Warpage Control on a Dashboard Carrier Mold for Stable Automotive Production Launch

Project Overview

Part: Automotive Dashboard Carrier Support Structure
Industry: Automotive Interior Components
Application: Structural interior mounting system
Challenge: Warpage control and dimensional stability improvement

Gege Mould developed and optimized a mold solution for a large automotive dashboard carrier support structure used inside the vehicle interior.

The dashboard carrier is a critical structural component that supports and positions dashboard modules, electrical components, and interior assemblies. Because it connects with multiple surrounding parts, its dimensional accuracy directly affects assembly efficiency, fit quality, and production stability.

For large automotive interior components, controlling warpage is one of the key challenges during injection molding. Even small deformation after molding can create assembly gaps, misalignment, and quality issues during vehicle production.

Customer Challenge: Eliminating Warpage Before Production Launch

During the first molding trials, the dashboard carrier showed unacceptable deformation after cooling.

The main problems included:

- Poor flatness on critical mounting surfaces.
- Difficulty achieving consistent assembly fit.
- Dimensional variation between molded parts.
- Increased risk during production validation and launch.

The customer needed more than a temporary adjustment. The requirement was a stable mold and molding process that could deliver consistent parts during mass production.

For a T1 automotive supplier, unstable dimensions can lead to:

- Additional assembly adjustments.
- Higher rejection rates.
- Delayed production approval.

- Increased launch costs.

The key question was:

Can the mold supplier solve the warpage problem and deliver a production-ready solution?

Root Cause Analysis: Understanding Why the Part Warped

Gege Mould performed a detailed review of the mold design, part structure, and molding conditions to identify the reasons behind the deformation.

The analysis identified several main causes:

1. Uneven Cooling Across the Part

The dashboard carrier contained large surface areas and complex structural features. Different regions cooled at different speeds, creating uneven shrinkage after molding.

This cooling imbalance generated stress inside the molded part and caused distortion after ejection.

2. Wall Thickness Variation

Certain areas of the component had thicker sections to meet strength requirements.

These thicker regions cooled more slowly than thinner areas, creating different shrinkage behavior and increasing the risk of warpage.

3. Gate Location and Filling Balance

The original gate position affected material flow during injection.

Uneven filling and packing pressure distribution increased internal stress, which contributed to dimensional instability.

4. Rib Structure Influence

The part required reinforcement ribs for structural strength. However, some rib areas created local thickness concentration, affecting cooling balance and shrinkage behavior.

Mold and Process Improvements

Based on the root cause analysis, Gege Mould implemented a series of improvements to improve dimensional stability.

Mold Cooling System Optimization

The cooling layout was redesigned around critical deformation areas.

The improvements helped:

- Balance cooling temperature across the part.
- Reduce uneven shrinkage.
- Improve flatness of important assembly surfaces.

Gate Position and Filling Optimization

The filling strategy was adjusted to achieve better material flow balance.

This reduced:

- Uneven packing pressure.
- Internal stress.
- Local deformation after molding.

Structural Design Review

The rib design and thickness transitions were evaluated to reduce warpage risk while maintaining required mechanical strength.

Process Window Optimization

Injection molding parameters were optimized through repeated trials, including:

- Injection speed.
- Holding pressure.
- Cooling time.
- Mold temperature control.

The goal was to establish a stable molding process that could be repeated consistently during production.

Dimensional Validation

After improvements, Gege Mould performed dimensional checks on trial parts and verified assembly performance.

The validation focused on:

- Critical mounting dimensions.
- Surface flatness.
- Part consistency.
- Assembly fit.

Final Results: Stable Dimensions and Production Readiness

After mold optimization and process adjustment, the dashboard carrier achieved improved dimensional stability.

The final trial results included:

- **Approximately 50% reduction in warpage compared with the initial trial condition.**
- **Improved flatness on critical mounting surfaces.**
- **Stable assembly fit with surrounding interior components.**
- **Reduced part-to-part dimensional variation.**
- **Consistent trial performance supporting production approval.**

The customer was able to move forward with greater confidence toward production launch, with reduced risk of assembly problems and quality issues.

Why This Matters for Automotive Buyers

For T1 suppliers and automotive engineering teams, large interior structural parts require more than good mold manufacturing.

They require a supplier who understands:

- Material shrinkage behavior.
- Cooling balance.
- Mold design impact on dimensions.
- Injection process stability.
- Production validation requirements.

This project demonstrates Gege Mould’s ability to solve complex warpage problems through engineering analysis, mold optimization, and process control.

From initial trial problems to production-ready performance, Gege Mould provides practical solutions for achieving stable automotive injection molding results.

Gege Mould Capability Highlight

Challenge: Large structural interior part deformation after molding.
Solution: Cooling redesign, filling optimization, structural review, and process adjustment.
Result: Improved dimensional stability, better assembly fit, and a more reliable production launch.

Gege Mould helps automotive customers reduce mold trial risks and achieve stable production performance for complex interior components.