Evaluation Internet Survey Grand Challenges aCAE 2023

1. Artificial Intelligence, Machine Learning, Big Data	**of max.**
Massive data exploration of simulation and test results	100
Virtual certification and homologation	94
AI + ML on Databases/Benchmark/LL to provide early design concepts in the advanced phase	91
AI in crash simulation - simulation of batteries	89

2. Body stiffness and strength	**of max.**
Structural properties of battery packs	100
Failure models for adhesives	81
Static and dynamic properties of castings	75
Static and dynamic properties of closures seals (air extraction)	65

3. CAE process & quality assurance	**of max.**
Battery layout and simulation of battery management	100
CAE in Advanced Vehicle Development (pre-CAD)	99
MDO as core process for CAE driven development	91
Isogeometric analysis: Reduced effort with high fidelity	80

4. CFD Computational Fluid Mechanics	**of max.**
Usage of ML for model reduction, results evaluation and optimization	100
Turbulence models	96
Particle wall interaction	87
Physics Informed Neural Networks PINN as multi-dimensional Meta models of CFD Simulations	87

5. Durability / fatigue	**of max.**
Durability and fatigue of structural battery packs	100
Influence of manufacturing processes on durability	96
Virtual proving ground: determining load collectives	93
Fatigue of aluminum components	88

6. Full vehicle simulation	**of max.**
Virtual testing of autonomous vehicles	100
Virtual verification and certification	95
Sensors and actuators in automated driving simulation	77
Road load data determination with advanced wheel and tire models	76

7. Material modeling with focus crash analysis	**of max.**
Modeling of battery cell: macro models on full vehicle level	100
Heat affected zone properties	90
Material and failure models for extrusions	85
Modeling of tempered materials (steel, aluminum)	83

8. Modeling issues crash analysis	**of max.**
Modeling crash behavior of battery packs	100
Modeling of batteries regarding short circuit (in crash)	97
Modeling of crash test barriers	77
Modeling of MIG and MAG line welds	72

9. Multi simulation	**of max.**
Influence of manufacturing processes on material and part	100
Battery and engine cooling for electric cars	98
Thermal management and comfort for future vehicles	91
Battery operation: simulating charging and consumption	85

10. Noise, vibration, harshness	**of max.**
Acoustic prediction accuracy	100
Interior noise electric vehicles from ventilation system	94
Squeak & rattle, groaning (noises from rubbing of parts)	92
Computing rolling tire noise	86

11. Occupant safety	**of max.**
Virtual Testing with Dummies und HBMs	100
Seat belt modelling including interactions - friction, jacket	79
Detailed modelling of seats (especially for AVs)	76
Response surface-based restraint system optimization	70

12. Optimization & robustness	**of max.**
Robust design	100
Reduced order modeling for fast optimization	94
Concept model creation for vehicle design optimization	92
Use of Meta-Models in optimization	90

13. Virtual manufacturing	**of max.**
Simulating joining and evaluating joint strength	100
Simulating casting and mapping of results	97
Simplified casting simulation	93
Spring back calculation and compensation	90