

# Designing For Permanent Mold

*An Engineer's Guide*



There are 3 main things to keep in mind when designing for permanent mold:

- 1. Wall Thickness**
- 2. Radius**
- 3. Draft**

In this engineering guide, we will walkthrough what those requirements are and other permanent mold design standards.

*If you have any questions, our in-house engineering and sales teams are eager to help! Give us a call at (812) 537-2275 or email us at [sales@batesvilleproducts.com](mailto:sales@batesvilleproducts.com)*

# Wall Thickness

Walls that are too thin will impact the flow and solidification of metal. At BPI, we recommend designing your part with at least an **0.180 inch** wall thickness.

It is important to keep in mind that **isolated thick or thin sections** may result shrinkage or other defects. While we can add cooling and venting to help this issue, it is often better to design your part to minimize potential issues before they have the chance to occur.

# Fillets & Radii

Sharp corners designed into permanent mold castings often lead to stress, cracking, or tearing defects. Therefore, we recommend designing corners slightly rounded with a **0.030 inch** radius.



# Draft

Draft helps with the ejection of your part from the mold, extending mold life and resulting in cleaner castings.

The industry for permanent mold draft design standards are...

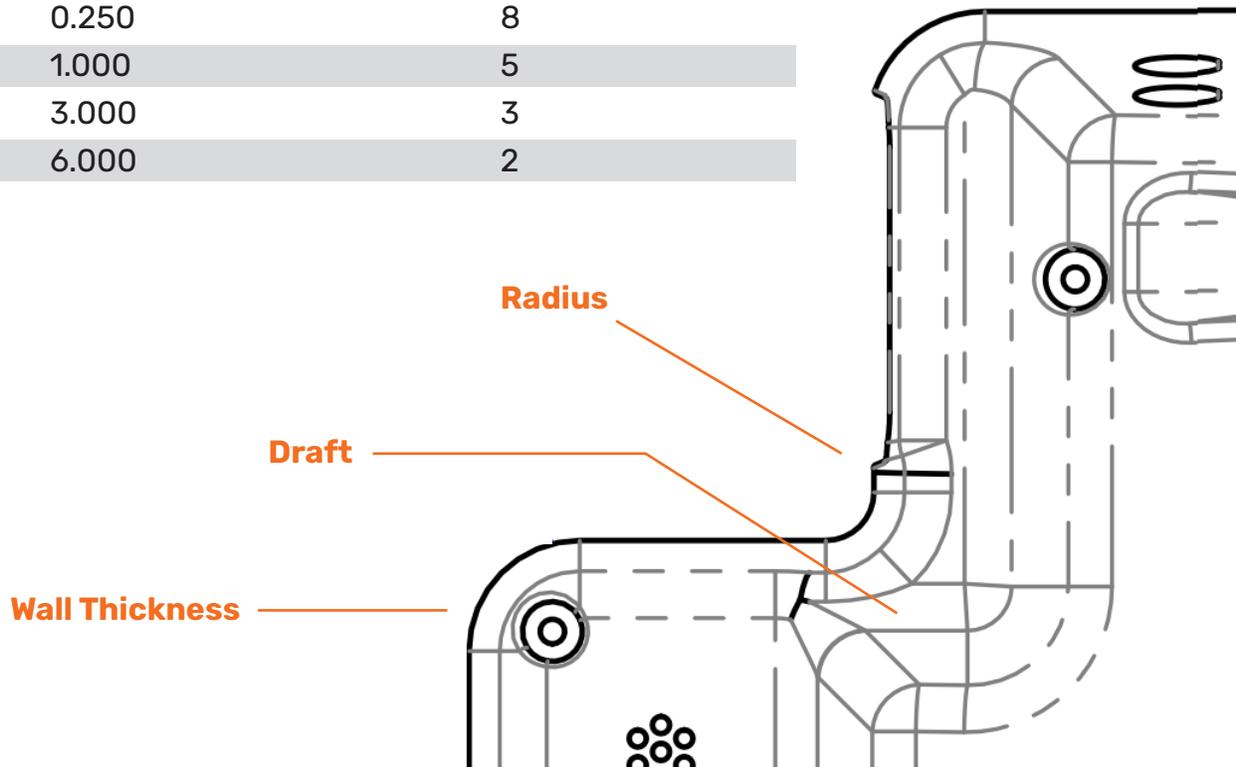
Depth (inches)	Draft Degrees (inside)	Draft Degrees (outside)
0.030-0.125	20	10
0.126-0.500	15	7
0.501-1.000	10	5
1.010-6.000	5	3
6.000-12.000	1.5	1.5

## Cored Hole Diameter vs Depth vs Draft

If your part requires a cored hole, you must also take into account its depth and draft.

The industry standards for cored hole depth and draft are...

Diameter (inches)	Maximum Depth (inches)	Draft Degrees
0.250	0.125	15
0.250-0.500	0.250	8
0.500-1.000	1.000	5
1.000-2.000	3.000	3
2.000-4.000	6.000	2



# More Design Standards

## Flatness

As for flatness, if your greatest dimension ranges from **0 to 6 inches**, your base tolerance is typically **+/-0.020**, with each additional inch being **+/-0.002**.

## Machine Stock Allowance

If your greatest dimension is from **0 to 12 inches**, the machine stock allowance should be **1/16**.

If your greatest dimension is from **12 to 18 inches**, the machine stock allowance should be **3/32**.

If your greatest dimension is from **18 to 24 inches**, the machine stock allowance should be **1/8**.

## Linear Tolerance

When basic linear tolerance on one side of the parting line ranges from **0 to 1 inch**, the base tolerance is **+/-0.015**, with each additional inch being **+/-0.002**.

Additional linear tolerance across the parting line is added as a function of the projected parting face surface area.

Range (inches squared)	Base Tolerance
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0-10	+/-0.010
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10-50	+/-0.015
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50-100	+/-0.020
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## Concentricity

Concentricity on the same plane ranging from **0 to 5 inches** has a typical base tolerance of **+/-0.025**, with each additional inch being **+/-0.003**.

On the contrary, concentricity across the parting line ranging from **0 to 10 inches** has a typical base tolerance of **+/-0.040**, with each additional inch being **+/-0.003**.