

## CASTING TECHNIQUE COMPARISONS

DESCRIPTION	METALS	SIZE RANGE	GENERAL TOLERANCES	TOOLING COST RANGE AVERAGE	COST <sup>1</sup>	DESIGN <sup>2</sup>	SURFACE FINISH	DRAFT REQUIREMENTS*	NORMAL MINIMUM SECTION THICKNESS**	ORDER QTY	NORMAL LEAD TIMES***
<b>DIE CASTING</b>											
Molten metal is injected, underpressure, into hardened steel dies.	Aluminum, Zinc, Magnesium and limited Brass	Not normally over 3' square. Some foundries capable of larger sizes.	Zn: +/- .002" first in; +/- .001" each add'l in. Al: +/- .003" first in; +/- .0015" each add'l in. Add +/- .002" to +/- .020" across parting line, depending on size.	\$15,000-\$500,000 \$60,000	1	2	32-90 RMS	1-3° Typical	Aluminum: .040" small parts; .050" Large parts. Zinc: .015" Small parts; .030" Large parts.	Usually 1,000 and up	Samples: 10-26 wks Production: 4-12 wks
<b>INVESTMENT CASTING</b>											
Metal mold makes wax replica. These are sprued, then "invested" in ceramic slurry, baked out, and metal poured in resultant cavity.	Most all castable metals.	Fraction of an ounce to 250 lbs, up to 48"	0"-1/4" +/- .003"; 1/4"-1/2" +/- .004"; 1/2"-3" +/- .005"/in. Add +/- .003"/in over 3"	\$1,500-\$200,000 \$7,500	5	5	63-125 RMS	None	Non-Ferrous: .030" Ferrous: .060"	All Quantities	Samples: 4-12 wks Production: 4-12 wks
<b>LOST FOAM</b>											
Expanded Polystyrene bead pattern is coated with ceramic, surrounded with tightly packed dry sand. Molten metal is poured directly onto pattern which evaporates. Metal replaces pattern.	Aluminum, Iron	900# gen'l max wt.	Less than 12" +/- .015"; Over 12" Add +/- .0015"/in	\$7,500-\$250,000 \$30,000	2-3	4	125-250 RMS	1-2° desired, 0° possible	.120" min	1,000 and up	Samples: 10-18 wks Production: 5-10 wks
<b>PERMANENT MOLD</b>											
Molten metal is gravity poured (typically) into cast iron or steel molds coated with ceramic mold wash. Cores can be metal or resin shell.	Aluminum, Zinc, Brass, Bronze, Copper and Cast Iron	Limitation mainly foundry capabilities. Small to large parts.	Aluminum: +/- .015" first in; Add +/- .002" each add'l in; Add +/- .010" to +/- .025" across partin line. Iron: +/- 1/32" in all directions.	\$8,000-\$150,000 \$40,000	2-3	3	Aluminum: 150-200 RMS Iron: 200-350 RMS Copperbase: 125-200 RMS	Non-ferrous: Outside: 2° min; Inside 2° min. Iron: Out: 2°; In: 5°.	Aluminum: .090" for small areas; 0.125" or more for large areas. Iron: 3/16" for small areas; 1/4" normal. Copperbase: .060" min.	100 and up	Samples: 8-20 wks Production: 2-8 wks
<b>PLASTER MOLD</b>											
Cope and Drag Method. Plaster slurry is poured onto pattern halves, allowed to set then mold is removed from pattern, baked, assembled, and metal is poured into resultant cavity.	Aluminum, Brass, Bronze, Zinc, Beryllium Copper	Normally up to 800 square inch area. Some foundries capable of larger.	One side of parting line +/- .005" up to 2"; Over 2" Add +/- .002"/in; Add .010" across parting line. Allow for parting line shift of .015".	\$1,500-\$20,000 \$7,500	5	4	63-125 RMS	External: 0-2° Internal: 1/2 to 2	.060"	1-500. Often used to prototype die castings.	Samples: 2-10 wks Production: 2-6 wks
<b>SAND CASTING</b>											
Mold halves made by packing tempered sand onto wood or metal pattern halves. Mold halves are removed from pattern assembled with or without cores, and metal is poured into resultant cavities.	Most all castable metals.	Limitation mainly foundry capabilities. All sizes.	+/- .030" up to 6". Add +/- .003"/in. over 6". Add +/- .020" to +/- .060" across parting line.	\$1,000-\$30,000 \$5,000	1-3	3	Non-Ferrous: 150-350 RMS Ferrous: 250-750 RMS	1-5°. Cores: 1°- 1-1/2°	Non-Ferrous: 1/8"-1/4" Ferrous: 1/4"-3/8"	All Quantities	Samples: 3-10 wks Production: 5-10 wks

<sup>1</sup> Part cost 1: Lowest 5: highest • <sup>2</sup> Design Freedom 1: Least 5: Most | \*Increase Draft with Depth | \*\*Size and surface area influence minimum thickness | \*\*\*This will vary widely depending on business conditions and foundry load. | © 2008

The above are generalities and should be used only as a rough guide. Your GLASER-MILLER Sales Agent can elaborate on the above information as it applies to your specific parts. Often, two or more processes could be evaluated for a given part.



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