Additive Manufacturing / 3D Printing

Manufacturing tolerances

Unless otherwise specified, the following tolerances apply to our manufacturing processes:

Manufacturing process / 3D printing technologies	Manufacturing tolerance depending on nominal dimension range		
	≤ 100 mm	> 100 mm	| Min. Wandstärke
DLP – Digital Light Processing	± 0.2 mm	± 0.2 %	| 0,5 mm
DLP – Digital Light Processing (Rubber 65A BLK) (3)	± 0,5 mm	± 0,5 %	| 1,5 mm
FDM – Fused Deposition Modeling (3)	± 0.3 mm	± 0.3 %	| 1,0 mm
FDM large – Fused Deposition Modeling large (3)	± 0.5 mm	± 0.5 %	| 1,0 mm
LCM – Lithography-based Ceramic Manufacturing	± 0.15 mm	-	
MJF – Multi Jet Fusion (PA11, PA12, PA12 GF/GB)	± 0.3 mm	± 0.3 %	| 0,7 mm (GF: 1,0 mm)
MJF – Multi Jet Fusion (TPU Ultrasint)	± 0.7 mm	± 0.7 %	| 1,0 mm
Polygraphy / PolyJet (3)	± 0.1 mm	± 0.2 %	| 0,5 mm
SLA – Stereolithography (3)	± 0.2 mm	± 0.2 %	| 0,5mm
SLM –Selective Laser Melting (1)	± 0.3 mm	± 0.3 %	| 1,0 mm
SLM fine – Selective Laser Melting fine (2)	± 0.1 mm	-	| 0,8 mm
SLS – Selective Laser Sintering (4)	± 0.3 mm	± 0.3 %	| 0,7 mm

(1) The manufacturing tolerances in metal printing / SLM depend on the respective component geometries and are evaluated individually for every component in the quotation process. During the additive manufacturing of **aluminium components** in particular, tolerances of up to ± 0.2 mm can be reached.

(2) The manufacturing tolerances of the materials **stainless steel and bronze** are ± 0.1 mm with a maximum component size of 10-50 mm. For aluminum, manufacturing tolerances are ± 0.3 mm (>100 mm ± 0.3%); minimum wall thickness is 1.0 mm.

(3) The specified tolerances correspond to the production of a prototype - often much tighter tolerances are possible. We are happy to advise you in advance on this matter.

(4) Exception: Polypropylene (PP): ±0.5mm (>100mm: 1.2%)

Further information:

Since the manufacturing of components is realised mainly through additive technologies, the definition of length depends on the component's alignment in the build space. Of interest here always is the alignment in the XY plane (recumbent position).

Separately indicated tolerances cannot be checked by our staff – thus, the tolerances indicated for the respective technology apply. Upon request, we are happy to assess the feasibility of your desired tolerances (2D drawings/derivation necessary).

The manufacturing tolerances in **vacuum casting** mainly depend on the master model's manufacturing tolerance. To this deviation, another production-related tolerance is to be added in compliance with DIN 16742, tolerance group TG 6 NW.

Range in mm	< 10	10-15	15-22	22-30	30-40	40-53	53-70	70-90	90-120	121-160	161-200	> 200
PU resin	± 0.21 mm	± 0.23 mm	± 0.25 mm	± 0.27 mm	± 0.30 mm	± 0.34 mm	± 0.38 mm	± 0.44 mm	± 0.51 mm	± 0.60 mm	± 0.70 mm	± 0.5 %
PA cast / RIM	± 0.24 mm	± 0.27 mm	± 0.30 mm	± 0.34 mm	± 0.38 mm	± 0.43 mm	± 0.50 mm	± 0.60 mm	± 0.70 mm	± 0.85 mm	± 1.05 mm	± 0.7 %

In the segment **Injection moulding with rapid aluminium tools**. the tolerance is ± 0.08 mm + 0.002 mm/mm (depending on the material up to ± 0.08 mm + 0.005 mm/mm).

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Rapidobject GmbH · Managing director: Petra Wallasch · Weißenfelser Str. 84 · 04229 Leipzig
Phone: +49 (0) 341 23 18 37 30 · Telefax: +49 (0) 341 23 18 37 69 · info@rapidobject.com · www.rapidobject.com · facebook.com/rapidobject