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UNDERBODY PROTECTION WITH DAMPING

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UNDERBODY PROTECTION WITH DAMPING EFFECT

Technical task:
The task of the technical innovation is to optimize the underbody protection both in its flexural rigidity and in its tightness, especially in view of the growing e-mobility and the associated safety criteria.

Initial situation:
Usually, the underbody protection is made of sheet metal or fiber-reinforced plastic (FRP) process reliable. Due to new requirements such as Protection of the battery, looking for alternatives to the existing process, possibly the material.
For sheet metal components, corrosion protection and damping (for example, to improve the acoustics in case of stone chipping) is necessary.
In addition, an energy absorption element between underrun protection and battery must be introduced.
There are approaches to provide FVK components with ribs and beads on the inside to stabilize them.

In electric vehicles, special attention is paid to the tightness of the underrun protection, for example by extra gaskets attached to these components.
To ensure the crash safety of fiber-reinforced plastic for the underrun protection, additional measures such as extra fabric or mats or tape reinforcement, necessary.

An underrun protection made of plastic has energy advantages, but here the heat dissipation from the electrical components is difficult. In the event of a crash, it means a lot of effort to prevent a burst and to absorb the introduced energy.

Solution:
The underrun protection described here consists of a foam structure attached to a stiffening element, which simultaneously performs the sealing function to the battery-side surface.
In a preferred embodiment of the technical innovation is a coated sheet that is inserted into a tool and foamed directly. The foam thus acts as a damping of the sheet and seals at the same time via a sealing rib the contour to the vehicle.

Instead of the sheet previously used, a fabric-reinforced plastic or a fiber mat, a fiber fabric or a structural film can also be used.
Depending on the required quantities and complexity, the underbody protection can consist of pressed, injected or cast and foamed plastic foam and the stiffening element.
In a further preferred embodiment, a sheet is used, which is roughened at least in the edge region (adhesive bond to the plastic foam), e.g. by lasers or rolling structure.
In a further preferred embodiment, an aluminum is used as the sheet.

In a particular embodiment, this metal sheet is inserted in the plastic so that it can be used as a crash reinforcement. In this case, the sheet for
Weight savings are partially perforated or contain recesses.
The sheet metal can also be completely enclosed in plastic or precoated.
In a particular embodiment, this metal sheet is inserted in the plastic foam so that a grounding of the electrical components on the sheet is possible.

In a particular embodiment, the foam used is a gas-laden plastic melt (chemical or physical blowing agent).
In a further particular embodiment, the energy absorption element is inserted into the foam for the battery side in the tool in the foam.
In a further preferred embodiment, the energy absorption element is formed directly from the foam material. This can e.g. done by local temperature increase in the Absoptionselemestes so that there is a compact mass z.b. produced by thermoplastic melt.

In a further particular embodiment, the foam used is a plastic particle foam.
Furthermore, in another preferred application, the crash element is achieved for energy absorption via the foam formulation (filler such as hollow spheres, fibers).
As a stiffening element, it is also possible to use metal in the edge region and fibers in the middle.

Advantages:
- By introducing stiffening acting plastic elements, the lack of flexural rigidity of the underrun protection can be improved.
- Due to the gained stiffness, the screw connection can be realized with a smaller number of screws (and screw points).
- This leads to savings of excipients and a faster assembly (F-time), since less screwing work must be done and effectively leads to a cost reduction.
- It can be saved weight and thinner metals are used.
- As a particle foam material from TPU and PP is conceivable, which can be designed to be particularly soft and acoustically damping.
- The plastic foam can be specifically designed as thermoplastic foam and so also for cost reasons of several elements that are subsequently welded, consist.

Possible application:
- For all vehicles, especially for BEVs and PHEVs.