3D Printing Guidelines and Requirements

Not all processes are equal, and each design is unique in its own way. Because of this, we have put together some guidelines to help produce the best quality parts for you.
Although these guidelines are based on average geometries, they will be a great starting point to follow when producing your designs for us to print. Always consider your particular application and geometry.
The IPFL team are always on hand to speak to if you would like some further guidance on your design.

Guidelines are generalised and are much geometry dependant.
Results and requirements can vary between technologies and materials.
Whilst we take every care to check your parts for below features, potential failing features sometimes make it past. Please check your data against the notes below and let us know if a further discussion is required.

Expected tolerances

HP MJF	± 0.2-0.3% (with lower limit ± 0.15mm)
Polyjet	± 0.1% (with lower limit ± 0.1mm)
FDM	± 0.15% (with lower limit ± 0.15mm)
SLA	± 0.1% (with lower limit ± 0.075mm)
Micro	± 0.05 – 0.01mm

Minimum wall thickness:
HP MJF = 0.8mm
FDM = 1mm
Polyjet = 0.6-1mm
SLA = 0.6mm
Please double check tapered edges and pointed features.
(HP MJF over 14mm thickness is required to be honeycombed to maintain surface quality)

Data file quality:
STEP/STP files are ideal.
If using STL, please ensure the resolution deviation is at least 0.37mm and the resolution angle is 2.3°

Engraved/embossed details:
HP MJF = 0.6mm
FDM = 0.8mm
Polyjet = 0.6mm
SLA = 0.3mm
Micro = 0.1mm

Data iterations/versions/updates:
Where possible, please notify us if the data is likely to be updated before an order is placed. Please amend files names (eg. V01, V02...) and request acknowledgement from the team.

Unsupported walls/pins/rods:
Thin and high aspect ratio features have a higher likeliness to break during clean-up. Please consider size and geometry for your chosen material and technology.

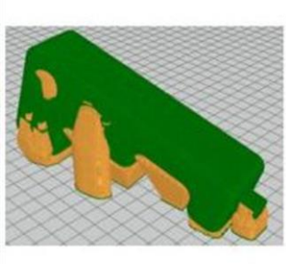
Polyjet glossy Top:
Polyjet parts can be printed with glossy upward facing surfaces. This can improve clarity. The geometry must be considered for this as a transitional witness can be seen from glossy to matte finishes at 90 degress.

Large, split parts and bonding:
If parts are too large for a single print, we may need to digitally split them and bond them together post-print. We will always let you know when this is required and discuss the level of bonding you require for your application.

SLA support removal:
SLA parts will have small pip marks from rigid support structures. The required level which these are smoothed down should be discussed at quote stage. Access is also required to break away and finish these support structures.
Please identify the level of finishing required.

Polyjet support removal:
Access is required for support material to be removed by jet wash post-print. If access is limited in cavities and hollow features, we will always try our best to notify you and remove as much as possible, but this cannot be guaranteed.

FDM support removal:
Whilst some materials have soluble support structures, this is not the case for all. Access is required to removal rigid supporting structures much like SLA. Parts will have witness marks from rigid support structures. The required level which these are smoothed down will be discussed at quote stage.
Please identify the level of finishing required.



HP MJF support removal:
No support structures are needed for HP MJF, however we do need access to blast away loose material powder. Avoid hollow features or cavities with limited access.

Polishing access:
Clear materials, or high-resolution surface finishes, that require polishing need to be assessed by our team for polishing access and viability. Access is required for both sanding and buff polishing.

Connecting, assembly, moving parts:
Minimum clearance of 0.4mm is required but it would be sinsible to allow for more whilst considering your geometry and application.

Warpage:
Parts with high aspect ratios (long & thin parts) are more likely to warp but every effort will be made to orientate parts to reduce this.
This is inherent to additive manufacturing across all technologies.

HP MJF capillarity effect:
Surfaces orientated upwards on the HP MJF technology are subject to a capillarity effect much like surface tension of a glass of water. To avoid this, add chamfers, radii, or specify your 'B' surface to us when being quoted.
Parts are always orientated to reduce this effect as much as possible.

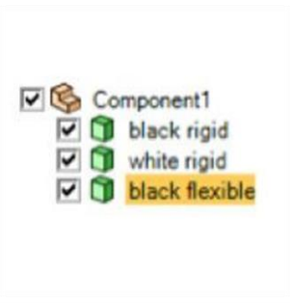
Additional finishing tolerance changes:
Consider accounting for your requried finishing processes ahead of production by adding or reducing dimensions. Painting, sanding, smoothing or coatings will make slight adjustments to part dimensions.

Threads:
Threads M8 and above can usually be printed. Below M8 we suggest either a cut thread post-print or a threaded brass insert. Inserts must have sufficient space to be accommodated. Please request our Threaded Inserts guidance document. Micro 3D printing threads can be much smaller. Please request discussion.
For threaded inserts please see hole guidelines: Please request to see our Tappex insert guidelines or see: https://www.tappex.co.uk/products/brass-threaded-inserts/multisert

Small, intricate features:
Features which do not meet minimum wall thickness guidelines and engraving/embossing guidelines will potentially lack clarity or fail to form. Please refer to guidelines above, consider your technology/material options or get in touch with the team.

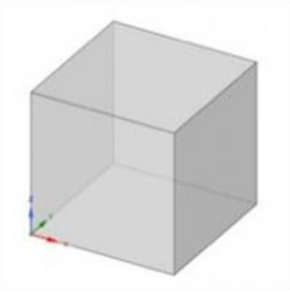
Hollow parts, bowls and cavitys:
Both closed and open volumes have the potential to encase support material, trap resin, cause warpage or weakness or even cause parts to fail. This is also to be considered for small holes and channels. Please allow access/escape holes for resin and support material.

Clear clarity:
Resin based materials which are branded 'clear' tend to be more translucent or frosted. For optical results or optimal clarity please discuss glossy tops, polishing and lacquering options with the IPFL team.



Assembly/ multi-material parts:
Supplying multi-component STEP files along with a detail drawing is best practive for assemblies. Naming assembly components is also very helpful for our team to identify your material allocations.

Key features:
Please make the IPFL team aware of key features or surfaces on your parts. We can accommodate special treatment and orientations for best results on accuracy and surface finishes



Polyjet build size:
495x395x195mm

HP MJF build size:
377x282x377mm

SLA build size:
450x450x400mm

FDM build size:
406x355x406mm

Micro DLP build size:
100x100x75mm

Special application requirements:
Please inform us if your part has a special requirement for:

- Heat
- Flame retardancy
- Specific material
- Ductility
- Surface finish
- Accuracy
- Strength or performance features

The IPFL team will be able to make recommendations to best accommodate your requirements.