講演番号	060

文献番号	20225060

Impact Detection for the High Voltage Battery

- Reduces Weight – Ensures Safety -

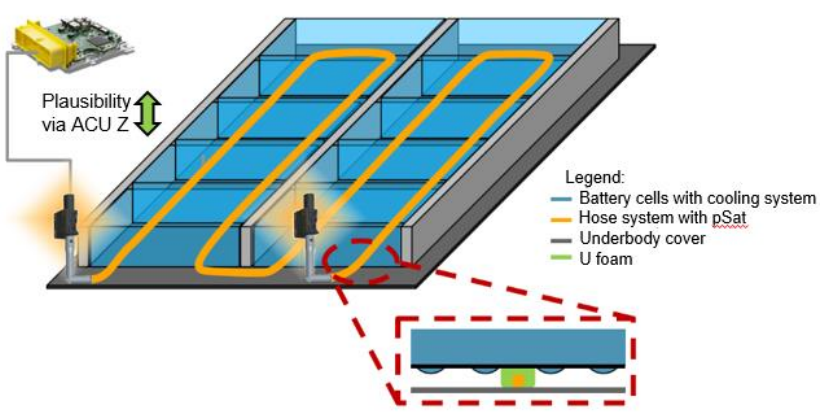
Johannes Vetter [1)] Andreas Forster [2)] Udo Geissler [3)]

1) Continental Safety Engineering International GmbH, Carl-Zeiss-Str. 9, 63755 Alzenau,
2) Continental Automotive GmbH, Siemensstr. 12, 93055 Regensburg,
Germany (E-mail:andreas.forster@continental-corporation.com)
3) Continental Safety Engineering International GmbH, Carl-Zeiss-Str. 9, 63755 Alzenau,
Germany (E-mail: udo.geissler@continental-corporation.com)

KEY WORDS:**battery, electric vehicle, impact, threat, detection, pressure sensing**

Most electric vehicles have a skateboard chassis architecture with the battery package being installed at the bottom of the vehicle floor. While this design significantly improves the center of gravity of the vehicle, it also increases the risk of battery damage. A collision caused e.g. by striking the curb or by throwing objects against the battery package while driving, could cause damage to the battery. Special protective measures are therefore required to prevent or detect intrusion. Damage to any type of traction battery must be detected as a matter of urgency in order to avoid the risk of fire in the event of short circuits.

Continental uses existing pedestrian protection sensors and applies the measurement principle to the battery. This allows to distinguish different types of impact events and warns the driver accordingly. The system is already active before the actual damage occurs and is robust enough to prevent unnecessary false alarms.



The battery impact system can additionally be used to detect intrusion to the front or the side into the battery by installing the sensor tube laterally around the battery.

Algorithms calculated in the airbag control unit identify critical events and activate the corresponding vehicle protection systems such as fire protection systems, driver information or other risk mitigation measures. The integration of this concept into the airbag control unit creates the possibility of sensor fusion by means of the sensor technology of the restraint system.

In the case of a collision from below, the BID provides a value for the impact severity as information. Triggering thresholds for graded information and warning signals to the driver can be defined in the algorithm. From a certain impact energy, the driver can be given a recommendation to have the underbody checked via the human-machine interface. From a higher threshold at which there is a risk of intrusion and therefore of a threat to battery integrity, the warning may be more urgent – theoretically up to the point where use of the vehicle is no longer recommended, or the vehicle should be brought to a safe place due to the potential risk of fire (soft shoulder, open space, removal from further fire loads, no use of underground garages, etc.). In the long-term networking with the e-Call System is conceivable, so that an actual outbreak of fire (detected by temperature sensors in the battery) is automatically reported to the fire brigade. If a case of intrusion has been identified as probable, there is also the possibility here analogously to the grounding protection function to initiate precautionary intervention in the affected zone through data transmission to the BMS and discharging any damaged cells. If a function that monitors the temperature of the battery compartments is also integrated in the vehicle as part of the BMS, the information from the BID can act as an additional trigger.

Beyond the background of the experience gained in the field of crash algorithms, Continental has the right "toolbox" at its disposal to quickly and efficiently apply this solution in series production development. This is supported by the possibility of the Continental Safety Engineering test facilities. The instrumentation of prototype electric vehicles is carried out in the vicinity of the crash test facility. A suitable test track for load and misuse tests is within immediate reach.