

# KOPLA Warpage Problem Solved Using Moldex3D Integrated Structural Analysis



Customer: [KOPLA Engineering](#)  
 Country: Korea  
 Industry: [Automotive](#)  
 Solution: [Moldex3D eDesign](#); [FEA Interface](#)



Image Courtesy of KOPLA Engineering

KOPLA has been developing and supplying the composite materials for the automobile industry since 1997. They have dedicated to develop eco-friendly material such as PPS, PPA, and PCT in 2013. This allows for expansion of lighter materials including carbon fiber reinforced composite, high heat resistance materials, and high strength materials.  
 (Source: <http://www.kopla.com/>)

## Executive Summary

The product in this case is a door module with a serious warpage problem (Fig. 1). The deformation led to difficulties in the assembling process. For solving the issue, KOPLA used Moldex3D to identify the material property variations from steel to plastic for the purpose of lightweight, and applied Moldex3D [FEA Interface](#) to run in-depth structural analysis (ANSYS). As a result, KOPLA was able to effectively find the optimized gate location design and decide the proper material to reduce warpage and successfully solve the assembling problem.

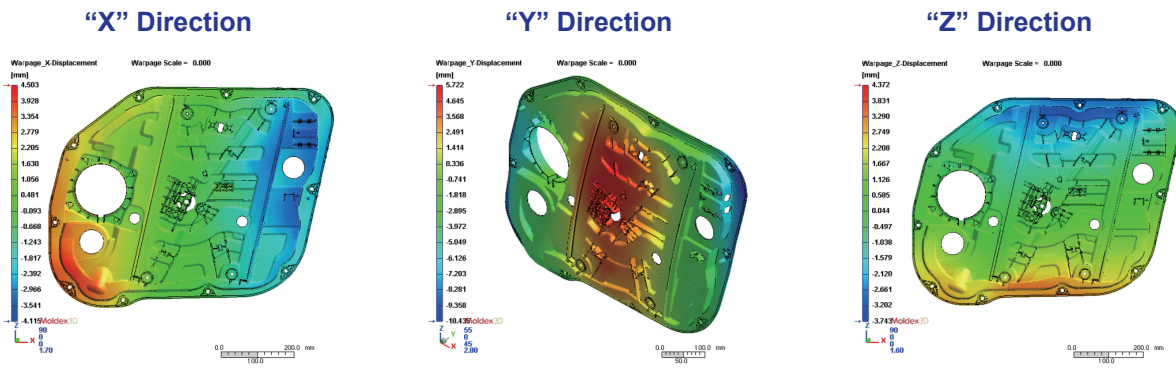


Fig. 1 The door module in this case has a serious warpage problem

## Challenges

- Serious warpage problems
- Poor assembling quality
- To achieve the lightweight target

## Solutions

KOPLA utilized Moldex3D eDesign and FEA Interface module to identify the material properties and solve the warpage issue.

## Benefits

- Successfully improved warpage
- Seamless workflow from injection molding to structural analysis
- More efficient material properties identification
- Reduced the cost of mold trials

## Case Study

The part in this case is the side door of a car. Many holes on the part are designed for assembling with other parts, so the hole positions are very important. The primary concern of the case is to reduce warpage and ensure the assembling quality.

KOPLA utilized Moldex3D to find out the solution. For KOPLA, the first issue is to look for a proper gate position in order to attain good filling patterns and decrease potential warpage ratio. KOPLA repetitively changed the gate position settings until they found the optimized one and decided the gate type based on the warpage analysis results (Fig. 2).

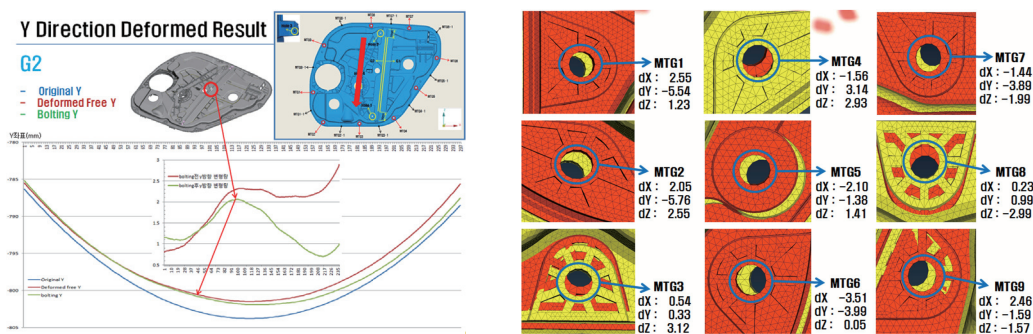


Fig. 2 KOPLA repetitively changed the gate position settings and simulated the deformation results

After finding the best gate location design, KOPLA could further output the warpage results, including fiber orientation and some element properties, through Moldex3D FEA Interface to ANSYS for in-depth structural analysis in order to observe the product strength and stability when assembling with other parts.

Having found that the part is warped toward the opposite side of the assembling plain, KOPLA decided to apply reversed mold warpage to compensate for this deflection. Also, the planar displacement of the bolt holes are also considered to correct the hole location accuracy. (Fig. 3 & Fig. 4). After changing the boundary condition settings, and checking the bolting displacement of the assembled part, KOPLA successfully improved the deformation and enhanced the structure design.

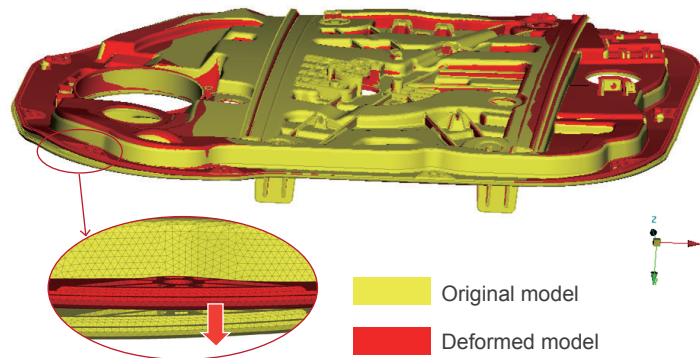


Fig. 3 The holes in the deformed model was consistent with the assumption.

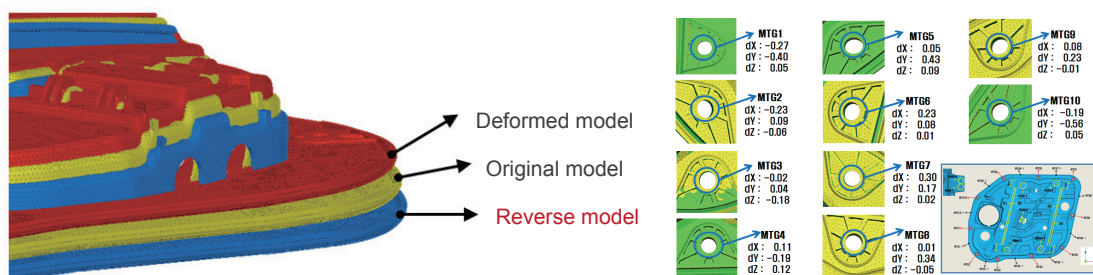


Fig. 4 The structural analysis of the part when being assembled with other parts

## Results

Through the streamline cooperation of Moldex3D and ANSYS structural analysis, KOPLA was able to successfully improve the product deformation and enhance the structure design. They also found consistent patterns between the analysis results and the real product. This helped them efficiently understand the material properties and greatly influenced their product design decisions.

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