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GROUPE PLASTIVALOIRE — AUBURN HILLS, MICH.

Warpage Waylaid Via Simulation

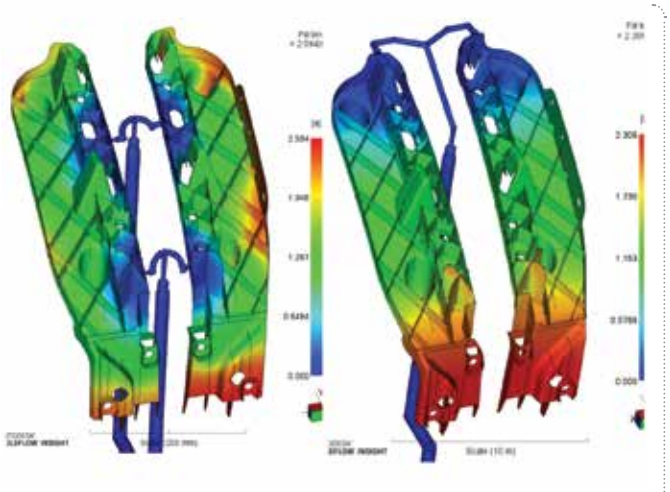
The mold was intended to produce a front-end automobile bracket. But the tool's real output was problems, until flow and warpage simulation provided solutions.

By Tony Deligio
Executive Editor

"That job was a headache from day one because we did not do a Moldflow analysis on it ourselves," explains Bill Hamilton. "Instead, we had the manifold supplier do it."

Tooling manager for Groupe Plastivaloire's North American operations, Hamilton works out of the Auburn Hills, Mich., office but he oversees operations at its nearby New Baltimore, Mich., facility which has 39 injection molding machines, as well as the Danville, Ky., plant, with 21 presses.

Groupe Plastivaloire specializes in large, complex molds, primarily for automotive parts, and molding components as large as bumpers and as small as air-duct actuators. Because of the high volume of molds built annually, Hamilton and his team now rely on simulation consulting expert CAE Services to provide upfront Autodesk Moldflow Insight analysis and consultation for projects. Groupe Plastivaloire undertook Moldflow analyses on more than 100 molds last year, but that wasn't always the case.



At left, the original design with two gates that ultimately led to unacceptable warp; at right, the revamped design with a single gate that met spec. (Photo: CAE Services)

Hamilton explains that before an acquisition brought three of the four plants under Groupe Plastivaloire in 2020, he worked for the former TransNav as a toolroom manager. TransNav had one seat of Moldflow software at the time, but Hamilton never fully trusted it, and the company eventually stopped using it in-house. Instead, it relied on its hot-runner suppliers to perform Moldflow analyses that Hamilton says were mostly effective but failed at times to address cooling or warpage issues.

When Hamilton was promoted to his current position at what was still TransNav, he was suddenly overseeing production of many more tools, and he reconsidered his Moldflow opinion. In retrospect, Hamilton said his previous mistrust of simulation results derived from the fact that his former company at times performed incomplete analyses that didn't apply all the software's capabilities.

At the urging of his new boss, Groupe Plastivaloire director of engineering Tim Nixon, CAE Services was called in to provide not only Moldflow analysis but also consulting for molds being designed and built. Nixon had longstanding experience with Mark Solberg and CAE Services. "As we started working with Mark and his team," Hamilton says, "we saw excellent results because they were doing a much deeper dive into the projects than I had seen done before."

Solberg explains that flow analyses conducted at manufacturing facilities and not by a simulation expert like CAE often look only at the fill pattern based on gate locations and ignore potential packing, cooling and warpage issues. To adequately address these, CAE builds a full runner/manifold system analysis.

Back to the headache-inducing tool. Based on the manifold supplier's Moldflow results, Plastivaloire built a mold with two gates for the automotive bracket. "When the mold was sampled, the parts were warped, so we tried to fix it," Hamilton recalls. "So much work was put into this project and we still had about 4 to 6 mm of warpage."

Enter CAE and a complete Moldflow analysis, which noted that since the part was being molded from glass-filled PP, the material would exhibit greater flow by entering the mold cavity lengthwise so the glass strands could align. CAE suggested changing to a single gate on one end of the part versus gates on both ends.

The molded parts prior to CAE Moldflow Analysis were exhibiting nearly 6.0 mm of overall warpage. After CAE's recommended gate-location and part-design changes were made, the simulation forecast deflection of 1.3 mm. Sampled parts exhibited just 1.1 mm of warpage, staying within spec. PT