

POWDER METALLURGY PROCESS MATRIX

	ATTRIBUTE	PRESS & SINTER	CONVENTIONAL MIM	3DM™ MIM	ADDITIVE BINDER JETTING (MBJ)
PART-RELATED	VOLUME (EAU)	30,000–Millions	20,000–Millions	20,000–Millions	1–100,000
	PART SIZE	≤ 2268g (± 5-lbs or less)	0.5–50g (± 2-oz or less)	10–450g (± 1-lb)	≤ 11,340g (± 25 lbs)
	SHAPE & FORMABILITY	Uni-axial Compaction	Multi-axial Material Deposit (Compare with ≥ 3 CNC Setups)	Multi-axial +Threads/Knurls (Part or Component Consolidation; Compare with ≥ 3 CNC Setups)	No Constraints (≥ 4 CNC Setups and/or non-toolable features)
	SURFACE FINISH	1.6 μm punch surfaces 0.8 μm die wall surfaces * In line with MPlF Standard 58	50–80 μin	100–140 μin	150 μin
MFG-RELATED	TOLERANCE	± 0.1–0.15%	± 0.3%	± 0.5%	± 1.0%
	DRAFT	Not Required Can be included to assist with off-tooling; will not appear on part	Required Only for Features w/ High Aspect Ratio(s)		
	COMMON MATERIALS Custom Alloys Available	Ferritic SS Austenitic SS Duplex SS Martensitic SS Soft Mag. Alloy	300-SS Series 400-SS Series Tool Steels - M2, 4140 Soft Mag. Alloy Non-Ferrous Alloys	300-SS Series 400-SS Series Tool Steels - M2, 4140 Soft Mag. Alloy Non-Ferrous Alloys	<ul style="list-style-type: none"> • 17-4 PH SS • 316L SS • M2 Steel • 4140 Steel
	PROPERTIES	PM MPlF Standard 35	MIM MPlF Standard 35		
COST-RELATED	TOOLING (Equipment required to prepare the part: Dies, molds, punches, etc.)	\$3,000–\$60,000	\$30,000–\$80,000	\$30,000–\$80,000	\$0 / NA
	SECONDARY OPERATIONS	Post-sintered powder metal parts behave similar to bar stock and can—if required—be: Machined, Turned, Coined, Milled, Drilled, Ground, Heat-treated, Plated, Coated.			
	AVG. LEAD TIME (Off-Tool Samples)	± 12-14 Weeks	± 18 Weeks	± 18 Weeks	2–4 Weeks

The information provided in this document is based on current industry standards and averages, and should not be used as a formal cost estimate. Information is subject to change without notice.