

COMPANY

NYX, LLC

LOCATION

Chandigarh, Punjab, India

SOFTWARE

AUTODESK® Moldflow®

NYX, LLC. elevates Automotive Interior Part Design to the Next Level using Autodesk® Moldflow®

NYX, LLC. is a unique synthesis of people, technology, and innovation; a Company equipped with right tools to deliver engineering and product solutions to its global automotive customers. NYX is a market-leading provider of interior, under-hood and technology solutions to the automotive industry.

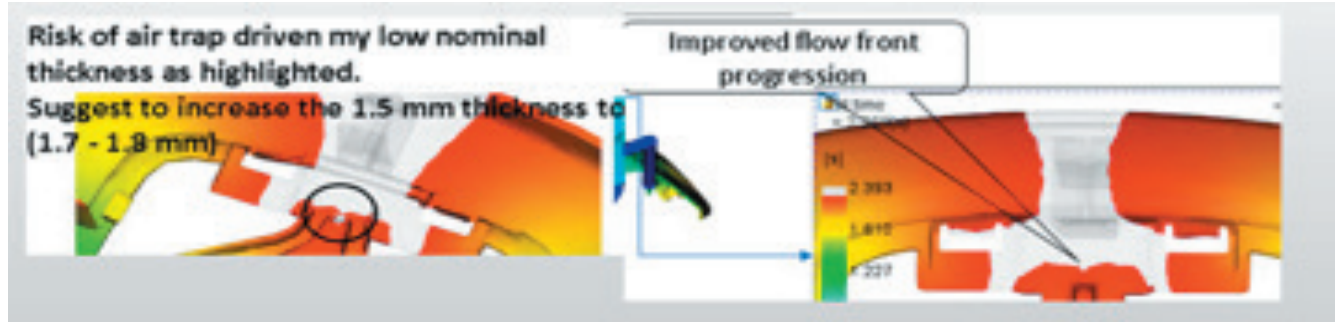
NYX was acquired Mr. Chain Sandhu, in 1989 and is registered with the MMSDC as a Minority Business Enterprise (MBE). In 1998, the company was voted MMBDC Minority Supplier of the Year. The Company is headquartered in Livonia, Michigan and has production facilities located throughout Michigan, Tennessee and Mexico.

NYX also maintains a Design and Engineering Center in India, strengthening NYX's competitive advantage and customer value proposition by improving time-to-market and reducing engineering design and development costs.

Challenges

Up until a few years ago, steel was the material of choice across most manufacturing industries, especially in the automobile industry. Designers had this material firmly fixed in their material databases, but automotive OEMs scouted for lighter alternative materials, mostly for vehicle interiors. The NYX team faced a challenge while working with a leading Automotive OEM, looking for a replacement for a metallic seat headrest with a lightweight plastic material, without compromising the strength, safety, aesthetics, and quality of the parts.

The front headrest seat assembly composed of an upper flange type part and supported ribs that attached the headrest to the seat structure. Since it is always hard to detect potential design defects at an early development phase, the NYX team started with the evaluation of surface appearances of the headrest before going to further stages through the accurate simulation capabilities of Autodesk® Moldflow® software.



With the help of Autodesk® Moldflow®, analysis identified that the thickness of the upper portion of headrest was found too thin for plastic and had a flow hesitation issue, which resulted in excessive injection pressure and partial short shots. In addition to the short shot problem, Moldflow results also predicted knit lines and risk for air traps as shown in the figure 1.

As the headrest was designed to be assembled with the seat structure, ribs were designed on the lower side of the part. With the accurate prediction of Moldflow, it was established that excessive thickness and length of the ribs was more likely to result in air traps and cause significant weld lines on the appearance.

Solution

The visualization of Autodesk® Moldflow® simulation analysis results facilitated a communication process between NYX and its customer. NYX was able to provide design improvement suggestions based on the early detection of possible surface problems in the headrest. Changing the thickness of the part was the key to avoid air-traps. NYX proposed thickening the upper side of the headrest to let the plastic flow faster, as predicted by the simulating scenario.

“When we encounter a situation like this, we apply different approaches, such as changing the part design, mold design and the process parameters, whenever possible or if client permits. Autodesk® Moldflow® simulation is the most desired and cost-effective solution to verify what can be improved in advance without causing unwanted iterations,” explains Mr. Vinay Raina (Senior Manager, Process Development).

Figure 1. demonstrates the change of thickness. The red region in Figure 1. illustrates the mold with a part thickness of 1.5 mm. The thickness was increased from 1.7 to 1.8 mm to solve the problem of air-trap and short shot.

In the same project, Moldflow also predicted a weld line positioned in the lower part where the ribs are located. Although the ribs were the most fragile area of the product, they supported structure strength in the headrest assembly. It was also difficult to overcome air traps in the ribs, as no air vents were feasible in this area. Using Moldflow, NYX team was able to discover structural alterations required to overcome weld line issue.

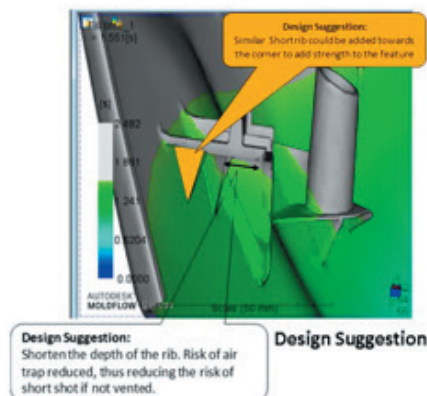


Figure 2.

With the assistance of Moldflow, NYX engineers were able to find optimum design for the ribs. To get rid of the air traps that caused weld lines, the rib thickness was increased. A proposal to reduce the height of the rib to half was also made, as shown in Figure 2. The part model was also checked for any other potential molding issues, particularly, sink marks. Various scenarios for the optimum ratio of rib length and thickness were analyzed before proposing the change in the length of the ribs to the client.

The NYX team used Autodesk® Moldflow® to simulate revised designs. The Moldflow analysis results correlated with the results of the actual mold trials. NYX was able to help their client not only in solving product design problems, but also in reducing trial-and-error iterations. Moldflow helped in precisely predicting the unbalanced thickness of the headrest and control the structure strength through optimum design of ribs.

Results

Through Moldflow simulation, NYX could clearly understand the filling behaviors and predicted weld line locations before actual production. The accuracy of Autodesk® Moldflow® simulation was also validated by the actual mold-trial results. NYX was able to successfully decipher the potential manufacturing issues and optimize their product and mold designs.

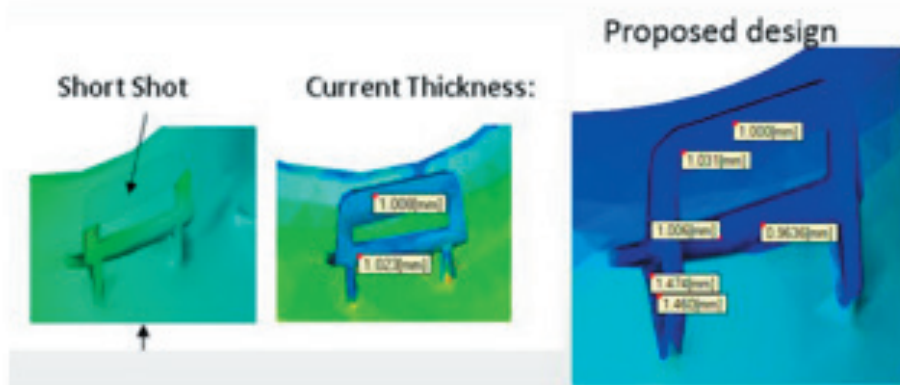


Figure 3.

The typical manufacturing difficulties when producing thin, lightweight products, such as weld lines, surface defects, and unbalanced pressure distribution, could be well-addressed and overcome by the use of Moldflow. The proposed design changes were accepted by the client and implemented in the final design. These improvements shortened the cycle time, and further reduced the production cost by eliminating unwanted expense spent on the post-processing tasks.

“Autodesk® Moldflow® has been instrumental in helping NYX to maintain its global leadership position for interior, under-hood and technology solutions in the automotive industry. Moldflow offers great advantage, it allows our team to share simulation results with clients to obtain their feedback, suggest them design changes and helps us meet their expectations. Moldflow use has given us a technological advantage and has been instrumental in drastic reduction of time invested in developing new products, design improvements, cost savings, and on-time delivery of products.” concludes Mr. Vikram Grover (Country Head- NYX India Operations).