

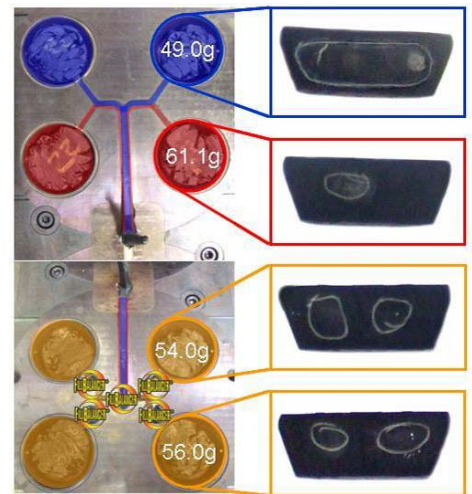
## Fill Balancer® Case Study

**Case Study:** FillBalancer® slashes cure time of NBR, EPDM, and Silicone.



Competitive manufacturing and product costs are critical to the success of the thermoset injection molding industry. However, manufacturing efficiency is often hindered by long cure times for thermosets, commonly extending cycle times to 3-5 minutes. REP International recognized that shear induced imbalances have a similar effect for thermoplastic materials, and worked with Beaumont Technologies Inc. (BTI) to study their effect on thermosets. BTI provided FillBalancer® designs based on the patented MeltFlipper® technologies, in order to provide optimal distribution of the compound's rheological properties.

An 8-cavity test mold was designed with a rack and pin insert, capable of molding either the top four cavities or the bottom four. The top half of the mold was designed with a conventional, geometrically balanced runner, while the bottom was designed with FillBalancer® and FillBalancer® MAX inserts. This unique combination allowed REP and BTI to consistently study runners with and without FillBalancer® technologies, and to compare the effect of shear induced imbalances on filling and curing variations.



As seen in the figure on the right, the short shots indicated a 20.4% shear imbalance for the conventional runner, while the cavities molded with FillBalancer® only showed a 3.4% shear imbalance. In addition, the conventional runner yielded significantly different stages of cure between the inside and outside cavities, while FillBalancer® provided nearly identical curing patterns. Lastly, the cure time was optimized and documented for both halves of the mold. The table below outlines the dramatic impact of FillBalancer® on cure time.

FillBalancer® technologies provided a uniform distribution of high shear, hotter, compound to each cavity. This along showed reductions in cure time, but the designs took it a step further utilizing FillBalancer® MAX, and strategically locating the high shear, hotter compound to the most advantageous location. In this case, the optimal location was in the cross-sectional center of the part. Essentially, the higher shear material provides an internal source of heat, thereby reducing the time required to heat and cure the parts.

	Cure Time		
	NBR	EPDM	Silicone
Optimized Without FillBalancer®	270s	420s	580s
Optimized With FillBalancer®	190s	320s	510s
Percent Improvement	30%	24%	12%

