

Eagle Precision Cast Parts, Inc.

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Investment Casting Process

Benefits

- Dimensional stability of castings
 - ± 0.005 " per inch
- Capable of casting walls down to 0.030".
- Near Net Shape / Net Shape Capable
 - Little to no machining required depending on part configuration and application.
- No draft required on vertical walls.
- Surface finish
 - Ranges between 60 – 200 RMS.
- Complex internal cavities can be produced.

Investment Casting Process

Casting Design – First Steps

- Utilize our experienced staff to help you with the “castability” of your design.
- Provide detailed drawings.
- Provide solid model files (SLDPRT, STP, or X_T preferred)
- Evaluate material options.
 - Steel - Stainless, Low-alloy, Carbon
 - Aluminum
 - Bronze – Aluminum, Silicon, Manganese
 - Tool steels/Martensitic Stainless
 - Other high-alloys

Investment Casting Process

Casting Design

o Radii

- o Large fillets and corner radii preferred.
- o Improved appearance.
- o Reduces stress.
- o Best to design with largest radii possible.

o Wall thickness

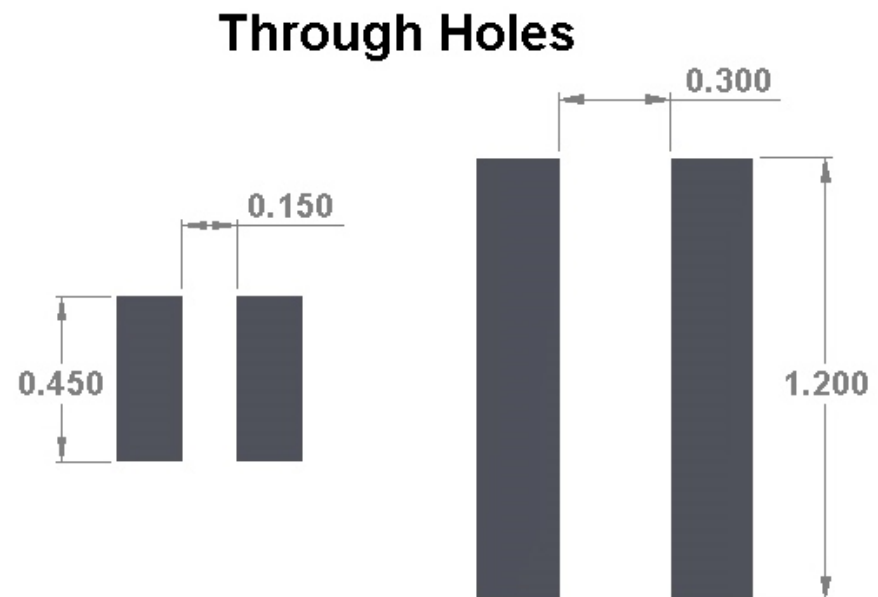
- o Dependent on part configuration.
- o Small castings down to 0.060" walls.
- o Medium & large castings require 0.080" – 0.100" walls.

Investment Casting Process

Casting Design - continued

o Through-holes

HOLE SIZE	MAXIMUM LENGTH
0.040" - 0.080"	2 times the hole diameter
0.081" - 0.200"	3 times the hole diameter
0.201" - 0.400"	4 times the hole diameter
> 0.401"	6 times the hole diameter

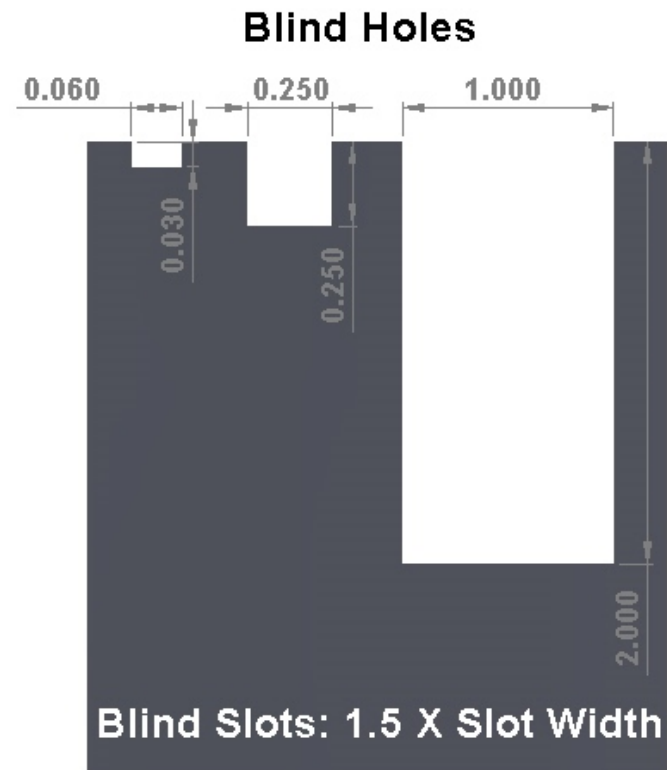


Investment Casting Process

Casting Design - continued

∅ Blind-holes

HOLE SIZE	MAXIMUM DEPTH	MINIMUM BLENDING CORNER RADII
0.040" - 0.120"	0.5 times hole diameter	0.5 times hole diameter
0.121" - 0.400"	1 times hole diameter	0.060" - 0.090"
> 0.401"	2 times hole diameter	0.090" - 0.180"



Investment Casting Process

Casting Design - continued



- Flatness / Straightness
 - Flatness to 0.005" per inch of length.
 - Heavy sections up to an additional 0.010".
 - Straightening adds to cost depending on requirements.
- Lettering, Numbers, & Logos
 - Raised features (0.020") in recessed pads preferred (0.030").
 - Logos can be cast to nearly any design.

Investment Casting Process

Costs and Lead-times

o Costs

- o Typical die cost ranges from \$2000 to \$4000.
- o Casting costs driven by size and weight.
 - o As number of castings on a mold increases, cost decreases.

o Lead-times

- o Following completion of AQP, construction of new tooling in 3 - 4 weeks.
- o Sample castings completed 2 - 3 weeks following tooling completion.

Investment Casting Process

Fab-to-casting conversion success



- Fabrications
 - Multiple welds
 - Multiple machining operations
 - Dimensionally inconsistent
- Assembly
 - Customer assembled completed fabrications
 - Multiple vendors supplied hardware.
 - Finished assembly had little to no aesthetic value.

Investment Casting Process

Fab-to-casting conversion success



- o Designed casting
 - o Reduced weight
 - o Blended features to eliminate stress-risers
 - o Cast holes & slots to reduce machining.
 - o Greatly improved aesthetic value.
 - o Eliminated all welding

Investment Casting Process

Fab-to-casting conversion success

BEFORE



AFTER



○ Benefits of conversion

- Cost savings
- Reduced lead-time
- Dimensional consistency
- Entire assembly delivered to customer ready for use
- Single vendor reduces purchasing requirements.
- Single vendor accountability.