

## Napino Utilizes Autodesk Moldflow to Successfully Resolve Deformation of Automotive Switch Case

### COMPANY

**NAPINO AUTO & ELECTRONIC LTD.**

### LOCATION

**Haryana, Uttarakhand, Gujarat  
Pune, Rajasthan, India**

### SOFTWARE

**Autodesk Moldflow**

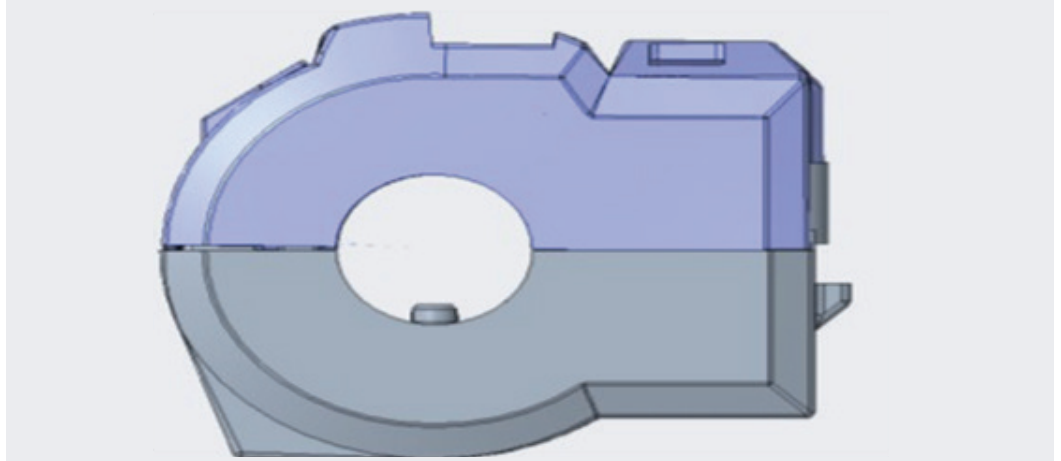


Image courtesy of Napino

Napino is one of the India's leading contract electronics manufacturers that offers design, engineering, development and manufacturing solutions to automotive OEMs. The portfolio includes ECUs, capacitor-discharge ignitor, regulator rectifier, wiring harness, handlebar switches, and eMobility products among other electronic offerings. Established in 1997, Napino Auto & Electronics Ltd. is headquartered in Gurugram, India, Napino is a focused and dynamic company committed to achieving greater value for its customers in the field of auto electrical and electronic products. Appreciating the continually evolving needs of the automotive industry, the company has kept abreast with the leading global technologies and consistently developed innovative products and variants for its customers. Moving into the future, Napino aims to expand its presence

globally as a one-point solution provider from concept to manufactured products. Napino's profound understanding of the automotive sector and its consistent focus on innovative applications for over two decades is what drives the company towards the future of automotive electronics.

### Challenges

Automotive design is going through one of its most profound changes now. The Innovation in automotive design is driven by electrical, electronic and mechatronic systems. Engineering plastics often enable innovative solutions which make electronic systems indispensable when it comes to safety, comfort and energy efficiency in modern vehicle concepts. In order to remain competitive, auto manufacturers are trying to differentiate themselves from the competition by enhancing

“Working on Aesthetic parts is always challenging as it influences judgment of a product’s quality and plays important role in the success of the products so it is very important to overcome the aesthetic defects in primary stages of product development,”

**Mr. Deepak Kumar**  
 Engineer,  
 Napino Auto &  
 Electronic Ltd.

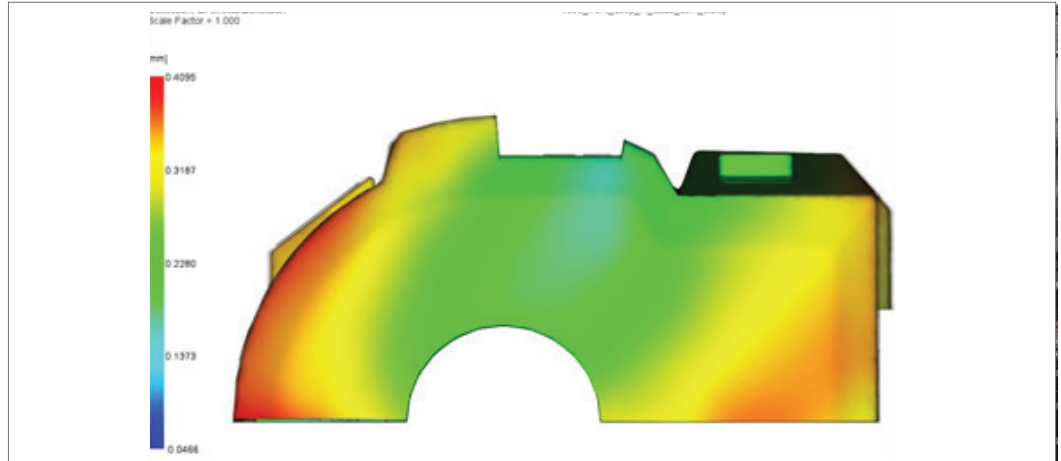


Image courtesy of Napino

their vehicle’s appearance, even a small accessory like a switch is among the top priorities to improve the aesthetic value of the vehicle.

Recently, Napino’s team faced a challenging situation when working on the design and development of handle switch case for the leading 2-wheeler automotive OEM. Switch case is a critical component in switch assembly with demanding tolerances at all fitment areas between upper and lower cases, handle bar and switches. In this project, the upper case and the lower case (Fig. 1) of switch assembly was not mating properly resulting in low dimensional accuracy and failure in assembling thus affecting aesthetics. It was affecting the bike’s appearance when switch was mounted on the handle bar.

For almost every product purchased, the consumer’s first contact with it is visual. Hence a product’s appearance

is of great importance to designers and manufacturers.

**Solution**

First of all, through Autodesk Moldflow Simulation on the original design, Napino engineers were able to detect a flow imbalance phenomenon in the filling result. That was ultimately leading to warpage in the upper and lower switch cases with displacement of approx. 0.8 mm (Fig.1) that was unacceptable for the switch assembly.

Automotive switch design requires interdisciplinary understanding to create robust, reliable product with very limited space for making changes in client’s design. Tight tolerances between mating parts and other demanding requirements of automotive industry together create a challenging situation for the design and simulation engineers.

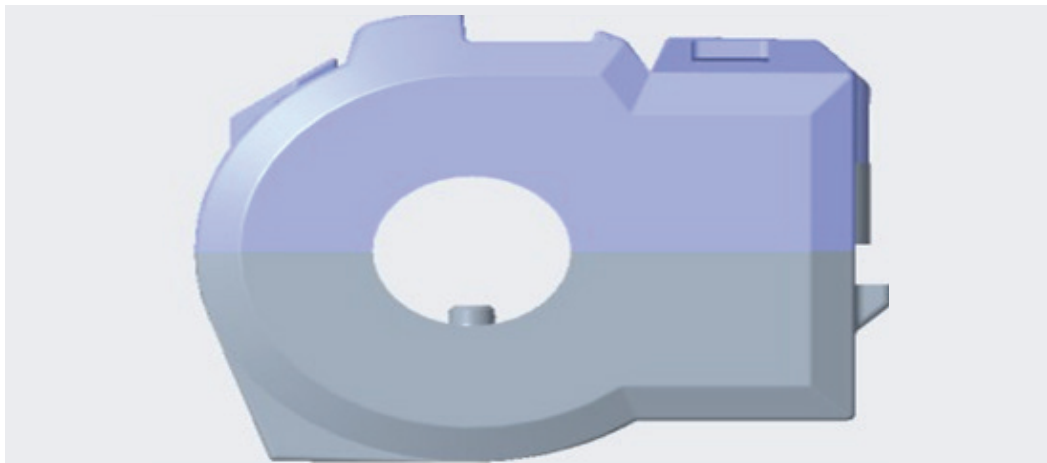


Image courtesy of Napino

After encountering this situation, the design team tried to apply different approaches such as changing the process parameters. However, an accurate simulation was the most desired and cost-effective solution to verify what could be improved in advance without causing unwanted iterations.

The primary concern of the case was to reduce warpage and ensure the assembling quality. To find the optimized solution, the team conducted some variation setups and used Autodesk Moldflow to verify the design changes.

In this project the first thing was to look for a proper feed system in order to attain good filling pattern. The single point gate was replaced with the two-point gate design in order to overcome flow imbalance for both switch cases. The two-point gate design reduced the warpage

according to Moldflow's simulation results but still there was scope to reduce it further by optimizing product design and processing parameters.

Lastly, with the help of Moldflow simulation, Napino was able to get an in-depth look at the process parameters and evaluated the potential problematic areas. The important process parameters like filling time, Mold Temperature, Melt Temperature were carefully examined and optimized to achieve best quality results. Also, it was noticed that in the cooling in the critical area was not sufficient enough, so Napino team decided to add cooling channel after having discussion with the customer, Moldflow helped them to accurately predict the effect of adding cooling channel.

“When working on complex geometry, if cooling in the critical areas is not enough due to temperature difference on the part have direct impact on the part quality and overall cycle time. Using Moldflow simulation not only help us to determine cooling time but also the temperature variations inside the mold and the coolant behavior,”

**Mr. Deepak Kumar**

Engineer,  
Napino Auto &  
Electronic Ltd.

The above-mentioned modifications in feed system, process parameters and cooling channel solved the problem with the warpage. The final part deflection was reduced 0.8 mm to 0.1 mm.

**Results**

Through Moldflow simulation, (Fig. 2) Napino’s team was able to optimize the switch case assembly design and processing parameters effectively to achieve most optimal results. With the validation of Moldflow analysis, team was able to make a confident decision and concluded on the most ideal design choice for improving the warpage issue in the part.

Deepak Kumar attributes the company’s success to its relationship with Autodesk Moldflow team.

“Napino’s association with Autodesk reassures our customers that they will receive the most comprehensive and quality solutions that have proven success in the market. Using Moldflow ensure that the potential manufacturing problems are detected before they become real problems, and that has helped us to gain strong confidence to overcome critical mold development issues and accelerating the product development timeline.”