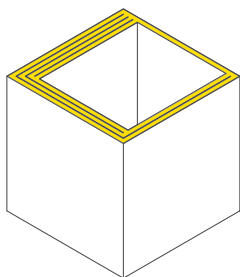
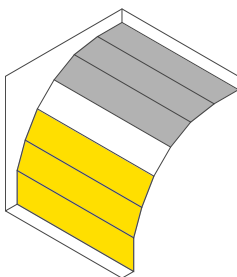


CAD DESIGN TIPS FOR 3D PRINTING

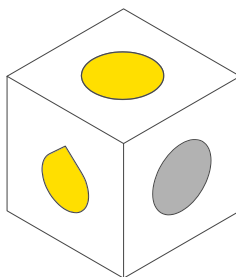
Written and illustrated by Billie Ruben



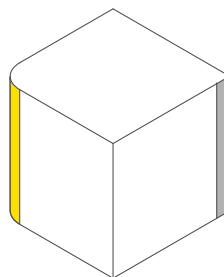
Make walls a multiple of your extrusion line width for a smooth slice. If it was 0.4mm use 0.8, 1.2, 1.6, etc.



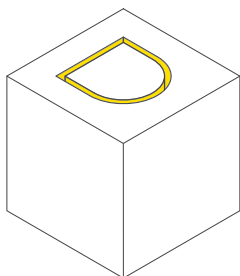
Filament must be laid upon existing material, so avoid steep overhangs to reduce the need for support.



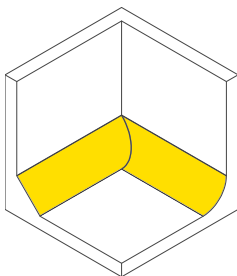
Vertical holes are fine, but horizontal ones should be tear-drop shaped to mitigate steep overhangs.



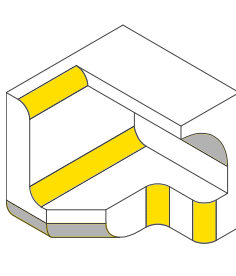
Vertical edge fillets increase quality by reducing inertia during harsh directional changes.



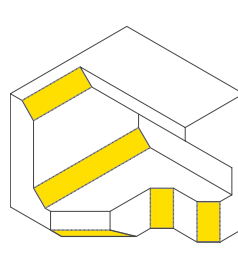
Roughly 0.3mm clearance should be added between fitted parts using offset face at end of modeling process.



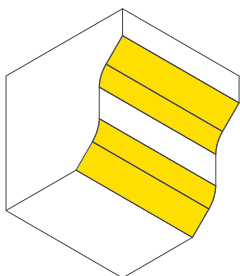
Adding a fillet or chamfer between a wall and base strengthens the join by adding more interface.



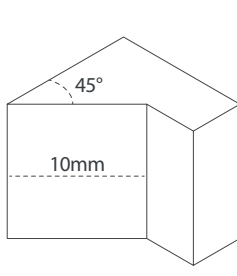
Fillets don't work well from below, due to harsh overhangs. But they can look great in other areas.



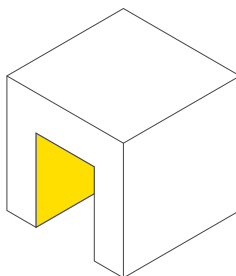
Equal chamfers always work (even from below) as their overhang remains at a printable 45°.



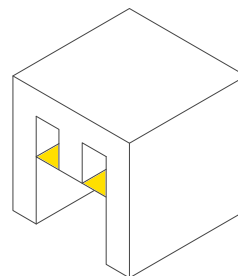
Combining fillets and chamfers mitigates the issues of fillets alone and smooths the chamfer.



Using parameters and constraints allows you to easily edit and iterate upon your designs.



Printers can bridge gaps between bodies quite easily. Distance varies, but most can easily handle 2cm+.

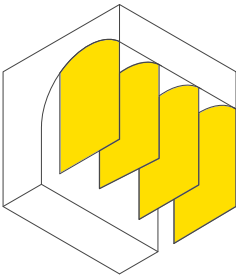


A thin, sacrificial bridging layer can reduce the need for support material. It is cut away after printing.

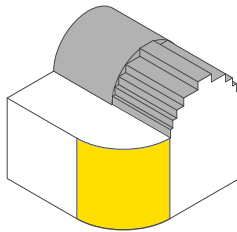
Like all production processes, 3D printing has constraints which are to be considered during the design phase in order to make high-quality, functional, and beautiful objects. I love seeing people make their own designs to fulfill their specific needs and desires, so I've collected many of these considerations to help you hit the ground running!



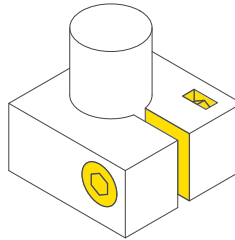
BILLIE RUBEN is a life-long maker, ex-moderator of r/3Dprinting and current admin of the largest 3D printing Discord. Billie enjoys collecting skills and sharing them with others, particularly with 3D printing. You can support her at patreon.com/BillieRuben, or follow her on Twitter: @BillieRubenMake.



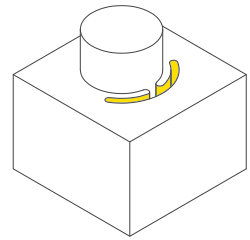
Sacrificial, perpendicular ribs can be added to support overhangs during printing.



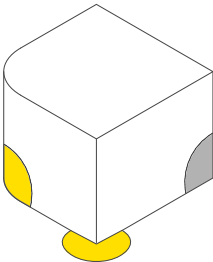
Curves look good with an axis in the Z direction, but due to the layering process can look very poor in the X/Y.



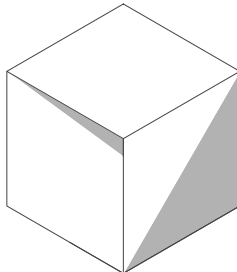
A slit, bolt, and trapped nut can be added to allow them to be tightened around another part.



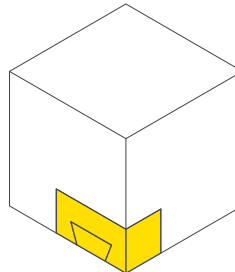
Compliance can be added to parts to enable flex, which enables push-fitting parts.



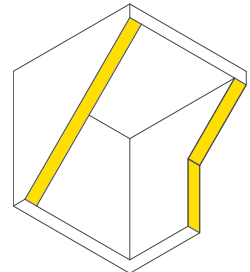
Reduce the risk of a print warping up from the bed by rounding out or adding mouse ears to corners.



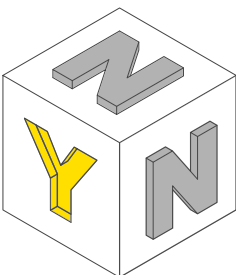
Use software that makes manifold objects (without tiny gaps or reversed faces), to avoid slicing errors.



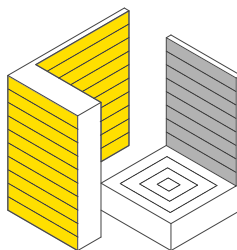
Complicated or fitted parts of an overall print can be isolated and printed to test for fit.



Diagonal ribs can be added to support/enable a roof to bridge between them. Can be beneficial inside a model.



Text looks best when indented into a vertical surface. It reduces overhangs and has better resolution.



Due to the planar layering of most 3D printers, print orientation has a significant impact on strength.

This infographic is part of a series of 3D printing poster guides that I have produced. You can access full-resolution copies of these guides for free so you can print your own; I also sell prints through RedBubble if you'd like to support me making more. Links for both can be found here: billieruben.info/shop

If you get stuck with a design, the 3DPrinters community on Discord (discord.gg/B4tp8MH), which I help run, is happy to help you out.

Happy Printing! 🍷