

COMPANY  
**Machino Plastics Limited**

LOCATION  
**Gurugram, Haryana, India**

SOFTWARE  
**AUTODESK® Moldflow®**

# Machino Plastics Ltd. eliminates unnecessary mold design iterations using Autodesk Moldflow®

Machino Plastics Ltd. believes that Autodesk Moldflow® helps them develop injection molds - easier and faster.

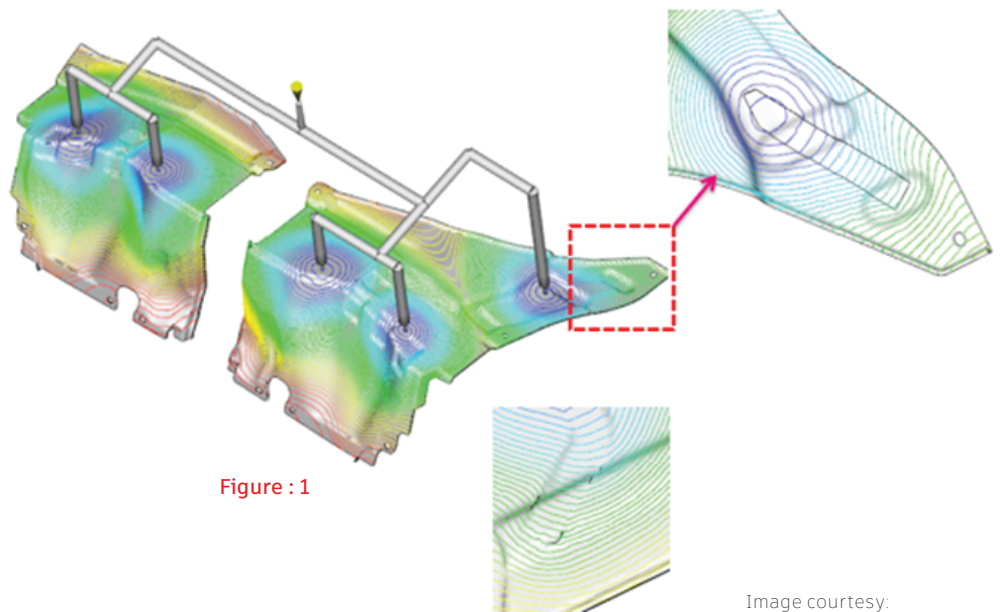


Figure : 1

Image courtesy:  
Machino Plastics Ltd.

“Autodesk Moldflow helps us look-over various scenarios in a virtual environment. We analyze the proposed designs from our clients by predicting the potential manufacturing difficulties prior to actual production.

We suggest design modifications beforehand, which in turn saves a lot of time for design improvements”

Mr. Prahalada Badia  
Sr. Engineer (Moldflow Analysis);  
Machino Plastics Ltd.

Founded in 1987, Machino Plastics Ltd. (MPL) is India’s first and largest plastic bumper and dashboard manufacturer company. The company has its state-of-the-art plastic molding product development division. Company’s quality certifications include the IATF 16949: 2016, ISO 9001: 2015, ISO 14001:2015, OHSAS 18001: 2007 and ISO 9001:2015 (Tool Division).

MPL provides turnkey solutions through an integrated approach of designing, tooling, manufacturing, and assembling clients’ most complex products. MPL’s competitive advantage is to provide outstanding customer support and service through the development of

strong partnerships, continuous improvements, and fast-tracking your product from design to manufacture. The company also has an extensive customer base that includes Maruti Suzuki India, Suzuki Motorcycle India and, Volvo Eicher.

The company has its manufacturing plants in Gurgaon, Manesar and Pithampur (Dhar, MP) equipped with a variety of modern high precision conventional injection molding machines in the range of 100 ton to 3150 ton.

## Challenges

To retain its position as a leading supplier for Automotive OEMs, MPL's team faced several challenges, including producing components with no surface defects, accurately predicting the lifespan of components and assemblies, reducing overall cost, improving the correlation between virtual analysis and bench testing of plastic products.

Today, Automotive components are developed in less time than ever before to meet the challenging time-to-market deadlines set by OEMs. In order to save time in product development and manufacturing and in turn meet customer expectations, Machino Plastics Ltd. engineers tried to eliminate unnecessary design iterations using advanced plastic injection simulation tools like Autodesk Moldflow.

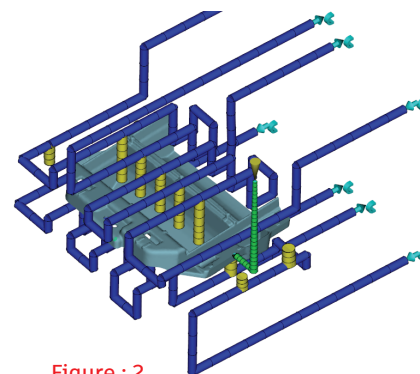


Figure : 2

“Autodesk Moldflow helps us look over various scenarios in a virtual environment. We analyze the proposed designs from our clients by predicting the potential manufacturing difficulties prior to actual production. We suggest design modifications beforehand, which in turn saves a lot of time for design improvements,” said Mr. Prahalada Badia, Manager Machino Plastics Ltd

Recently, while working on a complex dashboard part for a leading automotive OEM, the MPL's design and simulation team faced a challenging situation during the initial stages of mold filling. The material was injected in the product from the top of the mold using five gates. As shown in Fig 1, the flow didn't reach all extremities of a mold simultaneously due to complex design. Short shot resulted in imperfect filling of the mold cavity on extreme corners. Engineers tried to use trial-and-error methods but extending the filling time was not enough to resolve the issue at hand. Based on experience, the team members also tried changing gate locations and injection pressure, but their efforts did not help in resolving the complications encountered during the project.

In order to find the flow ratio, one must first determine the wall thickness. Wall thickness is generally specified by the original equipment manufacturer (OEM) early in the design phase. Ideally, Machino Plastics as a supplier should have followed the design given by OEM as increasing wall thickness would have been the easiest way to decrease flow ratio and flow resistance. A thicker wall typically lowers material viscosity, allowing the material to flow farther without adding filling pressure. Creating thicker walls uniformly across the part would have significantly increased material usage, adding part weight, and extending the cycle time. Also, it was difficult to convince OEM to make changes in part design at that stage.

## Solution:

In a detailed discussion among the team members, the cause of a short shot was analyzed “Autodesk Moldflow helped us analyze all the physical phenomena, predict flow behavior and subsequently study different design options,” said Mr. Prahalada Badia

MPL engineers used Autodesk Moldflow to obtain injection molding simulation results for the part. Based on the simulation results, the team decided to go for the flow leader within the part that extends from the gate till the areas of last fill. The thickness of the wall was 1.00 mm, the flow leader of 1.25mm thickness was added to

improve flow with no consequences. Instead of adding thickness to the entire wall, adding the flow leader was relatively more convenient. MPL team considered 25% thicker flow leader than the nominal wall as per standards.

Using a flow leader resulted in only one to two percent material addition for the entire part. By elongating the filling pattern, both the width and length of the part filled at a uniform rate. The part was easily molded using less tonnage smaller press machines. Designing flow leaders into the part also eliminated the need for an adding gate, which would have increased

tooling cost, as well as the likelihood of additional knit lines. Cosmetics could have suffered, requiring secondary operations and added costs.

“We didn't want any surprises once the part moved to the manufacturing floor, that's why we used Autodesk Moldflow software. We made sure that our designs were robust and would fill properly. The software helped us increase material flow in hard-to-reach areas of a part using flow leaders and achieve balanced filling,” explains Mr. Prahalada Badia

## Results

The standardized use of Autodesk Moldflow at Machino Plastics Ltd. led to optimizing both time and money. The company saved significant resources due to significant reduction in number of tests: **“Autodesk Moldflow has enabled us to realize savings or at least to prevent huge losses by limiting unnecessary mold design iterations, accurately predicting material performance before the steel for the mold is even cut,”** concludes Mr. Prahalada Badia

Most importantly, engineers were able to precisely simulate and predict the issue faced. With the help of Autodesk Moldflow, Machino Plastics Ltd. could fully investigate the issue in the mold and with minimum modifications the mold was filled completely giving reliable results.