

## POSITION EFFECT OF DRAIN HOLES ON CROSSMEMBER FOR SIDE POLL CRUSH SCENERIO

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KEYWORDS –  
Battery, Crossmember, Drain Holes, Crush, Safety

ABSTRACT –  
Crossmembers are essential parts of a battery pack. These structural parts have many roles on torsional stiffness, torsional strength, bending stiffness, modules carrying and side poll crush, so from basic design of a crossmember to serial production there are too many challenges to overcome. One of the biggest challenge is to define drain holes positions on crossmembers because of weakener effect. Study is investigating the position effect of drain holes on crossmember for side poll crush scenario with ANSA tool.

### 1. DESIGN AND EVALUATION SCENERIOS

There are 5 crossmembers in investigated design. 2 different positions are evaluated with quasistatic impactor to understand drain holes effect.

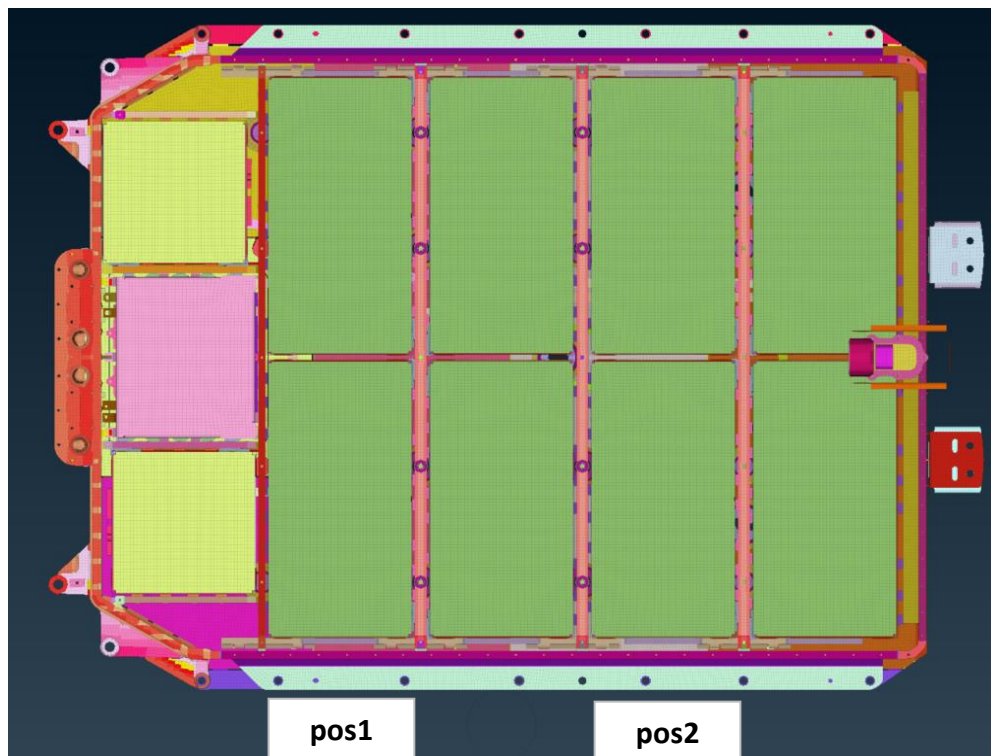


Figure 1 – battery inner design and quasistatic impact positions

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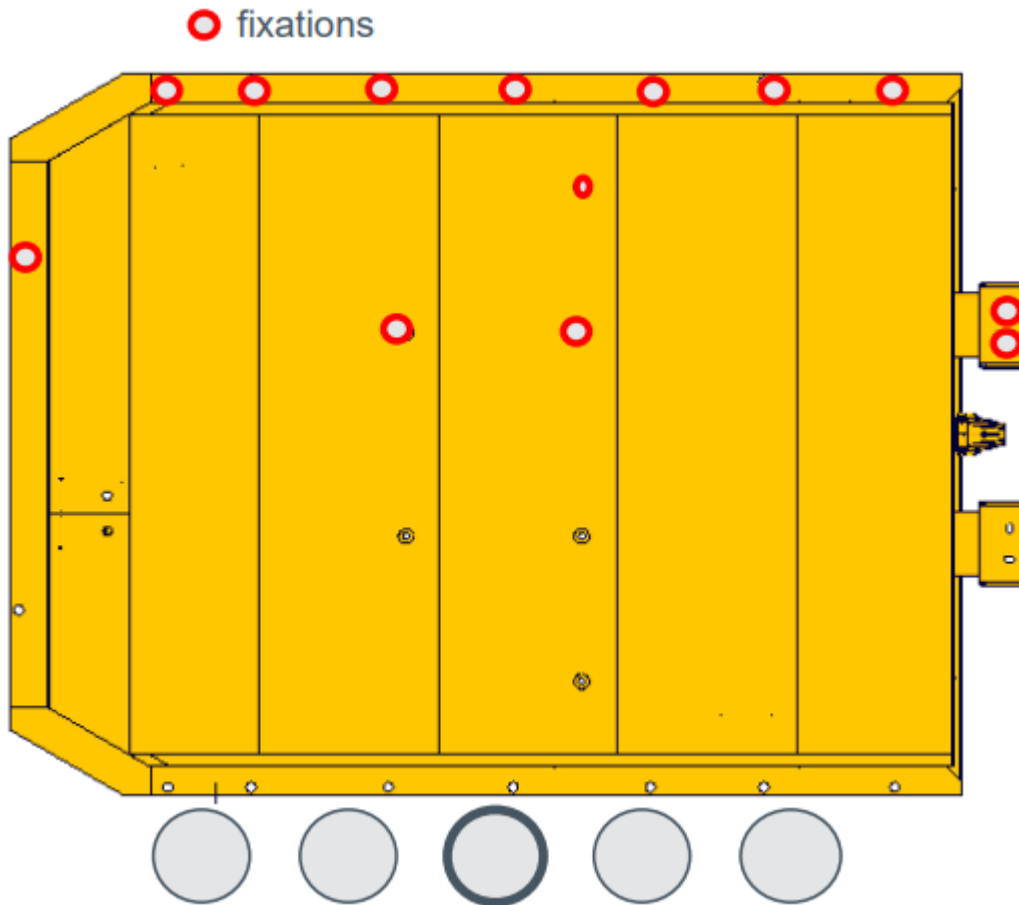


Figure 2– boundary conditions and load case

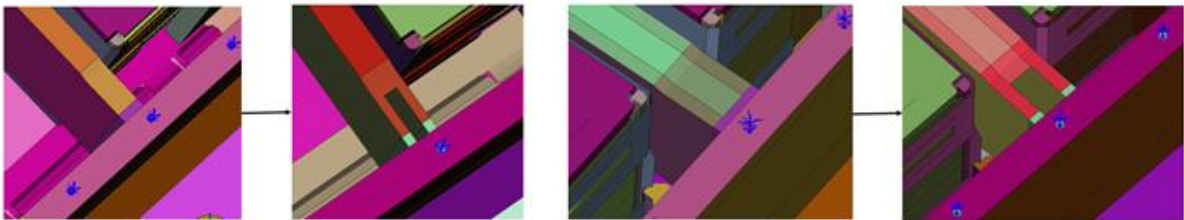


Figure 3 – drain hole example on crossmember.

### Run matrix for Evaluation

Battery packs are evaluated with punched and nonpunched crossmembers.

## **2. RESULTS**

Battery packs are evaluated with punched and nonpunched crossmembers. Failure observed in punched scenario.

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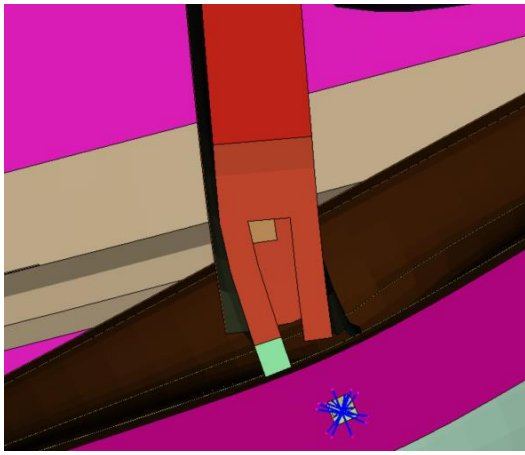


Figure 4 – punched crossmember distortion at front zone

Punched design breaks. LHS figure shows nonpunched, RHS figure shows punched design.

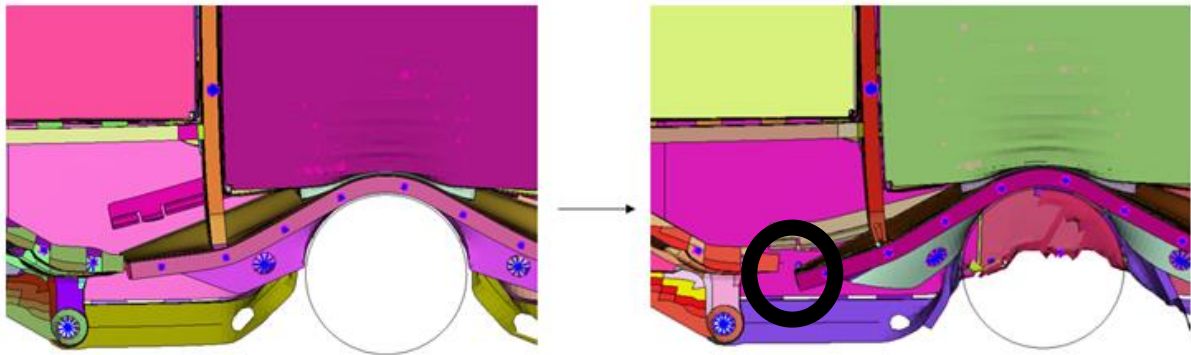


Figure 5 – comparison of front zone

Distortion is observed with punched design at rear side.

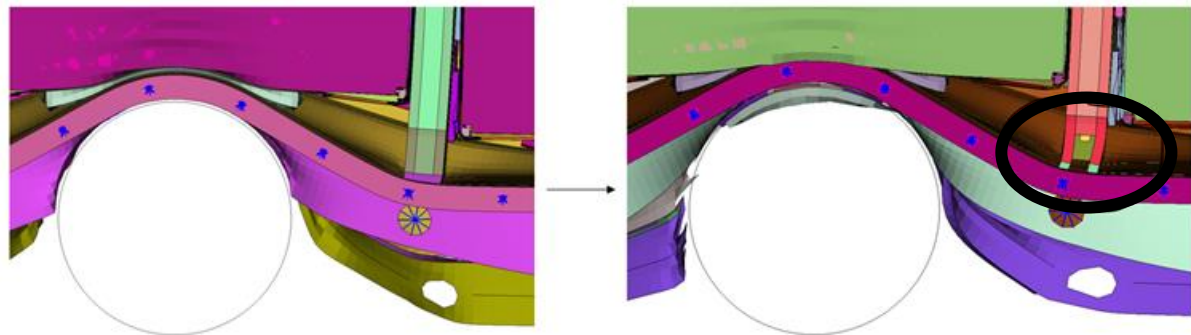


Figure 6 – comparison of rear zone

### 3. CONCLUSIONS

It is observed that if crossmember drain holes open at the end of crossmembers. It needs to be located inner zones to avoid from failures in side crush scenario.

### REFERENCES

- (1) ANSA version 17.0.0 User's Guide, BETA CAE Systems, July 2015
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