

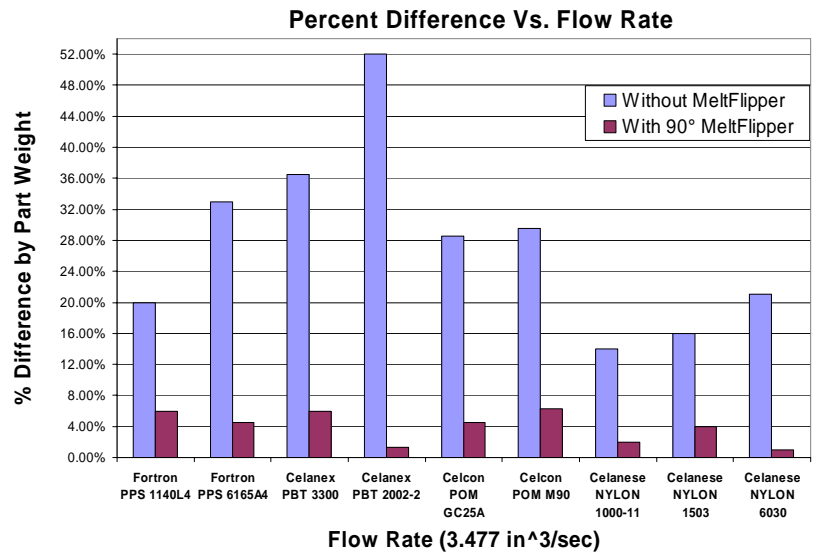
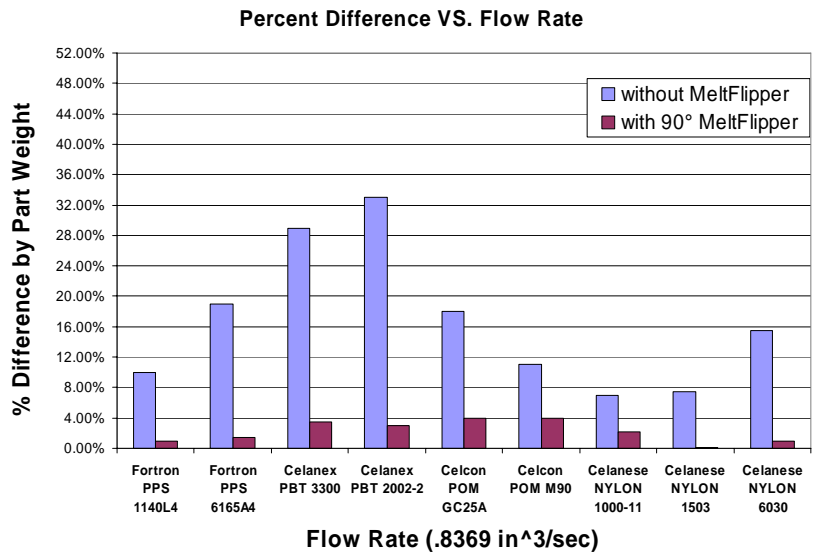
## MeltFlipper® Case Study

Customer: **Ticona**

Case Study: How MeltFlipper® technology widens your process window

Ticona, a business of Celanese AG and a world leading supplier of engineering resins, approached Beaumont Technologies, Inc. to conduct imbalance studies on a few of its materials. Ticona wanted to see the effect of shear on their materials and how it influences the mold imbalance; and how MeltFlipper® technologies apply to their materials to address the imbalances. Ticona and BTI agreed to study four different materials (Fortron PPS, Celanex PBT, Celcon Acetal, and Celanese Nylon), and multiple grades of each - some of which contained fillers. For each material analyzed, four different injection rates were chosen, along with varying the runner system to exclude and include MeltFlipper technology. The purpose was to see how process changes affected the imbalance due to variations in injection rate and how the various materials behaved themselves inside the same mold.

Figure 1 shows the slowest and fastest injection rate for a side-by-side comparison of the imbalance results with and without the MeltFlipper technology. It was shown that the imbalance is quite sensitive to process and material variations without the use of the MeltFlipper technology. By increasing the injection rate, the imbalance nearly doubled in every case. The PBT material showed the worst imbalance percentage at 52% for the fastest injection rate. However, by looking at the graphs, it has also been shown that the imbalance



**Figure 1: (Blue = without MeltFlipper; Purple = with MeltFlipper)**  
**Top** - Imbalance results for each material and grade with and without MeltFlipper technology at the slowest fill rate.

**Bottom** - Imbalance results for each material and grade with and without MeltFlipper technology at the fastest fill rate.

results are much less sensitive to both material and process variations by incorporating the MeltFlipper technology into the runner system. To illustrate the results more clearly, Figure 2 is a summary plot of one grade of each material at each flow rate showing the effects of the MeltFlipper technology on the imbalance. Again, please note the variations seen by changes in material and process conditions without the use of the MeltFlipper technology. This graph easily demonstrates that using the MeltFlipper runner system results in a much wider process window versus the traditional geometrically balanced runner - giving more flexibility to the molder and allowing them to produce a higher quality and consistent product from each cavity.

For example – when molding PBT in this mold at 1.67 in<sup>3</sup>/sec it can be seen that the imbalance is approximately 37%. If the molder is experiencing short shots in the outside cavities, the typical response is to increase injection rate to help fill out the parts. Now the process is running at 2.5 in<sup>3</sup>/sec with a 43% imbalance. The result could be flash on the inside cavities while filling the outer cavities. The molder will need to back off injection rate to ensure the outer cavities do not short while the inner cavities do not flash – hence the small process window created solely by shear-induced imbalances. But when MeltFlipper is utilized, the imbalance percentage is only 2-3% between BOTH injection rates – which creates a much wider processing window for the molder.

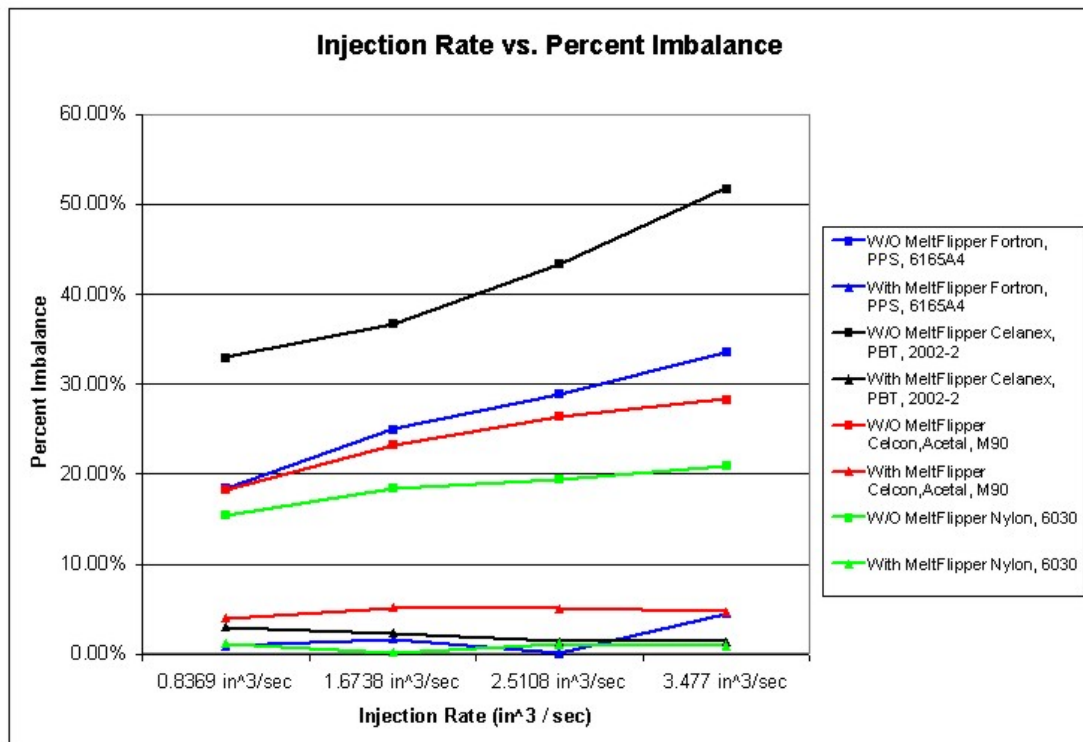


Figure 2: Summary plot of the imbalance results for one grade of each material with and without MeltFlipper technology at various injection rates.