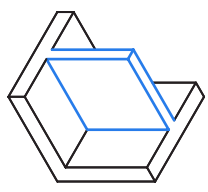
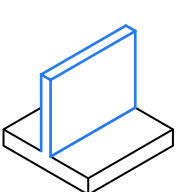
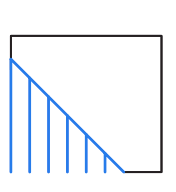
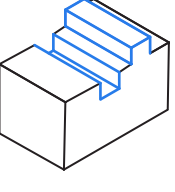
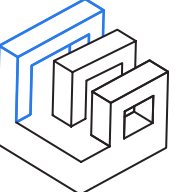
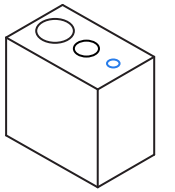
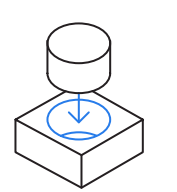
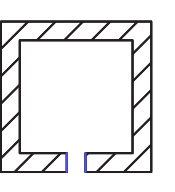
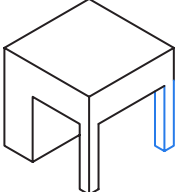
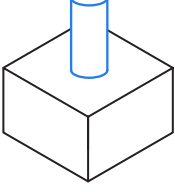
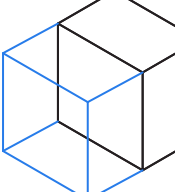


# DESIGN RULES FOR 3D PRINTING

|                                     | Supported walls   | Unsupported walls   | Support & overhangs   | Embossed & engraved details   | Horizontal bridges  | Holes   | Connecting /moving parts  | Escape holes  | Minimum features  | Pin diameter  | Tolerance   |
|-------------------------------------|---|---|---|---|---|---|---|---|---|---|---|
|                                     | Walls that are connected to the rest of the print on at least two sides.          | Unsupported walls are connected to the rest of the print on less than two sides.  | The maximum angle a wall can be printed at without requiring support.             | Features on the model that are raised or recessed below the model surface.          | The span a technology can print without the need for support.                       | The minimum diameter a technology can successfully print a hole.                    | The recommended clearance between two moving or connecting parts.                   | The minimum diameter of escape holes to allow for the removal of build material.    | The recommended minimum size of a feature to ensure it will not fail to print.      | The minimum diameter a pin can be printed at.                                       | The expected tolerance (dimensional accuracy) of a specific technology.             |
|                                     |  |  |  |  |  |  |  |  |  |  |  |
| <b>Fused deposition modeling</b>    | 0.8 mm  | 0.8 mm  | 45°   | 0.6 mm wide & 2 mm high   | 10 mm   | Ø2 mm   | 0.5 mm  |   | 2 mm  | 3 mm  | ±0.5% (lower limit ±0.5 mm)   |
| <b>Stereolithography</b>            | 0.5 mm  | 1 mm  | support always required   | 0.4 mm wide & high  |   | Ø0.5 mm   | 0.5 mm  | 4 mm  | 0.2 mm  | 0.5 mm  | ±0.5% (lower limit ±0.15 mm)  |
| <b>Selective laser sintering</b>    | 0.7 mm  |   |   | 1 mm wide & high  |   | Ø1.5 mm   | 0.3 mm for moving parts & 0.1 mm for connections                                    | 5 mm  | 0.8 mm  | 0.8 mm  | ±0.3% (lower limit ±0.3 mm)   |
| <b>Material jetting</b>             | 1 mm  | 1 mm  | support always required   | 0.5 mm wide & high  |   | Ø0.5 mm   | 0.2 mm  |   | 0.5 mm  | 0.5 mm  | ±0.1 mm   |
| <b>Binder jetting</b>               | 2 mm  | 3 mm  |   | 0.5 mm wide & high  |   | Ø1.5 mm   |   | 5 mm  | 2 mm  | 2 mm  | ±0.2 mm for metal & ±0.3 mm for sand  |
| <b>Direct metal Laser sintering</b> | 0.4 mm  | 0.5 mm  | support always required   | 0.1 mm wide & high  | 2 mm  | Ø1.5 mm   |   | 5 mm  | 0.6 mm  | 1 mm  | ±0.1 mm   |