11 Gennaio 2019

MANUFAT

Corso Martiri, 160
Lecco - 23900 (LC)
Italy

rapid@manufat.com
+39 0341 322 638

Design guidelines for A.M.

Premesse

Una parte non progettata e ottimizzata per la corretta tecnologia di stampa 3D non sfrutterà mai a pieno l'enorme potenziale.
Una parte ottimizzata per la fresatura o stampaggio ad iniezione non sarà mai l'ideale per la stampa 3D e viceversa.

Spesso con piccole modifiche è possibile ottimizzare una parte e rendere la stampa 3D una soluzione competitiva o la migliore soluzione.

REGOLE GENERALI

Il principale costo di una parte è dato dal volume di materiale utilizzato e l'eventuale materiale di supporto. Ridurre il volume di materiale non necessario significa diminuire il peso e il costo senza necessariamente compromettere il buon funzionamento.

Questo è il principio del **DESIGN FOR ADDITIVE MANUFACTURING**, che poi si può evolvere in **TOPOLOGY OPTIMIZATION** grazie all'ausilio di potenti software.

Di seguito è una tabella che indica approssimativamente il costo al cm3 dei principali materiali utilizzati:

Tecnologia / Materiale	€ / cm3
MJF / PA12	0.5
FDM / PETG	0.25
SLA / STANDARD PRO	0.90

NOTA. Il valore corretto dipende da molti altri parametri tra cui risoluzione dello strato, finiture, colori, rapporto ingombro/volume parte, service type ecc.

Per informazioni sul servizio di ottimizzazione topologica, scrivere a rapid@manufat.com

Design guidelines for HP MJF

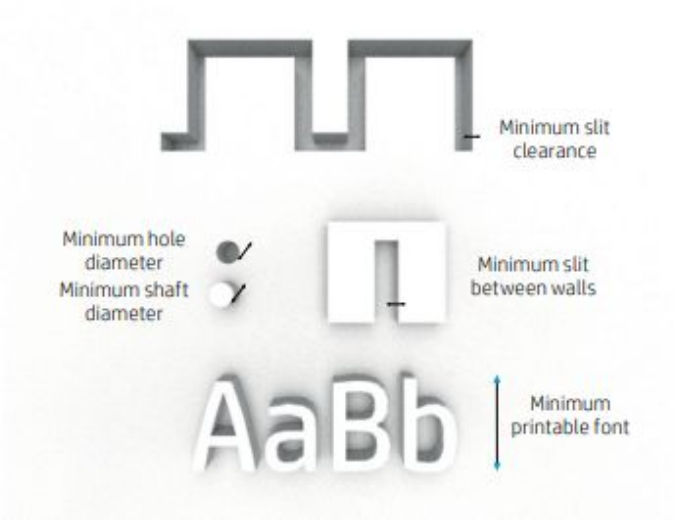
DIMENSIONAL ACCURACY

The dimensional accuracy that can be achieved by HP Multi Jet Fusion 3D is +/- 0.2 mm up to 100 mm and 0.2% above that value. Usually effective part tolerances are tighter but will not be guaranteed.

TECHNICAL SPECIFICATIONS

There are some specifications to bear in mind in order to avoid issues in parts and to achieve the best quality.

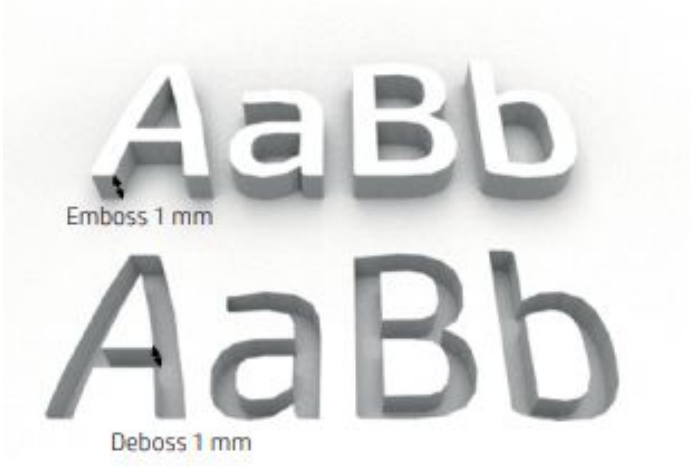
SPECIFICATION	VALUE
Layer thickness	0.08mm
Minimum wall thickness	1mm
Minimum wall thickness for living hinges	0.5mm
Minimum detail	0.25mm
Minimum hole diameter at 1 mm thickness	0.5mm
Minimum shaft diameter at 10 mm height	0.5mm
Minimum printable font size for embossed or debossed letters or numbers	6pt
Minimum clearance at 1 mm thickness	0.5mm
Minimum slit between walls	0.5mm



EMBOSSED AND ENGRAVED DETAILS

For embossed or engraved textures, we advise a minimum thickness of 0.25 mm. For legible engraved or embossed text, we recommend letters with a minimum line thickness of 0.5 mm, a depth of 1 mm, and an overall height of at least 2.5 mm.

NOTE. Multi Jet Fusion technology allows for printing letters, and a number of drawings with a very high resolution and definition.



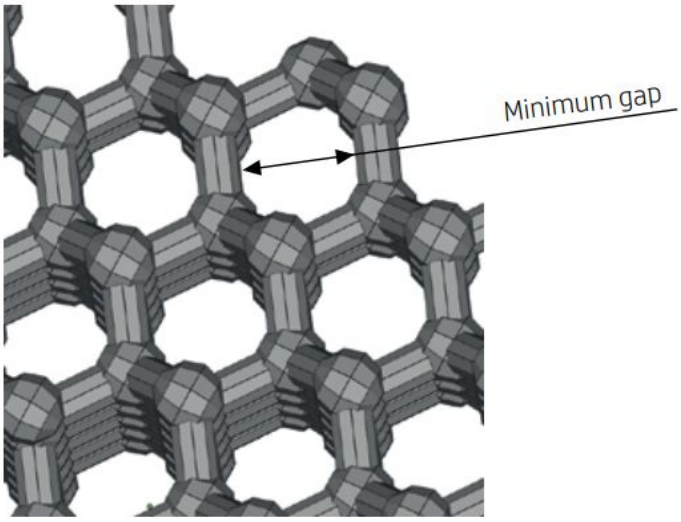
SOLID AND LATTICE INFILL

Lattice infill is recommended for all parts with a wall thickness of 10mm or more.

WARNING. Very thick walls (>15mm) will accumulate heat and cause spot shrinkage and deformation. For this reason parts with thick wall (>20mm) will be automatically made out of a closed lattice with a maximum of 20mm wall thickness. Non fused powder will remain internally to increase part strength.

LATTICE STRUCTURES

Lattice structures allow you to reduce weight and cost. Keep in mind that you must maintain a minimum gap of **1 mm** between the lattice beams so the unfused powder can be removed.



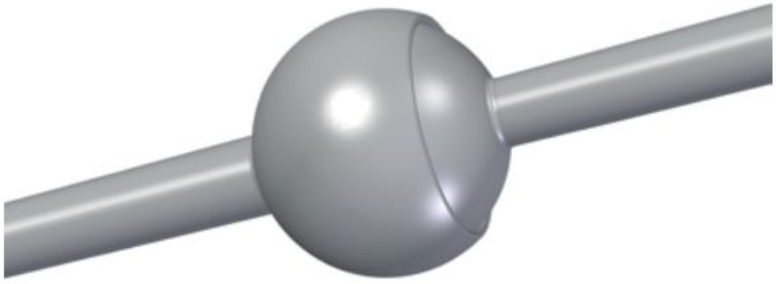
MINIMUM HOLE

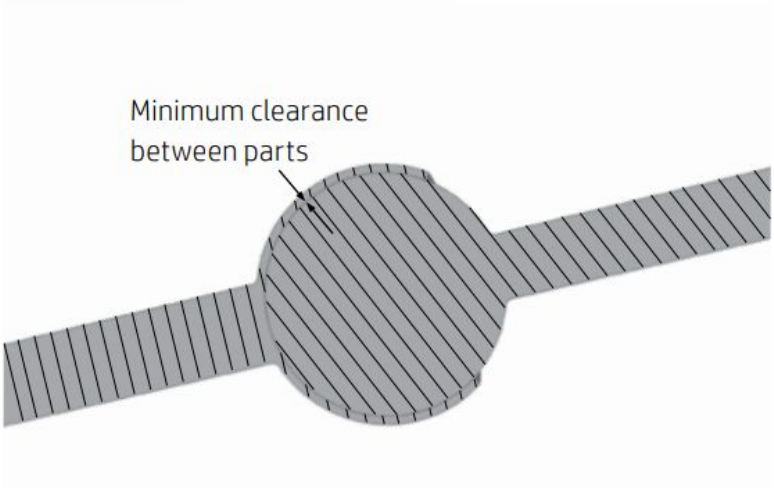
If the parts printed are hollow, drain holes need to be added to the design to remove the material. The minimum recommended diameter of the holes is 2 mm. You are recommended to include at least two holes. Complex geometries will require larger holes or unsintered powder will remain inside.

MINIMUM SPACING

Minimum gap between parts to be assembled after printing: 0.4mm
Sometimes a pair of printed parts need to fit together for the final application. In these cases, you are recommended to have gaps of at least 0.4 mm (±0.2 mm of tolerance of each part) between the interface areas that should fit together, in order to ensure correct assembly.

Minimum spacing and clearance between parts printed as assemblies.
Assembly parts that are printed together should have a minimum clearance of 0.7 mm. Parts with very thick walls above 50 mm should have a higher gap in order to ensure proper performance.





JOINING PARTS

Parts larger than the maximum build size can be printed with Multi Jet Fusion by splitting them into different parts. They can then be joined together by glueing, welding, or by pin inserts.

If you plan to glue parts together, you are recommended to include interlocking features such as those shown in the pictures below: as a guide to position the parts, to help them to bond together, and to facilitate the glueing process. Remember to leave an additional space of 0.1–0.2 mm between parts for the glue, in addition to the minimum spacing between parts printed as assemblies (see above).