

How to Avoid the Top 8 Micro Design Mistakes

Recommendations for creating successful designs from the start

Design for Manufacturability

Nothing is more frustrating for micro part designers than to spend countless hours on a new drawing, only to get to the manufacturing phase and find out they need to make significant revisions or compromises.

Here are some recommendations from MTD's tooling department to help improve the manufacturability of your next micro design—and minimize project cost and lead time.

See the drawing on page 2 for examples of each design mistake.

1

STAY SYMMETRICAL

AVOID: lopsided tolerances

Adjust the part model to be at the midpoint of the tolerance range. For example, **0.150" \pm .002"/.000"** would become **0.151" \pm .001"**. Tooling engineers require room on each side of nominal to successfully build the tool. We see why lopsided tolerances exist in micro medical designs—especially when multiple components are designed to fit together—but avoiding them will greatly increase manufacturing success. It can be a tall order for designers to accommodate when the design is already in progress, so plan for symmetrical tolerances when you start your design.

2

MAKE IT POSSIBLE

AVOID: nearly-impossible tolerances for a critical dimension

While manufacturing feature dimensions with extremely tight tolerances is achievable, sustaining their capability in long-term production is extremely challenging, depending on the part geometry. Passing a gauge R&R on a dimension with an extremely tight tolerance is nearly impossible unless there is a high level of dimensional certainty. It also can be beyond the capabilities of most tooling and measuring equipment.

3

BE FLEXIBLE

AVOID: assigning poor gate locations

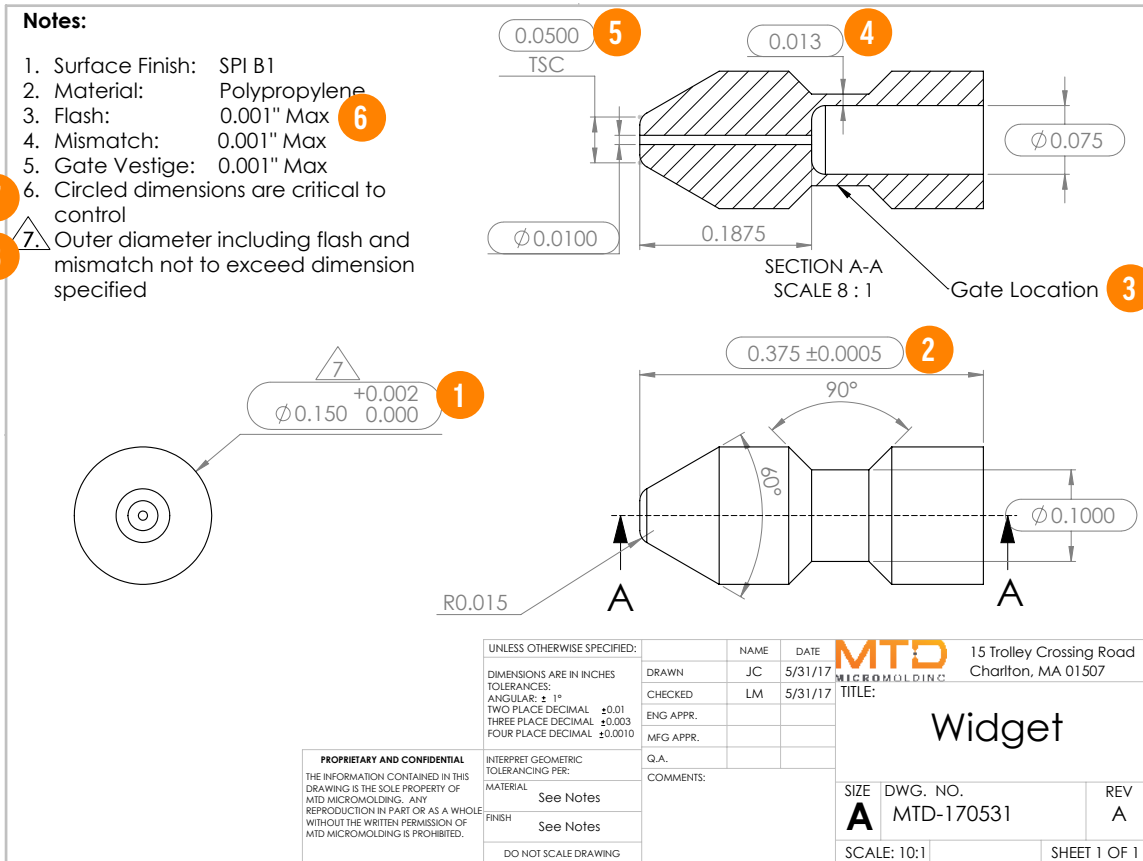
When possible, allow your molder to advise on gate location decisions, assessing the best entry point(s) for the plastic based on the tool design. A non-ideal gate location can result in dimensional instability; cause issues with filling, packing, knit lines, and sink; and highly influence the amount of gate vestige. For example, gating into a thin area of the part can result in gate freeze, creating problems with packing out the part.

4

KEEP IT TOGETHER

AVOID: critical dimensions requiring cross-sectioning

Assigning a critical dimension to a cross-section view in a drawing is always discouraged. When you segment parts this small, there is a high level of uncertainty and variation in the measurements, resulting in an unreliable (and often unsuccessful) capability analysis. Typically CT scanning offers a better solution for obtaining these measurements for non-critical dimensions.



5 KEEP IT REAL

AVOID: critical dimensions including theoretical points

Any drawing callout for a measurement to a theoretical point with a tight tolerance should be avoided. If it cannot be avoided, avoid making the dimension critical. Otherwise, you will likely face capability challenges down the line which could cause significant delays to your timeline.

6 FLASH HAPPENS

AVOID: unrealistic flash specifications

It is important to remember that flash always exists where two pieces of steel come together in injection molding and this needs to be accounted for in your part drawing. In your mold design review, your molder should identify potential flash areas. They can highlight areas that could be prone to flashing and help you create realistic tolerances for flash—or even design the tool to influence the direction of flash to not jeopardize your part's designed function.

7 CRITICAL MEANS CRITICAL

AVOID: more than 4 critical dimensions

We understand that every dimension on a micro medical design is important, but we recommend only designating up to four critical dimensions, if possible. During the design review, we encourage customers to identify the most critical dimensions to function as critical and rethink the less critical ones, which drives cost efficiency and optimizes lead time.

8 KEEP 'EM SEPARATED

AVOID: including mismatch and flash measurements with drawing dimensions

Keep flash and mismatch separate from your dimension. For example, a dimension tolerance of ± 0.003 " can be interpreted to mean the tolerance range includes flash and mismatch measurements. If mismatch, flash, and gate vestige are accounted for in a dimension tolerance, this infringes on the manufacturing tolerances and can result in a very low chance of success.