

PLASTIC INJECTION SIMULATION

Case description: The objective of this work is to predict the resulting gap between the two parts belonging to the set after being injected, to verify whether they meet the quality requirements established for this product.

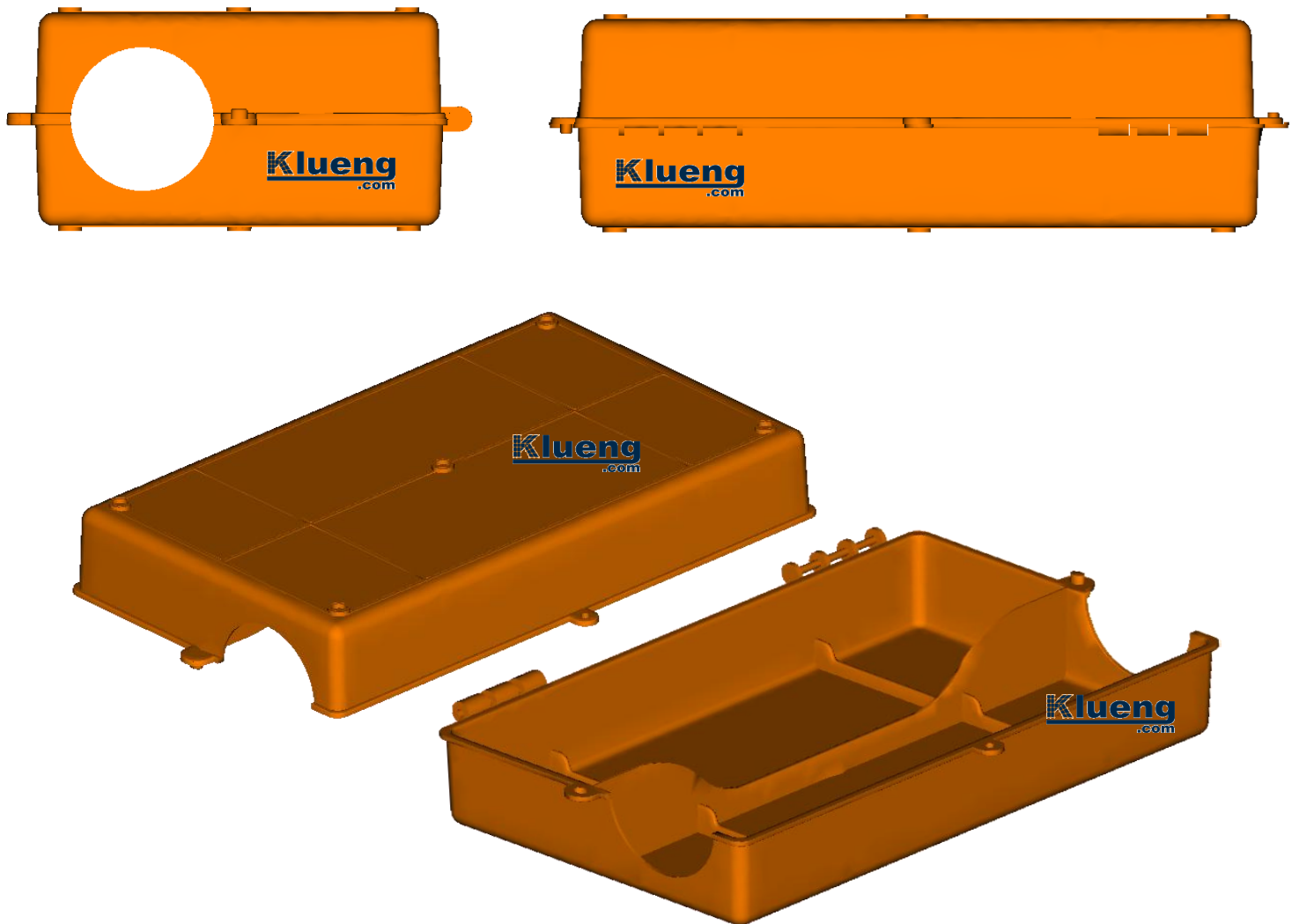


Fig. 1 - Geometry to analyze

Development: At first, the meshes of both pieces were made. Then the simulation of injection molding (with the material inlet where the green arrow indicates) was carried out.

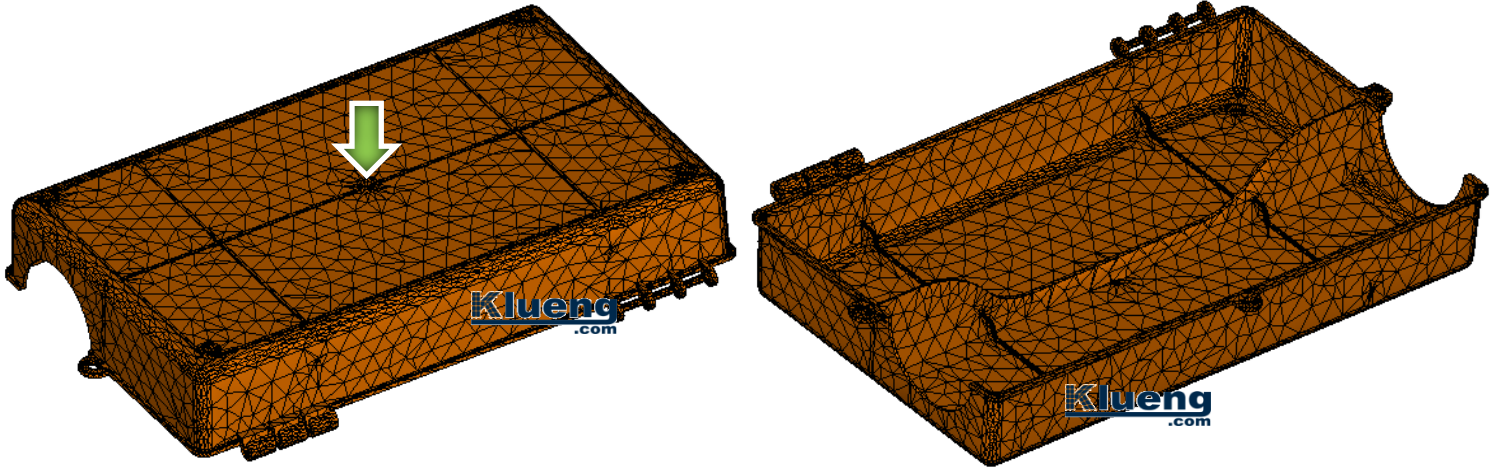


Fig. 2 – Mesh of the upper part of the set

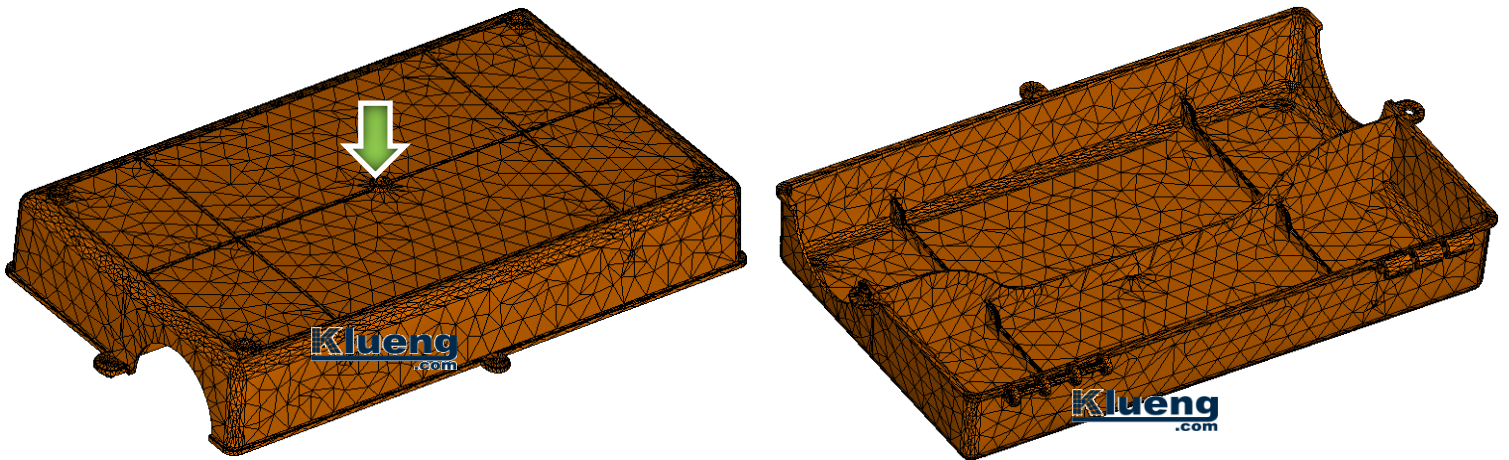


Fig. 3 - Mesh of the lower part of the set

For information purposes, filling results were:

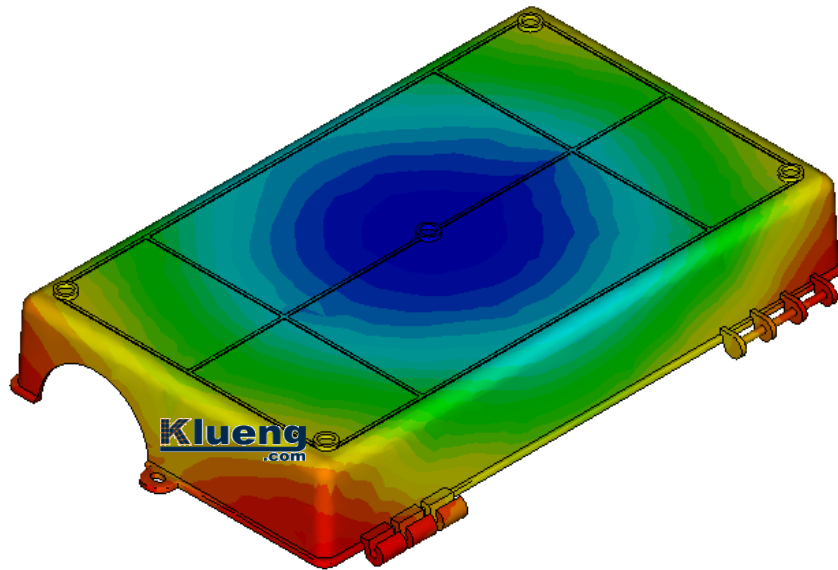
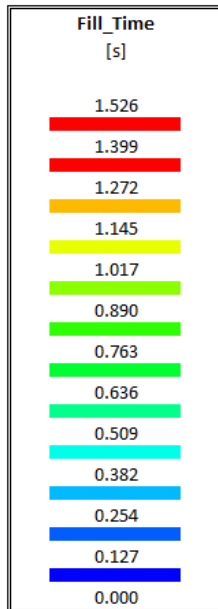


Fig. 4 – Filling time of the upper part

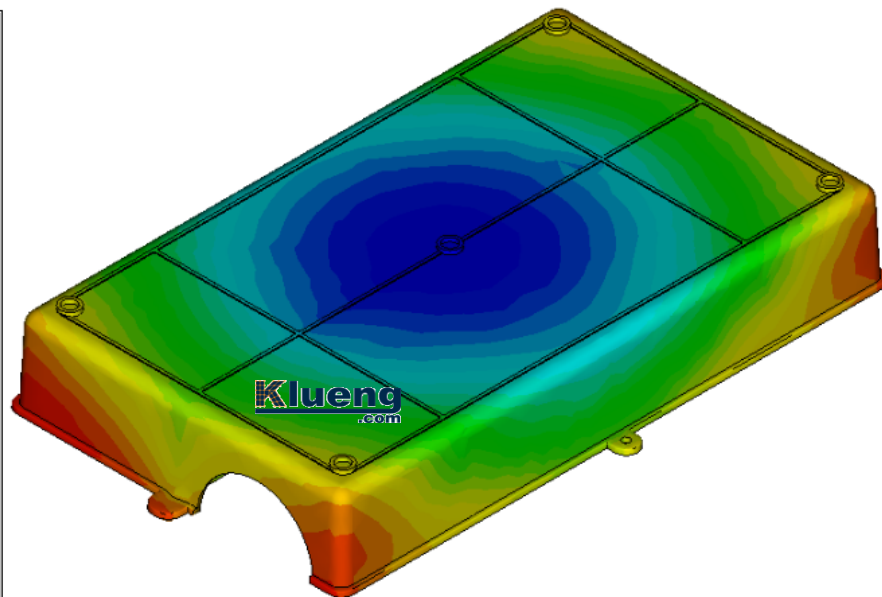
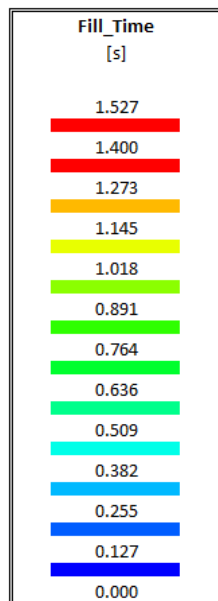


Fig. 5 - Filling time of the lower part

Finally, the desired result is shown in the graph of Fig. 6:

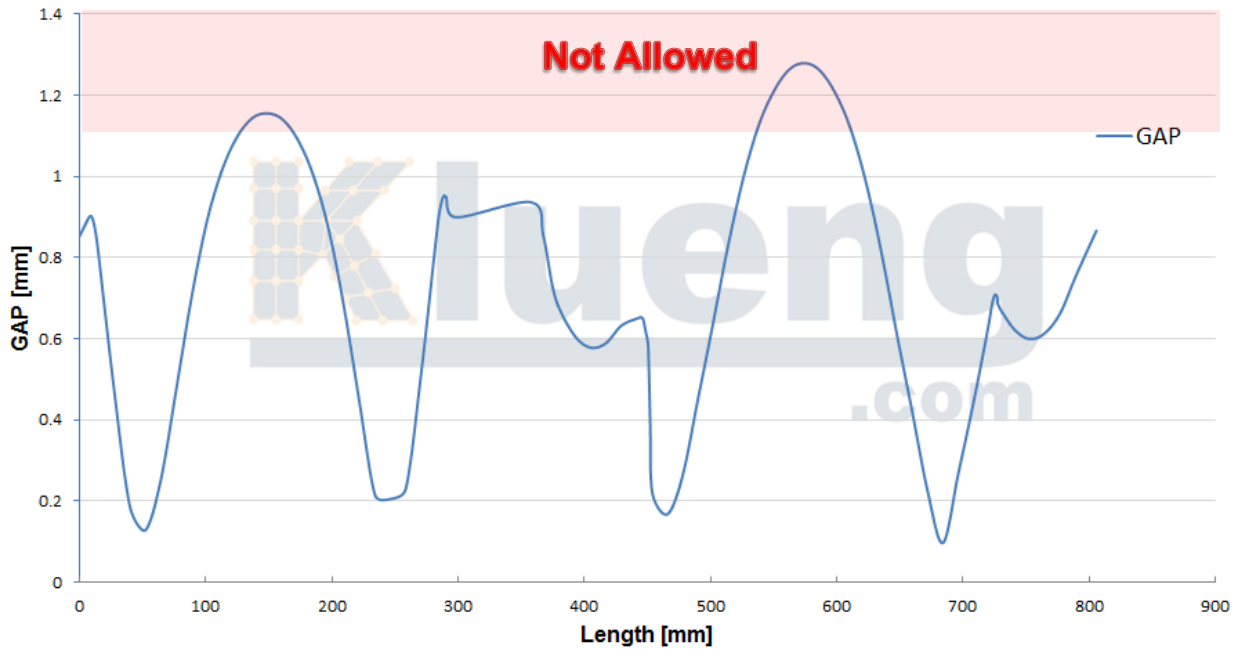


Fig. 6 – GAP between the pieces after the mold injection process

It can be seen that all these conditions are not allowed in the product specifications, as a corrective action, the packing profile will be optimized to try to minimize the warpage of the parts. To carry out this simulation was necessary to model the injection system to know the freeze time of the material inlet. The GAP between pieces presented an improvement that allowed the set meets the original specifications, Fig. 7.

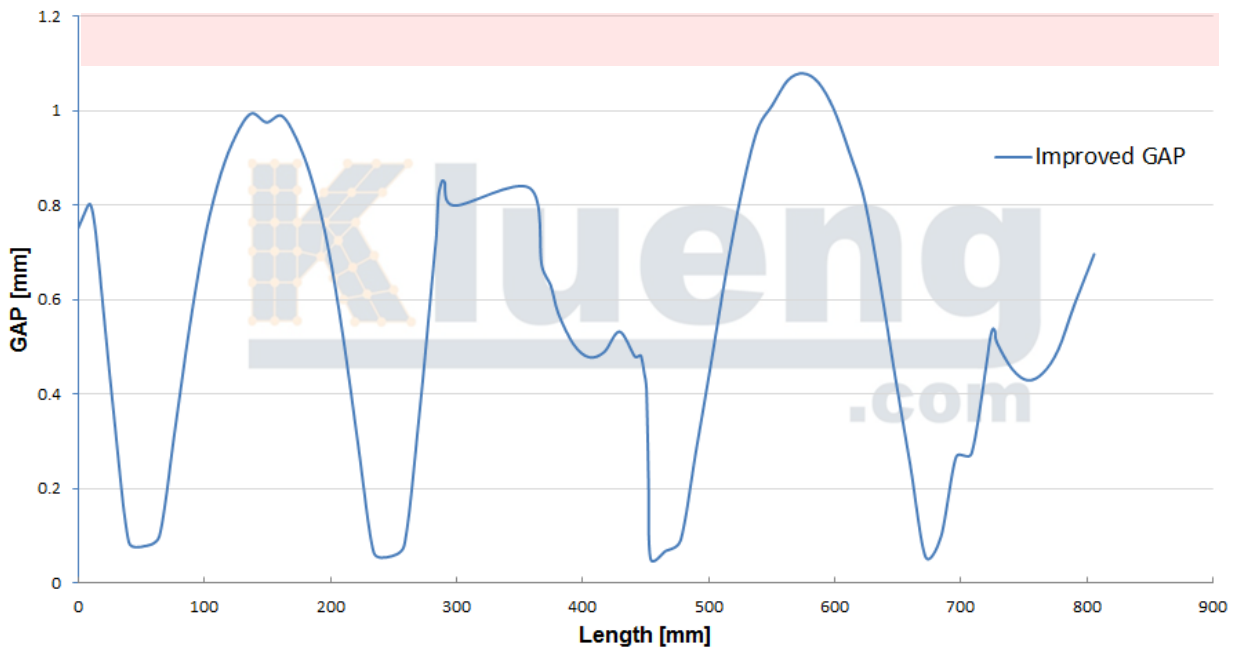


Fig. 7 – Improved GAP

Conclusions: Through numerical simulation, the deformation of the profile of both pieces after injection could be obtained and, in addition, the GAP of both parts that would be presented in the final assembly.

After, the packing profile was optimized, what allowed the overpacking improvement to minimize the deformation of the parts and satisfy the quality requirements. The results of the first simulations indicated that the assembly presented an excessive GAP.

As a final conclusion the magnitude of the defect was predicted and a corrective action was implemented before the production process, minimizing scrap that would have caused this phenomenon and obtaining the initial set-up process that ensures optimum performance of the plastic injection process.

Note that the process can be further improved by several techniques that the client at the time of the consulting service decided they were expensive by requiring modifications in the mold which was already built. This can be avoided if the simulation had been performed in the zero step of the project, before the mold construction.