TRA2022

TRANSPORT RESEARCH ARENA
LISBON 2022

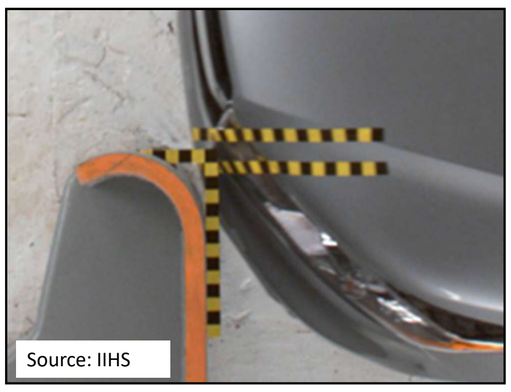
POSTER SESSION

Oliver Deisser

Innovative design steps towards a safe active lightweight chassis for an electric vehicle

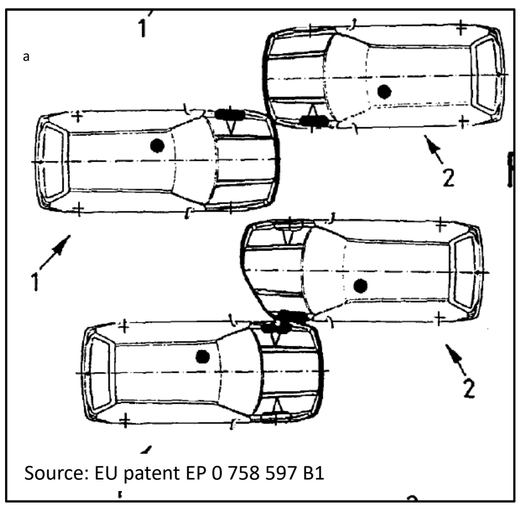
1. Motivation

1.1. Current regulations, the lack of crash compatibility in reality

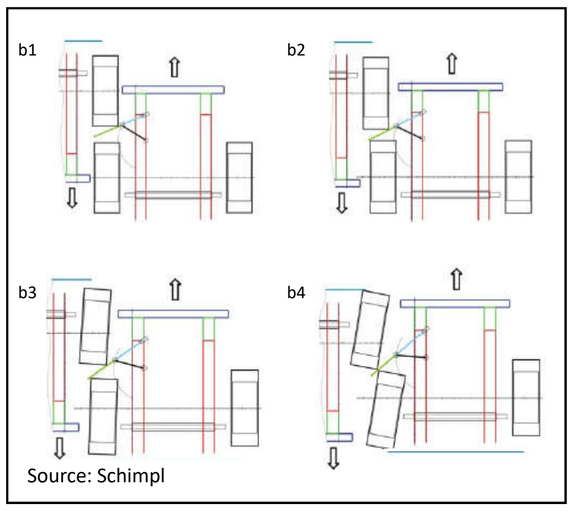

Source: IIHS


Source: ADAC

1.2. Deflection as an existing solution



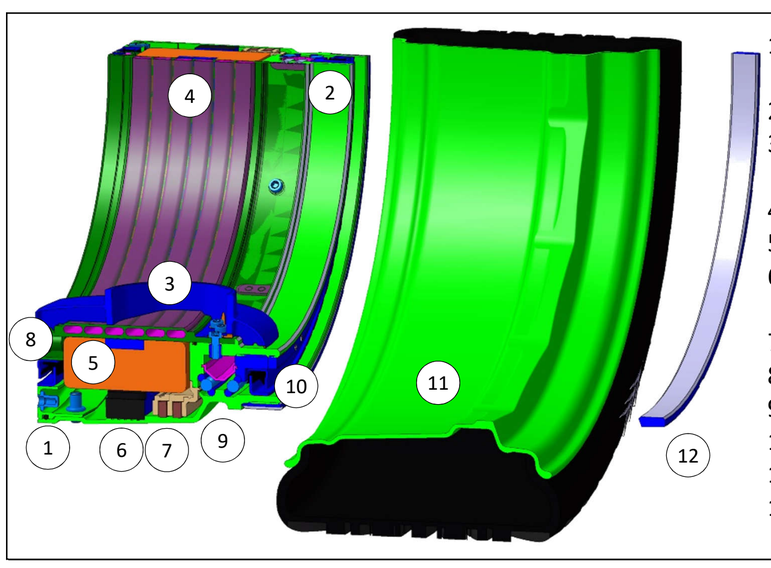
Source: EU patent EP 0 758 597 B1



Source: Schimpl

2. The chassis system of the Next Generation Car – Urban Modular Vehicle (NGC-UMV)

2.1. The orbital wheel concept detailed design



1. Outer housing for bearing
2. Inner housing for bearing
3. Link to wheel guidance comp.
4. Cooling jacket
5. Electric stator
6. Permanent magnetic rotor
7. Labyrinth sealing rings
8. Radial shaft sealing rings
9. Wire bearings
10. Adjusting ring
11. 7x20 rim with tire
12. Central locking nut

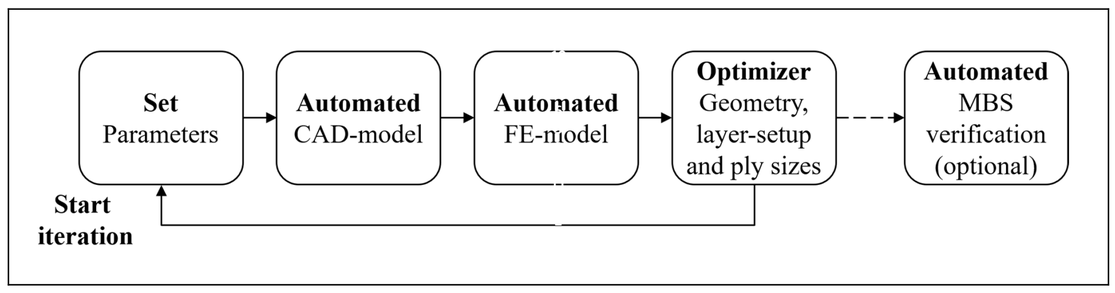
2.2. Active two axis independent steering system


Source: Daimler

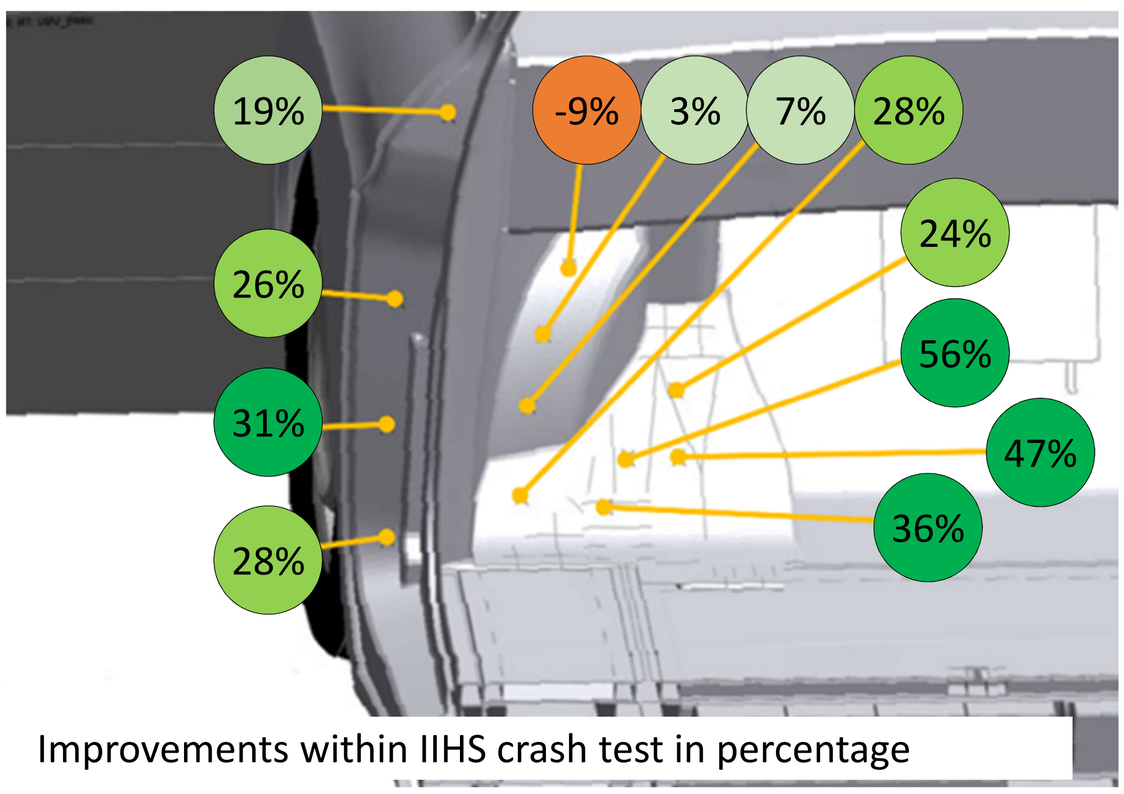
Advantages of wheel independent steering:
- Reduced energy consumption
- Better driving performance
- High active safety potential

Potential of Integration of a simple camber actuator, thus:
- Better grip
- Enhanced cornering stability

2.3. Virtual dimensioning process for the GFRP transverse leaf spring



2.4. The wheel as deflection shield is enough for an improvement in passive safety



Improvements within IIHS crash test in percentage

3. Conclusion and Outlook

A methodical design and dimensioning of the transverse leaf spring is actually a work in progress. Also, the dimensioning and the calculation of the needed torsion moments and the energy demand of the two-axis steering system will be done during this project. The build-up of a functional demonstrator for the bearing is planned within this year. The final virtual integration of the suspension system into the NGC-UMV CAD model is the last step before a full functional demonstrator is build.

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