

**Keywords - Family Mold, Runner Design, Moldflow**

## Problem

An injection molder needed to determine how to design the runner system to achieve a balanced fill pattern of a family mold for three different polycarbonate parts.

## Evaluation

The molder was in the initial design stages of a three-cavity family mold. The mold was to produce three unique parts that would be assembled together after molding. Using the family mold reduces the manufacturing cost for the parts and ensures color uniformity. The design of the runner system is critical for manufacturing quality parts in this type of mold. A well designed runner allows all mold cavities to fill and pack uniformly, and increases the size of the processing window.

An initial runner layout pattern was developed by the molder that provided the initial cavity spacing and a rough runner layout. An initial injection molding simulation revealed the proposed runner system did not fill the cavities uniformly, which resulted in a pressure spike during injection. This pressure spike led to non-uniform pressure distribution in the cavities and reduced the size of the processing window. Additionally, the runners were undersized, which required excessive pressure to fill the mold.

After the initial simulation, The Madison Group altered the size of the runner, and reposition the cavities relative to the injection location. This manipulation produced a runner system that filled the cavities uniformly. The final design allowed for a lower pressure requirement and tonnage requirement to manufacture the parts.

## Conclusion

It was the conclusion of the evaluation that the original runner design would not produce a balanced fill pattern and would likely result in a narrow processing window. A series of simulations were performed that resized the runners and repositioned the cavities to provide a uniform filling pattern of the cavities. This runner balancing allowed for a wider processing window to be achieved.

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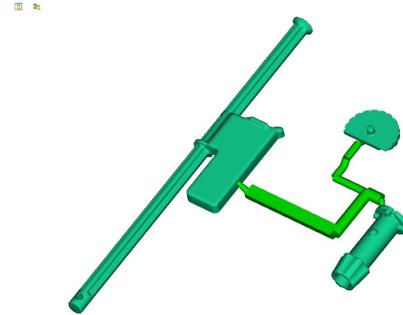


Figure 1: Original runner system design.

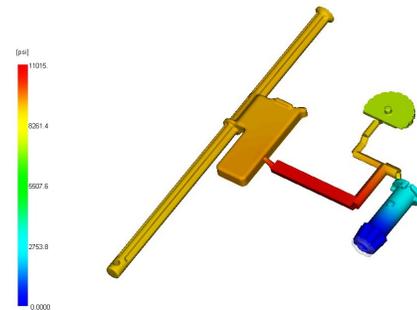


Figure 2: Original runner design led to excessive injection pressures and a non-uniform fill of the cavities.

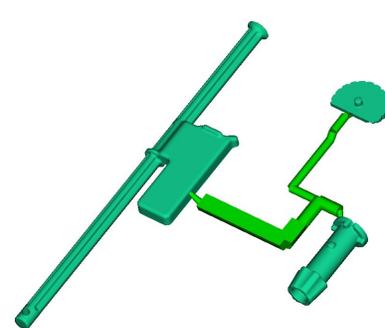


Figure 3: Modified runner system design as determined through simulations.

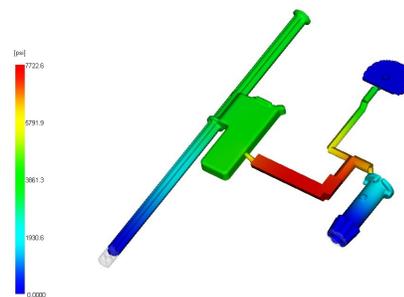


Figure 4: Redesigned runner system produced a more balanced fill pattern and reduced the required injection pressure to fill the mold.