



CASE STUDY /

Ansys + Vitesco Technologies

“Thanks to Ansys SPEOS, we can do as many simulations as we want, while respecting the launch deadlines set by our customers. Engineers can model a concept during the day, run several simulations at night and analyze the results the next day to define the most relevant solution without wasting time designing physical prototypes. We get the desired results the first time and there is almost never any remolding.”

Design Engineer / Vitesco Technologies

The Business unit Sensing & Actuation of Vitesco Technologies specializes in the design of these key elements of any automated system. For instance, door handle sensors (DHS) are capacitive sensors that detect when a user touches the handle to lock or unlock the vehicle.

Vitesco Technologies Optimizes the Exterior Lighting of Vehicles Using Numerical Optical Simulation from Ansys.

/ Context

Vitesco Technologies (formerly Continental Powertrain) integrates innovative and efficient powertrain system solutions for vehicles of all kinds. With smart principles like scalability and modularity, they cover the requirements of cars, commercial vehicles, and two-wheeled transport, as well as new mobility concepts. Thanks to intelligent systems and components for electric, hybrid, and combustion engines, Vitesco Technologies makes powertrains clean, efficient, and affordable.

/ Challenge

With the boom in connected vehicles and the increase in the range of models, customers' needs and requirements have evolved significantly. One example is the desire to integrate lighting systems into door handles. For automakers, light plays an essential role in practicality and comfort, but it also contributes to the visual signature of the vehicle by differentiating brands and making them recognizable.

In an increasingly competitive market, Vitesco Technologies must provide solutions that meet these needs in increasingly shorter times and at ever lower cost. However, developing an optical system that integrates electronic sensors and meets customer specifications and international regulatory standards (UNECE R48) can be complex. Engineers must ensure that light is distributed uniformly and in the right places, while taking into account multiple physical parameters (optical, mechanical, electronic). In addition, there are constraints related to the design of the handle and door (topology, materials, roughness, etc.).

"In the automotive industry, it is difficult to use the iterative validation process of physical testing because products require validation under final conditions using expensive prototypes. In addition, the tests need to integrate a multitude of criteria such as brightness, visibility or weather conditions to verify that the product will perform well in all situations. Careful preparatory work is therefore essential to validate the products," **says Vitesco Technologies Design Engineer.**

Thus, in order to provide high-performance solutions and accelerate the development of innovations, Vitesco Technologies needs a digital simulation tool to study and validate numerous concepts, while reducing prototyping needs to a minimum.

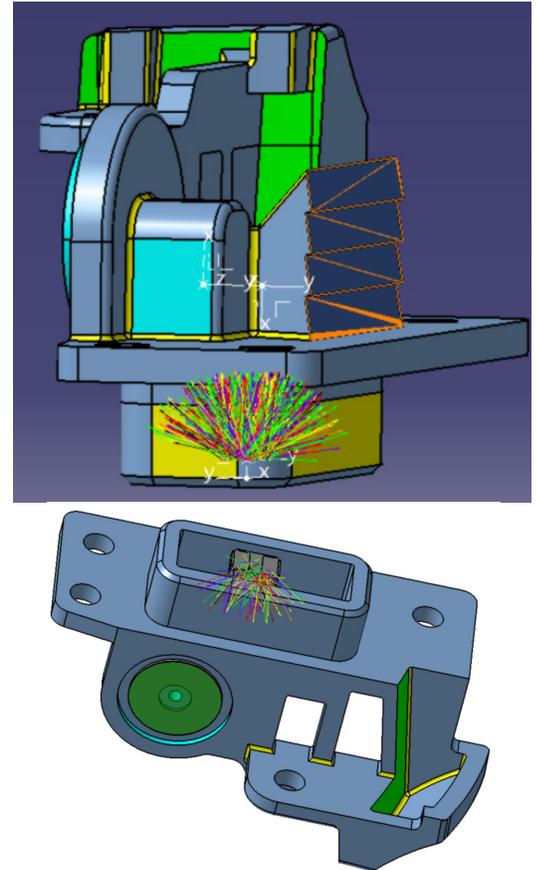


Fig.1 : Modeling of a Vitesco Technologies module for the rootcause detection of parasitic highlighting in door handle lighting.

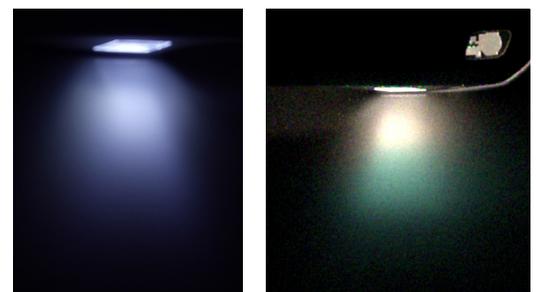


Fig.2 : Comparison between the photograph (left) and the simulation (right) of the global lighting including the Vitesco Technologies module: the simulated system has the undesirable parasitic effect present on the real system.

/ Solution

In 2006, the company turned to optical simulation with the Ansys SPEOS software.

SPEOS enables Vitesco Technologies engineers to model and validate all optical systems of the handle that capture and guide the rays coming from the light source in order to guarantee lighting results that comply with specifications. With SPEOS, Vitesco Technologies teams can implement models of the various components (handle, lightguide, etc.) to simulate them in their final environment and understand the interactions between light and materials in real lighting and use conditions. By combining light simulation and human vision capabilities with extensive material libraries and an optical optimizer, engineers can explore many lighting concepts and hypothetical scenarios, generating very realistic photometric and colorimetric visualizations of the results.

Optical simulation gives Vitesco Technologies a predictive view of the optical performance of the systems. This view enables them to control the entire product design process in real time, from concept development to validation to preparation for mold manufacture.

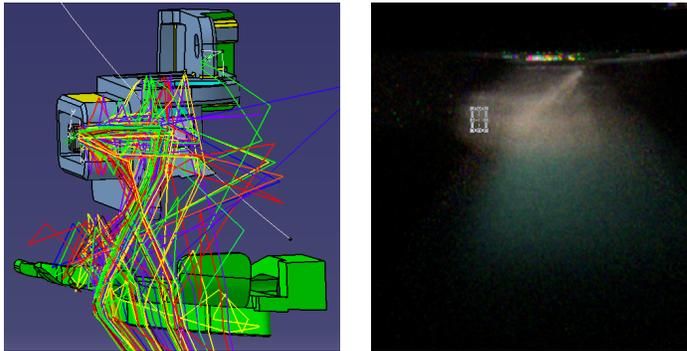


Fig.3: Identification of the origin of the parasitic effect thanks to the simulation and the Light Expert technology of SPEOS: it can be seen that the parasitic effect is not induced by the Vitesco Technologies module, but by another part of the system, which will make it possible to provide recommendations to eliminate the effect.

/ Results

Using SPEOS has enabled Vitesco to drastically reduce the time and cost of designing and validating lighting systems, dramatically accelerating time to market. In just under 15 years, development time has been reduced by 75%. Furthermore, using simulation starting in the design phase has considerably reduced the number of physical prototypes required for validation: Engineers can skip the prototype mold and go directly to the production mold.

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In addition, SPEOS software is key in responding to calls for tenders and facilitating the filing of patents, such as the "Optical Effect Touch Pad on Steering Wheel for Finger Detection" patent, obtained in March 2019. This is an innovative gesture control detection system that does not require electronics inside the steering wheel and does not require electrical wiring.

"The ability to simulate a near-finished product as closely as possible to the customer's requirements makes it possible to quickly identify the various technical options available, which can be a decisive advantage. Thus, for Vitesco, simulation is an essential lever today for continuing to innovate and remain competitive," Vitesco Technologies Design Engineer concludes.

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