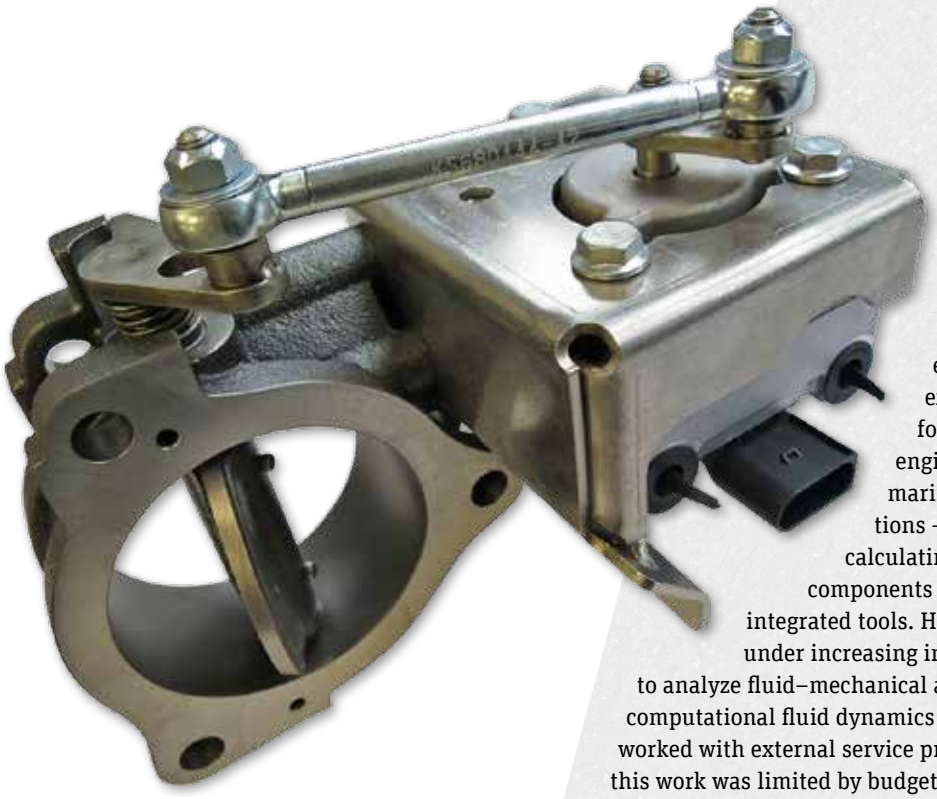
TAKING OFF THE **BRAKES** TO **PRODUCT DEVELOPMENT**

Moving from CAD-centric design to the world of high-fidelity simulation was made easy for designers at a leading automotive and marine supplier by using ANSYS AIM. Access to multiphysics tools has reduced costs, improved productivity and provided insights that were previously unavailable.

By **Richard Krellner**, Construction Manager, and **Tobias Dörres**, Development and Test Engineer, Klubert + Schmidt GmbH, Pottenstein, Germany



^ Klubert + Schmidt exhaust control flap for commercial vehicles

CAD designers at Klubert + Schmidt GmbH — a reliable developer and supplier of exhaust flaps and hot-side exhaust gas recirculation valves for heavy- and medium-size engines used in on-road, off-road, marine and industrial applications — had, for several years, been calculating the mechanical loads of components and subsystems using CAD-integrated tools. However, the design team was under increasing internal and external demand to analyze fluid–mechanical aspects of their products with computational fluid dynamics (CFD). In the past, they had worked with external service providers, but contracting out this work was limited by budget, the time required to explain the task to an outside engineer and effectively communicating the meaning of the results obtained.

The company started looking for CFD software and met with CADFEM, an ANSYS elite channel partner. CADFEM recommended the new multiphysics simulation software ANSYS AIM, which integrates analysis of fluid flow, structural mechanics and thermal behavior in a single software tool.

However, the team at Klubert + Schmidt was very skeptical. Designers initially believed that this comprehensive tool was oversized for their company, but they were encouraged that AIM provided an integrated solution that enabled designers to work with native CAD data.

FROM CAD TO SIMULATION MODEL

After a demonstration, the designers were impressed by ANSYS SpaceClaim, the integrated geometric modeler within ANSYS AIM. SpaceClaim enables

ANSYS AIM: Try It Now for Free
ansys.com/tryAIM

designers to apply the changes required for simulation to already existing CAD models. Often, preparing a CAD model for simulation involves numerous modifications. Transferring an optimized geometry from the simulation tool back to the CAD modeler was, in many cases, problematic even with native CAD models. AIM with SpaceClaim overcomes these difficulties.

Klubert + Schmidt decided to use ANSYS AIM because of the ease of use and consistent user interaction for all physical domains. Another decisive factor was the wide distribution of ANSYS software and the attractive value/price ratio of AIM.

In September 2015, the company introduced ANSYS AIM simulation software by training six designers. The company chose training based on a real development project — a Klubert + Schmidt engine brake. Because this product had already been measured on the test bench, the simulation process and results could be, and were, validated.

After the training, a test engineer focused on flow simulations and temperature field calculations — certain products reach up to 700 C — so that this user could build up expertise in the use of ANSYS AIM. Flow analysis was new to him and he was eager to learn to use CFD results as a basis for further calculations.

DETAILED UNDERSTANDING OF PRODUCT BEHAVIOR

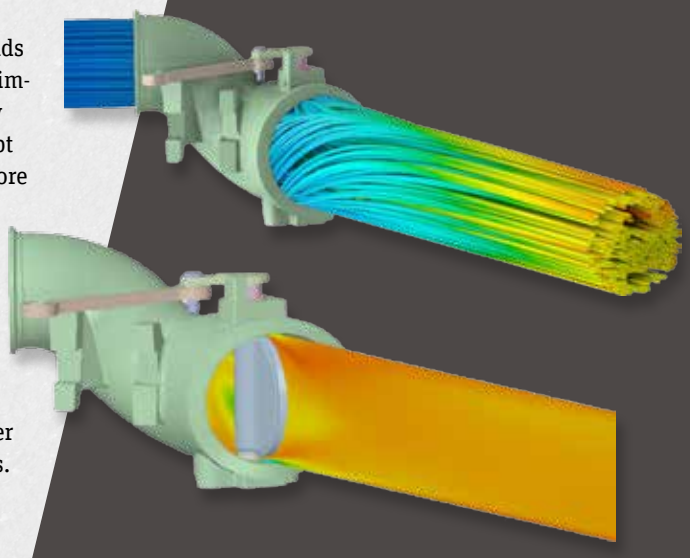
Later, for a new customer project, the developers at Klubert + Schmidt were able to present technical details well before the design freeze. In addition to the first prototype demonstration, the customers were impressed with ANSYS AIM simulation results that vividly illustrated the basic functionality of the new product technology. This extended use of simulation emphasized the company's technical and innovative competence.

The CFD simulations performed so far have helped the developers understand details of the behavior of their products that were previously unknown. Bench testing variants of components had been a common practice. But, for some of the measurements, the team was unable to determine a sound physical explanation. With simulation, this is much easier and faster. By not relying on a single measurement, unexpected behavior often can be better understood. Problems that used to be discovered only on the test stands during the final stages of the development can now be eliminated almost completely with early simulation. Not only are functional impairments identified early in the concept phase, initial vulnerabilities can be fixed, leading to a more robust design. Additional parameter studies help to identify the limits of safe operation.

Multiphysics simulations with ANSYS AIM are becoming a part of the standard development process at Klubert + Schmidt. Simulation will be a future element of the quality gates through which development passes to enter the next phase of the project. Many test rig setups and some physical prototypes are no longer needed, since simulations provide the necessary answers. This saves the company time and money. In addition, simulation allows the design team to check ideas that were previously too costly or too difficult to follow up.

Exploring new possibilities with multiphysics simulation enables Klubert + Schmidt to better meet the ever-rising demands for product development and innovation.

> "Klubert + Schmidt decided to use ANSYS AIM because of the ease of use and consistent user interaction for all physical domains."



^ Flow and temperature simulation of a typical exhaust flap