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Metal Casting versus Forging Comparison Chart

Introduction:

There are many things to explore when choosing among a forging or casting process for your metal product(s). The chart below is intended to be used as a general guideline and should not be considered as 100% accurate information that cannot be deviated beyond what is listed in the table. All data is relative and may change based on your specific needs. For example, the "cost per piece" may be higher during a high volume production run due to the increased labor requirement. However, the "cost per piece" may actually be lower during a small volume production run after taking into account the cost of the tooling itself.

		Size Range	Surface Texture	Tooling Cost	Tolerances / Reproducibility (refer to DCTG table)	Cost per Piece	Potential for Internal Defects	Suited for High Volume Production	Processes ability to handle complex designs	Wide Range of Alloy Materials Used
Metal Forging Processes	Open Die	1 LB - 1000 LBS	Smooth	HIGHER	Approx. ±0.17"	MEDIUM	LOW	GOOD	GOOD	BEST
	Closed Die	< 200 LBS	Smooth	HIGHER	Approx. ±0.065"	MEDIUM	LOW	BEST	GOOD	BEST
Metal Casting Processes	Green Sand Mold	1 LB - 2000 LBS	Rough	LOWER	DCTG 11 - DCTG 14	HIGHER	MEDIUM	FAIR	BEST	BEST
	No-Bake Mold	1 LB - 10000 LBS	Smooth	MEDIUM	DCTG 3 to DCTG 8	MEDIUM	MEDIUM	GOOD	GOOD	BEST
	Resin Shell Mold	1 LB - 10000 LBS	Smooth	HIGHER	DCTG 8 - DCTG 12	MEDIUM	LOW	FAIR	GOOD	BEST
	Permanent Mold	1 LB - 100 LBS	Fine	MEDIUM	DCTG 3 to DCTG 8	MEDIUM	LOW	GOOD	GOOD	GOOD
	Die Cast	Approx. 75 LBS MAX	Fine	HIGHER	DCTG 3 to DCTG 8	LOWER	HIGH	BEST	FAIR	FAIR
	Investment Cast (lost wax)	Approx. 75 LBS MAX	Fine	MEDIUM	DCTG 3 to DCTG 8	HIGHER	MEDIUM	FAIR	BEST	BEST
	Expandable Pattern (lost foam)	1 LB - 1000 LBS	Smooth	LOWER	DCTG 8 - DCTG 12	MEDIUM	HIGH	GOOD	GOOD	GOOD
	Vacuum ("V") Process Mold	1 LB - 2000 LBS	Fine	MEDIUM	DCTG 8 - DCTG 12	HIGHER	LOW	FAIR	GOOD	GOOD
	Centrifugal Mold	1 LB - 100 LBS	Fine	MEDIUM	DCTG 8 - DCTG 12	MEDIUM	LOW	BEST	FAIR	GOOD

DCTG Tolerance Details:

		Linear Dimensional Tolerance for Dimensional Casting Tolerance Grade (DCTG) per ISO 8062-3: 2007(E)														
Nominal dimensions related to the moulded part		DCTG 1	DCTG 2	DCTG 3	DCTG 4	DCTG 5	DCTG 6	DCTG 7	DCTG 8	DCTG 9	DCTG 10	DCTG 11	DCTG 12	DCTG 13	DCTG 14	DCTG 15
-	≤ 10	0.09	0.13	0.18	0.26	0.36	0.52	0.74	1	1.5	2	2.8	4.2	-	-	-
> 10	≤ 16	0.1	0.14	0.2	0.28	0.38	0.54	0.78	1.1	1.6	2.2	3	4.4	-	-	-
> 16	≤ 25	0.11	0.15	0.22	0.3	0.42	0.58	0.82	1.2	1.7	2.4	3.2	4.6	6	8	10
> 25	≤ 40	0.12	0.17	0.24	0.32	0.46	0.64	0.9	1.3	1.8	2.6	3.6	5	7	9	11
> 40	≤ 63	0.13	0.18	0.26	0.36	0.5	0.7	1	1.4	2	2.8	4	5.6	8	10	12
> 63	≤ 100	0.14	0.2	0.28	0.4	0.56	0.78	1.1	1.6	2.2	3.2	4.4	6	9	11	14
> 100	≤ 160	0.15	0.22	0.3	0.44	0.62	0.88	1.2	1.8	2.5	3.6	5	7	10	12	16
> 160	≤ 250	-	0.24	0.34	0.5	0.7	1	1.4	2	2.8	4	5.6	8	11	14	18
> 250	≤ 400	-	-	0.4	0.56	0.78	1.1	1.6	2.2	3.2	4.4	6.2	9	12	16	20
> 400	≤ 630	-	-	-	0.64	0.9	1.2	1.8	2.6	3.6	5	7	10	14	18	22
> 630	≤ 1000	-	-	-	-	1	1.4	2	2.8	4	6	8	11	16	20	25
> 1000	≤ 1600	-	-	-	-	-	1.6	2.2	3.2	4.6	7	9	13	18	23	29
> 1600	≤ 2500	-	-	-	-	-	-	2.6	3.8	5.4	8	10	15	21	26	33
> 2500	≤ 4000	-	-	-	-	-	-	-	4.4	6.2	9	12	17	24	30	38
> 4000	≤ 6300	-	-	-	-	-	-	-	-	7	10	14	20	28	35	44
> 6300	≤ 10000	-	-	-	-	-	-	-	-	-	11	16	23	32	40	50

* Dimensions in millimeters

These tolerance grades DCTGs are referenced in the castings and forging comparison chart.