Aerodynamic Design

The aerodynamic properties of the numerous and varied stylistic designs for the new Polo were investigated and evaluated at an early phase in the design process. Attention was focussed on designing the basic body of the vehicle. Predominantly numerical simulations were used for assessing the designs.

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1 Computer-aided Aerodynamics

The significant advantages of numerical studies mean that no physical models have to be built and massive changes can be made quite straightforwardly to the shape of the vehicle models for potential studies.

Numerical assessments of the various design proposals delivered information for improving their aerodynamic properties – predominantly for reducing aerodynamic drag and rear lift, **Figure 1**.

2 Extensive Detailed Optimisation

As the development process reached an advanced stage, increasing numbers of experimental studies were performed on the design models in the wind tunnel, **Cover Figure**. These involved models at 1:1 scale, allowing precise modelling as well as rapid and reliable assessment of details. Once the basic shape of the new Polo had been largely established, it was necessary to turn attention to details such as the A-pillars and the roof spoiler as well as add-on parts such as the wing mirrors.

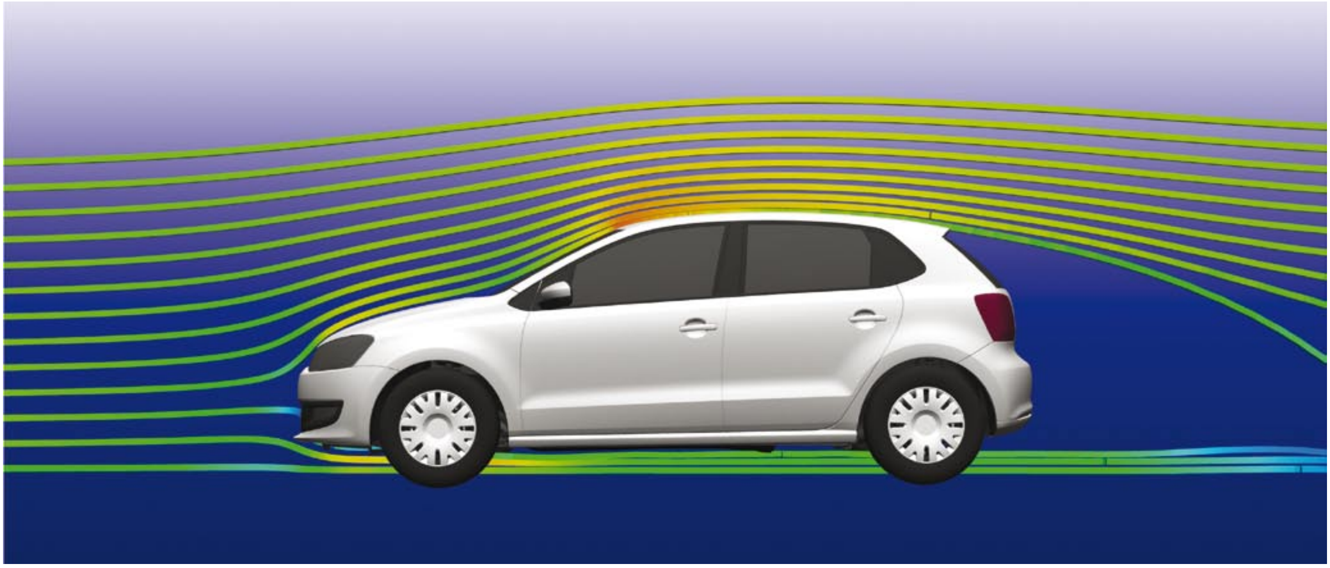

Bild 1: Aerodynamic simulation

The side skirts are a notable feature that are more striking than on the previous model, and they give the vehicle a more favourable basic shape in terms of fluid mechanics.

The drag of the Polo has been significantly reduced by designing the underbody for an improved airflow. The front spoiler already used on the previous model has also been improved in shape and effectiveness, as have the floor trims on both sides of the central tunnel. Furthermore, wheel spoilers have been added in front of the front wheels, delivering lower flow losses in the area of the front wheel wells.

Significant improvements in aerodynamic properties have been achieved with the wing mirrors. The mirror housings have been made more compact so that they offer a smaller resistance surface, whilst the new statutory regulations for the field of vision have been implemented to optimum effect. In addition, the shape of the housings was selected with the objective of not only finding a geometry to reduce drag but also to achieve favourable aero-acoustic properties, **Figure 2**. The air flow onto the wing mirror housings is significantly influenced by the shape of the front end, in particular the windscreen and A-pillar. The mirror caps were designed with aerodynamic aspects in mind in parallel to the development of the Polo, with the work being performed on the vehicle model in its particular shape at any given time. Compared to the previous model, drag from the wing mirror housings has been reduced by 20 % because of the detailed optimisation.

The aerodynamically favourable design of numerous details on the new Polo not only made it possible to compensate for the drag disadvantage attributable to the 30 mm wider track and the wider basic tyres (175/70 R14), but indeed the new Polo has lower drag than its predecessor. Even the basic version of the new Polo achieves an air resistance coefficient c_d = 0.32, which is a very good value for this class of vehicle.

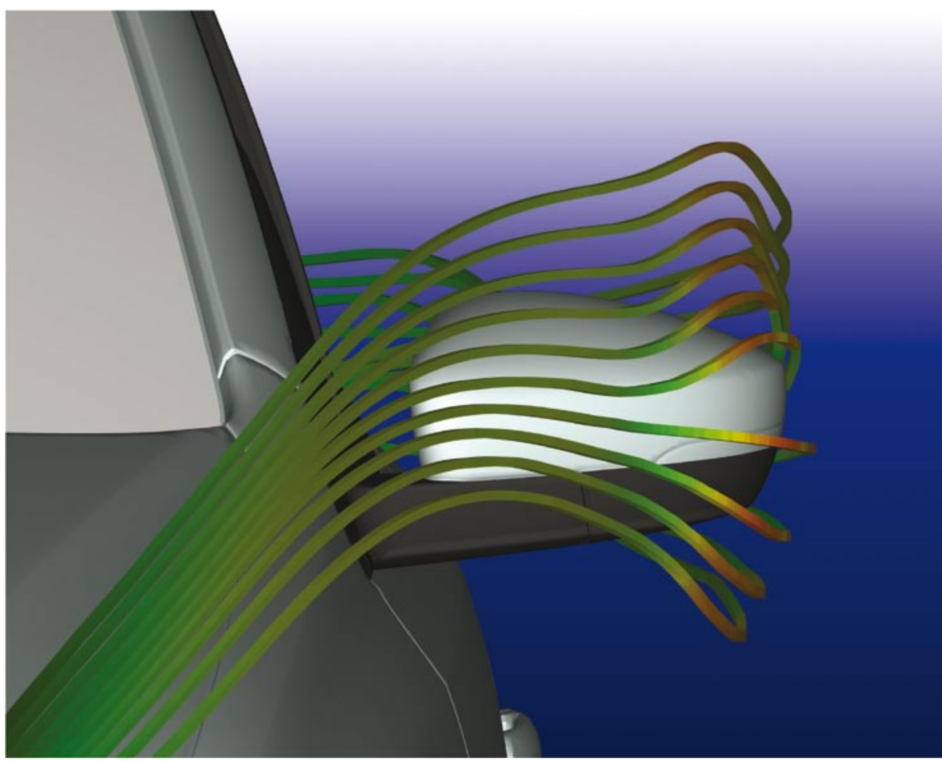

Bild 2: Aerodynamic simulation of the wing mirror