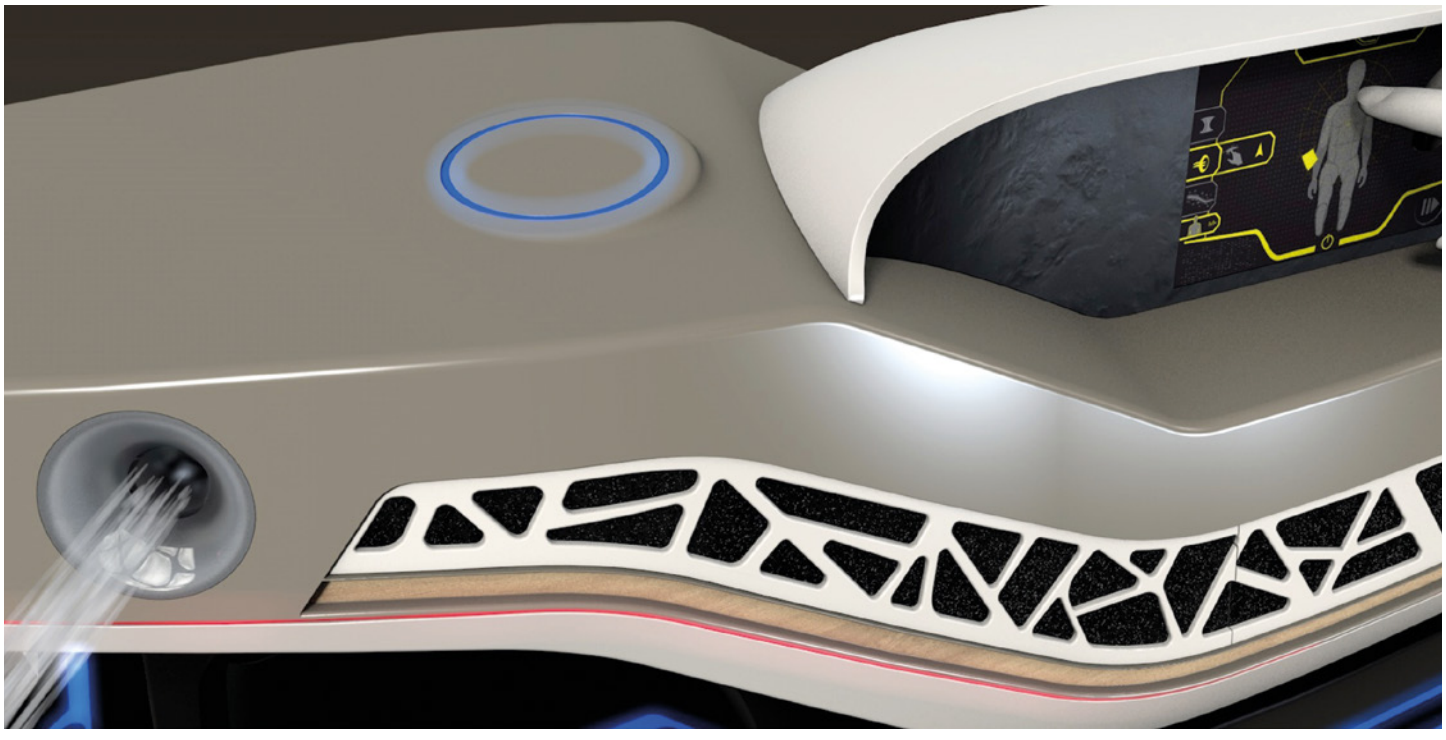
FloEFD helps Dr. Schneider's mission: To make the Car the Best Place in the World

By Enrico Lorenz, Research & Development, Dr. Schneider Unternehmensgruppe GmbH



Dr. Schneider, a successful family-run business, located in Kronach-Neuses in Germany, supplies and develops vehicle plastics components and systems for renowned automotive producers all over the world. The entire process chain is handled within the group, from research and design to prototype construction. (Figure 2) Dr. Schneider has more than 3,900 employees and 90 years of experience in the plastics field, 60 of which are in the automotive industry.

Dr. Schneider's primary products are visible parts for the car interior: air vents (figure 1), stowage boxes, kinematic components, bezels, covers and trims, grills and window frames.

As the automotive market expands and grows, product development times are dramatically reduced. For many projects even the use of prototyping is no longer an option, making the need for reliable, fast and accurate simulation tools essential to overcome these challenges. Furthermore, frontloading the Computational Fluid Dynamics (CFD) simulation into the product development phase is crucial to the success at Dr. Schneider. Mentor Graphics' FloEFD tool is used mainly for the simulation of the air vents, one of Dr. Schneider's core products.

Figure 1. Extract of Dr. Schneider's products: air vents

"With FloEFD we can shorten product development time, quickly find appropriate design variants, save costs and explain and present the flow behavior of our products to our colleagues and customers."

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As FloEFD can be directly embedded into Catia V5, CAD models were used directly in the program with no need for additional geometrical preparations. Airflow distribution is investigated at a very early stage and must adhere to strict customer targets and specifications. For the example shown in figure 4, the influence of a bezel was investigated. The two variants of this broadband vent, with and without bezel, were simulated. The broadband vent variant including the bezel shows a better distribution of the airflow. The flow angle into the lower area is enlarged. Additional experiments in the lab using fog to visualize the air flow confirmed the FloEFD predictions. (Figure 5)

Enrico Lorenz, Simulation Engineer, explains: "We make up to 100 FloEFD simulations per month per license. We need fast, robust and accurate simulation results. In addition we need an efficient way to create the result reports and presentations". In combination with the batch run functionality which allows automatically runs of many variations, the pictures for comparing the defined

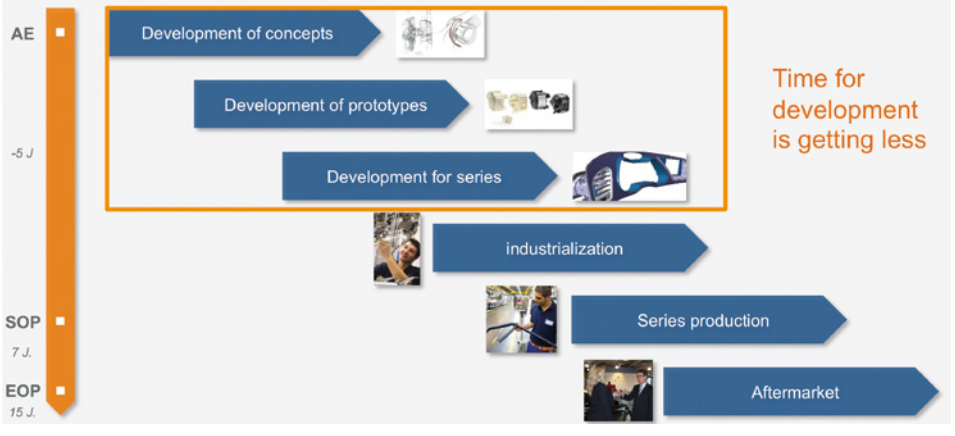

Figure 2. Todays product development process

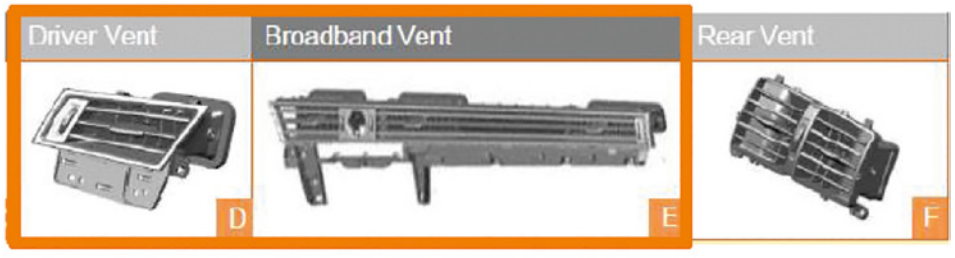

Figure 3. Driver, broadband and rear vent

"FloEFD predicts what we need, so it helps us to make the car the best place in the world."

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results items are created automatically. The influence of design changes on the fluid flow behavior can immediately be identified. (Figure 6)

One of the major tasks is creating MS PowerPoint presentations for internal purposes and for customer presentations. This might take more time than the simulation itself. For this reason, a VBA code is generated by the Dr. Schneider engineers which automates this work in MS PowerPoint.

With FloEFD embedded in Catia V5, Dr. Schneiders' engineers are able to meet today's requirements of short development times and fulfill the strict targets of automotive manufacturers.

Figure 4. Broadband vent and airflow

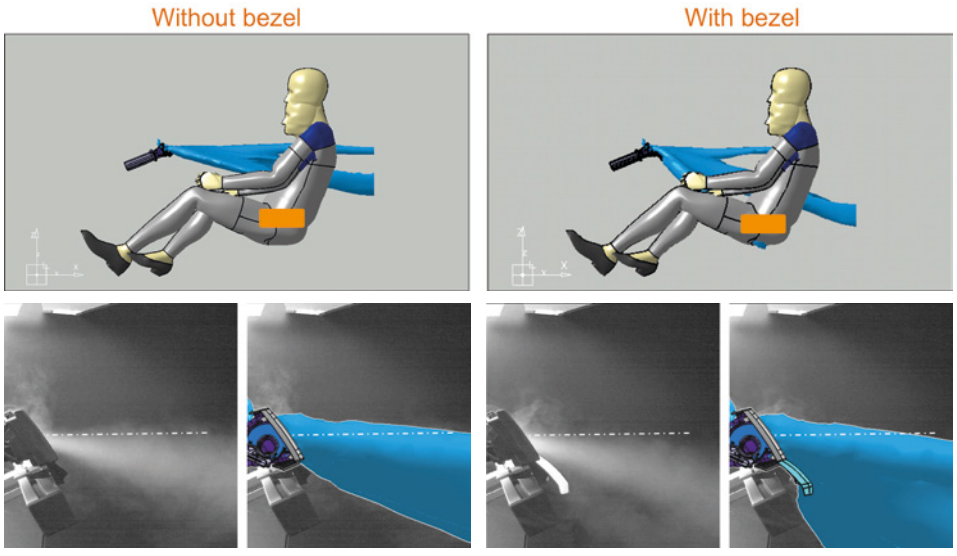

Figure 5. Comparison of the broadband vent without and with bezel

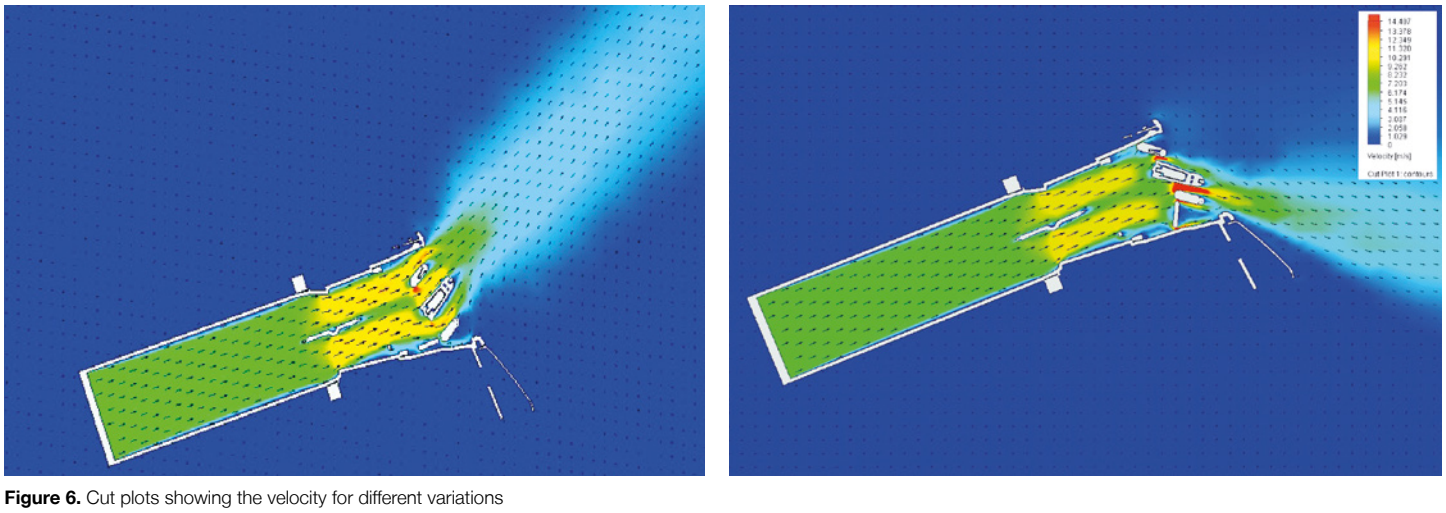

Figure 6. Cut plots showing the velocity for different variations

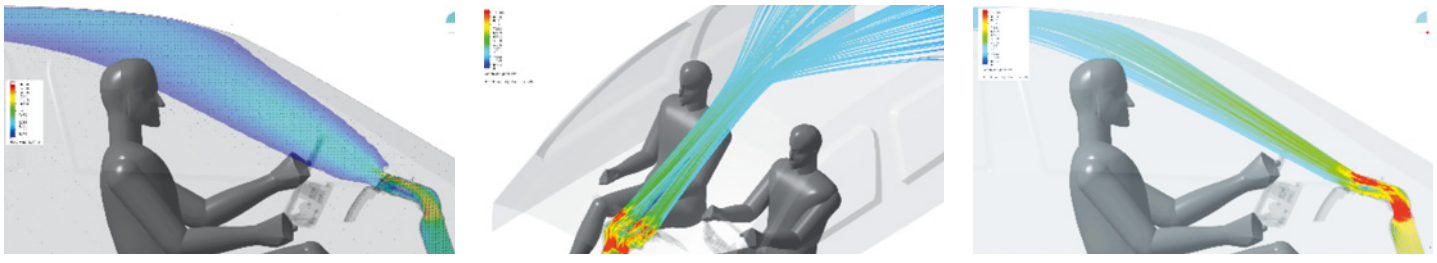

Figure 7. Airflow distribution in the car interior