

ALTAIR

SIMCON

CADMOULD & VARIMOS TOP USE CASES

Altair Partner Alliance

3D- Volumetric Filling Simulation of a Multi-Component Optical Lens

Challenge

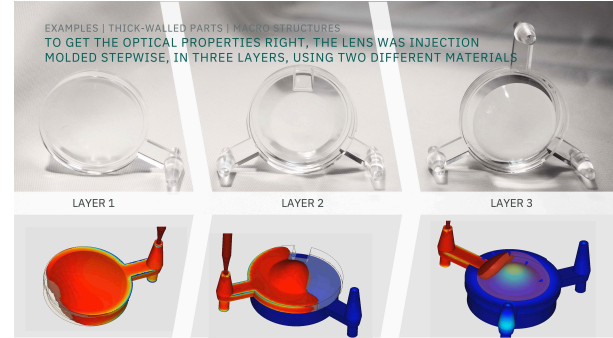
- Develop plastic injection molded car headlight lenses that are cheaper and lighter than classical glass lenses. To create the right optical properties, three different translucent materials had to be molded on top of each other in layers, with micro-scale Fresnel structures for optimal refraction. This required an accurate simulation of the multi-component filling behavior of this thick, bulbous part.

Solution

- CADMOULD's 3D-volumetric (3D-V) simulation algorithm was deployed to simulate the filling behavior both on the macro- and the micro-levels.

Result

- This project demonstrated that a lighter-weight plastic lens with desirable optical properties are feasible. Both macro filling and the filling of micro-structures were three-dimensionally simulated using CADMOULD.



Optimizing Weld Line Locations in a Cosmetics Bottle

Challenge

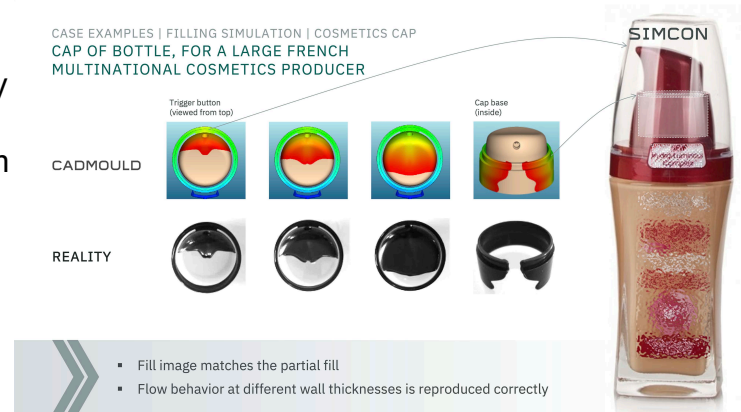
- In this cosmetics bottle (for L'Oréal Paris), the challenge was to avoid weld lines in visible surface areas of the cap, for aesthetic reasons. To achieve this, it is important to accurately predict flow behavior in the cavity. This was complicated by the varying wall thicknesses along the part, due to the thin film hinge connecting the cap button to a thicker base.

Solution

- CADMOULD was used to simulate flowing behavior and predict weld line locations, and find optimal injection gate locations, as well as the right injection parameters.

Result

- The location of weld lines could be optimized, such that they occur in a section of the part that is not visible from the outside. The aesthetics of the cap were thus optimized.



Simulating Shrinkage and Warpage with Fiber-Filled Materials

Challenge

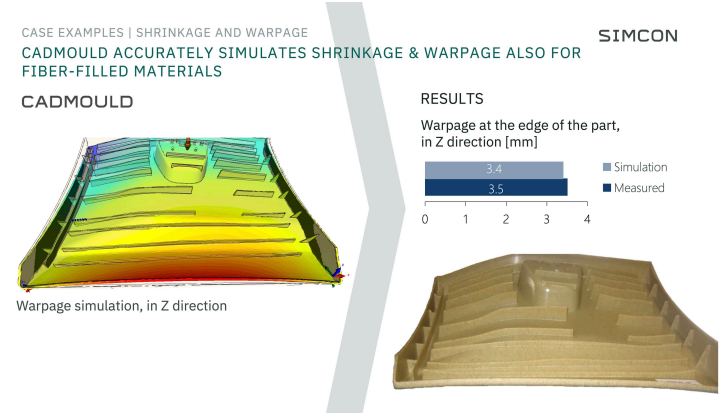
- One of the most important challenges when dealing with fiber-filled materials is to anticipate fiber orientations, since these have a significant influence on anisotropic properties. They impact both shrinkage and warpage, as well as mechanical / structural properties, which matter e.g. for crash testing.

Solution

- CADMOULD's fiber orientation and shrinkage and warpage simulation, was used to anticipate fiber orientations and predict shrinkage and warpage of this part. Fiber orientations were transferred to a structural solver for crash testing simulation.

Result

- Simulation results and real-world measurements confirmed the incredible accuracy of CADMOULD's shrinkage and warpage simulation. Fiber orientations were used to accurately predict crash behavior in a crash simulation.



Reducing Sink Marks with CADMOULD and VARIMOS

Challenge

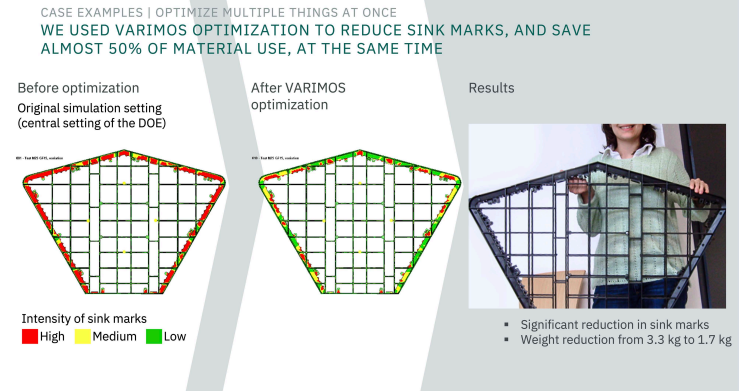
- This industrial air filter case was too heavy, and had significant issues with sink marks all over the geometry.

Solution

- CADMOULD's materials database was used to identify a suitable, lighter material. A **rapid variant analysis** using VARIMOS was used to find ways to reduce wall thicknesses while satisfying all mechanical constraints, and to find optimal injection parameters. The goal of this optimization was two-fold: to reduce weight, while also reducing sink marks.

Result

- Using the simulation and the rapid variant analysis, the customer was able to reduce part weight by almost 50%, while significantly reducing sink marks.



Optimize Shrinkage and Warpage of a Sophisticated Tail-light

Challenge

- Due to shrinkage and warpage, the transparent front pane of this automotive tail-light (for the Audi A6) did not perfectly fit the back pane. This meant the two components could not be laser-welded together, resulting in waterproofness issues.

Solution

- Used CADMOULD to simulate and analyze shrinkage and warpage of the multi-component part. Deployed a VARIMOS **rapid variant analysis** to explore a large number of solutions rapidly. Found a way to modify injection parameters and packing in order to minimize shrinkage and warpage.

Result

- Shrinkage and warpage were significantly reduced, thus enabling successful laser welding, to produce a waterproof part that met all geometric tolerances. The customer (odelo) won an engineering innovation award (2019 GKV Tecpart innovatin prize) for this iconic and innovative part.

