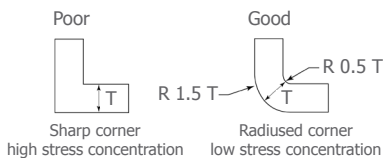
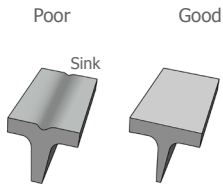
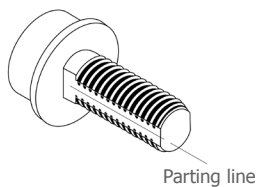
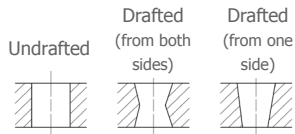
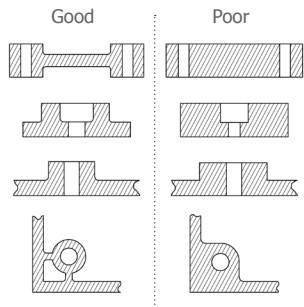
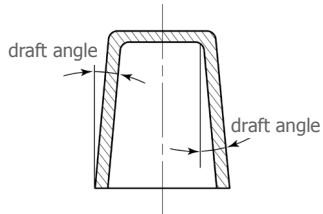
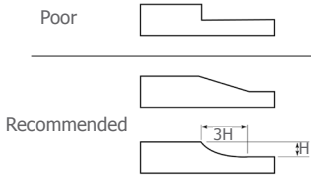


Basic MIM Design Guide

Components made with metal injection molding (MIM) are similar to those made by plastic injection molding in complexity and artifacts. Gate, ejector pin, and parting line artifacts are mostly unavoidable and need to be strategically located for both application and process. MIM is best suited for components that will fit on the palm of your hand and components that have thin wall sections. A flat feature to provide uniform support for sintering is one feature that is strongly recommended to avoid sintering fixturing costs.



Design Do's

- ▶ Maintain uniform wall thickness
- ▶ Core out thick areas
- ▶ Design with a flat surface, lettering, and threads
- ▶ Consider location of gates, ejector pins, and parting lines

Design Don'ts

- ▶ Don't design walls thinner than 0.1 mm (0.0039 in)
- ▶ Don't design holes smaller than 0.1 mm (0.0039 in) in diameter
- ▶ Don't design components over 12.5 mm (0.5 in) thick and over 100 grams in mass
- ▶ Don't design sharp corners

Typical Attributes Produced by the MIM Process

Attribute	Minimum	Typical	Maximum
Component Mass (g)	0.030	10-15	300
Max Dimension (mm)	2 (0.08 in)	25 (1 in)	150 (6 in)
Min Wall Thickness (mm)	0.025 (0.001 in)*	5 (0.2 in)	15 (0.6 in)
Tolerance (%)	0.2%	0.5%	1%
Density	93%	98%	100%
Production Quantity	1000	100,000	100,000,000

*Features this small could have distortion.

MIM Structural Material Properties

Material	Density (g/cc)	YS (MPa)	UTS (MPa)	Elongation (%)	Unnotched Charpy Impact Energy (J)	Macro Hardness	Young's modulus (GPa)
316L SS	7.8	180	520	40	190	67 HRB	185
17-4PH SS	7.6	740	900	6	140	27 HRC	190
17-4PH SS H900	7.6	1100	1200	4	140	33 HRC	190
420 SS	7.5	1200	1370		40	44 HRC	190
440C SS	7.6	1600	1250	1		55 HRC	190
310 SS	7.5						185
Fe	7.6			20			190
2200 (2 Ni)	7.6	125	280	35	135	45 HRB	190
2700 (7.5 Ni)	7.6	250	400	12	175	69 HRB	190
4605	7.55	210	440	15	70	62 HRB	200
4605 HT	7.55	1480	1650	1	55	48 HRC	210
4140 HT	7.5	1200	1600	5	75	46 HRC	200

Further Information: Handbook of metal injection molding, ed. D. Heaney, ISBN: 978 0 85709 066 9.