need to display high strength in the top section to protect vehicle occupants. In the lower section, at the foot of the pillar, good elongation properties are required to dissipate part of the impact energy in a crash. The InCar developers also used the new hot stamping steel MBW[®] 1900 for the B-pillars. With a strength of 1,900 megapascals (MPa), the material allows a more than 25 percent increase in part strength compared with previously available hot stamping steels.

The InCar B-pillar made by tailored tempering is 22 percent lighter than the reference and costs nine percent less but offers the same crash performance. The new solution reduces emissions of CO₂ equivalent over the full lifecycle of a car by 122 kilograms per vehicle. The crash performance of the B-pillar was validated virtually and within the InCar reference structure. All results are in the same range as the reference. The InCar solution also meets the particularly tough requirements of the US IIHS side impact crash tests (Insurance Institute for Highway Safety).

27 percent less weight, 13 percent lower cost: Longitudinal member as T³ tube

The InCar solution for front longitudinal members offers a weight advantage of up to 27 percent compared with the reference and costs up to 13 percent less. It is based on the ThyssenKrupp-developed T³ technology for tubular parts. The new solution reduces CO₂ equivalent emissions by up to 125 kilograms per vehicle.

T³ technology is an innovative manufacturing process for tubular components that allows several parts and manufacturing steps to be combined. Recesses, positioning holes and end welding flanges are produced in the part during the forming process. The longitudinal member is manufactured from tailored blanks.

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Opening new doors: Advanced Door concept

The Advanced Door concept offers an eleven percent weight reduction and improved crash properties at the same cost as the reference. The advanced part of the name refers in particular to a highly integrated door inner and a thin, light outer made of high-strength dual-phase steel. The climate statistics: up to 109 kilograms less CO₂ equivalent over the lifetime of the car.

The developers took a new design approach with the door inner by dividing the conventionally one-piece part top to bottom into an inner and an outer panel. The outer inner panel integrates almost all the necessary reinforcements, thus significantly reducing manufacturing complexity for car manufacturers.

The outer inner panel is produced from a high-strength tailored blank, which can be made from either hot stamping steels or ultrahigh-strength cold stamping materials. The new outer skin of the Advanced Door accounts for seven of the eleven percent weight reduction: The developers used a steel sheet with a thickness of 0.55 millimeters – 0.2 millimeters thinner than in the reference structure. The material is a high-strength dual-phase steel.

Sandwich roof: Achieve weight reduction goals at low cost

Two thin steel sheets and a polymer filling are the ingredients for a new roof outer panel made of sandwich material. The solution is attractive from both a weight and cost perspective. Yet despite the low weight, stiffness and crash performance match the high standards of the reference structure. Appropriate customary assembly methods have been identified for integrating the roof into the body. The lightweight roof reduces the burden on the environment by 200 kilograms of CO₂ equivalent per vehicle lifecycle.

The sandwich roof is 38 percent or 7.29 kilograms lighter than the steel roof of the InCar reference structure. Total costs are roughly 33 percent higher, resulting in attractive weight reduction costs of 1.35 euros per kilogram. The sandwich material can also be used for other outer skin solutions such as hoods, doors, fenders and tailgates.

Magnesium roof module

The InCar magnesium roof offers weight reduction at the very highest level: Weighing only 8.94 kilograms, the roof module is 62 percent lighter than the benchmark. Designed for use in exclusive, high-performance niche vehicles in the high-end segment, the magnesium roof offers significant cost advantages over comparably light carbon fiber composites. It meets current crash requirements and displays slightly higher

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stiffness values than the reference structure. Production viability has been confirmed by FEM simulations (Finite Element Method), extensive testing and pre-production prototyping.

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