A face-saver in the event of a crash

GF Automotive helps build the crash-resistant steering bracket.

A car crash can leave mental as well as physical scars. The automotive industry can therefore never do too much to reduce the impact of crashes, particularly when it comes to preventing head injuries. Airbags help cushion direct contact between parts of the car and the face and head. However, they have a basic problem in that they act in the wrong direction, bursting open against the driver who is thrown forwards in a crash.

The ideal solution would be a steering column that moves forward at the same time as the airbag opens. And precisely this is now made possible thanks to sophisticated metal casting techniques.

A big advance in car safety

In conventional car design the steering bracket which joins the steering column to the cross member or floor frame is a rigid unit. Now in a new design approach, the component that fixes the steering column in place in the longitudinal direction is in the form of a separate slide.

Imagine a sledge which is firmly frozen to the ground. If it is hit hard, it is released within fractions of a second. In the same way, the slide in the steering column housing is tightly joined to the bracket so that it cannot move until a hard impact causes it to release in a flash.

"The slide bracket joint system has a double function", explains Detlef Buchmann, Head of Technology at GF Automotive at the Altenmarkt location. "Together with other deformation elements it helps absorb the impact energy. At the same time in a crash the steering wheel moves forward clear of the passenger compartment by a defined amount."

Details are as secret as Coca-Cola

Detlef Buchmann is happy to provide information about the basic manufacturing principle. "The two elements, both made of magnesium, are joined by means of a force fit system. The corresponding positions on the slide are machined and coated with a lubricant. The bracket is then merely calibrated in the joint region."

But there is no way Detlef Buchmann can be persuaded to reveal how the joint created by the force fit can be made to yield exactly in the desired area when a certain impact force is exceeded, and how this is achieved with extremely high precision. The detailed formula for this seems to be almost as much of a secret as the recipe for Coca-Cola. But then, competitors might be reading this and it is precisely such refinements that give GF Automotive its competitive edge.

The special design which minimizes vibrations, however, is no secret. It ensures that motorists can enjoy smooth driving at all times and not just added safety if it should come to the crunch.

The basic principle

There's no limit to what you can do with metal casting

"Despite all the various different alternatives that are already in use, there are always new possibilities even for metal casting: a process that previously only appeared to be possible with plastic injection moulding gave us the idea for the latest chamfered slide joint pressure die casting."

Detlef Buchmann, Technical Head GF Automotive, Altenmarkt (A)

The big trend

Passive safety is becoming more and more active

Active and passive safety

Active safety includes everything that can prevent accidents: from optimum handling characteristics (e.g. traction), through elements designed to keep the driver fit (for example, ergonomic seats) to electronics-based systems (ABS, ASR, etc.).

Passive safety includes everything that reduces the risk of injury in an accident: from the seat belt system, through airbags to deformation zones (popularly known as crumple zones) which absorb the energy of impacts. The new slide bracket system belongs to this category and improves passive safety in some crucial respects.

Intermediate steps in the future

Further development in the safety domain is concentrated on varying the way components react according to different levels of danger. Although this calls mainly for sophisticated sensor systems, the accurately predictable properties of advanced castings will almost certainly help achieve even more differentiated reaction in the future.

Market interest

New steering bracket is an immediate hit

A good 1.8 million units a year in the PQ 35 platform

The PQ 35 platform of the VW Group is used in models from Audi (e.g. A3), VW (e.g. Golf V), Seat and Skoda. GF Automotive's project partner is ThyssenKrupp Presta.

And another 1.8 million units in the C1 platform

The C1 platform is used in Ford, Mazda and Volvo models
Project partner is also ThyssenKrupp Presta.

"Adding Quality to People's Lives"

The dream of safer driving

Fewer neck ...

In a crash it is not only the face that is at risk of injury. All parts of the driver's head are affected. Improvements in this area also offer the added benefit of reducing the risk of injury from whiplash.

... and chest injuries

Designing the steering column to move forward in a crash also reduces the risk of injury to the thorax which protects the lungs and other organs.

Better driving under normal conditions as well

Accidents are of course the exception, but drivers also benefit from the carefully enclosed steering column at all other times. The bracket is designed to very high standards as regards resonant frequency and this prevents external vibrations. The steering – the perceptible interface between person and car – thus gives a reassuring, safe feeling.

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