

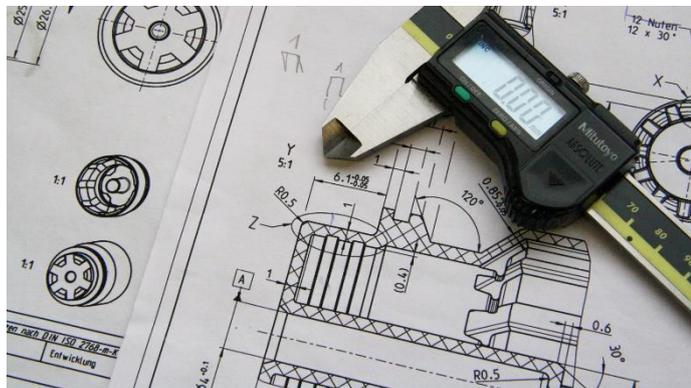
## 3D Printing Tolerances - Guidelines

Whatever is the manufacturing method you are following; it is important to remember the environment or the assembly your part is going to go in and/or function.

For 3d printing the tolerances might differ depending on the manufacturing method used. Hence, it is important to understand all the elements that may affect the final dimensions of the printed part.

Before we go through each 3d printing technology and its tolerance bands, lets discuss the main 3d printing characteristics.

- **Thickness layer:** Is the laid layer by the 3d printer in  $\mu\text{m}$  (micrometers)
- **Wall thickness:** the minimum wall thickness (in mm) that a 3d CAD object should have to be able to be printed



- **Part shrinkage:** is the % of shrinkage the actual 3d printed part will end to have due to heat of the process and/or walls being too thin
- **Clearance:** is the gap between two or more parts so they can move and/or function together without clashing
- **Tolerance:** Is the acceptance range of how much deviation from the nominal value a part can be acceptable. For example, a part can have 50mm width  $\pm 0.5\text{mm}$ , which means the width of the part is acceptable when printed from 49.05mm to 50.05mm.

<b>TABLE OF GUIDANCE TOLERANCES PER 3D PRINTING TECHNOLOGY</b>				
<b>Technology</b>	<b>Layer thickness range (µm)</b>	<b>Minimum acceptable clearance (mm)</b>	<b>Minimum acceptable wall thickness (mm)</b>	<b>Part Shrinkage (%)</b>
SLS	100 - 150	0.5	0.8	2 - 3
FDM	100 - 150	0.5	1.0	2 - 3
HP MJF	80	0.5	0.6	1 - 2
SLM	150	0.5	1.0	1 - 2
DMLS	30 - 40	N/A	0.8	1 - 2
Polyjet	28	0.4	1.0	1 - 2
<p>The above values are guidance and they cannot be used as standards. Tolerances heavily depended on the 3D printers and their set-up prior printing.</p>				