

**COMPANY**  
MARQUARDT INDIA PVT. LTD.  
**LOCATION**  
Germany, France, Romania,  
North macedonia, Tunisia,  
Mexico, U.S. China, India  
**SOFTWARE**  
Autodesk Moldflow

## **Autodesk Moldflow Enables Marquardt to Evaluate Component Improvement at Development Stage**

The Marquardt Group is a leading multinational manufacturer of electromechanical and electronic switches and switching systems. Marquardt operates in all major markets around the world and has offices in 21 locations in 13 countries with more than 10,200 employees.

The automotive business unit of Marquardt is developing and producing innovative driver authorization systems, control panels, switches and assemblies. Marquardt has achieved a leading technological position on the world market. Renowned automotive, home appliances and Original Equipment Manufacturers (OEMs) are among Marquardt's long-standing customers.

In India, the company has its design development and production facilities in Pune and Mumbai areas. Marquardt helps customers develop sustainable products and massively invest in Research and Development each year. Marquardt prides itself on uncompromising creativity, reliability, quality, deadlines and costs. We take pride in evolving

with the rapidly changing automotive industry and continuously adding more and more products for its ever-expanding customer base.

As a leading automotive product supplier, Marquardt India has a strong domestic demand for precision quality plastic parts. Plastics offer tremendous advantages over traditional automobile production materials, but due to time-to-market pressure and the complexity of parts, Marquardt's team faces a number of challenges in the design development and manufacturing of the plastic parts.

### **Challenges**

During recently accomplished projects for the leading Automotive OEM in India, Marquardt's team faced a challenging situation while working on the design and development of the button component with the LED graphics symbol illumination. The button component displayed visible air traps and weld line as shown in Fig. 1.

“Meeting challenges against a backdrop of a substantial downturn requires us to rethink past approaches, to find better ways to design and manufacture. Simulation software like Autodesk Moldflow is a key enabler to achieve important objectives”

**Mr. Shailesh Singh**  
Team Manager - R&D  
Mechanical, Marquardt  
India Pvt. Ltd.

“The Automotive switch or button is the bridge between the user and the device that needs to be reliable. Even minor defects can have implications on aesthetics, safety and functionality. So, it was important to find the potential defects, prevent them, or process them out in earlier development stages.”

**Mr. Onkar Joshi**  
Sr. Engineer tooling and Moldflow , Marquardt India Pvt. Ltd.

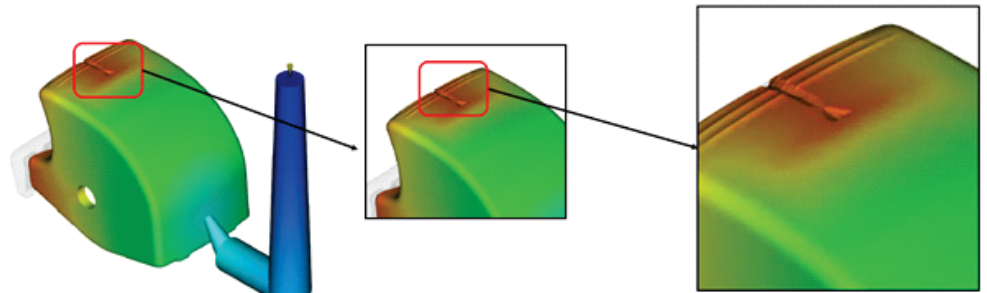


Fig.1

Image courtesy - Marquardt India Pvt. Ltd.

The main objective of this case was to prevent the visible air traps and the weld line on the button component. The air trap formation may have led to a short filling in the component, causing further problems. To overcome this issue, Marquardt utilized Autodesk Moldflow to find the optimum gate position to balance the melt flow and incorporated suggested changes in the part thickness to prevent air traps.

**Solution**

Firstly, Marquardt utilized Autodesk Moldflow to simulate the molding scenario on the original design. The simulation results showed the air traps and a weld line on the core side. The defect was having a direct impact on the product's appearance shown in Fig.2

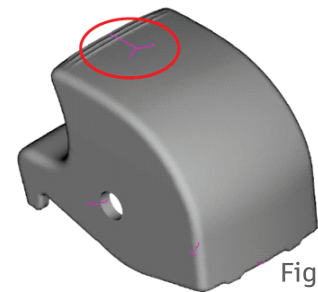


Fig.2

Image courtesy - Marquardt India Pvt. Ltd.

For iteration one, modifications were introduced to the design and increased the base thickness and the low-thickness illumination patch. Again, after doing a Moldflow simulation on the modified case, results indicated filling under velocity, pressure and temperature within the recommended limit for the material, air trap formation was nullified and there was a significant improvement in the weld line visibility on the surface.

“Beyond the strong analysis capabilities of Autodesk Moldflow, it is a user-friendly tool allowing us to face challenges without worry. Provides early diagnosis of molding defects, increases our competitiveness, reduces the need for the trial-and-error and speeds up the product development time.”

**Mr. Shailesh Singh**  
Team Manager - R&D  
Mechanical, Marquardt  
India Pvt. Ltd.

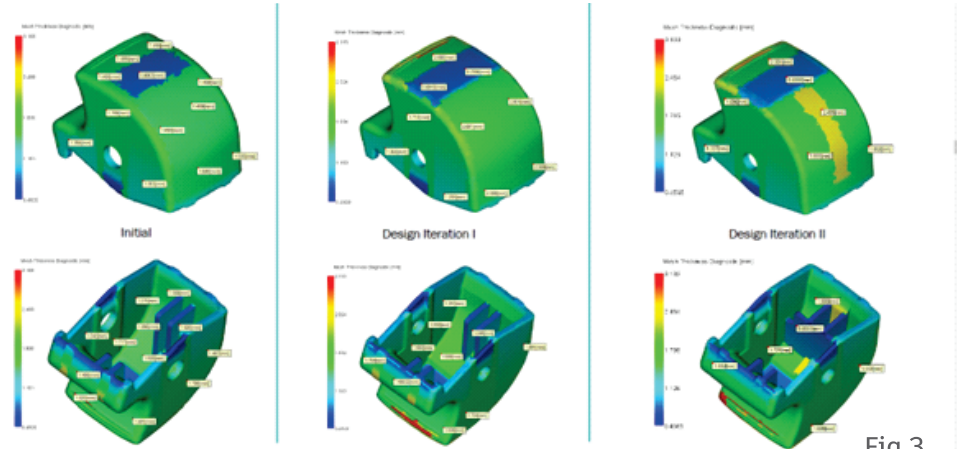


Fig.3

Image courtesy - Marquardt India Pvt. Ltd.

Though the component achieved the required quality criteria, the team decided to go for another iteration by increasing the base thickness and adding a flow leader to optimize flow. Still, the results were similar to the previous iteration shown in Fig. 3.

Marquardt's team decided to implement iteration one in which air traps were eliminated with hardly visible weld line on the surface. The weld line was

eliminated during post-processing. The painting provides the desired surface finish and protects against mechanical, chemical and physical influences such as scratches and weathering.

“With Autodesk Moldflow as a tool, we are much more efficient. Saving time allows us to focus on the more demanding aspects to manufacture more reliable products and demonstrate our value as a supplier.”

**Mr. Onkar Joshi**  
Sr. Engineer tooling and Moldflow , Marquardt India Pvt. Ltd.

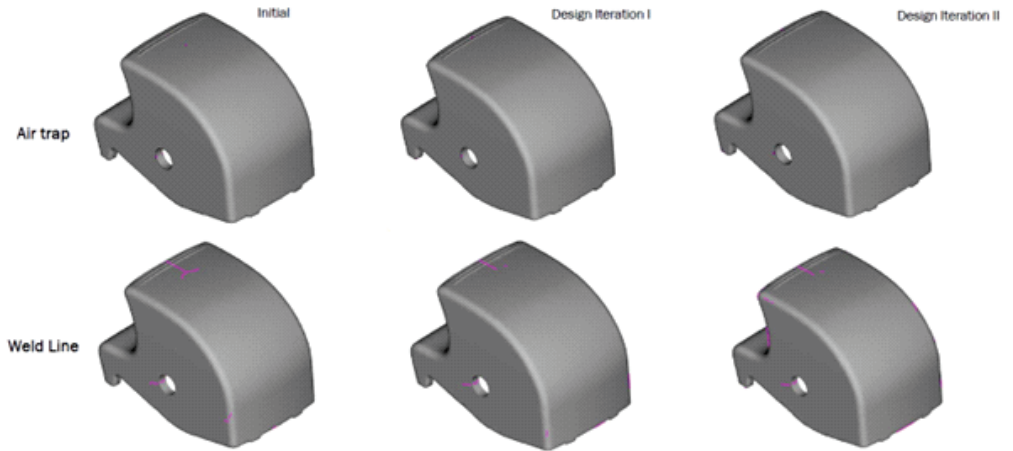


Image courtesy - Marquardt India Pvt. Ltd.

### Results

Through Moldflow simulation, Marquardt clearly understood the filling behaviors in the mold and predicted potential defects on the button part before the actual production. Later, the actual mold trials validated the accuracy of the Moldflow simulation. Eventually, Marquardt successfully resolved the air traps, weld line issue, optimize product and mold design for the button component.