Augmented Reality: Augmented Reality (AR) tools provide essential advantages as they superimpose virtual content with the real prototype. Using such hybrid prototypes, the user can experience several characteristics simultaneously and associate them with each other. The development of well-engineered prototypes that are flexible for use in different applications is the basis for a time and cost saving product development process.

Prototype AR Applications: A prototypical AR device based on optical tracking tools to visualize CFD simulation data was setup, adjusted and presented to end users. The visualization was done with the software program COVISE, which is developed at the HLRS.

Application - Optimization of Aerodynamics: In order to realize the guidelines in terms of fuel consumption and toxic emissions, data like pressure and velocity of the airflow is collected in wind tunnel experiments. With AR visualization, these characteristics can be investigated in an understandable and demonstrative way.

Hybrid Prototypes in Vehicle Development: In order to allow an economical development, the number of prototypes, whose fabrication is often very time-consuming and expensive, is reduced. A key approach to compensate the lack of physical prototypes is to combine well-engineered models with new technologies, so that the prototypes can be flexibly used in different application areas. AR applications are a demonstrative and intuitive tool in the early design and development phase as they allow to comprehend and interpret complex relation-ships quickly. Further, AR technologies intensify the interaction between specialists of different depart-ments and support common decision making in small review groups.

Application - Optimization of Air-Conditioning
Comfortable climatization depends on the power of the climate control unit, the connected air guiding system and the position of the ducts. Simulation results and experimental data of the airflow coming out of the ducts is analyzed to optimize the comfort for the passengers. AR visualization helps examining temperature, pressure and velocity from the perspective of the end user in a tangible physical environment.

Future Work: With the setup of specified prototypical AR applications in a real automotive environment we want to acquaint engineers with this new technology. In order to provide AR tools that are adjustable to different environmental conditions, we will develop a natural feature tracking and integrate a mechanical tracking system which is widely used in product development.