

COMPANY

VEROLT Engineering

London, UK

Pune, India

SOFTWARE

Autodesk Moldflow® Insight

In the highly competitive automobile industry, achieving faster time-to-market is crucial. High-level products require high-performance tools, and Autodesk offers both technology and support, which is instrumental in supporting any challenging project

– **Maneesh Kalyat**
Senior Lead Engineer
VEROLT Engineering

Improving Vehicle Aesthetics with Simulation

VEROLT uses up-front mold simulation to minimize visual defects of a vehicle grille.

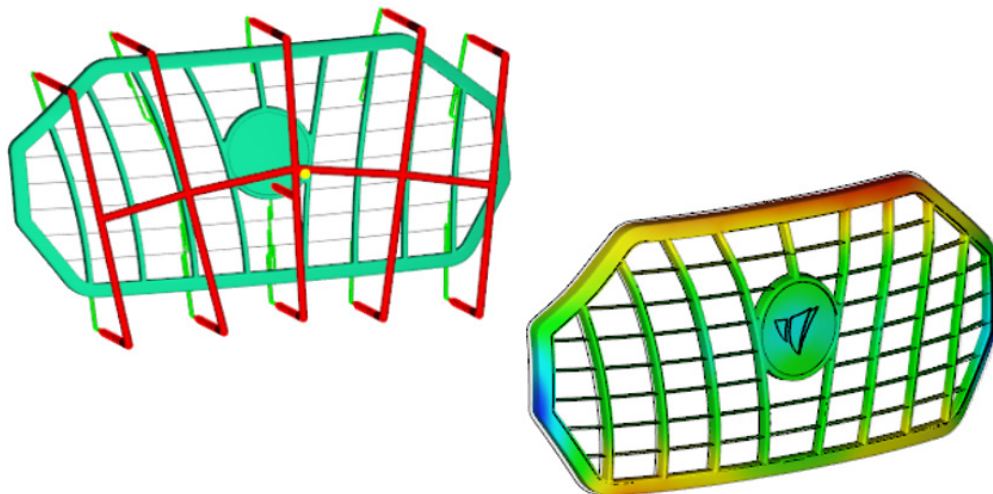


Image courtesy of VEROLT Engineering.

Introduction

VEROLT Engineering, is a European engineering services company focused upon the Automotive Industries. The company has deep domain expertise in Automotive Mechatronics, HMI & ADAS, led by a technical team with over 200 years of combined relevant experience. VEROLT's presence within Europe is supported by dedicated and competent delivery centers in India – one in Pune and one in Bengaluru. They support customers with Engine Control Unit (ECU) software development for Advanced Driver Assistance System (ADAS) functions and Human Machine Interface (HMI) software development for cross platform applications also support customers with CAD and design services, Autodesk Moldflow analysis, Finite Element Analysis (FEA) and benchmarking services.

VEROLT Engineering is pursuing a strategy of continuous improvement, enhancing its competencies, and providing specialized, value-added engineering to win new business, focusing on customers with challenging engineering demands. To help achieve this strategy, VEROLT found a solution that radically shortens the design and simula-

tion. The engineers at VEROLT know that the best way to meet customer deadlines is by shortening the development process with the right technical approach. One way in which they achieve this is by enabling design and analysis to be performed concurrently.

The Challenge

Plastics have revolutionized interior and exterior automotive design. The use of automotive plastic to reduce weight is now a global trend and several automakers have already initiated the replacement of metal components with plastic. Recently, a European Automotive OEM developing its range of world-class vehicles worked with VEROLT Engineering to define a recognizable brand identity and to develop a specific design language for their latest model. The company offered various components design and simulation tasks to VEROLT Engineering. One of them was the main visual components on the front of the vehicle – the grille.

“The grille influences the first impression of a vehicle; it makes the car attractive and shapes its identity. Nowadays, attentive observers can guess the make of a given car by simply looking at its grille.”

Up-front mold simulation promotes finding optimal designs quickly, prior to production

“So, identifying a design and material that fulfils all the necessary features for mass production of automotive systems in terms of functionality, robustness, reliability, and durability is a highly creative task,” explains Sonali Giri (Senior Engineer) VEROLT Engineering.

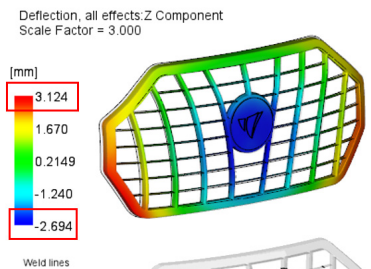


Figure 1 Screenshot of Autodesk Moldflow Insight deflection and weld line results of original design.

As shown in Fig.1, VEROLT’s client was facing serious weld line and warpage issues in the grille mesh. The presence of weld lines at those locations, as shown in the Autodesk Moldflow Insight simulations, were reducing the part’s mechanical strength and causing an unacceptable visual appearance for an aesthetic feature. The client was unable to solve issue using their experience and traditional approaches and looking to avoid expensive design changes late in the vehicle development process. Before initiating proposed design changes to attempt solving the visible weld lines and warpage issues, the client turned to VEROLT to benchmark the weld line and warp conditions with CAE mold filling & packing analysis.

The team communicated with the client and suggested some primary changes in mold and feed system design, but the client was not fully convinced. They wanted to see actual data instead of a hypothetical solution before making the changes to the mold. So, the VEROLT team decided to benchmark the existing conditions and offer ideas to resolve the weld line and warp issue. The VEROLT engineers took a holistic approach

to the issue faced using Autodesk Moldflow Simulation software. After examining the external grille feed system, VEROLT engineers were able to verify the grape gate design from the bottom of the part, to overcome the weld lines and warpage issue.

The Solution

The goal of this project was to overcome the warpage and weld line issue in the grille during the concept phase, thereby enhancing the final product quality. Through Moldflow analysis, VEROLT team optimized the process parameters, understand the filling behaviors, and predicted weld line locations in the grille.

Next, a preliminary filling analysis was conducted to check the effectiveness of the gate location. VEROLT engineers did a comparison of pressure and temperature over the multiple iterations using Autodesk Moldflow simulation software. The VEROLT team worked to identify the right combination for the gate location and number of gates as shown in the Fig. 2. In the conventional feed system design, a total of 15 nozzles were used, later team tried to optimize the part with a lesser number of nozzles. The VEROLT team changed the design from 15 to 11 nozzles.

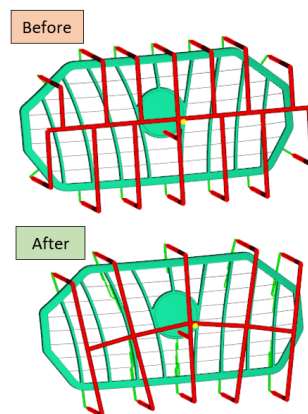


Figure 2 Screenshot of the original (Before) and modified (After) gate designs in Autodesk Moldflow Insight.

As a result, the “Z” direction deflection was drastically reduced from 3.124 mm to 0.8869 mm. Also, the weld lines were either eliminated or shifted to safer and acceptable locations, as shown in Fig. 3.

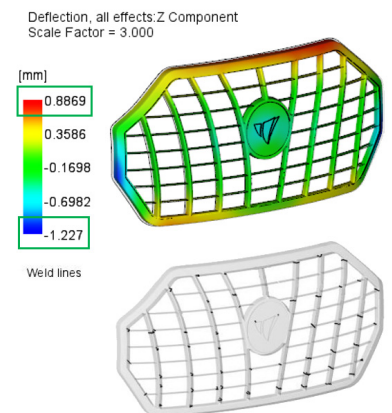


Figure 3 Screenshot of the Moldflow Insight deflection and weld line results with the updated feed system.

“In an effort to maintain sound relations with the customers, our team always seeks to be proactive in exceeding their expectations. Now we know how we can tackle ambitious projects, because Autodesk Moldflow simulation software meets our high level of demand, helps us to stay competitive and enables us to grow and evolve,” said Maneesh Kalyat.

The Results

VEROLT engineers were able to evaluate multiple design changes within a short period of time. This helped the customer to find out the most feasible and optimal product design and manufacturing parameters before the actual production. VEROLT engineers used a lesser number of nozzles than conventional feed system design, which directly addressed both issues in a practical way. “Through Autodesk Moldflow simulation, we could clearly identify the issue of weld lines and warpage in the grille and further revised [the] right combination for the gate location and number of gates. Besides getting acceptable weld line positions and lower warpage in the grille, we were able to notably shorten the development time, substantially decrease cost, and offer high-level services in line with the European standards,” concludes Sonali Giri.