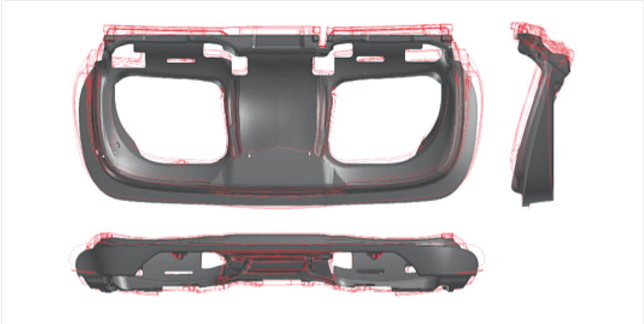
JSP Improves the Accuracy of their Seat Manufacturing with the use of ESI Virtual Seat Solution

Challenge

When JSP started to embed plastic and/or metal components into seats fabricated in ARPRO® Expanded Polypropylene (EPP), they discovered that shrinkage after manufacture was more difficult to predict. The CAE methods they applied did not account for thermal effects during shrinkage so simulations of the manufacture were unreliable. Consequently, more trial and error was required resulting in extended development time and increased costs.

Benefits

With ESI Virtual Seat Solution (VSS), JSP was able to define a target shape, including plastic or metal molded inserts, to select the density of their ARPRO® foam, and to calculate the mold shape to be used to achieve the required geometry of each component after the molding and curing process.



Thermal Shrink Simulation – Distorted Shape

"ESI Virtual Seat Solution allowed JSP to accurately predict the distortion of parts as they cured. Consequently, we were able to design molds that compensated for that distortion before they were constructed, saving us a tremendous amount of time, effort and money. This improvement in JSP's capabilities is a competitive advantage that we can use to capture additional business and increase our market share."

Kipp Boegner
Engineering Manager
JSP

Story

JSP is a global supplier of ARPRO® Expanded Polypropylene (EPP) foam, which is used in the manufacture of a wide range of automotive components. ARPRO®, thanks to its excellent strength-to-weight ratio, is widely used in seating to achieve significant weight reduction. Furthermore, the material is versatile so seats can be readily engineered to control the H-point for different driver/passenger morphologies.

Metal wires can be molded directly into an ARPRO® part. These insert-molded components create integrated sub-assemblies that can be used as primary or secondary attachment features to the steel seat frame or for structural enhancements. The addition of these elements provides opportunity for further weight reductions as the traditional and heavy, steel anti-submarine ramp can be replaced.

A typically molded ARPRO® foam part, without insert-molded components, will typically shrink about 2% in volume after a standard molding process. However, the addition of plastic or metal components, molded into the ARPRO® part, causes the part shrinkage to vary locally and results in dimensional errors in the final molded part, unless the effect is predicted and then corrected in the mold shape.

To accurately predict shrinkage, JSP turned to ESI Virtual Seat Solution (VSS). JSP's first objective was to check the methodology and predictive capability of ESI VSS regarding the final distorted shape of the ARPRO® foam parts, after they are manufactured and cooled to ambient temperature. Then, with the help of VSS, they looked into predicting the compensation to mold shape that was required so that the desired shape would be achieved after cooling. Lastly, they wanted to output the predicted compensated mold geometry to a Computer-Aided-Design (CAD) file for mold construction.

Today, with ESI Virtual Seat Solution, JSP can input a targeted part shape, including insert-molded plastic and metal inserts, select the desired density of their ARPRO® foam, and run a reverse simulation to predict the corrected mold shape that will be necessary to achieve the targeted part shape after the molding and curing process.

To date, JSP has successfully completed and correlated over 18 independent studies in an effort to validate ESI VSS's capabilities. Satisfied with the results, JSP has commissioned and constructed five production capable molds based on ESI VSS's output. These first molds have produced dimensionally capable parts as expected and have required no significant costs for revision.

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